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## Effect of Green Supply Chain Practices on the Performance of Building, Mining and Construction Firms in Kenya

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### **Abstract:**

*This research was a cross-sectional study that explores to establish the effect of Green Supply Chain Practices on the Performance of building, mining and construction firms in Kenya. Specific objectives of the study are eco-design and eco-labelling, green manufacturing, green procurement and reverse logistics. The theoretical framework of this work includes theories such as the theory of green operations, institutional theory, and the game theory. This study adopted a cross sectional survey design. The study used a structured questionnaire. The data was analyzed with the aid of Statistical Package for Social Sciences SPSS version 23. Descriptive statistics was presented in the form of frequency tables, and percentages. The inferential statistics includes Pearson's correlation and regression analysis. The study findings indicated that eco-design & eco labelling, green manufacturing, green procurement and reverse logistics have a positive and significant association with the performance of building, mining and construction firms in Kenya. This implies that green supply chain practices and performance change in the same direction. The study found out that building, mining and construction Firms in Kenya have embraced green supply chain practices for effective performance. The study recommended: that it would be appropriate for building, mining and construction firms in Kenya to embrace eco-design & eco labelling, green manufacturing, green procurement and reverse logistics as green supply chain practices; that the government has a role to play in ensuring successful implementation of the green supply chain in organizations by coming up with appropriate measures that will encourage the manufacturers and other organization to adopt the green supply chain practice; that the effectiveness of green supply chain practices should be advocated to ensure sustainability of not only the current generation but the future generation. Further, there should be adequate supply of people who are educated in the philosophy of green supply chain practices to improve the performance of the firm. Moreover, building, mining and construction firms in Kenya to need to invest more on green supply chain practices for sustainable manufacturing. Firms should emphasize on suppliers to have ISO 14001, use life cycle assessment to evaluate environmental load, cooperate with suppliers to standardize packaging and process returned merchandise to improve their performance. Finally, the adoption of reverse logistics as a management strategy will boost performance of building, mining and construction firms in Kenya.*

**Keywords:** Performance, Eco-design & Eco-label, Green manufacturing, Green procurement, Reverse Logistics and building, mining and construction firms In Kenya

### **1. Introduction**

Manufacturing alludes to the way toward changing raw materials, segments, or parts into finished stock with help machines for use or deal reason. Green Supply Chain Management (GSCM) is acquiring recognition among firms and supply chain networks. Globalization instigates ventures to execute the GSCM practices to be skilled in the worldwide market; it additionally gives freedoms to makers to send out (Semen et al., 2012). GSCM rehearses additionally stretch out to the whole worth chain from supplier to customer when associations educate purchasers regarding approaches to lessen their effects on the indigenous habitat (Handfield et al., 2008; Miemczyk et al., 2012). Organizations that buy contributions from a particular supplier likewise obtain squander from every supplier up the supply chain. These qualifications are fundamental since organizations that embrace GSCM rehearses assess the ecological effects of their first-level suppliers (Handfield et al., 2008). The pressing factor and drive going with globalization have incited ventures to improve their natural presentation (Zhu and Sarkis, 2016). Subsequently, organizations have shown developing worry for the climate in the course of recent years (Sheu et al., 2015).

The pressure on corporations to improve the environmental performance comes from globalization rather than localization (Sarkis&Tamarkin, 2013). Increasing environmental concern has gradually become part of the overall corporate culture and, in turn, has helped to re-engineer the strategies of corporations (Madu&Madu, 2012). Globalization provides opportunities for business extension simultaneously it introduces the challenge of GSCM implementation to

reduce emissions from the industries. Different drivers influenced industries to initiate green practices as a result of environmental concerns become a part of the industrial culture which helped industries to reformulate their strategies (Madu&Madu, 2012). Currently, enterprises are practicing GSCM or initiating GSCM practices in their operation.

