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**Accepted: September 5, 2021**

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**ABSTRACT**

*The main objective of this study was to assess the effects of Green Distribution on the organizational performance of sugar sub-sector in Kenya. The study employed descriptive research design. The target population was 600 respondents comprising of the management of sugar companies in Kenya, sugarcane farmers and sugar importers and exporters. Stratified random sampling was used with sample size of 30% of the target population, which comprised of 180 respondents. The study collected data using questionnaires. The study adopted both qualitative and quantitative data analysis techniques. This study used SPSS Version 21 and Microsoft word tools to aid in data analysis. Regression analysis was used to establish the relationship between the variables. Data analysis was conducted using descriptive and inferential statistics by use of hierarchical moderated multiple regression analysis. The study established that green distribution is a critical component in cost mitigation and performance enhancement in the sugar sector. The study recommended manufacturing firms should embrace the use of re-usable packaging material, recyclable packaging material, non-hazardous packaging material, bio-degradable packaging material, reduced packaging material and low-density packaging material.*

**Key Words:** Green Distribution, Sustainable Supply Chain

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**CITATION:** Panya, K. O., Ochiri, G., Achuora, J., & Gakure, R. W. (2021). Effects of green distribution on the organizational performance of sugar sub-sector in Kenya. *The Strategic Journal of Business & Change Management*, 8 (3), 939 – 952.

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## INTRODUCTION

The technological changes in sugarcane growing and production includes but not limited to the generation of new crop varieties, development of new products and byproducts such as ethanol production, bio-plastic or organic plastic products and cogeneration of energy, advanced mechanization, modernization of the manufacturing techniques through the concept of Integrated Industrial Complexes comprising of Sugar Plant, Co-generation (Power) plants, Fuel-Ethanol Distilleries etc., (Araújo, Goes, Marra & Oliveira,2010; Lemmens, 1987; Clarke,1999; Lusia,2016; Ngamkroeckjoti & Speece,2008; Pratono,2015; Li, Chen & Ying,2019; Gbabo & Dauda,2013).

Like many other food and chemical industries, the sugar industry and related sugar-bio-product industries are currently facing tough sustainability issues, (Eggleston & Lima, 2015). According to World Bank Final report 2017 on sugar sustainable supply chain, Sugar processing activities generate large quantities of organic solid waste and by-products e.g. leaves from cane or beet, molasses from the final crystallization, press mud or cachaza, bagasse fiber from the cane, mud and soil arriving at the plant with the raw material, and lime solids from the juice clarification,(World Bank,2017). Sugar milling and associated industries, are working towards achieving environmentally acceptable and economically viable manufacturing in a tough legislative framework while meeting the high demands of a growing population, (Eggleston & Lima, 2015).

DHL Express is a German logistics company considered to be the largest logistics company applying green initiatives and a front runner in SSCM best practices. Since DHL's activities centers around delivering mail and parcels, green logistics and sustainable transportation initiatives constitute the core of DHL's SSCM activities, which in turn can reduce a considerable portion of its CO<sub>2</sub> emissions. DHL under the Go-Green program demonstrates

that the company has implemented numerous green initiatives to cope with its environmental inefficiencies including but not limited to green transportation and warehousing, Green Distribution, dynamic route planning, consolidation of shipments, minimization of empty runs through freight backloads, maximal capacity usage, modal shifts and moving air freight to road and rail etc., (Pourhejazy & Kwon, 2016; Saeed & Kersten, 2019; OECD, 2017).

