HOW DOES INFORMATION SHARING INFLUENCE PERFORMANCE OF SUGARCANE ENTERPRISES IN KENYA

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Abstract

*The Kenya sugar industry is not producing enough sugar to meet local demand due to a
shortage of sugarcane. Supplier development has often been used as a sourcing strategy by
manufacturing firms to improve the performance of vendors in respect of material availability.
Information sharing is a direct supplier development initiative that has been found to improve the
performance of suppliers and buyers. The objective of the study was to access the effects of
Information sharing on the performance of sugarcane enterprises in Kenya. The hypothesis was*

that there is a significant positive relationship between Information sharing and the performance of sugarcane enterprises in Kenya. A descriptive research design was adopted for this study. A sample size of 400 was drawn from a population of 250,000 farmers. A pilot test was done using 10% of the respondents to check on the validity and reliability of the questionnaire. 293 questionnaires were returned against the 400 issued, thus attaining a 73.25 % response rate. Simple linear regression results were (r=.378, p=0.000) implying that there was a significant and positive correlation between information sharing and performance of sugarcane enterprises in Kenya. The results also show an R2 value of 0.143. Regression coefficient test results indicated that information sharing β= 0.213 was significant (p<0.05) and t-values were found to be positive and higher than the stated 1.96. Similarly, the constant was significant (p<0.05), consequently, if the rest of the variables were controlled in the model, the level of sugarcane yield would be 2.358 units. The results confirmed support for the research hypothesis that there is a significant positive relationship between Information sharing and the performance of sugarcane enterprises in Kenya. Based on the results the study concluded that information sharing as a direct supplier development activity had a positive influence on the performance of sugarcane enterprises. The study recommends that Sugar millers in Kenya should adopt supplier development to improve the capability of farmers to improve sugarcane yield.

Keywords: supplier development, information sharing, sugarcane farmers, sugar millers and sugarcane enterprises

INTRODUCTION

Inter-firm competition using supply chains has increased the outsourcing of raw material from suppliers which in turn has put pressure on manufacturers to proactively manage their supply base to maintain competitive advantage (Glock *et al.*, 2017). The supply chain paradigm is about the establishment of relationships between buyers and suppliers with the focus being customer satisfaction. Consequently, the raw material shortage is a risk that requires manufacturers to proactively seek out reliable and capable suppliers to respond to the dynamism and uncertainties in the market, and therefore these episodes support information sharing in supply chains (Scur & Kolososki, 2019). The mainstream view holds that buyers manage their supply base by adopting supplier development to improve supplier ability and overall supply chain performance (Routroy& Pradhan, 2014). Extant literature shows that it is almost impossible for a buying firm to find a capable and reliable supplier that is responsive enough to meet their operational needs. Consequently, buyers use supplier development sourcing strategies to build and support their suppliers to improve their capabilities (Holmen *et*

al., 2013; Wang & Gunasekaran, 2017). Supplier development is defined as "a long term cooperative effort between a buying firm and its suppliers to upgrade the suppliers' technical, quality, delivery, and cost capabilities and to foster ongoing improvements (Routroy& Pradhan, 2014). Accordingly, the strategy is viewed as a resource mobilization effort that enables the buyer to influence and leverage the resources of the supplier in pursuit of business success (Glavee-Geo. 2019).

Supplier development programs are usually undertaken to upgrade the capacity and abilities of the vendor in an effort towards meeting the operational needs of the buyer in terms of quality, quantity, cost, and delivery. Supplier development activities are grouped into indirect and direct activities. The indirect activities do not require a lot of capital commitment while the direct approach requires significant human, financial, and material resources investment by the buyer (Proch *et al*., 2017). The approach emphasizes initiatives such as technical support, financial support, supplier training, and knowledge exchange, strategic partnership and collaboration, and information sharing among other activities (Mohanty *et al*., 2014; Lawson *et al*., 2015).In direct supplier development architecture Routroy and Pradhan (2014) identified information sharing as one of the important success factors in supplier development. Similarly, Kembro and Selviaridis (2015) opined that inter-firm information sharing has been on the agenda of supply chain practitioners spanning a period of over a decade. In business transactions, manufacturers align their supply chain (SC) strategy with their long term strategic intent to gain competitive advantage and; benefit all the parties in the exchange process (Skarmeas *et al*., 2016). Information sharing is seen as a facilitator and enabler in the resource transaction routines as it minimizes the bullwhip effect; reflecting the value it creates across the chain. This is amplified by the increasing number of scholars who have given attention to the influence of information sharing in supplier development (Kembro & Naslund 2014).

