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ROLE OF TECHNOLOGY TOWARDS ORGANIZATIONAL PERFORMANCE OF FOOD PROCESSING FIRMS IN NAIROBI COUNTY

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ABSTRACT

In today's global business environment, businesses are facing increased competitive, regulatory and community pressures. Furthermore, there is also pressure for environmental sustainability, which requires strategies to be put in place to reduce the environmental impacts caused by the products and services offered. As customers become more aware of environmental issues, there is an increase in the demand for ecological products. Whereas, this increased awareness of and sensitivity towards environmental issues place certain demands on business functions to become greener little is known regarding how going green impact organizational performance. The purpose of this study is to investigate the role of green supply chain management practice i.e. role of green manufacturing technology towards organizational performance of food processing firms in Nairobi County. The study is anchored on theory of Innovation. The respondents included finance officers and directors from county treasuries in the counties. Primary data was collected using a questionnaire whereas secondary data was obtained from the firms' annual audited financial statements. The study used qualitative data, Statistical Package for Social Science Version 21 was used to analyze qualitative data that generated both descriptive and inferential statistics. Multiple linear regression analysis was used to establish the effect of green supply chain management practices on organizational performance of food processing firms in Nairobi County, Kenya. The study concludes that green manufacturing technology has a positive and significant effect on organizational performance of food processing firms in Nairobi County. From the findings, this study recommends that the management of food processing firms should formulate and implement effective strategies to embrace green manufacturing technology.

Key Words: green supply chain management practice, green manufacturing technology, organizational performance

INTRODUCTION

In the 21st century, by the impact technology progress and global economic integration, the supply chain between different countries and different regions are becoming more and more common (Stadtler, 2015).). Meanwhile, the conflict between the natural environment and the manufacturing are becoming increasingly serious. The problem has two aspects: on one hand, with the expansion of supply chain manufacturing industries affect more on natural environment; on the other hand, the environmental problems also bring more constraints and limitations to manufacturing company (Handfield, et al, 2015). All the related companies of the supply chain are affected. Therefore, in order to solve the environmental problems, it is necessary for all companies to work closely together to improve environmental performances.

Kenya is a country with large scale of manufacturing yet still not very mature. The manufacturing industry has not paid enough attention to environmental protection. As a result, the consumption of resources is too high, utilization rate is low, and the pollution problem is serious. Kenya's automobile industry is also facing this problem. But the improvement of environmental performance cannot achieve by a manufacturer independently. Even an internal management is strictly carried out by an enterprise, still upstream and downstream partners are needed to achieve the goal of environment protection. That means the environmental factors should be considered in supply chain management (Mburu, 2017).

Across the world, public authorities are increasingly becoming aware of their environmental impacts and their responsibility to reduce them. Green public supply chain management is a well-established and fast developing concept. In Europe for example, it is gaining momentum as the vehicle of choice for public authorities to manage their environmental impacts and influence business and society to do the same. Green public supply chain is practiced by many governments, and is generally underpinned by robust international and national policy frameworks (EU, 2016). Whilst implementation models differ, the use of agreed, minimum environmental product specifications is widespread and appears to be the main mode of delivery, widely supported by governments.

In Africa, some of the countries that places importance in green procurement include South Africa, Egypt, Algeria, Morocco, Nigeria and Ghana. For instance South Africa has a long-standing commitment to sustainable supply chain management. Responsibility for overall implementation lies with the Ministry of Infrastructure and the Environment, a federal body. This is supported by a number of other state bodies that have responsibility for implementation at regional and local government levels.

The method of implementation, as set out in the National Action Plan (published in 2003), is through the use of sustainable product criteria. This is underpinned by political, output-based targets for federal government and decentralized public sector administrations (Provinces, Municipalities, Water boards) and regular monitoring. The EU, (2016) further adds that legal framework removes barriers but does not mandate the use of these criteria. As of May 2013, criteria documents had been developed for 50 product groups.