Sugarcane production in Kenya has declined due to several challenges. At the farm level, sugar productivity is low due to poor seed of long maturing varieties, smut disease, high costs of inputs and delayed payments to farmers, (Mati & Thomas,2019).Kenya is a deficit sugar producer, with the current total national consumption outstripping national production by over 300,000 metric tonnes,(CODF,2017). In recent years, sugar production has declined from about 635,700 tonnes in 2015 to 491,100 tonnes in 2018 of milled sugar. Meanwhile, sugar imports have been increasing. The annual domestic demand is over 900,000 tonnes, meaning the country is a net importer of sugar, (Mati & Thomas, 2019; OECD/FAO, 2019). FAS/Nairobi forecasts stagnant sugar production in MY 2019/2020 due to delays in the privatization of state-owned mills, a move that was anticipated to spur the sector, (USDA, 2019). In the last two decades cane availability has inconsistently matched the factory capacity hence the mills have not been able to meet their cane requirements. At an average factory efficiency level of 80%, cane requirement will be 9.84 Million MT which translates to sugar production of 1.09 Million MT per annum, (SISTR, 2019, Mati & Thomas, 2019; KNBS, 2018).

The average ex-factory price of sugar in Kenya is about US\$800 per tonne, which compares poorly with world market price of US\$280 per tonne. This means that Kenyan consumers pay too much for sugar. According to the Agriculture and Food Authority some 56 companies are registered as

sugar importers. Thus, importers are more than all the sugar factories in Kenya combined. Quite often, domestic sugar prices are inflated, partly due to tariffs and quotas applied to Kenya's raw sugar imports, making sugar expensive, (Mati & Thomas, 2019).

### Statement of the Problem

According to (B.A.T, 2019; Sarhaye & Marendi, 2017; EABL, 2019; Safaricom, 2019; Coca-Cola Ltd, 2019& Njuguna & Maronge, 2019), B.A.T Plc, Safaricom Ltd, Coca-cola and EABL are among the leading companies in SSCM best practices in Kenya. These companies have invested heavily in energy saving projects, reduced their water consumption, invested in effluent treatment, water and solid waste recycling, sustainable packaging/recycling, reducing overall carbon footprint in production, reduced the amount of plastic use, ensured employee safety and planting of millions of trees across the country among others. This is not however the case with sugar subsector. (Mati & Thomas, 2019; World bank, 2015; Sarhaye & Marendi, 2017 & Cowi, 2002), has indicated that pollution from toxic industrial waste water, hazardous high greenhouse gas emissions, herbicides and pesticides loading into Lake Victoria from Nzoia River basin is 3,340 tonnes total N per year and 946 tonnes total P per year causing loss of biodiversity and long term damage to ecosystems.

Studies by (Lalah *et al.*, 2008; Cowi, 2002; Moses *et al.*, 2011; Omwoma, 2012; Onyari & Wandiga, 1989), indicates that River Nzoia and L.Victoria are loaded with heavy metals from the sugarcane farming activities such as the application of nitrogenous fertilizers among others. These heavy metals have numerous effects on human health including: Wilson's disease (copper), Lead arthragia (lead), birth effects, infertility, tumor (chromium) and the growth of water hyacinth, (Lalah *et al.*, 2008; Moses *et al.*, 2011; Omwoma, 2012).

Nike Inc., Dell Inc. and Apple Inc. in the USA, Toyota and Fujitsu Ltd in Japan, DHL and Volkswagen in Germany and Kenana Sugar company in Sudan due to favorable business environments in their

respective countries, are leading in SSCM best practices in the world, (Mugo, 2017; Pourhejazy & Kwon, 2016; Dell 2018; Toyota, 2018; Apple, 2019; Erwa *et al.*, 2015). These Companies have set priorities for green initiatives i.e. Green design of new buildings, production of on-site renewable energy, (including solar energy, directed bio-gas fuel cells, and micro-hydro energy), introduction of hybrid (petrol/electric) and fuel cell (hydrogen) drive systems, and providing charging ports, (Toyota, 2018; Apple, 2019). Use of Green Distribution, take-back policy for its products, use of robots, minimizing carbon emissions, production of lean items, turning green their entire Supply chain, replacing lighting and energy control systems, (Pourhejazy & Kwon, 2016; Dell 2018), the installation of a photovoltaic system with solar cells and utilization of an innovative system to harvest and store rainwater, (Mugo, 2017; Dell 2018), provision clean drinking water to the communities, Hospitals & Clinics, good roads, rails and combating desertification through planting of trees, (Erwa *et al.*, 2015) among others.