It has been argued that the competitiveness of a manufacturing firm reflects the competitiveness of its supply base and how well it is managed (Wang & Gunasekaran, 2017). This is based on the understanding that information sharing facilitates the proper effective functioning of supply chains by offering a platform for networking and resource acquisition. The duality environment of the supply chain creates customer dependency on vendors as a source of critical resources, capabilities, and competencies of their suppliers to compete (Tanskanen, 2015). The buyer dependency on the supplier is informed by the realization that critical resources lie outside their boundaries and therefore they have to perform many activities beyond their boundaries to invest, manage and align the supply base with their strategic fit by developing long term interactions with suppliers (Proch *et al*., 2017). The dependence aspect in the supply chain was emphasized by Khan *et al*., (2016) who asserted that access to

information by chain participants leads to improved partnerships by promoting collaboration between buyers and suppliers, leading to better performance in the chain. In this regard, Zhang and Chen (2013) believed that information sharing was a predictor of supply chain responsiveness and contributes improved coordinative abilities by facilitating access to vital information to all chain members.

Direct supplier development involves substantial investment by the buyer. The process of identifying and selecting the supplier to develop requires a lot of information spanning different attributes of the supplier. The risk of losing substantial investment of money, human and equipment informs the decision by buyers to get it right during the selection phase of the supplier(s) to be developed (Worthmann *et al.*, 2016). For instance, Chen *et al.*, (2015) developed a mathematical model that helps to evaluate supplier improvement and possible cost implication of supplier development initiatives. Further, Rezaei *et al.*, (2015) formulated a multi-criteria selection approach that segments and identifies suppliers based on attributes of technical, collaboration, and ability to improve. Review of literature pertinent to supplier development demonstrates that information sharing is deemed essential for any success of supplier development initiatives. Achievement of cooperative behavior is an important attribute in supply that culminates in joint actions as a result of voluntary access to information (Ding *et al.*, 2014). Therefore it is anticipated that information sharing as a supplier development activity has a major impact on the performance of sugarcane enterprises in Kenya. Accordingly and given that information sharing is considered so vital for efficient functioning supply chain particularly in supplier development; it is a feature worthy of examination concerning the performance of sugarcane enterprises in Kenya, especially from the perspective of sugarcane farmers.

The sugar industry in Kenya is a significant employer and contributor to the national economy. According to Mwanga *et al.*, (2017) sugarcane is amongst the most important viable crops in the economy of Kenya. The crop supports about six million Kenyans directly or indirectly contributing significantly to improved income and job creation to the farmers and rural communities thereby impacting positively to rural economies in the sugar belts (Kigen *et al.*, 2015). The sugar millers are entirely dependent on smallholder growers who supply 93% of cane milled in Kenya (Mati & Thomas, 2019). Currently, the industry continues to experience an acute shortage of sugarcane resulting in under capacity utilization and importing sugar to bridge the gap (AFA, 2015; USDA, 2016). On-time responsiveness to market requirements is critical to the successful firm performance in the market place and is the reason why milling firms are justified in supporting the farmers to improve their capacity and capability through the

implementation of direct supplier development aspects of information sharing to enhance sugarcane yield.

Performance in business is generally spoken of in terms of the ability to accomplish a specific task, goals, or outcomes measured against a variety of measurement metrics or indicators. The accomplished outcomes may economic or noneconomic or both. These measurement metrics including but not limited to the speed of response, flexibility, dependability, customer satisfaction, financial performance, lead time decrease, quality enhancement, and prompt delivery ((Kaplan, 2010; Dora *et al.*, 2013; Bennett *et al.*, 2014). In the supply chain, performance is considered from an entire business supply chain activities that include both tangible and intangible outcomes like relationships, integration, cooperation among partners, and seamless information sharing ((Akyuz & Erkan, 2010; Banomyong & Supant, 2011). An integrated supply chain leads to enhanced information flow which consequently contributes to improved business performance (Qrunfleh & Tarafdar 2014). Information sharing is essential in determining supply chain performance and as such this accords the importance to the need for information to be shared and its contribution to success in business undertakings.