Companies are concerned about corporate image and hence they are paying key attention on matters concerning environment. This is partly because environmental issues are becoming a source of competitive parity, (Blome, Holos&Paulraj, 2014). Consequently, there has been need to reconsider the role of green procurement. There has been increased pressure from diverse stakeholders, compelling firms to consider sustainability and address environmental concerns across their business processes as well as value chains. This has compelled the firms to engage in a number of green procurement practices in their procurement functions. This has had a positive impact on prevention of pollution. Procurement, being a boundary spanning department has been blamed on negative environmental impact, through both upstream and downstream environmental pollution, high energy consumption, emissions, and lack of eco-efficiency. Consequently, focal firms are synchronizing demands to demanding green products, increasing their environmental performance and collaboration with suppliers to improve green performance (Blome, Holos&Paulraj, 2014).

### *1.1. Statement of the Problem*

Manufacturing is one of the key drivers of economies globally. According to United Nations Environment Program (UNEP, 2011), the GDP of developing countries have doubled in the last decade. In 2019, the construction, mining and quarry industry contributed 5.6% and 0.7% of Kenya's GDP respectively. The construction industry grew at a Compounded Annual Growth Rate (CAGR) of 13.8% from USD 3.1 billion in 2015 to USD 5.2 billion in 2019 (KNBS). Increased spending by the Government on capital projects such as extension of the Standard Gauge Railway (SGR) line from Nairobi to Naivasha and expansion of the road network across the country drove this growth. (KAM, 2020).

UNEP reports that manufacturing has had a large impact on both economy and environment. Specifically, manufacturing is responsible for about 35% of global electric use and contributes to about 20% of CO<sub>2</sub> emissions. Along with extractive industries, manufacturing firms' accounts for 23% of employment globally and also accounts for about 17% of air pollution associated health damages. (UNEP, 2018) also records those damages associated to air pollution ranges between 1% - 5% of the Gross Domestic Product (GDP) globally. This cost of air pollution is projected to exhibit an upward trajectory and increase in three-fold by the year 2030. Given these facts, manufacturing firms are committing to decoupling environmental pressures emanating from economic growth. As such, they are embracing green supply chains that are way different from the traditional and convectional supply chains and seeks to reduce the natural resources required to assemble a finished product through energy efficient productions, material efficiency, and also aims at reducing negative externalities associated with pollution and waste.

A Kenyan Economic Survey (2015) indicates that the Kenyan economy is highly dependent on climate sensitive sectors such as agriculture, manufacturing, energy, water and health. The study further notes that the country has been hard hit by climatic hazards that have resulted into economic losses estimated at about 3% of the country's Gross Domestic Product. Additionally, although Kenya has one of the most dynamic and diversified economies, it faces a number of challenges ranging from economic to social and environmental challenges (Tumpa, 2019). Specifically, concerns about environmental degradation and sustainable development have been on an upward trend as the economy has become highly dependent on exploitation of natural resources. The specific environmental degradations include; over-exploration, industrial pollution, deforestation, desertification, loss of biodiversity, and water scarcity (Tumpa, 2019).

Undoubtedly, there has been consensus among policy makers, community and scholars that environmental pollution has an inevitable effect on the economic growth. As such, manufacturing firms are laid back on addressing the issue of pollution. However, the Government of Kenya has intervened to address the issue of environmental degradation in view of building a climate smart middle-income economy by 2030. This intervention has compelled most of manufacturing firms to reconsider their stand on the control of environmental degradation. Specifically, the government intervention has compelled manufacturing industries to reconsider their waste management, waste handling and pollution control across the entire product life cycle comprising of procurement, transportation, sorting fraction recovery and disposal stages. This study aims at establishing the effect of green supply chain management practices on the performance of building, Mining and construction firms in Kenya.

### *1.2. Objectives of the Study*

#### 1.2.1. General Objectives of the Study

To determine the effects of Green Supply Chain Practices on the Performance of building, Mining and construction firms in Kenya.

#### 1.2.2. Specific Objectives

- To determine the effect of Eco-design and Eco-labelling on performance of building, Mining and construction firms in Kenya
- To assess the effect of green manufacturing on performance of building, Mining and construction firms in Kenya
- To establish the effect of green procurement on performance of building, Mining and construction firms in Kenya
- To evaluate the effect of reverse logistics on performance of building, Mining and construction firms in Kenya.

### 1.3. Significance of the Study

This research was helpful to the management of Building; mining and construction firms in Kenya as it come up with findings on the role of Green SC practices on SCM. This study quantified the effects of green supply chain practices on the performance of Building, mining and construction firms in Kenya. This research provided valuable insights into the effects of GSCM practices in Building, mining and construction firms.