According to (SISTR, 2019), Most sugar companies in Kenya are in violation of the Public Health Act, Pharmacy & Poisons Boards ACT, and NEMA ACT through adulteration of its products and by-products, improper handling of pesticides and herbicides, which has led to contamination of the Eco-system and excessive energy use in the juice heating, boiling and crystallization.

A comprehensive literature review on SSCM practices by (Kumar *et al.*, 2020; Mati & Thomas, 2019; Imbambi *et al.*, 2017; Mitullah *et al.*, 2017 & Sarhaye & Marendi, 2017), shows that most of the research has focused on green supply chain management strategies, leaving out other components of SSCM Practices. There is minimal research on the effects of SSCM Practices on firm's performance. The existing research had not provided clear evidence on the link between SSCM practices and firm performance. This study therefore shall investigate the effect of SSCM on performance of Sugar firms in Kenya.

### Objective of the study

The objective of this study was to assess the effects of Green Distribution on the organizational performance of sugar sub-sector in Kenya. The study was guided by the following hypothesis.

- **H<sub>0</sub>:** Green Distribution has a significant effect on performance of sugar sub-sector in Kenya.

### LITERATURE REVIEW

#### Transactional Cost Economics Theory

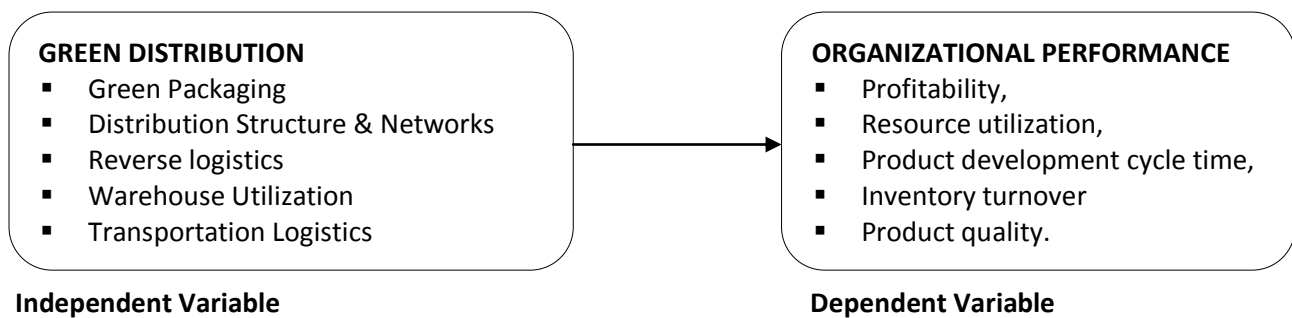
The transaction cost economics theory was first proposed by Williamson in 1981 and later expounded by Sarkis (2011). The theory explores how much effort and cost is required for two entities to complete an economic exchange or transaction which includes distribution costs, searching costs, bargaining costs and control costs, (Mutisya & Kinoti, 2017). Transaction costs are costs which arise because of a company's activities in the market, including (fees, commission, taxes) which are paid by the firm to provide a service or produce a good either to external parties or as internal costs such as the cost of transport, warehouse, packaging etc, (Yousuf 2017, Katarzyna 2014, Clem 2004). Firms must make a comparison between internal and external transaction costs and choose the lowest cost which enables them to increase profits, (Yousuf 2017, Katarzyna 2014, Rodrigo, Fernando, André, Ferreira & Li, 2010). Firms have to reduce their distribution costs to the minimum level to achieve more profits and competitive advantage. A profit is what is left of the revenue a business generates after it pays all expenses directly related to the generation of the revenue, such as producing a product, and other expenses related to the conduct of the business' activities (Grimsley, 2015, Katarzyna 2014, Clem 2004).