Statement of the Problem

Sugarcane is an important commercial crop in Kenya and remains a contributor to economic activity since more than 93% of cane milled in the country is supplied by farmers (Mati &Thomas, 2019). However, currently, the Kenya sugar industry has experienced an acute shortage of sugarcane. This is supported by the sugarcane census report which shows that between the years 2015 to 2018, the average cane yield declined form 66.4t/ha to 55.1t/ha (AFA, 2015). Sugar consumption has been on a steady rise but the increased consumption is not matched with a similar increase in production to make the country self-sufficient mainly due to under capacity utilization arising from an inadequate supply of sugarcane (Mati & Thomas, 2019; USDA 2017). The shortfall in sugar supply is met through imports from the Common Market of Eastern and Southern Africa (USAD 2015, AFA, 2015). The millers cannot meet their requirements internally from their Nucleus Estate, hence the overdependence on external suppliers for the raw materials (Mati & Thomas2019). It is therefore important for millers to improve farmers' capabilities by adopting and pursuing collaborative sustainable cane development strategies like supplier development.

The buying firms often engage in proactive practices such as supplier development initiatives to manage their supply base to minimize material supply disruptions thereby minimizing unscheduled stoppages and under capacity utilization (Chisanga *et al.*, (2014).The sugarcane supply chain is made up of multi-stakeholder/multi ownership components that must

be aligned to the strategic objectives of all the players to ensure a steady supply of the raw material (AFA, 2015). The failure by sugar millers to adopt proven innovative sourcing strategies such as supplier development to influence their sugarcane supply base is responsible for an acute shortage that has been experienced over the years (AFA, 2015). Adoption of direct supplier development strategy of information sharing with farmers could help to minimize sugarcane supply disruptions occasioned by the non-availability of the raw material and enhance their competitiveness in the future (Mwanga *et al.*, 2017).

The objective of the study

The objective of the study was to find out how information sharing affects the performance of sugarcane enterprises in Kenya. Specifically, the study sought to access the effects of Information sharing on the performance of sugarcane enterprises in Kenya.

LITERATURE REVIEW

Conceptual Framework

The association between the independent variable-information sharing and the dependent variable-performance of sugarcane enterprises in Kenya was hypothesized as operationalized in figure 1. The study sought to test the research hypothesis stated in the alternative as-Ha1: There is a significant positive relationship between Information sharing and the performance of sugarcane enterprises in Kenya. The construct information-sharing was measured by price, Variety, and planning. Sharing of information on changes in farm gate prices of sugarcane creates the knowhow on the prevailing market prices and acts as a motivation to farmers especially if the price is on an upward trend. Similarly, information on changes in input prices helps farmers plan on overhead costs related to sugarcane farming. New sugarcane varieties have superior attributes compared to the traditional varieties. Creating awareness among the farmers through information sharing would lead to the adoption of the new varieties by the majority of the farmers that result in improved cane yield thereby minimizing sugarcane shortage.

Information sharing on scheduled production, factory maintenance, sugarcane development programs, harvesting, and transportation helps in the coordination and synchronization of the millers' operations and farmers. It eliminates the possibility of harvesting immature cane, hitches in transportation resulting in the rotting of cane in the field, yet the cost is borne by the farmer. Scheduled factory maintenance enables farmers to scale down of sourcing of labour for harvesting and loading. Scheduled sugarcane development programs enable farmers to set aside suitable acreage of land for cane growing. Further, it also enables

millers to proactively engage with farmers and develop their sugarcane fields, thereby eliminating the prevalent chaos associated with sugarcane poaching by millers who never developed their fields.
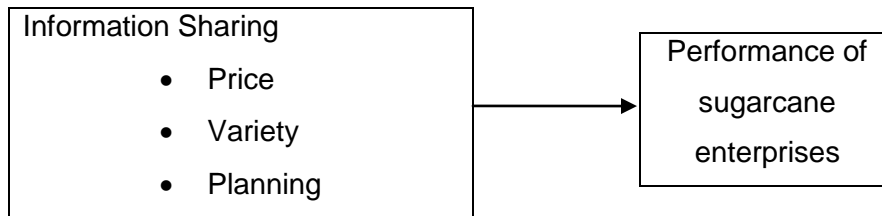
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┌─────────────────────────────┐              ┌─────────────────────┐
│ Information Sharing          │              │  Performance of     │
│        • Price               │─────────────▶│    sugarcane        │
│        • Variety             │              │    enterprises      │
│        • Planning            │              │                     │
└─────────────────────────────┘              └─────────────────────┘
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Figure 1 Conceptual Framework

Theoretical review

Resource-Based View

Resource-based view (RBV) is an interdisciplinary theory that the supply chain research community has used to study spanning areas like purchasing procurement, materials management, and logistics (Gligor & Holcomb, 2014).

The theory postulates that competitive advantage can be achieved if firms possess and harness their assets that are valuable, rare, imperfectly imitable, and non-substitutable (Barney, 1991). The underlying principle is that firms should create and harness tangible and intangible assets that provide a platform of long-term competitive advantage. The tangible and intangible assets are money, people, capabilities, competencies, processes, methods, information, and knowledge; some of which are difficult to imitate and substitute (Barney, 1991). Thus making the resource superior and distinct compared to a rival could be a basis of competitive advantage to the firm so long as it matches and is aligned with the strategic fit of the firm (Shibin *et al.*, 2017).