In Kenya, public supply chain management is guided by the Public Procurement and Assets Disposal Act (2015). This law means to set up strategies for procurement and the disposal of unserviceable, out of date or surplus stores and equipment by public entities to accomplish the accompanying destinations: to augment economy and proficiency; to advance rivalry and guarantee that contenders are dealt with reasonably; to advance the uprightness and decency of those techniques; to build straightforwardness and responsibility in those systems; and to

expand public trust in those methods and to encourage the advancement of local industry and monetary improvement (RoK, 2015).

Although the law does not directly cite environmental conservation as one of its objectives, it is flexible enough to allow for green supply chain in that it maximizes economy and efficiency of the procuring entity. Be that as it may, as Witjes and Lozano (2016) note that Kenya, as one of the developing nations has been moderate in taking up organized and policy-driven way to deal with improving reception of green supply chain the advantages accruing in any case. The government has however put in place a wide range of policy, institutional and legislative to govern all business activities to ensure there is protection of the environment (Odhiambo, 2008). The Public Procurement and Disposal Act (PPDA) of 2005 and the Procurement Regulations of 2006, for instance has presented new benchmarks for public procurement in Kenya.

The competitive manufacturing environment is one that is rapidly changing as globalization and technology force organizations to constantly seek ongoing improvement in all areas in terms of their knowledge, flexibility and performance. According to a report by the Ministry of Industrialization Enterprise and Development during the Industrialization conference held at KICC Nairobi on 19 November 2013, food processing covers: foods, beverages, dairy, vegetable oil, grain milling, baking and confectionery, fruits and vegetables, meat and fish, honey, nuts, mushroom, etc. The report revealed that food sector constitute about a third of the manufacturing sector in Kenya and that the sector adds value to agricultural produce and therefore its success depends on efficient agriculture sector.

Statement of the Problem

Kenya has the most well-established food manufacturing industry in east Africa region. Compared with its neighbors, it has the highest number of food processing firms. However, a study by Muse et al., (2016) gave evidence of how local food processing firms are struggling in terms of performance. In Kenya food processing firms contributed to seven percent of Kenya GDP in 2017 (Bundervoet, Maiyo & Sanghi, 2019). Ngamau (2018) observed that food processing firms in some countries in Africa especially in south Africa, Egypt, Namibia and Morocco contributed 19%, 18%, 21% and 22% percent respectively towards their countries 'GDP which was attributed to ability to embrace green supply chain management.

In today's global business environment, businesses are facing increased competitive, regulatory and community pressures and also increased pressure for environmental sustainability, which requires strategies to be put in place to reduce the environmental impacts caused by the products and services offered and as customers become more aware of environmental issues, there is an increase in the demand for ecological products (David & Muthini, 2019). Whereas, this increased awareness of and sensitivity towards environmental issues place certain demands on business functions to become greener little is known regarding how going green impact organizational performance (Mwirigi, 2017).

In Kenya, studies such as Okello and Were (2014), Gichuru, Iravo and Arani. (2015) did not explore the contributions of green supply chain management practices that include green manufacturing technology, green procurement practice, green distribution, and green raw material role in organizational performance of food processing firms in Kenya. It is against this background this study sought to investigate the role of green supply chain management practices towards organizational performance of food processing firms in Nairobi County, Kenya.