The findings of this study were relevant to other firms in different sectors of the economy as the findings from this study were inferred to their companies. This research assisted the manufacturing industry to become more aware of integrating GSCM concept with their business processes. The management was position to identify the GSCM practices that improved the company's business performance and even mobilize their R&D department to research on production of environmentally sustainable products.

This research come up with recommendations on how the government and its agencies, going forward, need to invest on regarding laws, regulations and policy frameworks and guidelines to further foster green practices in the state. This study also assisted the government to identify the loopholes in the existing environmental laws and regulations hence making better policies on environmental concern. The government also come up with infrastructure to handle the disposal of wastes.

This research work contributed to the existing body of knowledge in the green supply chain; other academicians can use this for further research. Further, this study gave academicians a greater understanding of green supply chain management practices and the concept of sustainability in supply chain management. Also, it added to the existing literature and body of knowledge on outsourcing and performance.

This research work was necessary to KAM who are significant stakeholder regarding sustainable manufacturing and processing. The society at large was sensitized on the importance of conserving the environment for future. This enabled them to have more concern on buying products that are environmentally friendly.

### 1.4. Conceptual Framework

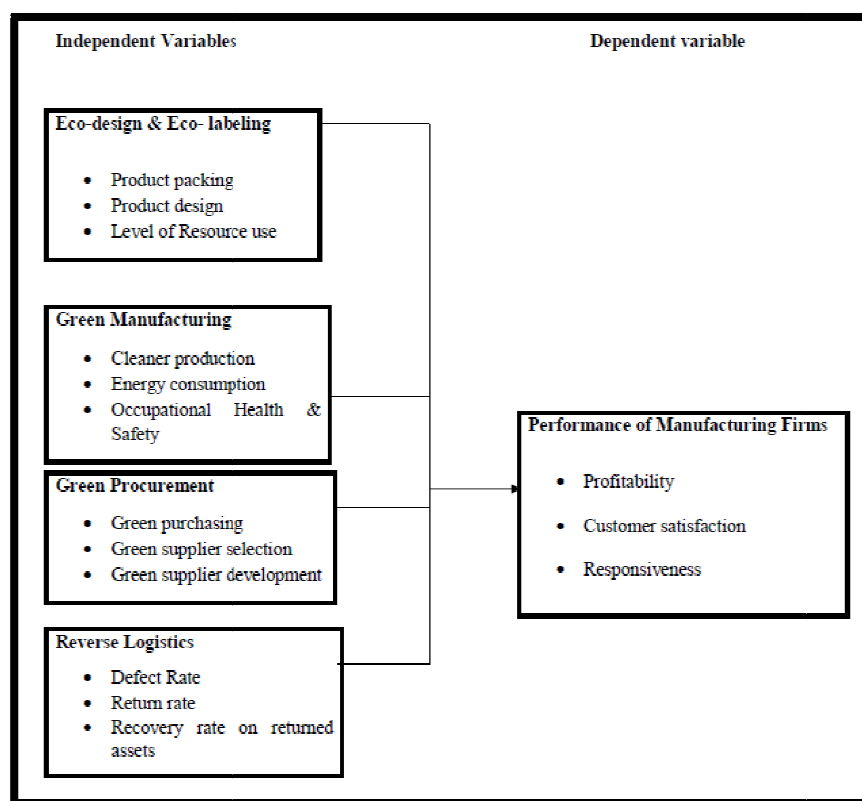


Figure 1: Conceptual Framework

## 2. Data and Methodology

### 2.1. Research Design

In this research cross sectional survey design was employed.

### 2.2. Target Population

Target population for this study was employees working in procurement, transport and logistics, customer service and quality management departments across the registered 54 building, mining and construction firms in Kenya (KAM, 2020).

### 2.3. Sampling and Sampling Technique

The sample size of this study was 192 employees working in procurement, transport and logistics, customer service and quality management departments across the registered 54 building, mining and construction firms in Kenya.