Resource-based view is complemented and supported by Knowledge-based view theory which helps explain why knowledge flows across firms create value. Knowledge in the supply chain is enabled through information flow that consists of customer, technical, and organizational (Liu *et al.*, 2014). The dual aspect of the supply chain amplifies the interdependence that exists among the chain actors. Complexity theory helps to explain the interdependence nature of supply chain arising from plurality, dynamism, and diversity in the number of actors and environmental factors such as customers, manufacturers, regulations, technology, and shorter product life cycle (Busse *et al.*, 2016). The intangible resources such as information and knowledge sharing if leveraged creates value in the chain since insufficient information is a barrier to the attainment of a responsive supply chain. Accurate and timely

information flow minimize uncertainties and disruptions by eliminating bullwhip effects in the supply chain arising from the complex nature of interdependence (Busse *et al.*, 2016).

The success of the supply chain is conditional on internal and external conditions, which must be aligned with the deliberate objectives of the chain players, hence information sharing across the chain members becomes paramount (Gr€otsch *et al.*, 2013). Following the resource-based view theory, effective sharing of information resources creates connectivity and integration along the chain resulting in visibility which in turn improves performance across the supply chain (Brandon-Jones *et al.*, 2014). According to Pooe *et al.*, (2015) effective and efficient collaboration through information sharing contributes to better performance of the vendors by facilitating well-organized coordination and responsiveness (Pooe *et al.*, 2015). Effective communication in price changes, adoption of new varieties, sugarcane development planning, harvesting, and transportation can be enhanced resulting in synergy across the farming community and millers. Sugarcane farmers are critical in the sugarcane supply, and the resource-based view theory was deemed appropriate as it provides a valid theoretical lens in understanding the need for information sharing resource between millers and farmers.

Information Sharing

Information is an important intangible asset that could be leveraged to create value in the supply chain, consequently is the basis of competitive advantage in the market. Knowledge generated as a result of learning and sharing within the chain enhances visibility in the chain; resulting in competitive advantage through collaborative relationships. Sharing of information plays a crucial role in knowledge transfer, and has a considerable influence between partners, making them better to appreciate each other's goals in the relationship with a view of appropriating value accruing thereof by eliminating the possibilities of bullwhip effect along the supply chain. Information sharing at the inter-organizational level has attracted much research since it is a critical factor in supply chain improvement (Kembro *et al.*, 2014). Supplier development strategy can evolve in close collaboration and partnership relationship that relies on the interdependence of the supply chain partners to access resources lacking among other partners but essential for their undertakings. Voluntary information sharing among the supply chain participants can shape their behavior positively due to the value created through their interactions. Information sharing enables resource flows among the partners and collectively brings about integration and improved efficiency of the supply chain progression by enabling the partners to work as a single unit (Ding *et al.*, 2014; Khan, Hussain & Saber, 2016).

For example actors of the chain exchange information on demand and sales forecast, thereby reducing the amplification of demand variability, which reduces information distortion,

demand variability, and stock levels along the chain, which ultimately eliminates the bullwhip effect along with the upstream and downstream of the chain. Tsanos, Zografos, and Harrison (2014) argue that information exchange allows for a seamless flow of suitable and correct information across the chain which aids coordination and timely decision making; bringing about visibility and competitive advantage. Kim and Chai (2017) explained that supplier innovation has a positive effect on information sharing and supply chain agility, confirming the necessity of information in bringing about the stability of processes in the chain. Information sharing leads to a high measure of collaborative behavior among the chain actors. Information sharing enhances knowledge interaction and exchange resulting in transactional collaboration in the supply chain. It is considered an important factor in supply chain efficiency and effectiveness; however, the value can only be realized in the supply chain if there is congruent of objectives among the parties that are sharing information (Ding *et al.*, 2014). Information sharing consists of both inflows and outflows, consistent with an exchange between external and internal sources, create relational capital that provides for balanced information between buyers and suppliers (Lee & Ha, 2018).