Specific Objectives

1. To ascertain the role of technology towards organizational performance of food processing firms in Nairobi County.

LITERATURE REVIEW

Theoretical Review

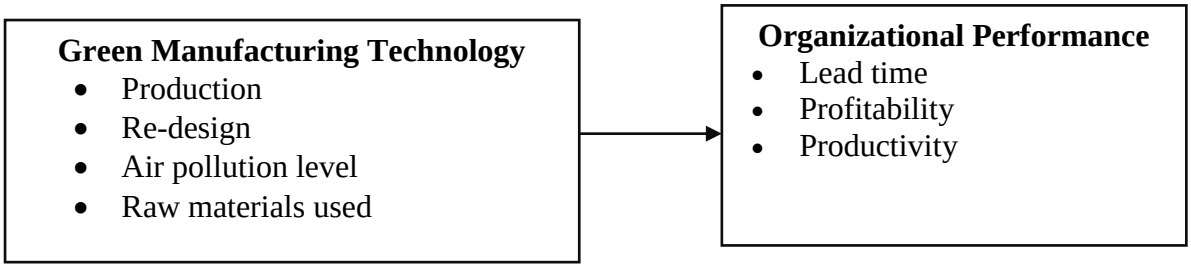
Theory of Innovation

This theory is attributed to Schumpeter (1934, 1939, 1943). The theory had low status until end of 1970s. The economic depression of the 1970s and the subsequent boom lead to the conclusion that innovations are the determinants responsible for most growth when an economic boom begins in a period of depression (Freeman, 1974). Earlier on, Schumpeter (1943) had credited benefit to dynamic changes coming about because of a development. To begin with he takes an industrialist shut economy which is in a stationary balance. This harmony is portrayed by what Schumpeter calls a "roundabout stream" which keeps on rehashing itself for ever. In such a static state, there is superbly focused balance. The cost of every item just equivalents its cost of creation and there is no benefit.

Just exogenous elements like climate conditions can cause changes in the roundabout stream position. In the roundabout stream position products are being delivered at a steady rate. This normal work is being performed by the salaried directors. The business visionary exasperates the channels of this roundabout stream by the presentation of an advancement. In this way Schumpeter doles out the part of a trailblazer not to the industrialist but rather to the business person. He underscores making new esteem creating exercises as a method for scanning for higher benefits from development. Such esteem age can be tapped from selection of the green condition.

Sundbo (1998) argues that innovations are important to the national economy during periods of depression. He adds that it is also important to individual organizations because it portends potential for expansion and future profits. Being innovative includes adopting issues of current global concern in to business processes in a manner that gets the business competitive advantage (Porters, 1989). According to Wanjohi (2016) the current global concern is climate change and its effects to human lives and livelihoods. Well managed organizations are innovatively adopting the green environment in their processes to gain competitive advantage and improve organizational performance. This theory supports green manufacturing technology variable in this study.

Conceptual Framework



Green Manufacturing Technology

As indicated by Sahay and Mohan (2003), the effects of procedures utilized as a part of manufacturing products and services likewise fluctuate. Manufacturing procedures may contrast in the productivity of information utilization, the sum and sort of waste created and

ecological impacts on biological systems and human wellbeing. Such effects might be decreased by manufacturers through different means, running from upgrades concentrating on singular factors, for example, amounts and sources of energy utilized, to coordinated methodologies, for example, lean manufacturing strategies, which intend to diminish waste and enhance proficiency all through the manufacturing procedure. Seeking after the green manufacturing of products is extremely useful in the lightening of ecological pressures. Green manufacturing is a manufacturing mode intended to limit the natural effect in the manufacturing procedures of products (Dornfeld, 2014), and the reception of green manufacturing lessens waste and contamination (Digalwar, Tagalpallewar & Sunnapwar, 2013).

Environmentally capable manufacturing forms, GSCM practices, and their numerous related standards have turned out to be critical techniques for organizations to accomplish profit and increase share of the market by bringing down their natural effect and improving productivity. Manufacturing procedures have been impacted by natural prerequisites (Gmelin & Seuring, 2014). Factors, for example, impediment of raw material, consumption of common resources and worries about the transfer of technological waste, related with worries about maintainability, have constrained organizations to audit their manufacturing methodologies. Another factor is the development of a corporate image, which can be influenced by poor performance in ecological and supportability angles (Zhu & Peng, 2012).

Organizational Performance

Organizational performance refers to how well an organization achieves its market oriented goals as well as its financial goals (Holt & Ghobadian, 2014). The short-term objectives of green supply chain management practices are primarily to increase productivity and reduce inventory and cycle time, while long-term objectives are to increase market share and profits for all members of the supply chain in addition to protecting the environment. Financial metrics have served as a tool for comparing organizations and evaluating an organization's behavior over time (Hsu & Hu, 2017).