According to (Mwaura *et al*, 2016), distribution structure and networks, Green Distribution and transport logistics determines the overall

profitability of a firm as it directly affects both the supply chain cost and the customer experience. Green Distribution influences distribution in terms of the size, types of materials used and the transportation features of the product, (Hutomo *et al*, 2018). Green, distribution practices range from reducing the amount of fossil fuels and greenhouse gases used in manufacture and distribution to increased emphasis on the environment during distribution, (Valentina & Rosa 2018; Dellis 2016). The TCT has expanded its breath to Supply Chain Management, strategic management and international business in seeking to explain how firms internationalize and the structural arrangements required to improve the odds of success, (Yousuf 2017, Katarzyna 2014, Clem 2004, Rodrigo *et al*, 2010, Oliver 2007, Oliver 1998, Andrea-Oana 2007). Recycling involves the transportation of faulty parts/ products from the service centre to the recycling centre, transferring usable parts to the manufacturing or assembly point, the recyclable parts to the recycling plant and waste material to landfills, etc. Managing these logistics activities efficiently is crucial to a firm's success, profitability and reputation, (Valentina & Rosa 2018; Orzan, *et al* 2018).

Sustainable distribution practices for example helps reduce carbon dioxide, are economically viable and brings about a better quality of life for the earth's future inhabitants. Green distribution practices range from changing the way distribution centers and vehicles are powered to implementing greater transparency regarding the environment and distribution practices, (Mwaura *et al*, 2016). The Transactional Cost Model is applicable in this study because it ascribes the inefficiencies to the failure of companies to bring together contributions from functional areas in order to understand and achieve established goals. This theory supports the study by linking the variables to role of green distribution in achieving maximum organizational performance.





**Figure 1: Conceptual Framework**

Green distribution refers to any means of transportation/hauling of goods and services from the source through an eco-friendly channel right up to the final consumer. It involves storage, order processing and picking, packaging, loading and delivery to the customer. (Mwaura *et al*, 2016), defines green distribution as practices that include those that reduce carbon dioxide, and are economically viable and will bring about a better quality of life for the earth's future inhabitants. The word 'Green' make our mind to think about a world without pollution and eco friendly, (Vijay *et al*, 2015). As environmental concerns increase, the integration of environmental issues into the supply chain studies has become a thriving subfield, (Mwaura *et al*, 2016).According (Mwaura *et al*, 2016; Ninlawan *et al*, 2010), Green Distribution involves downsized packaging and use of eco-friendly/bio-degradable packaging materials that help reduce the amount of fossil fuels and greenhouse gases used in manufacture and distribution to increased emphasis on the environment during distribution.

The development of Green Distribution is to enable packaging of lightweight, recyclable, re-use, recycling, biodegradable materials, and to prevent the use of non-ecological materials, (Zao &Zang, 2012). Environmental degradation during distribution activities incur high costs including foregone opportunities, preventive/aversive expenditure, replacement costs, externalities and foregone future opportunities that can affect organizational performance, (Mwenda & Kibutu 2011). Green distribution is significant to

performance, since it enables eco-friendly transportation, delivery, and bulk handling of the products, protects the product from influences of the external environment and its exposure to factors that can cause contamination for the benefit of consumers' health and safety, and influences consumer behavior with regard to green practices, (Dellis 2016).

**Empirical Review**

(Mwaura *et al*, 2016), defines distribution as the movement of a product from the production stage to the customer in the supply chain. Increased environmental awareness has led more companies to adopt sustainable, or green, distribution practices. These practices span from reducing the amount of fossil fuels and greenhouse gases used in manufacture and distribution to increased emphasis on the environment during distribution,(Mwaura, *et al* 2016;Valentina &Rosa 2018;Dellis 2016). (Hutomo *et al*, 2018), asserts that green distribution consist of practices that reduce carbon dioxide, are economically feasible and therefore influences the overall profitability of a firm as it directly affects both the supply chain cost and the customer experience. (Chin *et al*,2015), explains that the main objectives of green distribution are to encourage use of environment friendly packaging raw materials and systems, standardizing packaging process in coordination with suppliers, using recycled materials along with producing recyclable packages, and reducing energy consumption in warehouses.