### 2.4. Sample Size Formula

This study adopted purposive sampling technique. The sample size was procedurally selected using (Yamane, 1967) formula. This formula was preferred in this study because of its simplicity in usage, scientific and applicability in large populations. (Yamane, 1967)

$$n = \frac{N}{1 + N(e)^2}$$

$$n = \frac{54}{1 + 54(0.05)^2} = 48 \text{ companies}$$

Where:

n= Sample Size

N=Population

e=Margin of error

Therefore, the sample size was  $48 \times 4 = 192$  employees

CATEGORY	No of Companies	No of Respondents	No. of Questionnaires
Procurement managers	48	1	48
Transport and Logistics managers	48	1	48
Customer service officers	48	1	48
Quality management officers	48	1	48
TOTAL		4	192

Table 1: Sample Size

### 2.5. Data Collection Instruments

This study used primary data that was collected by use of a structured questionnaire. A questionnaire is a data collection instrument in which each person is asked to respond to the same set of questions in a predetermined order (deVaus, 2012). Structured questionnaire was the main tool for collecting data and was guided by the objectives of the study, data to be collected and time available. The questionnaire was in form of Likert scale where respondents were required to indicate their views on the scale of 1 to 5 where 1 is strongly agree, 2 is mildly agree, 3 is neither agree nor disagree, 4 is mildly disagree and 5 strongly disagree. This data collection tool was chosen because it allows the respondents to express their views more clearly and openly. The questionnaire was administered through a drop and pick method and it consisted of six sections; section A: general information, section B: Eco design and eco labels, section C: Green Manufacturing, Section D: green procurement, Section E: Reverse logistics, section F: Performance of the building, mining and construction Firms in Kenya.

### 2.6. Pilot Test

The aim of pilot study was to establish the accuracy and appropriateness of the research design and instrumentation (Saunders, Lewis & Thornhill, 2009). Cooper and Schindler, (2006) concurs that the purpose of pilot testing is to detect weakness in design and implementation to provide proxy for data collection of a probability sample. Sekaran, (2008) reinforces that pilot test is necessary for testing the reliability of instruments and validity of the study. Cooper and Schindler, (2011) concurs that Pilot test should constitute 10 percent of the sample used in data collection. Therefore, the data collection instruments were pilot tested in 5 Building, mining and construction firms in Kenya with a total of 20 respondents involved. The selection of the 5 Building, mining and construction firms for pilot testing was informed by the fact that they possess homogenous characteristics with other Building, mining and construction firms in the industry. Data obtained in pilot study was exempted for analysis and presentation.

#### 2.6.1. Validity of the Research Instruments

From data obtained from the pilot study, an analysis was undertaken for which validity was ascertained to determine if the variables met the threshold. Construct validity was undertaken through the help of the supply chain practitioners and the research supervisor.

#### 2.6.2. Reliability of the Research Instruments

Internal consistency was measured using the statistic Cronbach's coefficient Alpha. Cronbach's alpha is a measure of internal consistency; that is, how closely related a set of items are as a group (Eisinga & Pelzer, 2013). This study adopted Cronbach's alpha internal consistency level of  $\geq 0.7$ .

### 2.7. Data Processing and Analysis

Data analysis is the processing of data collected to make meaningful information out of them (Saunders, Lewis & Thornhill, 2009). Upon obtaining data from the field, through questionnaires, it will be coded and keyed in using SPSS (version 20). Before processing the responses, the completed questionnaires were edited for completeness and consistency. Descriptive statistics analysis methods such as the use of frequency distribution, frequency tables, pie charts, and percentages were used to analyze quantitative data. The inferential statistics included Pearson's correlation and regression analysis; the dependent variable was correlated with the independent variables to show the relationship between the variables. To establish statistical significance, of the independent variables, on the dependent variable, multivariate ordinary least squares regression was employed. The regression equation adopted the following form;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$$

Where Y= Performance of building, mining and construction Firms

X1= Eco-Design & Eco-Labeling

X2= Green Manufacturing

X3= Green Procurement

X4= Reverse Logistics

In the model,  $\beta_0$  = the constant term while the coefficient  $\beta_i$  = 1...4 was used to measure the sensitivity of the dependent variables to unit change in the predictor variables.  $\epsilon$  is the error term which captures the unexplained variations in the model.

## 3. Results and Discussion

### 3.1. Pilot Study Results

With a view of validating the research instrument, twenty questionnaires were issued to respondents across five registered building, mining and construction firms in Kenya. The respondents were controlled from participating in the actual study. Pilot test was carried out to evaluate the reliability of the data collection instrument. The pilot study findings are as described below.