Any organizational initiative, including supply chain management, should ultimately lead to enhanced organizational performance. A number of prior studies have measured organizational performance using both financial and market criteria, including return on investment (ROI), market share, profit margin on sales, the growth of ROI, the growth of sales, the growth of market share, and overall competitive position represented by constructs like, Price/Cost. "The ability of an organization to compete against major competitors based on low price" (Li, 2006).Quality. "The ability of an organization to offer product quality and performance that creates higher value for customers", delivery dependability. The ability of an organization to provide on time the type and volume of product required by customer(s) (Li et al, 2006), Product Innovation. The ability of an organization to introduce new products and features in the market place and Time to Market. "The ability of an organization to introduce new products faster than major competitors" (Kamau, 2017).

Empirical Review

Shaukat and Naz (2013) did a study on effects of innovation types on firm performance with special focus on Pakistan's manufacturing sector. The study applied linear regression analysis to analyze the effects of four dimensions of innovation on four dimensions of organizational performance. A total of 250 manufacturing companies were selected from 9 manufacturing sectors. The results indicated that innovative performance brought about major variation in production performance as compared with marketing performance. The significant adjusted R

depicted that innovative performance explained 77.9% & 5.7% of the variance in production and market performance respectively. The results indicated a positive effect of innovation types on firm performance. Although the study is informative to the current study the study failed to address the relationship between green manufacturing technology and firm performance.

Sezen and Cankaya (2013) carried out a study on effects of green manufacturing and eco-innovation on sustainability performance, investigated the influence of green manufacturing and eco-innovation on corporate sustainability performance (economic, environmental, and social). Their results indicated that the green manufacturing applications have a significant positive impact on performance and social performance. Additionally, eco-process innovation has a significant positive impact on corporate sustainability. However, eco-product innovation was not found to have a significant effect on any of the three types of performance. Regression analysis results indicated that eco-process innovation dimensions have significant effect on the three dimensions of the corporate sustainability performance. Their argument was that Green manufacturing can lead to lower expenditure on raw material, production efficiency gains, reduced environmental and occupational safety expenses, and improved corporate image.

Lau, Tang, and Yam (2010) carried out a study on the effects of supplier and customer integration on product innovation and performance: assessing the moderating effect of novelty-centered and efficiency centered business model design, novelty-centered and efficiency-centered business model design themes all play a moderating effect on the relationship between green product innovation and firm performance, while a fit between green product innovation and novelty-centered design theme is better for firm performance. They established that interaction was significant (ß = 0.177, $P < 0.05$); moreover, the adjusted R2 of model (4) is also higher than that of model (3), indicating that novelty-centered design theme plays a moderating role. As such, green research and design was found to affect firm performance.

RESEARCH METHODOLOGY

This study adopted a descriptive research design in view of the research problem highlighted earlier and research philosophy adopted. The target population for this study comprised of the 103 firms in food processing sector licensed by the Nairobi City Council located in Nairobi which have been in business for over three years with focus on general managers or operations manager of the firms. The firms formed the study unit of analysis while the target respondents were the unit of observation. To obtain a sample size that has an adequate size relative to the goals of the study, the researcher adopted Yamane's formula to obtain a sample size of 58 respondents.

Questionnaires allow greater uniformity in the way questions are asked, ensuring greater compatibility in responses. Data collected was quantitative in nature. Quantitative data was analyzed by descriptive analysis. The descriptive statistical tools such as SPSS and MS Excel helped the researcher to describe the data and determine the extent used. The findings were presented using tables. To quantify the strength of the relationship between the variables, the researcher used regression model

ANALYSIS AND INTERPRETATION OF DATA

The researcher sampled 58 respondents who were each administered with the questionnaires. From the 58 questionnaires 55 were completely filled and returned hence a response rate of

94.8%. The response rate was considered as suitable for making inferences from the data collected.

Descriptive Statistics Analysis

Green Manufacturing Technology and Organizational Performance

The first specific objective of the study was to ascertain the role of green manufacturing technology towards organizational performance of food processing firms in Nairobi County. The respondents were requested to indicate their level of agreement on various statements relating to green manufacturing technology and organizational performance of food processing firms in Nairobi County. A 5 point Likert scale was used where 1 symbolized strongly disagree, 2 symbolized disagree, 3 symbolized neutral, 4 symbolized agree and 5 symbolized strongly agree. The results were as presented in Table 1

From the results, the respondents agreed that the firm employ technologies that facilitate exit of hazardous production. This is supported by a mean of 4.030 (std. dv = 0.972). In addition, as shown by a mean of 4.012 (std. dv = 1.005), the respondents agreed that technology in their firm enables re-designing of products to conform to green. Further, the respondents agreed that technology in their firm helps reduce air pollution during manufacturing. This is shown by a mean of 4.002 (std. dv = 0.608). The respondents also agreed that this firm utilizes more electronic business processes and work methods. This is shown by a mean of 3.989 (std. dv = 0.786).

