

**THE MODERATED MEDIATING EFFECT OF SITUATIONAL  
LEADERSHIP AND FARMER CHARACTERISTICS ON THE  
RELATIONSHIP BETWEEN CHANGE MANAGEMENT AND  
SUGARCANE PRODUCTIVITY IN SUGAR FACTORY CANE  
CATCHMENT AREAS IN KENYA**

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**ABSTRACT**

**Purpose of the Study:** This study sought to determine if the moderating effect of situational leadership on the relationship between change management and sugarcane productivity in Kenya is different from the mediating effect of farmer characteristics.

**Statement of the Problem:** Locally, the Kenyan sugar subsector cannot satisfy the citizenry consumption sugar needs at 1,031,055 metric tonnes per year in the period 2014-2018 (AFA, 2019). In 2020, the subsector was at 58% sugar availability on the 1,038,717 metric tonnes sugar per year.

**Methodology:** This study adopted the positivist philosophy, which is founded on objectivity, precision and scientific rigor to develop knowledge as opposed to the phenomenological approach. The cross-sectional survey design was adopted for this study in order to provide relevant information of the extent to which change management influences sugarcane productivity in sugar factory cane catchment areas.

**Result:** In step one, the regression model of Change Management on Sugarcane Productivity was significant with  $\beta=0.751$ ,  $p=0.001<0.05$ . In step two, the results show that the regression model of Change Management, Situational Leadership, Farmer Characteristics and the interaction term SL\*FC on sugarcane productivity in sugar factory cane areas in Kenya was significant with  $\beta_1=0.279$ ,  $p=0.005<0.05$ :  $\beta_2=0.040$ ,  $p=0.021<0.05$ :  $\beta_3=0.250$ ,  $p=0.025<0.05$ ,  $\beta_4=0.026$ ,  $p=0.025<0.05$

**Conclusion:** The study concluded that the moderated effect of situational leadership on the relationship between change management and sugarcane productivity is significantly different from the mediating effect of farmer characteristics.

**Recommendation:** This study therefore advocates that the managers in the sugar sector critically consider situational leadership style in their companies.

**Keywords:** *Farmer Characteristics, Situational Leadership, Productivity, Sugarcane Factories*

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## **INTRODUCTION**

Kenya and other 163 country economic sub-sectors are in the WTO mutuality business union and bound by rules that are designed to encourage to eliminate trade distortions and create competitiveness. Most (90%) of the world's sugar is mainly obtained from sugarcane (90%) and the remainder (10%) from sugar beet at a per capita consumption rate of about 22.6 kg (ISO, 2019). The world sugar trade is regulated by WTO of United Nations. The organization regulates world trade through 5 liaison mandates: trade negotiations, managing trade disputes; monitoring national trade policies; giving technical assistance and training for developing countries and cooperating with other international organizations to foster international trade (WTO, 2015). Today's Kenya 13 mills, some of which emerged from State Owned Sugar Enterprises (SOSE), can deliver only 500,000 tonnes sugar per year out of potential a potential of 800,000 tonnes of sugar per year. The mills fail to meet the consumption demand of 1,031,055 metric tonnes per year for a population 47 million citizens. Gakunga (2020) indicates a widened sugar deficit of 58% relative to sugar consumption needs. Kenya therefore is a net importer of sugar under WTO sugar trade requirements. The country seeks WTO reprieves from the guidelines to protect her industry from COMESA (Kemigisha, 2016). The negative impacts on some sugar sub-sectors particularly for the ACP countries including Kenya have been evident. The trade globalization negative and a few other local impacts have justified this study for Kenya where low sugarcane and sugar productivity are prevalent and not allowing expected good agribusiness from the sugar-subsector. Hence, this study sought to establish the effect of change management, situational leadership and farmer characteristics on sugarcane productivity in sugar factory cane catchment areas in Kenya.

A general agricultural process like sugarcane farming delivers amounts of farm produce in a quantifiable amount to a farmer for a sugar factory. The produce may be converted into productivity, which is defined generally as a ratio between the produce output volume and the

volume of inputs to generate the produce (FAO, 2017). At farm level in the sugar sub-sector this measures how, for example, units of land area, in hectares, labour in man hours and capital in a currency, are able to give level of productivity, say in tonnes sugarcane per hectare. This is partial factor productivity or PFP presented as Tonnes cane per Hectare (TCH) (Fuglie et al., 2016). In this study, model productivity metrics involve only PFP such as TCH, at farm level and tonnes sugar per year (Ts/Y) at the factory. Other productivity types are Total Resource Productivity (TRP) important in farming environmental impacts evaluations (Nadia, 2014).