Empirical Review

Information flows in supply chains have been found to play key roles in improving both buyer and supplier performance. Gunasekaran *et al.*, (2016) examined information sharing in the context of big data under the moderating influence of financial support and predictive analytic in India. The study found that connectivity and information sharing under the moderation effect of financial support commitment are positively correlated to big data predictive analytics acceptance, assimilation under the moderation effect of big data predictive analytics routinization, and positively associated to supply chain performance and business performance. Organizations requiring leveraging on big data should invest in connectivity and information sharing in the supply chain to realize improved performance. Information flows in supply can bring about supply chain integration which can improve coordination across the chain. *Gichuru et al.*, (2015) in the study on collaborative supply chain practices found that information sharing and resource sharing had a positive influence on performance at the company. It can, therefore, be inferred that companies should share information with their vendors which can translate to improved performance. The study carried out by Liu et al., (2015) on the impact of information sharing and procedure coordination on logistics outsourcing, it was found that interactive mechanism was helpful in logistics outsourcing and Information sharing was found to contribute to customized and advanced outsourcing which translates to operational and financial performance.

Ding *et al.*, (2014) evaluated the quality of information sharing in the Australian meat industry. The findings showed that strategic alliance, information quality, trust, and commitment are considerably connected to food quality. Specifically, information quality had a significant positive association with food quality. This shows that the quality of information shared among the supply chain partners reduces the effects of a bullwhip in the chain. The aspect of information sharing creates interdependence among supply chain participants beyond the dyad relationships. This aspect was explored by Kembro *et al.*, (2015). The findings indicate that participants resort to pooled or reciprocal interdependence of information sharing. This relies on the unique offerings of the participants in the supply chain. Quality of information shared that is accurate, timely, adequate, and credible improves cooperative behavior among supply chain members, which in turn improves performance. There is no doubt from the empirical review that information sharing across the supply chain can bring about a positive impact on suppliers' development, resulting in improved performance of sugarcane yield. This study set out to ascertain the association between information sharing and the performance of sugarcane enterprises.

RESEARCH METHODOLOGY

The study was set on a descriptive research design guided by the cross-sectional survey. According to Cooper & Schindler, (2012) this design was also viewed as the most appropriate given the scope of the study, the nature, source and type of data to be collected, and the method of analysis to be performed. The design was envisaged to offer the study an opportunity to collect data across many farmers supplying different millers and to empirically test the association of the constructs along with its conceptualization of supplier development aspect of information sharing and performance sugarcane enterprises. This design was also used by among others Lusuli *et al.*, (2017); Aduda and Musyoka (2011).

The population of interest for this study comprised of 250,000 contracted sugarcane farmers spread across the ten sugar millers in Kenya. The selection of the population was informed by the understating that 93% of sugarcane milled in Kenya is supplied by private farmers. Due to a large number of the population of interest a representative sample size was selected with due regard to the cost of data collection, sufficient statistical power, effective size, estimated measurement variability, significance criterion, and the level of precision (Singh &Masuku, 2014). Stratified sampling and simple random sampling techniques were used in the selection of informants because the population did not constitute an identical group and hence required comparisons between various sub-groups under different sugar millers and the unit sample had an equal probability of inclusion in the sample(Cooper & Schendiler,2012;Singh &

Masuku, 2013). The informants were stratified and distributed to each miller in proportion to acreage under sugarcane cultivation by the miller. The sample size was calculated using the Yamane (1967) formula, 95% confidence level, and P-values 0.05 were assumed. This method was also used to calculate a sample size from a large population by Imbambi *et al*., (2017)

$$n = \frac{N}{1 + N (e)^2} \ldots\ldots\ldots \text{(Yamane, 1967)}$$

$$n = \frac{250,000}{1 + 250,000(0.05)^2}$$

n = 400

Where: n = sample size

N = population size

e = level of precision (0.05)

The study had a representative sample size of 400 informants and distributed proportionally to each millers as indicated in the table 1.

Table 1 The Sample Design

Company	Acreage	Population	Proportion	Sample size
Chemelil	14730	2008	8.0 %	32
Muhoroni	16538	22464	9.0%	36
Kibos	4394	5968	2.4%	10
Butali	18538	25180	10.1%	40
West Kenya	24871	33783	13.5%	54
Nzoia	25124	34127	13.7%	55
Mumias	40608	57336	23.0%	92
Sony	16123	21901	8.8%	35
Transmara	12012	16314	6.5%	26
Sukari	9511	12919	5.2%	21
Total	**184052**	**250,000**	**100%**	**400**

Source: Kenya Sugar Board (2015)

A questionnaire was used to collect primary data in this study because they are cost-effective, easy to administer to a large sample size, and offers an opportunity to capture in-depth information from the informants (Neuman, 2013). The self developed questionnaire was structured in closed and open-ended questions to cater varied perceptions of respondents, thus

enabling the informant to rate different attributes of the study. The closed questions helped in reducing varied responses on the same attribute. The open-ended questions offered the opportunity to the informants to give additional information that may have not been included in the close-ended questions. The questionnaires were randomly pre-tested on 10% of the sample size who were not informants in the main study. This was done to enhance its validity and reliability. The study distributed and picked questionnaires later to improve the response rate. Secondary data was extracted from a five year published company's records of farmers' payment statements. Data was cleaned, coded, processed, and analyzed using Statistical Package for Social Science (SPSS version 23). Inferential statistics viz. correlation, and regression analysis were applied to determine how information sharing impacted on the performance of sugarcane enterprises in Kenya.