S/No.	Variable	Cronbach Alpha	No of Items
1	Eco Labelling	.808	8
2	Green Manufacturing	.826	8
3	Green Procurement	.817	7
4	Reverse Logistics	.831	5
5	Performance...	.799	4

Table 2: Pilot Study Results

Nunnally & Bernstein (1994) suggested that a value of .70 or higher for Cronbach's alpha demonstrates satisfactory internal consistency and reliability of the instrument, values substantially lower indicate an unreliable scale. Moreover, it should not be assumed that a very high value of alpha is always a good thing (Taber, 2018). All the variables of the study were qualified since they met the required threshold of  $\geq 0.7$ . This result explained that the research instrument is acceptable and reliable in measuring the respond. From these findings, the data collection instrument is reliable.

### 3.2. Response Rate

The number of questionnaires that were administered was 192. A total of 172 questionnaires were filled and returned. This represented an overall successful response rate of 90% as shown on Table 4.1. This agrees with Babbie, (2004) who asserted that return rates of 50% are acceptable to analyse and publish, 60% is good and 70% is very good. Based on this assertion 90% response rate is adequate for the study.

Particulars	Frequency	Percent
Returned	172	90%
Unreturned	20	10%
Total	192	100

Table 3: Response Rate

### 3.3. Demographic Information

#### 3.3.1. Respondent's Position

As stated in the scope of the study, the study was undertaken in the 54 registered building, mining and construction firms in Kenya where the respondents were spread across the following department's procurement department, Transport and logistics department, customer service department and quality assurance department in all

the registered building, mining and construction in Kenya. The table below summarizes the list of respondents where 92% of the respondents indicated their respective department while 8% didn't.

The study endeavored to obtain demographic characteristics of the respondents and as shown on table 4.3, the first specific characteristic was their work designation in their company. Respondents who were procurement managers formed the majority of the respondents at 55% (95 respondents). Customer service managers were represented by 20% (34 respondents), Fleet Managers were represented by 17% (30 respondents) quality assurance managers formed a constituent of 8% (13 respondents). With this respondents' composition, the respondents were able to familiarize with various specific supply chain terminologies used in the research tool and respond appropriately.

Position	Frequency	Percent
Procurement manager	95	55%
Fleet Manager	30	17%
Customer service manager	34	20%
quality assurance manager	13	8%
Total	172	100

Table 4: Respondent's Position

### 3.3.2. Respondents' Level of Education

The respondents were asked to indicate their highest level of education. Results in table 4.3 reveal that 56.9% of the respondents had attained bachelor's degree, 21.6% had Masters Degrees, 13.9% had Diploma, 7.6% had doctorate while 0% had KSCE. The results imply that all the respondents were knowledgeable and that their education level was sufficient for effective performance. The results further imply that all the employees were in a position to understand the operations of the firms.

Department	Frequency	Percent
KSCE	0	0%
Diploma	24	13.9%
Degree	98	56.9%
Masters	37	21.6%
PhD	13	7.6%
Total	172	100

Table 5: Respondents' Level of Education

### 3.3.3. Respondents as Per the Period Worked in the Firm

The respondents were asked to indicate the number of years they have worked in the organization. Results in table 4.4 reveal that majority (49.4%) of the respondents indicated 16- 20 years and more than 20 years, 31.3% indicated 11 to 15 years while 13.4% indicated 6 to 10 years and 5.9% of the respondents indicated 0-5 years respectively. This implies that majority of the building, mining and construction firms have been in operation long enough. As such, the firms are expected have sufficient information about green supply chain.