### **STATEMENT OF THE PROBLEM**

The 13-mill sugar sub-sector in Kenya is able to make less than 500,000 and not the rated 800,000 tonnes sugar per year. The sub-sector has failed to deliver on its sugar business mandates nationally and internationally (AFA, 2019). Locally Kenya sugar subsector cannot satisfy the citizenry consumption sugar needs at 1,031,055 metric tonnes per year in the period 2014-2018 (AFA, 2019). Import sugar quotas fill the deficit in the Kenya sugar market demand from COMESA and about at USD 350 per tonne sugar which is cheaper than USD 750 per tonne for the Kenyan product. Therefore, the country cannot enjoy exports under WTO guidelines because its sugar is not available for external markets. In 2020, the subsector was at 58% sugar availability on the 1,038,717 metric tonnes sugar per year (Gakunga, 2020). The country sugar productivity deficit together with its high price makes not attractive for markets in COMESA, EAC, AGOA and EU. Cane productivity deficit is a key challenge for several operational gaps allowing only 4.95 million tonnes sugarcane per year for the mills designated to crushing 8.7 million tonnes sugar per year. The sub-sector has operation gaps and include: lack of agribusiness transparency, poor operational efficiency and low profitability caused by political interference (Mitullah *et al.*, 2016). These key operational gaps are reflected in inefficient land use and no clear plans for cane development by millers.

Existing studies fail to provide a general analysis of determinants of sugarcane productivity in sugar factory cane catchments areas in Kenya. Further, the evidence in literature on linkage between change management, situational leadership, farmer characteristics and sugarcane productivity are not evident. Therefore nature of the influence and strength of the relationship and needs investigation. In addition, most of studies done are based on different contexts other than sugar mills in Kenya. These previous studies exhibit a conceptual gap in that; there are no studies

that had reviewed the situational leadership as the moderating variable and farmer characteristics as the mediating variable. There was also a gap in literature on the moderating role of situational leadership on the mediation effect of farmer characteristics. Due to the gaps identified in previous research and lack of consensus in findings from previous studies, the relationship between change management and sugarcane productivity in sugar factory cane catchments areas in Kenya is therefore open to further scrutiny as to how they relate with moderating effect of situational leadership on the mediation effect of farmer characteristics. The main research question that guided this study was “what is the effect of change management, situational leadership and farmer characteristics on sugarcane productivity in sugar factory cane catchment areas in Kenya? “

### **RESEARCH OBJECTIVE**

To determine if moderating effect of situational leadership on the relationship between change management and sugarcane productivity is different from the mediating effect of farmer characteristics in Kenya.

### **RESEARCH HYPOTHESIS**

**Ho:** The moderating effect of situational leadership on the relationship between change management and sugarcane productivity is not significantly different from the mediating effect of farmer characteristics in Kenya.

### **THEORETICAL REVIEW**

#### **McKinsey 7S Theory**

The 7S Model was coined by Tom Peters and Robert Waterman of McKinsey and Company in the 1980s. The theory holds that the 7s elements ought to be adjusted for a successful change to occur. The 7s variables consists of the style, staff, strategy, structure, skills and the shared values (Manktelow & Carlson, 2015). The change implementation of an organization is affected by the 7s variables (Rajala et al., 2012). The theory needs to be supported and reinforced for better performance in an organization (Tarus, Gichoya & Muumbo, 2015). The 7S model analyses and addresses the design of the organization.

The 7S model is useful in realignment of the circumstances in enhancing performance in the organization also in determining the right approaches to change implementation (Alshaher, 2013). This theory provides insights on the steps that Sugar Factory Cane Catchments Areas adopt to

implement change with minimal difficulty. The seven levers relate with the variables under the study that influence effective change implementation in Sugar Factory Cane Catchments Areas. The theory provides insights in the implementation of change in Sugar Factory Cane Catchments Areas as a function of strategic leadership, employee training and operational change.