RESULTS

Demographic Information

The respondents in the study were male and female farmers who supplied sugarcane to different sugarcane millers. The study result in Table 2 indicates that the most of the farmers are male (63.5%) while women constituted (36.5%). The findings are in line with that of (Madzokere *et al.*, 2018; Thuo *et al.*, 2019) who found that sugarcane farming was male-dominated in Zimbabwe and Kenya. This finding was however contrasted with that of (Owino *et al.*, 2018) who established that gender did not affect sugarcane farming in the Nyando sugar belt.

Table 2 Compositions of the Respondents

	Frequency	Percent	Cumulative Percent
Male	186	63.5	63.5
Female	107	36.5	100.0
Total	293	100.0	

Test of Normality

Normality is a significant attribute in parametric tests. The study conducted a Normality test using the Shapiro –Wilk test. Tables 3 shows that variable had p values of more than 0.05 (p>0.05) indicating that it was not significantly different from normal distributions therefore, it was assumed to be normally distributed. Thus the variable could be used in various parametric tests such as regression analysis.

Table 3 Skewness/Kurtosis tests for Normality

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
Information Sharing	291	0.9105	0.0707	3.30	0.1921

Descriptive Statistics

Table 4 presents the results of the analysis of the information sharing variable. The raw data was collected based on a five-point Likert scale. According to the results, most respondents (38.7%) indicated that the rate at which millers shared information on the change in the market price of sugarcane with farmers was to less extent implying that in most cases information on the change in gate price of sugarcane was not communicated effectively to farmers. The findings are agreement with the previous work of (Nazir *et al.*, 2013) who asserted that output price was one of the factors that hindered sugarcane production. The information sharing between millers and farmers on improved sugarcane varieties was rated as to a moderate extent by (36.7%) of the respondents. This demonstrates that improved sugarcane varieties had not been fully taken up by farmers due to a lack of information about their superior properties. Growing of new improved sugarcane varieties can increase yield per acre translating to improved profitability of the farmer. The findings are consistent with those of Thuo *et al.*,(2019) who established that majority of the cane growers in Kakamega County planted old varieties of sugarcane as opposed to new varieties that had superior attributes like high tonnage and early maturity.

A proportion of 30.6% of the respondents stated that the rate at which millers and farmers exchanged planning information on sugarcane development was to no extent at all while, 27.1% indicated that it was to less extent an indication that there were no coordinated sugarcane development programs. The finding was in agreement with the sugarcane availability projections which established that majority of sugarcane available in the field were composed of Raton crops 2 and 3 and less of plant crops (AFA, 2015). Information sharing between millers and farmers on production schedules was rated by 38.9% of the respondents as to the moderate extent, (41.4%) rated information sharing between millers and farmers on harvesting and transport programs as to less extent.

Information sharing between the millers and farmers about factory maintenance was rated as to a moderate extent by 35.8% of the respondents while 33.9% indicated that it was to less extent. Production schedule, harvesting, transport, and factory maintenance are usually synchronized to ensure smooth coordination and synergy. Poor factory maintenance and harvesting of immature cane were cited as some of the challenges faced by sugar factories in Kenya (AFA, 2014; Mati & Thomas, 2019; Owiye *et al.*, 2016). The results of information sharing

between milers and farmers on agronomy and extension advisory services, 42.2% of the respondents indicated that it was to no extent at all. Extension services are a key link between the miller and the farmer as the officers provide the provision of important agronomy information to the farmer. Mati and Thomas (2019) opined that revamped extension services were a factor in the motivation of smallholder farmers to improve productivity. The results demonstrate that the sharing of information between the millers and farmers was not adequate implying that it was not done to the expectations of the farmer.