Period	Frequency	Percent
0-5 years	10	5.9%
6-10 years	23	13.4%
11-15 years	54	31.3%
16-20 years	85	49.4%
Total	172	100

Table 6: Respondents as Per the Period Worked in the Firm

## 3.4. Descriptive Statistics for the Study Variables

### 3.4.1. Eco-design& Eco- labelling

Respondents were asked to state the extent to which they concurred to statement on the effect of Eco-design and Eco-labelling on performance of their firms in Kenya. Five-point Likert scale statement questions were set for which the responses are presented in the table 4.5

Likert scale of mean ( $\bar{x}$ =1 to 1.8 Strongly Disagree; 1.8 to 2.6 Disagree; 2.6 to 3.4 Undecided; 3.4 to 4.2 Agree; 4.2 to 5 Strongly Agree).the results show that most respondents strongly agreed with the assertion that firms design products and processes in consideration of the entire lifecycle of the product. ( $\bar{x}$ = 4.5814, SD= 0.57155). For the statement that you consider re- using and recycling the packages Majority of respondents strongly agreed ( $\bar{x}$ = 4.3314, SD= 0.53042). Most respondents agreed strongly with the statement that company has optimal manufacturing designs and product packing for eco-friendly production. ( $\bar{x}$ = 4.3023, SD= 0.62257). Respondents of ( $\bar{x}$ = 4.2384, SD= 0.79187) strongly agreed that they design products for reduced materials and energy consumption. A ( $\bar{x}$ = 4.1744, SD= 0.79017) of the respondents agreed that firm designs products, in consideration of characteristics such as functionality, product safety, comfort, efficiency, and aesthetics. A ( $\bar{x}$ = 4.1221, SD= 0.96862) of the respondents agreed that company provides the end customers with accurate

information concerning the environmental qualities of a product including information about the product lifecycle. Respondents of ( $\bar{x}$  = 4.0698, SD = 0.78421) agreed that our firm provides eco-labels for the product portfolio. Respondents of ( $\bar{x}$  = 4.0698, SD = 0.76915) agreed that our firm considers collection of used packages for proper disposal. Further, respondents of ( $\bar{x}$  = 3.9709, SD = .97589) agreed that firms consider downsize packaging.

Using a five-point scale Likert mean more than ( $\bar{x}$  = 4.2) it is clear that a major section of the respondents agreed strongly with the statements on eco-design & eco labelling. The findings of the study show that Eco-Design & Eco-labelling has a greater impact on the performance of building, mining and Construction firms in Kenya.

The finding corresponds to those of (Kipruto & Noor, 2018) who stated that Eco-design and Eco-labeling affect performance of manufacturing firms to a great extent. Eco-design and Eco-labeling are independent factor that influence performance of manufacturing firms.

<b>Eco-design&amp; Eco- labelling</b>	<b>Mean</b>	<b>Std. Deviation</b>
your firm designs products and processes in consideration of the entire lifecycle of the product	4.5814	.57155
Your firm designs products, in consideration of characteristics such as functionality, product safety, comfort, efficiency, and aesthetics	4.1744	.79017
Your company provides the end customers with accurate information concerning the environmental qualities of a product including information about the product lifecycle	4.1221	.96862
You provide eco-labels for the product portfolio	4.0698	.78421
You design products for reduced materials and energy consumption	4.2384	.79187
Your company has optimal manufacturing designs and product packing for eco-friendly production.	4.3023	.62257
you consider re- using and recycling the packages	4.3314	.53042
You consider downsize packaging	3.9709	.97589
You consider collection of used packages for proper disposal	4.0698	.76915

*Table 7: Descriptive Statistics for Eco Design and Labels*

#### 3.4.1.1. Respondent's Suggestions on the Role Eco- Design and Eco-Labels Practices

Table 3.7 shows the respondents suggestions on how the Eco-design and Eco-labels practice plays a role in performance of Building, mining and construction firms.

The table below show that majority of respondents suggested that Higher quality products, Happier consumers and Fewer emissions are among a key role played by Eco- design and Eco-labels practices to enhance performance with the following percentages 34%,42% and 24% respectively.