Reduction in air emissions, effluent and solid waste, and decreased consumption of hazardous and toxic materials improves the firm's reputation and image and creates better relations with institutional stakeholders. This causes the firm to sell more and hence increase profits, (Odock *et al*, 2016; Testa & Irlado, 2010).

(Magretta & Stone, 2002; Odock, 2016) asserts that indicators and performance measurement are critical elements in translating an organization's mission or strategy, into reality. Performance measurement in organizations is still largely concentrated on financial data for the purposes of coordination and control, (Haddadi & Yaghoobi, 2014). However, (Felizardo *et al*, 2017), notes that traditional performance measures, based on cost accounting information, provide little to support organizations on their quality journey, because they do not map process performance and improvements seen by the customer. A study done by (Muma *et al*, 2014), argues that SSCM practices such as green purchasing, green production, green marketing, waste management, and green distribution have a significant positive relationships with organizational performance of firms. The results of a study done by (Chin *et al*, 2015) approved the significant and positive impact of green distribution as one of SSCM practices on environmental performance of industrial firms in Malaysia. SSCM practices such as Green Distribution is significant to firm's overall performance, since it is an effective medium of marketing having an effect upon the purchasing decision of consumers, it enables the transportation, delivery, and bulk handling of the products, protects the product from influences of the external environment and its exposure to factors that can cause contamination for the benefit of consumers' health and safety, and influences consumer behavior with regard to green practices, (Dellis 2016).

Green distribution activities cover every effort to reduce the adverse effects of a company's products or services on the environment. These efforts positively impact the improvement of organization's

performance by reducing the consumption of solid/liquid wastes and hazardous substances, reducing the incidence of environmental accidents and improving community health, (Eltayeb *et al*, 2011; Çankaya & Sezen, 2018). Eco-packaging for instance, improve a firm's product quality and profitability by ensuring protection of food from oxygen, temperature fluctuation, moisture, light, preserve foods from biological microorganism's attack, physical protection from damage while reporting information about the food product, and its identification, (Valentina & Rosa, 2018; Orzan *et al*, 2018). Eco-packaging solutions present an opportunity to tackle profitability problems by reducing the negative environmental impacts packaging causes over time. With rising consumer demands for eco-friendly packaging, an increasing number of companies take on the chance to pack their products 'greener' and become engaged in sustainable business practices, (Mutingi 2014; Valentina & Rosa 2018; Orzan, *et al* 2018). The changing global scenario and the growing concern over environmental issues has had a considerable effect on traditional supply chains. The traditional supply chain now needs to incorporate an additional component to handle environmental concerns, (Mishra, Kumar & Chan 2012).

According to (Ivanova & Avasilcăia, 2013), the main role of performance measurement is to assess the current position of the organization and also to help managers create and implement better strategies. Where many companies adopt about the same strategies, or have similar products or services, the only way to obtain long-term performance is to innovate. Waste management plays an important role in improving the environmental, social and economic performance of manufacturing organizations. It involves the transportation of faulty parts/ products from the service centre to the recycling centre, transferring usable parts to the manufacturing or assembly point, the recyclable parts to the recycling plant and waste material to landfills, etc. Managing these logistics activities efficiently is key to a firm's success, profitability and

reputation, (Valentina & Rosa 2018; Orzan, et al 2018). The success of waste management implementation requires the coordination of forward and backward flows of both materials and information. The reverse flow of products entering the chain impacts the dynamics of SC members' inventories. This, in turn, affects the dynamics of order placed to suppliers and, thus, impacts the performance of the entire SC in terms of the order and inventory variance amplification, (Stock et al., 2006; Sarhaye & Marendi, 2017).