### **EMPIRICAL REVIEW**

Dindi (2013) has indicated a decline of sugarcane productivity from 137 to 58 TCH between 1973 to 2010 in one of the 13 study factory catchment areas of Mumias. Although this final lower yield level is close to the international sugar sub-sector average one of 63 TCH. It has been reported countries like Columbia in South America can attain 115TCH average (Kenya National Assembly Report, 2015). The higher South America country index may depict better efficiency in the cane development resource deployment articulated in the GMP tool. Cane yield raise in Kenya may be possible for back to about 137TCH but it must be a gradual process (Dindi, 2013). High yield restoration will need realigning the production through several mitigations embedded in the GMP tool. This study is potentially about sugarcane productivity remodeling through the study variables designated in this line of investigation.

Ndahiro, Shukla and Oduor (2015) study established a statistically significant relationship between change management and performance. The study examined effect of change management on the performance of government institutions in Rwanda. Survey research design was adopted. Quantitative and qualitative approaches were used. Primary and secondary data were used. Questionnaires were used to collect data. Data was analyzed through SPSS and Microsoft excel. This study used purely primary data.

Irungu (2017) conducted a study to examine the change management practices adopted by Equity Bank. Change is difficult and inevitable due to the unpredictable nature of the current business environment. Change management is the right application of knowledge, tools and the resources available at one's disposal to harness the benefits of change. The study adopted a case study as well as an interview guide to collect data. The collected data was organized and further analyzed using content analysis. The study found that Equity Bank institutes and uses multiple change management practices. The study recommends that Equity Bank should set up a strategy of flexible organizational structure so that all departments are linked and can enhance rapid decision making and promotes delegation within the organization. The study also recommended that the Bank pays

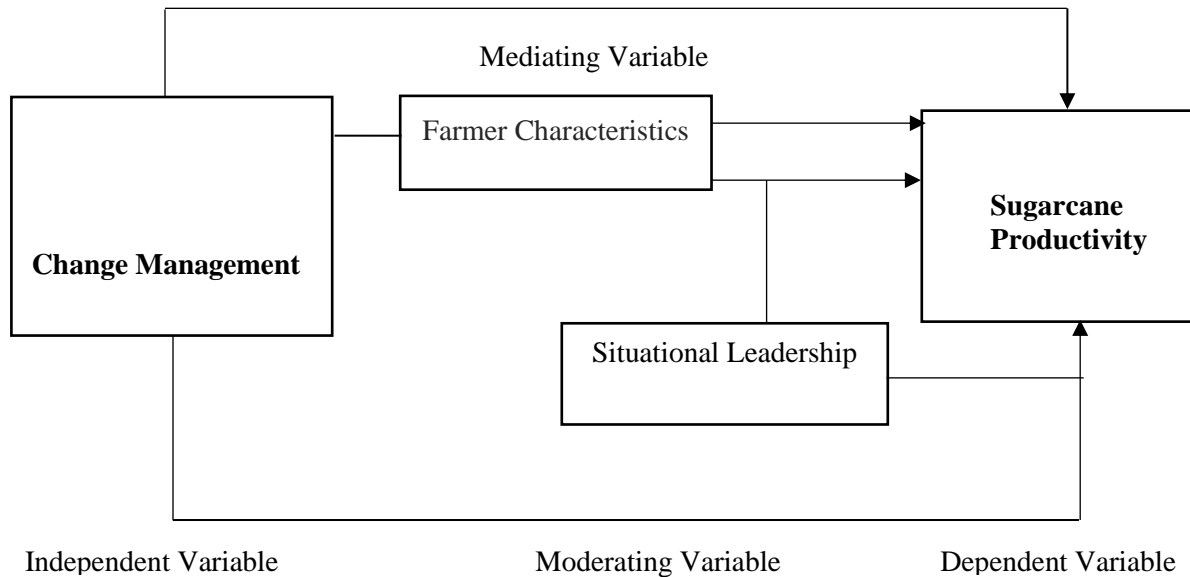
attention to the activities and the aspects of the employees that can promote their appreciation or motivation to embrace change.

Okoji (2014) studied the influence of leadership styles on community development program implementation in rural communities. The study adopted descriptive survey research of the ex post facto type. The (CLPS) inventory and Community Members Assessment of Leaders Scale were used. Two hypotheses were answered and tested at 0.05 level of significance. Data were analysed using descriptive and Pearson's product moment correlation. The result of the influence of leadership styles on community development programmes implementation in rural communities was mostly influenced by Situational leadership style. The study emphasized that there is the need for proper dissemination of information from the rulers to the followers, through documentation and dissemination of information, the followers can share the best practices and learn from each other.