<b>Statements</b>	<b>Frequency</b>	<b>Percent %</b>
Higher quality products	57	34
Happier consumers	73	42
Fewer emissions	42	24
Total	172	100

*Table 8: Respondent's Suggestions on the Role Eco- Design and Eco-Labels Practices*

#### 3.4.2. Green Manufacturing

The study sought to determine the effect of green manufacturing on the performance of building, Mining and construction firms in Kenya. The obtained descriptive results of green manufacturing are summarized in the Table 9 below;

<b>Green Manufacturing</b>	<b>Mean</b>	<b>Std. Deviation</b>
Green Manufacturing Produce products that have packages which can be recycled	4.6221	.71097
Control power consumption in the products	4.2500	.83858
Green manufacturing results in overall minimization of overall output of waste	4.0581	1.11717
Your company uses machines or tools which consume less energy, water and fuel	4.3547	.73892
Replacing hazardous substances with that are environmentally friendly	4.2558	.70397
Your firm has occupational health and safety policy in place	4.2267	.81706
Your firm does risk assessment for energy and resource use	4.5523	.53272
you have got efficient processes to reduce solid waste, air emissions and conserve energy and maximize production out	4.5116	.60686
You have implemented environmental management system (EMS) to enhance environmental performance	4.4360	.78097

*Table 9: Descriptive Statistics for Green Manufacturing*

From the above table, the results show that most respondents strongly agreed with the assertion that Green Manufacturing Produce products that have packages which can be recycled. ( $\bar{x}$ = 4.6221, SD= 0.71097). For the statement that your firm does risk assessment for energy and resource use Majority of respondents strongly agreed ( $\bar{x}$ = 4.5523, SD= 0.53272). Most respondents agreed strongly with the statement you have got efficient processes to reduce solid waste, air emissions and conserve energy and maximize production out ( $\bar{x}$ = 4.5116, SD= 0.60686). Respondents of ( $\bar{x}$ = 4.4360, SD= 0.78097) strongly agreed that their firms have implemented environmental management system (EMS) to enhance environmental performance. A ( $\bar{x}$ = 4.3547, SD= 0.73892) of the respondents strongly agreed that their company uses machines or tools which consume less energy, water and fuel. A ( $\bar{x}$ = 4.2558, SD= 0.70397) of the respondents strongly agreed that their firms are replacing hazardous substances with that are environmentally friendly. Respondents of ( $\bar{x}$ = 4.2500, SD = 0.83858) strongly agreed that their Controls power consumption in the products. Respondents of ( $\bar{x}$ = 4.2267, SD = 0.81706) agreed strongly that firm has occupational health and safety policy in place. Further, respondents of ( $\bar{x}$ = 4.0581, SD = 1.11717) agreed that green manufacturing results in overall minimization of overall output of waste. Using a five-point scale Likert mean more than ( $\bar{x}$ = 4.2) it is clear that a major section of the respondents agreed strongly with the statements on green manufacturing. The findings of the study show that green manufacturing has a greater impact on the performance of building, mining and Construction firms in Kenya.

The results above indicate majority of respondents strongly agreed that building, mining and construction firms in Kenya practice green manufacturing. Therefore, the firms Produces products that have packages which can be recycled, firms do risk assessment for energy and resource use, firms have got efficient processes to reduce solid waste, air emissions and conserve energy and maximize production out, firms have occupational health and safety policy in place access and uses machines or tools which consume less energy, water and fuel. It was observed that the building, mining and construction sector have a goal of reducing and ultimately minimizing environmental impact while also trying to maximize resources efficiency (Korir, 2014).

#### 3.4.2.1. Respondent's Suggestions on the Role of Green Manufacturing Practices

Table 3.9 shows the respondents suggestions on how the green manufacturing practice plays a role in performance of Building, mining and construction firms.

The table below show that majority of respondents suggested that production efficiency, improve environmental and reduce environmental burdens are among a key role played by green manufacturing to enhance performance with the following percentages 28%,37% and 35% respectively.

Statements	Frequency	Percent %
Production efficiency	49	28
Improve environmental situation	63	37
Reduce environmental burdens	60	35
Total	172	100

Table 10: Respondent's Suggestions on the Role of Green Manufacturing Practices

#### 3.4.3. Green Procurement

The research aimed to determine the effect of green procurement on the performance of building, Mining and construction firms in Kenya. Five-point Likert scale statement questions were set for which the responses are presented in the table 4.10 below;

Green Procurement	Mean	Std. Deviation
Green Procurement You frequently select suppliers who use energy conservation	4.0756	1.07065
Your firm awards tenders/quotations to suppliers whose products are considered green based on environmental assessment	4.4709	.57661
your company recognizes the importance to include suppliers and purchasers in developing the environmental performance of the supply chain	4.0523	.88035
you cooperate with suppliers to jointly meet environmental objectives	4.1744	.68726
you select and develops suppliers who uses green materials	4.4302	.75766
Your firm has an elaborate supplier development program	4.1221	1.03854
Require suppliers to have ISO 14001	4.0581	1.04691
Evaluate Suppliers on specific environmental criteria	4.4884	.91440
You Conduct Environmental Audits Of Supply Base	4.3133	.70372