Organizations' performance is related to the manufacturing plant's ability to reduce costs associated with purchased materials, energy consumption, waste treatment, waste discharge and fines for environmental accidents, (Zhu et al, 2008). Organizations can gain directly from economic benefits and reputation through green practices such as reducing waste and energy costs, (Schmidt et al., 2017). According to (Alshura & Awawdeh, 2016), proper distribution structures and networks help reduce/eliminate environmental damages and wastes distribution thereby contributing towards a firm's efficient resource utilization. A structured distribution network ensure reductions in the fuel consumed by the vehicle transporting the product, reduced frequency of transportation operations, reduced distance to the customers and packaging characteristics (weight, shape and material) which in turn affect positively the performance of manufacturing organizations, (Sarkis, 2003; Çankaya & Sezen, 2018). Due to increasing environmental issues and the associated resource depletion problems, environmental regulatory bodies continue to put stricter regulations in place. At the same time, the customer's environmental consciousness has evidently increased, (Mutingi 2014; Valentina & Rosa 2018; Orzan, et al 2018).

Studies by (Sarhaye & Marendi, 2017; David & Muthini, 2019), found that there exist a positive relation between SSCM Practices such as waste management and organizational performance. They concluded that purchasing of commodities should

be done with keen attention to quality of supplies and environmental awareness. According to (Mutisya & Kinoti, 2017), SSCM practices such as green distribution, green manufacturing, sustainable waste management and ICT have a positive and significant relationship with the performance of large chemical manufacturing firms in Kenya. There is also need for firms to purchase energy saving equipment, to cooperate with suppliers to ensure standard packaging and have a well-functioning waste management system. (Mulwa & Mutisya, 2017), emphasizes the adoption of SSCM practices to improve organizational performance through cost-savings, enhanced employee motivation, product quality improvement and new market opportunities. (Cousins et al, 2019), indicates that sustainability-related activities directed at their supply chains represents a significant challenge for most firms. The study shows that SSCM practices help to improve both environment and cost performance; with supercharged benefits for operating cost improvement where the firm has high levels of supply chain traceability and adopts a broader view of their supply chains which incorporates nontraditional actors.

## METHODOLOGY

This research study adopted Positivist philosophical paradigm with an objectivist approach. The study utilized empirical review setting to investigate the theoretical relational paths drawn from literature and test them through the research hypotheses or research questions. This study was based on the premise that knowledge is founded on facts and that no abstractions or subjective status of individuals is considered. This research problem was studied through the use of a descriptive research design. The study population of this research consisted of Supply Chain and Procurement Managers of sugar companies, County Agricultural Chief Officers, Kenya sugar research Foundation officers, Sugarcane Farmers and Sugar Importers totaling to 600 professionals. The sample size for the study was therefore 180 respondents



the sugar sub-sector in Kenya. This Study used questionnaires to collect data.

## FINDINGS

### Green Distribution

The objective of the study was to examine the effect of Green Distribution on the performance of sugar sub-sector in Kenya. The study sought to find out the respondents' views on specific aspects of Green Distribution as a prospect of green supply chain management practice. The respondents were asked to rate specific statements based on a five-point Likert scale. The findings were as shown in table 1 and they revealed the following: majority of the respondents agreed with the first statement that the organizations used reusable packaging materials as evidenced by a mean of

4.10 and a standard deviation of 1.22; on the second statement that the organizations used recyclable packaging materials and this is evidenced by a mean of 4.23 and a standard deviation of 1.12; on the third statement that the organization designed packaging materials that were non-hazardous, most of the respondents agreed as shown by a mean of 4.51 and a standard deviation of 0.74 and; on the last statement that they utilize low-density-packaging-material, as shown by a mean of 4.01 and a standard deviation of 0.98. The findings implied that as much as packaging was concerned, the firms relatively observed green practices- a move that could go a long way towards enhancing performance of sugar sub-sector in Kenya.