With a mean of 3.987 (std. dv = 0.675), the respondents agreed that this firm finds cheaper ways to communicate (e.g. store information in computer databases and centralize ICT systems) to decrease cost. From the results, the respondents agreed that the firm get up-to-date information about new environmentally friendly technology. This is supported by a mean of 3.978 (std. dv = 0.975). In addition, as shown by a mean of 3.958 (std. dv = 0.636), the respondents agreed that the use of green manufacturing technology in procured items is very important to the organization. Further, the respondents agreed that the firm has an integrated holistic eco-information system. This is shown by a mean of 3.854 (std. dv = 0.897).

With a mean of 3.876 (std. dv = 0.786), the respondents agreed that the firm implements a recycling policy without an additional capital outlay. From the results, the respondents agreed that the firm uses advanced cutting edge technology to move to a paperless administrative environment. This is supported by a mean of 3.864 (std. dv = 0.982). In addition, as shown by a mean of 3.751 (std. dv = 0.896), the respondents agreed that in the firm they have developed more effective environmental auditing systems. Further, the respondents agreed that the technology in their firm helps reduce use of toxic materials. This is shown by a mean of 3.673 (std. dv = 0.983).

Table 1: Green Manufacturing Technology and Organizational Performance

	Mean	Std. Deviation
The use of green manufacturing technology in procured items is very important to the organization	3.958	0.636
The firm employ technologies that facilitate exit of hazardous production	4.030	0.972
Technology in my firm enables re-designing of products to conform to green	4.012	1.005
Technology in my firm helps reduce air pollution during manufacturing	4.002	0.608
Technology in my firm helps reduce use of toxic materials	3.673	0.983
Implement a recycling policy without an additional capital outlay	3.876	0.786
In this firm we have developed more effective environmental auditing systems	3.751	0.896
This firm uses advanced cutting edge technology to move to a paperless administrative environment.	3.864	0.982
This firm utilizes more electronic business processes and work methods	3.989	0.786
This firm finds cheaper ways to communicate (e.g. store information in computer databases and centralize ICT systems) to decrease cost.	3.987	0.675
This firm se an integrated holistic eco-information system.	3.854	0.897
The firm get up-to-date information about new environmentally friendly technology.	3.978	0.975
Aggregate	3.998	0.873

Organizational Performance of Food Processing Firms

The respondents were requested to indicate their level of agreement on various statements relating to organizational performance of food processing firms in Nairobi County. A 5 point Likert scale was used where 1 symbolized strongly disagree, 2 symbolized disagree, 3 symbolized neutral, 4 symbolized agree and 5 symbolized strongly agree. The results were as presented in Table 2.

From the results, the respondents agreed that they are satisfied with performance of their organization over the past few years. This is supported by a mean of 3.958 (std. dv = 0.636). In addition, as shown by a mean of 3.915 (std. dv = 0.776), the respondents agreed that the profitability of their organization has been improving over the years. Further, the respondents agreed that the market share of their organization has been improving over the years. This is shown by a mean of 3.752 (std. dv = 0.608). The respondents also agreed that there are few customer complaints relating to the quality of their products. This is shown by a mean of 3.612 (std. dv = 1.005). With a mean of 3.610 (std. dv = 0.972), the respondents agreed that customer satisfaction in their organization has improved.