Alsaqqa (2020) sought to address the benefit of situational leadership in dealing with the context of healthcare organizations. This is because the healthcare industry over the past two decades has been unpredictable. This state of uncertainty was as a result of change in managed care, increased demand for quality care by clients and the expensive costs of new medical technology. These change in the environmental factors have led to the development of new strategies by healthcare organizations and healthcare managers. Leaders in health organizations face a variety of challengers and responsibilities in their daily operations most commonly staff relations, continuous change and their ability to meet the targets of the organization. As such, situational leadership needs one to create collaboration within the organization by pooling the knowledge of all staff together, defining the discussions to be held and to ask critical questions. The study concluded that leaders should be equipped with situational leadership skills for the enhancement of healthcare in health organizations.

### **CONCEPTUAL FRAMEWORK**

The study's conceptual framework indicates a relationship between change management as the independent variable and sugarcane productivity as the dependent variable. Situational leadership was a moderator while Farmer characteristics was the mediating factor. The conceptual model is illustrated in Figure 1.



**Figure 1: Conceptual Framework**

**RESEARCH METHODOLOGY**

The philosophical foundation of this study was positivism, where quantitative data was used. Positivist philosophy is founded on objectivity, precision and scientific rigor to develop knowledge as opposed to the phenomenological approach which focuses on personal knowledge and subjectivity (Van Manen, 1997). The cross-sectional survey design was adopted for this study in order to provide relevant information of the extent to which change management influences sugarcane productivity in sugar factory cane catchment areas.

The sugar sub-sector sugarcane production population of 394,321 individuals make a target population of 392,282 farmers and 2,039 extension service staff or leaders. This population works on a gross surface of 188,449 hectares as a gross catchment at 13 sugar mills of the sugar sub-sector. Slovin (1960) formula may be used in deriving a sample size, n, from a target population where 478 respondents were arrived at. In addition, Cane catchment sugarcane farming 78 situational Leaders or extension staff pre -qualify for a domain of special skills (they each independently possess by their jobs descriptions at all the 13 mills; Managing Director, Head of Agriculture Operations, Cane Development Manager, Extension Services Manager, Agronomist. The researcher used structured questionnaires for data collection.

An empirical model was used to test the statistical significance of the independent variable on the dependent variable. The model for the study:

To establish if the mediating effect of farmer characteristics is different from the moderating effect of situational leadership in the relationship between change management and sugarcane productivity in sugar factory cane catchments areas in Kenya, Hayes and Rockwood (2020) model for moderated mediation was adopted.

$$SL = i_M + aCM_i + \varepsilon \dots\dots\dots (1)$$

$$SP = i_Y + c'CM + b_1SL + b_2FC + b_3SL*FC + \varepsilon \dots\dots\dots (2)$$

Where;

$i_Y$  and  $i_M$  = Constants

SP= Sugarcane Productivity;

SL= Situational Leadership;

FC= Farmer Characteristics

$\beta SL*FC$  = Interaction

## RESULTS AND DISCUSSION

The study realized a response success rate of 96%. According to Mugenda and Mugenda (2003) and Kothari (2004), a response rate of above 50% is adequate for a descriptive study. Babbie (2004) also asserted that return rates of above 50% are acceptable to analyze and publish, 60% is good and 70% is very good. Thus 96% was considered very good for the study.

### Correlation Analysis

Correlation analysis was carried out to determine the association between the variables, Change Management, Situational Leadership, Farmer Characteristics and Sugarcane Productivity. The mean score for each of the independent variables was calculated and the Pearson's correlation obtained using SPSS. The correlations were done at 0.05 significance level with one asterisk (\*) or a 0.01 significance level with two asterisks. To determine whether the correlation between variables is significant, one needs to compare the p-value to the significance level used. A significance level (denoted as  $\alpha$  or alpha) of 0.05 works well. An alpha of 0.05 indicates that the risk of concluding that a correlation exists when, actually, no correlation exists is 5%. The p-value indicate whether the correlation coefficient is significantly different from 0 or not. When the p-



value is less than or equal to 0.05 the correlation is statistically significant. However, if the p-value is greater than 0.05 or the significant level then correlation is not statistically significant (Statistics Solution, 2018). The correlation results are presented in Table 1.