**Table 1: Green Distribution**

Statement	N1	SD (%)	D (%)	N2 (%)	A (%)	SA (%)	Mean	SD
Our organization uses re-usable packaging material.	161	6.2	5.6	15.5	16.8	55.9	4.10	1.22
Our organization uses recyclable packaging material.	161	5.6	3.1	9.9	24.8	56.5	4.23	1.12
Our organization designs packaging materials that are non-hazardous.	161	1.2	0.6	5.6	30.4	62.1	4.51	0.74
Our organization packages product using bio-degradable materials.	161	4.3	9.3	21.7	36.0	28.6	3.75	1.10
Reduced-packaging-material	161	4.3	11.8	24.2	23.6	36.0	3.75	1.18
Low-density-packaging-material	161	3.7	1.9	19.3	39.8	35.4	4.01	0.98

**Key:** SD= Strongly Disagree; D= Disagree; N1 = Number of respondents;

N2 = Neutral; A= Agree; SA= Strongly Agree

### Factor Analysis for Green Distribution

Factor analysis for Green Distribution as one of the study variables was carried out. This was done using the KMO test for sampling adequacy. The findings are as shown in Table 2. As the findings

portray, the KMO measure for sampling adequacy was 0.698 an implication that the factor loadings for the items under the variable met the threshold of 0.6 hence all the items were adopted in the analysis.

**Table 2: KMO and Bartlett's Test for Green Distribution**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.698
Bartlett's Test of Sphericity	Approx. Chi-Square	336.604
	Df	15
	Sig.	.000

## Hypotheses Testing

*H<sub>0</sub>: Green Distribution has a significant effect on performance of firms in the food and beverage processing sector in Kenya*

The hypothesis of the study was that there was a significant and positive influence between Green Distribution and performance of sugar sub-sector in Kenya. The findings revealed that the p-value was 0.000, R<sup>2</sup>=0.285, β= .424 and t=7.952. The findings implied that there was a positive significant relationship between Green Distribution and performance of sugar sub-sector in Kenya since the significant value obtained was less than 0.05, similar to the t value which was more than 1.96 at 5% significant level. The results therefore implied that there was a positive significant relationship between Green Distribution and performance of sugar sub-sector in Kenya. Based on the findings, the study accepted the alternative hypothesis that there is a positive significant relationship between Green Distribution and performance of sugar sub-sector in Kenya.

## CONCLUSIONS AND RECOMMENDATIONS

The objective of the study was to determine the effect of Green Distribution on the performance of food and beverage processing companies in Kenya. The study established that Green Distribution has a positive significant effect on the performance of sugar sub-sector in Kenya. The coefficient of determination (R<sup>2</sup>) value was 0.285 which implied that 28.5% of the variations in performance of

sugar sub-sector in Kenya can be attributed to Green Distribution whereas, 71.5% can be attributed to other factors other than Green Distribution. The regression coefficients realized indicated a positive significant relationship between Green Distribution and performance of sugar sub-sector in Kenya; hence the study accepted the alternative hypothesis and affirmed that there is a positive significant relationship between Green Distribution and performance of sugar sub-sector in Kenya. The study therefore held that Green Distribution is an important indicator of performance in performance of sugar sub-sector in Kenya.

The study established that Green Distribution is a critical component in cost mitigation and performance enhancement in the sugar sector. When green distribution is properly implemented it leads to higher financial performance, superior quality of products, reduced costs and better environmental preservation.

The study recommended manufacturing firms should embrace the use of re-usable packaging material, recyclable packaging material, non-hazardous packaging material, bio-degradable packaging material, reduced packaging material and low-density packaging material. The findings established a positive significant relationship between Green Distribution and performance of sugar sub-sector in Kenya.

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