Table 4 Descriptive Results on Information Sharing

	Not at all	Less extent	Moderate extent	Large extent	Very large extent	Mean	Median	Skewness
The extent to which the miller share information about change in market price of sugarcane with the farmer	14.1%	38.7%	31.7%	13.7%	1.8%	2.5	2	0.3
The extent to which the miller share information on new improved sugarcane varieties with the farmer	15.2%	30.0%	36.7%	14.5%	3.5%	2.6	3	0.2
The extent to which the miller and farmer exchange planning information on sugarcane development programs	30.6%	27.1%	25.7%	13.7%	2.8%	2.3	2	0.4
The extent to which the miller and the farmer exchange planning information on production schedule	19.3%	28.4%	38.9%	11.9%	1.4%	2.5	3	0.1
The extent to which the miller and the farmer share planning information on harvesting and transport programs	18.2%	30.5%	29.1%	21.1%	1.1%	2.6	3	0.0
The extent to which the miller and the farmer share information on scheduled maintenance program	19.4%	41.4%	23.1%	13.2%	2.9%	2.4	2	0.5
The extent to which the miller and the farmer share information on agronomy and extension advisory services.	17.2%	33.9%	35.8%	11.7%	1.5%	2.5	2	0.2

Inferential Statistics

Hypothesis Testing using Correlation

The objective of the study was to access the effects of Information sharing on the performance of sugarcane enterprises in Kenya. The hypothesis to test this specific objective was stated in the alternative as: Ha1: There is a significant positive relationship between Information sharing and the performance of sugarcane enterprises in Kenya. Table 5 shows the Pearson correlation test results between information sharing and the performance of sugarcane enterprises. The result was significant and positive (r=.378, p=0.000) implying that an increase in information sharing was simultaneous to the increase in performance and vice versa. Thus the study found support for the alternative hypothesis that there is a significant positive association between information sharing and the performance of sugarcane enterprises in Kenya.

Table 5 Correlation Test between Information sharing and performance of sugarcane enterprises

Variables	Information Sharing	Performance
Information Sharing	1.00	
Performance	0.378[**]	1.00

** p<0.01, * p<0.05

Simple Linear regression Tests

The objective of the study was to access the effects of Information sharing on the performance of sugarcane enterprises in Kenya. Simple linear regression test was run to confirm whether the independent variable in the model was a good predictor of the dependent variable. The model summary table 6 shows an R-value of 0.378 implying that information sharing and performance of sugarcane enterprise were positively correlated. The R^2 value was 0.143, which implied that information sharing accounted for 14.3% variation in the performance of sugarcane enterprises. This demonstrates that information sharing is not the only predictor of performance of sugarcane enterprises, thus other variables could be added to the model to account for the balance of 85.7%. Therefore it can be inferred that the model was adequate in explaining the relationship.

Table 6 Model Fitness Summary-Information sharing

Indicator	Coefficient
R	.378
R Square	.143
Adjusted Square	.140
Std. Error of estimate	.45967

ANOVA table 7 shows the goodness fit of the model. The result shows an F statistic of (1283) = 47.285, p=0.000 indicating that information sharing had a significant effect on the performance of sugarcane enterprises. The result demonstrates that the predictor variable in the model had a significant effect on the dependent variable and therefore statistically the results imply that the independent variable was a good predictor of performance of sugarcane enterprises, therefore, the model fitted the data well. This means that information sharing between millers and farmers was statistically significant in the improvement of sugarcane production. The more the millers shared important information with farmers, the more the increase sugarcane yields and vice versa.

Table 7 Analysis of Variance -Information Sharing

	Sum of Square	df	Mean square	F	Sig.
Regression	9.991	1	9.991	47.285	.000
Residual	59.798	283	.211		
Total	69.789	284			

Table 8 shows the actual effect of the predictor variable on the dependent variable. The regression test showed that the information sharing β= 0.213 was significant (p<0.05) and t-values were found to be positive and higher than the stated 1.96, and calculated as 26.903 and 6.876 respectively. It was inferred that a unit increase in the information sharing between millers and farmers while holding other factors constant would result to an increase in the performance of sugarcane enterprises by 0.213 units. Thus, information sharing has a linear influence on the performance of sugarcane enterprises. The constant was significant (p<0.05) implying that when the rest of the variables were controlled in the model, the level of sugarcane yield would be 2.358 units, which is considered an improvement. The findings are supported by that of Gichuru *et al.*, (2015) who concluded that information sharing with suppliers improved organization performance.