**Table 1: Correlation Matrix**

Variables		Sugarcane Productivity	Change Management	Situational Leadership	Farmer Characteristics
Sugarcane Productivity	Pearson Correlation	1.000			
	Sig.(2-tailed)				
Change Management	Pearson Correlation	.750**	1.000		
	Sig.(2-tailed)	0.000			
Situational Leadership	Pearson Correlation	.760**	.661**	1.000	
	Sig.(2-tailed)	0.000	0.000		
Farmer Characteristics	Pearson Correlation	.761**	.645**	.554**	1.000
	Sig.(2-tailed)	0.000	0.000	0.000	

The results in Table 1 indicate that change management is positively and significantly associated with Sugarcane Productivity in sugar factory cane catchments areas in Kenya ( $r= 0.750$ ,  $p=0.00<0.05$ ). Situational Leadership is positively and significantly associated with Sugarcane Productivity in sugar factory cane catchments areas in Kenya ( $r=0.760$ ,  $p=0.00<0.05$ ). Farmer characteristics is positively and significantly associated with Sugarcane Productivity in sugar factory cane catchments areas in Kenya ( $r=0.761$ ,  $p=0.00<0.05$ ). Since the R-values were above 0.7, this is an indication that Change Management, Situational Leadership and Farmer Characteristics portrayed a high association with Sugarcane Productivity in sugar factory cane catchments areas in Kenya.

**Hypothesis Testing**

The objective of the study was to determine the moderating effect of situational leadership on the relationship between change management and sugarcane productivity is different from the mediating effect of farmer characteristics (Moderated Mediation). The hypothesis stated in the null form was as follows:

**Ho:** The moderating effect of situational leadership on the relationship between change management and sugarcane productivity is not significantly different from the mediating effect of farmer characteristics in Kenya.

The effect was assessed and results explained using coefficient of determination (R-Square), Analysis of Variance (ANOVA) and the regression coefficients. Analysis of Variance consists of calculations that provide information about levels of variability within a regression model and form a basis for tests of significance. The results are presented in Table 2.

**Table 2: R<sup>2</sup> for Moderated Mediation Effect**

<b>Model</b>	<b>R</b>	<b>R Square</b>	<b>Adjusted R Square</b>	<b>Std. Error of the Estimate</b>
<b>1</b>	<b>.750a</b>	<b>0.563</b>	<b>0.562</b>	<b>0.77146</b>
<b>2</b>	<b>.828a</b>	<b>0.686</b>	<b>0.684</b>	<b>0.65574</b>

The first model for regressing Change Management against Sugarcane Productivity had 56.3% while the second step of regressing Change Management, Situational Leadership, Farmer Characteristics and SL\*FC against sugarcane productivity had 68.6%. The Rsquare for model increased from 56.3% to 68.6% after the moderated mediating effect. The ANOVA results are presented in Table 3.

**Table 3: ANOVA**

<b>Model</b>		<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F</b>	<b>Sig.</b>
1	Regression	355.724	1	355.724	597.699	.000b
	Residual	276.152	464	0.595		
	Total	631.876	465			
2	Regression	433.647	4	108.412	252.122	.000b
	Residual	198.229	461	0.43		
	Total	631.876	465			

Analysis of Variance consists of calculations that provide information about levels of variability within a regression model and form a basis for tests of significance. The F-Calculated for model one was (1, 464) = 597.699 which is greater than F-Critical (1, 464) = 3.84 at 95% confidence

level. The F-Calculated for model two was  $(4, 461) = 252.122$  which is greater than F-Critical  $(4, 461) = 2.371$  at 95% confidence level. Therefore, the results confirm that the regression model one and two are significant. The regression coefficients for Change Management, Situational Leadership, Farmer Characteristics and Sugarcane Productivity are as shown in Table 4.

**Table 4: Regression coefficients for Moderated Mediation Effect**

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	0.714	0.100		7.17	0.000
	Change Management	0.751	0.031	0.750	24.448	0.001
2	(Constant)	0.469	0.28		1.678	0.094
	Change Management	0.279	0.044	0.279	6.335	0.000
	Situational Leadership	0.230	0.112	0.227	2.056	0.040
	Farmer Characteristics	0.250	0.111	0.248	2.25	0.025
	SL*FC	0.026	0.0034	0.143	7.60	0.045

The fitted model was;

$$\text{Model 1: } SL = 0.714 + 0.751CM$$

$$\text{Model 2: } SP = 0.469 + 0.279CM + 0.230SL + 0.250FC + 0.026SL*FC$$

Where;

SP= Sugarcane Productivity;

SL= Situational Leadership;