Table 2 Organizational Performance of Food Processing Firms

	Mean	Std. Deviation
The profitability of our organization has been improving over the years	3.915	0.776
Am satisfied with performance of our organization over the past few years	3.958	0.636
Customer satisfaction in our organization has improved	3.610	0.972
There are few customer complaints relating to the quality of our products	3.612	1.005
The market share of our organization has been improving over the years	3.752	0.608
Aggregate	3.854	0.786

Inferential Statistics

Correlation Analysis

This research adopted Pearson correlation analysis determine how the dependent variable (organizational performance of food processing firms in Nairobi County) relates with the independent variables (green manufacturing technology, green procurement practice, green distribution and green inventory management). The findings were as depicted in Table 4.7.

From the results, there was a very strong relationship between green manufacturing technology and the organizational performance of food processing firms in Nairobi County (r = 0.811, p value =0.000). The relationship was significant since the p value 0.000 was less than 0.05 (significant level). The findings are in line with the findings of Simiyu (2018) who indicated that there is a very strong relationship between green manufacturing technology and organization performance.

Table 1: Correlation Coefficients

		Organization Performance	Green Manufacturing Technology
Organization Performance	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	55	
Green Manufacturing Technology	Pearson Correlation	.811**	1
	Sig. (2-tailed)	.000	
	N	55	55

Regression Analysis

Multivariate regression analysis was used to assess the relationship between independent variables (green manufacturing technology, green procurement practice, green distribution and green inventory management) and the dependent variable (organizational performance of food processing firms in Nairobi County).

The model summary was used to explain the variation in the dependent variable that could be explained by the independent variables. The r-squared for the relationship between the independent variables and the dependent variable was 0.851. This implied that 85.1% of the variation in the dependent variable (organizational performance of food processing firms in Nairobi County) could be explained by independent variables (green manufacturing technology, green procurement practice, green distribution and green inventory management).

Table 2: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.923[a]	.851	.853	.10482

The ANOVA was used to determine whether the model was a good fit for the data. F calculated was 349.41 while the F critical was 2.557. The p value was 0.002. Since the F-calculated was greater than the F-critical and the p value 0.002 was less than 0.05, the model was considered as a good fit for the data. Therefore, the model can be used to predict the influence of green manufacturing technology, green procurement practice, green distribution and green inventory management on organizational performance of food processing firms in Nairobi County.

Table 5 Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
2	Regression	102.028	4	25.507	349.41	.002[b]
	Residual	3.668	50	.073		
	Total	105.695	54			

a. Dependent Variable: Organization Performance

b. Predictors: (Constant), green manufacturing technology, green procurement practice, green distribution and green inventory management.

The regression model was as follows:

$Y = 0.342 + 0.397X_1 + \varepsilon$

According to the results, green manufacturing technology has a significant effect on the organizational performance of food processing firms in Nairobi County β_1=0.397, p value= 0.000). The relationship was considered significant since the p value 0.000 was less than the significant level of 0.05. The findings are in line with the findings of Simiyu (2018) who indicated that there is a very strong relationship between green manufacturing technology and organization performance.

Table 6: Regression Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.342	0.089		3.843	0.002
Green Manufacturing Technology	0.397	0.097	0.398	4.093	0.000

Conclusions

The study concludes that green manufacturing technology has a positive and significant effect on organizational performance of food processing firms in Nairobi County. Findings revealed that exit hazardous production, re-design products to conform to green, avoid air pollution during manufacturing and avoid use of toxic materials influence organizational performance of food processing firms in Nairobi County.

Recommendations

The study found that green manufacturing technology has a positive and significant effect on organizational performance of food processing firms in Nairobi County. This study therefore

recommends that the management of food processing firms should formulate and implement effective strategies to embrace green manufacturing technology.

Suggestions for Further Studies

This study focused on investigating the role of green supply chain management practices towards organizational performance of food processing firms in Nairobi County, Kenya. Having been limited to food processing firms in Nairobi County, Kenya, the findings of this study cannot be generalized to other firms in Kenya. The study therefore suggests further studies on the role of green supply chain management practices towards organizational performance of other firms in Nairobi County, Kenya.

Further, the study found that the independent variables (green manufacturing technology, green procurement practice, green distribution and green inventory management) could only explain 86.1% of organizational performance of food processing firms in Nairobi County. This study therefore suggests research on other factors affecting the performance of food processing firms in Nairobi County.

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