Table 8 Regression of Coefficients-Information Sharing

Variable	Un-standardized Coefficients		Standardized coefficients	t	Sig
	B	Std. Error	Beta		
(Constant)	2.358	.088		26.903	.000
Information sharing	.231	.034	.378	6.876	.000

DISCUSSION OF THE FINDINGS

The objective of the study was to access the effects of Information sharing on the performance of sugarcane enterprises in Kenya. The study found that information sharing had a significant and positive correlation with the performance of sugarcane enterprises; therefore the first hypothesis was supported. The findings agree with those of Kembro *et al.*, (2014) who opined that information sharing among the supply chain members was a critical factor in improving the overall supply performance which translates to firm performance. The analysis of results shows that the extent to which farmers and milers shared information was moderate and relevant information was not received effectively. Poor information sharing can lead to supply chain disruptions. Supply chain disruptions are catastrophic especially if the material affected is critical to the firm operations such that if it is not available, it leads to the stoppage of operations. Liu *et al.,* (2015) asserted that information sharing enhances partner interaction, coordination, and customization in logistics.

According to the results, information on new cane varieties, changes in the farm gate price of cane produce, sugarcane development plans, harvesting, and transport plans, and extension services were shared to a less extent between the millers and farmers. This was an indication that the process of sharing relevant and up-to-date information with farmers was not as effective as it ought to be. Further results showed that the exchange of other pieces of information such as on production planning and even in the provision of advisory services to farmers was done inadequately. Generally, the extent of information sharing between the millers and farmers was to no extent at all. The findings are consistent with those of (Thuo *et al.*, 2019) who found that the process of adoption of new cane varieties by farmers in Kakamega was low. Sharing of relevant information with farmers concerning new cane varieties enhances the adoption process of the new varieties resulting in improved cane yield.

Sanders *et al.*, (2011) argued that there was a need for information sharing, alliance, and networking among businesses that take part in supply chain management for firms to perform at an optimal level. The no extent at all results on the levels of information exchange between the farmers (vendors) and the buyers (millers) in this study could result in the negative impact on the level of sugarcane yield thus worsening the continued shortages being experienced. The results of information sharing between the farmers and the millers show a significant positive correlation. It was concluded that an improvement in information exchange had a subsequent improvement in the performance of sugarcane enterprises and vice versa. The findings resonate with the views of Gichuru *et al.*, (2015) who indicated that improved information exchange among supply chain participants leads to superior supply chain performance. Thus

information exchange enables the chain actors to access productive resources domiciled among other chain members.

Information exchange among the chain actors creates visibility along the chain. Information sharing allows requites inflow of the necessary resources from the external sources into the firm for the conversion process. The output flows out to the market aided with information flows among participating firms. This view is supported by that of Khan *et al.*, (2016) who established that information sharing was responsible for strong and lasting supply chain relationships anchored on integration between suppliers and manufacturing firms, leading to improved performance. Information sharing, therefore, is a resource that builds strong supply chain partnerships and aids in improving the performance of all the parties involved.

CONCLUSION

The study accessed the effects of Information sharing on the performance of sugarcane enterprises in Kenya. The formulated hypothesis was supported. The study concluded that information sharing correlated positively with the performance of sugarcane enterprises. This was supported by the linear regression results which show that information sharing had a positive influence on the performance of sugarcane enterprises in Kenya. The study confirms the view that information sharing as a supplier development initiative improves both buyer and supplier performance. Therefore based on the results of the study it is concluded that information sharing improves the performance of sugarcane enterprises in Kenya. Consequently, sugarcane millers are encouraged to exchange information with farmers to help in synchronizing and coordination of their activities to ride on the success of synergy that is likely to accrue from such undertakings. The study provides validation for similar study results in other areas of the Kenyan manufacturing sector, especially for agricultural-based raw materials where such study is yet to be conducted. The study also acts as a reference source for future research on agricultural-based raw material operating in a similar setting.

Prior studies have concentrated on the application of supplier development as a sourcing strategy on manufactured raw materials, thus leaving out agricultural raw material that requires a longer time to produce. This study contributes to supply chain management knowledge particularly supplier development aspect of information sharing concept application to agricultural-based raw material. Information sharing is a direct supplier development which is part of the wider asset exchange between sugarcane millers and farmers and is premised resource-based view theory. Information sharing between millers and farmers had a significant and positive correlation with the performance of sugarcane enterprises. This supports Resources based view theory through direct supplier development that information exchange

amongst the chain actors constitutes the sharing of intangible resources. The findings are in line with that of (Shibin *et al.*, 2017) held that information sharing can create value and competitive advantage by improving overall firm performance. Data collected for this study was limited to sugarcane farmers yet sugarcane enterprise is a multi stake holder industry. In order to deepen understating of the entire sugarcane enterprise in Kenya, the study recommends further studies that capture the perspectives of the management of millers, regulatory bodies in Kenya and famers outgrowers' organizations. This is likely to provide results in the broader context and application in the Kenyan sugar industry.

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