FC= Farmer Characteristics

SL\*FC = Interaction term

The regression of coefficients results shows that in step one, the regression model of Change Management on Sugarcane Productivity was significant with  $\beta=0.751$ ,  $p=0.001<0.05$ . In step two, the results show that the regression model of Change Management, Situational Leadership, Farmer Characteristics and the interaction term SL\*FC on sugarcane productivity in sugar factory cane areas in Kenya was significant with  $\beta_1=0.279$ ,  $p=0.005<0.05$ ;  $\beta_2=0.040$ ,  $p=0.021<0.05$ ;  $\beta_3=0.250$ ,  $p=0.025<0.05$ ,  $\beta_4=0.026$ ,  $p=0.025<0.05$ . Since, the p value for the Moderation mediating term (SL\*FC) was significant  $0.045<0.05$  was less than the critical value 0.05, the study rejected the null hypotheses that the moderating effect of situational leadership on the relationship between

change management and sugarcane productivity is not significantly different from the mediating effect of farmer characteristics.

### **Discussion**

The objective of the study was to determine if the moderating effect of situational leadership on the relationship between change management and sugarcane productivity is different from the mediating effect of farmer characteristics (Moderated Mediation). Hayes and Rockwood (2020) model for moderated mediation was adopted. The hypothesis stated in the null form was as follows:

**Ho:** The moderating effect of situational leadership on the relationship between change management and sugarcane productivity is not significantly different from the mediating effect of farmer characteristics.

The regression of coefficients results shows that in step one, the regression model of Change Management on Sugarcane Productivity was significant. In step two, the results show that the regression model of Change Management, Situational Leadership, Farmer Characteristics and the interaction term SL\*FC on sugarcane productivity in sugar factory cane areas in Kenya was significant. Since, the p value for the Moderation mediating term (SL\*FC) was significant  $0.045 < 0.05$  was less than the critical value 0.05, the study rejected the null hypotheses that the moderating effect of situational leadership on the relationship between change management and sugarcane productivity is not significantly different from the mediating effect of farmer characteristics.

The results agree with Ndahiro, Shukla and Oduor (2015) whose study established a statistically significant relationship between change management and productivity. Okiiya (2013) study on the relationship between change management and productivity established that there was a statically significant relationship between change management and productivity. The results are consistent with those of Guo, Wen and Zhu (2015) who assessed the impact of aging agricultural labor population on farmland output: from the perspective of farmer characteristics and results showed that changes in the working-age households have a significant impact on agricultural output. The study also found that elderly farmers who do not intend to abandon farming had higher agricultural output compared to other farmers. This indicates that the adverse effects of changes in the agricultural population age result more from the agricultural output of older farmers who intend to

give up farming. This intention adversely affected other elements and reduced investment. Therefore, various forms of training should increase efforts to cultivate modern professional farmers and policies should be simultaneously developed to increase agricultural production levels.

The findings agree with Kassem and Sarhan (2013) on the effect of job characteristics on satisfaction and productivity revealed that productivity was not related to the core job dimensions while satisfaction was. The study posited that the managers of Egyptian agricultural extension system should put job characteristics into consideration for job redesign to enhance satisfaction and productivity of extension agents. The findings of Senen, Masharyono and Edisa (2020) on the effect of job characteristics to employee's productivity indicated that there was a positive influence between job characteristics on employee productivity.

## **CONCLUSIONS**

The study concluded that the Moderated effect of situational leadership on the relationship between change management and sugarcane productivity is significantly different from the mediating effect of farmer characteristics. The same positive and strong correlation was given between leader's relationship behaviour from a side and farmer's productivity in a firm from another side. Thus, leaders inside the organizations ought to improve their relationship behavior in order to increase productivity. Every farmer has their own characterized need, therefore, it is highly necessary that managers and leaders in the sugarcane sector adopt a strategy that emphasizes their needs.

## **RECOMMENDATIONS**

The study provides significant information for managers of the sugar factories warrant appropriate recommendations. The sugar factories operate in an overly growing competitive environment thus calling for quick strategic changes to cope up. Therefore, this calls for change management in the sugar factories. The expiry of the COMESA safeguards is worry enough to catapult the organization's leadership into strategic change processes that will ensure its future survival.

Farmer characteristics on the relationship between change management and sugarcane productivity contributes to literature on the role of farmer characteristics. These findings are very critical to management to ensure they develop and implement policies that support all category of farmers and their diverse needs. It is helpful for managers to not only identify their own work style but also the style of those they manage.

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