Table 11: Descriptive Statistics for Green Procurement

From the above table, clearly show that most respondents strongly agreed with the statement that their firm evaluates Suppliers on specific environmental criteria ( $\bar{x}$ = 4.4884, SD=0 .91440). For the statement that firm awards



tenders/quotations to suppliers whose products are considered green based on environmental assessment the respondents strongly agreed ( $\bar{x}$  = 4.4709, SD= 0.57661). Most respondents strongly agreed with the avowal that they select and develops suppliers who uses green materials ( $\bar{x}$  = 4.4302, SD= 0.75766). Respondents of ( $\bar{x}$  = 4.3133, SD= 0.70372) strongly agreed that their firms conduct Environmental audits of supply base. A ( $\bar{x}$  = 4.1744, SD= 0.68726) of the respondents agreed that their firms cooperate with suppliers to jointly meet environmental objectives. A ( $\bar{x}$  = 4.1221, SD= 1.03854) of the respondents agreed that firm has an elaborate supplier development program. A ( $\bar{x}$  = 4.0756, SD= 1.07065) of the respondents agreed that Green Procurement You frequently select suppliers who use energy conservation. A ( $\bar{x}$  = 4.0581, SD= 1.04691) of the respondents agreed that firms require suppliers to have ISO 14001. Further, A ( $\bar{x}$  = 4.0523, SD= 0.88035) of the respondents agreed that company recognizes the importance to include suppliers and purchasers in developing the environmental performance of the supply chain. Using a five-point scale Likert mean more than ( $\bar{x}$  = 4.2) it is clear that most respondents agreed with avowals about green procurement. It can be concluded from the findings that green procurement had a larger effect on the performance of building, mining and construction firms in Kenya.

The results indicated that majority of the respondents strongly agreed that green procurement is practiced by building, mining and construction firms in Kenya. In relation to study conducted by Lee (2008), a buying organization with a green supply chain imitative will pay attention to green practices of their suppliers. The adoption of green procurement is one of the commonly accepted dimensions of Green Supply Chain Management practices.

#### 3.4.3.1. Respondent's Suggestions on The Role of Green Procurement Practices

Table 11 shows the respondents suggestions on how the green procurement practice plays a role in performance of Building, mining and construction firms.

The table below show that majority of respondents suggested that Supplier Environment Management Systems Supplier Certification and Supplier Compliance Auditing are among a key role played by green procurement to enhance performance with the following percentages 22%,51% and 27% respectively.

Statements	Frequency	Percent %
Supplier Environment Management Systems	39	22
Supplier Certification	87	51
Supplier Compliance Auditing	46	27
Total	172	100

Table 12: Respondent's Suggestions on the Role of Green Procurement Practices

#### 3.4.4. Reverse Logistics

The research aimed to determine the effect of reverse logistics on the performance of building, Mining and construction firms in Kenya. Five-point Likert scale statement questions were set for which the responses are presented in the Table 13 below;

Reverse Logistics	Mean	Std. Deviation
you reuse and recycles materials across the value chain	4.0988	.94689
you have a well-established waste management procedures and protocols	4.2326	1.00495
you have system of monitoring production defects	4.4942	.67101
your firm conducts product recalls to get back defective goods from the market to recapture value of the goods	4.1744	.81207
Screening defective merchandise	4.0291	.76798
Processing returned merchandise	4.3140	.84827

Table 13: Descriptive Statistics for Reverse Logistics

From the above table, clearly show that most respondents strongly agreed with the statement that their firm you have system of monitoring production defects ( $\bar{x}$  = 4.4942, SD=0.67101). For the statement that firm does Processing of returned merchandise the respondents strongly agreed ( $\bar{x}$  = 4.3140, SD= 0.84827). Most respondents strongly agreed with the statement that their firm have a well-established waste management procedures and protocols ( $\bar{x}$  = 4.2326, SD= 1.00495). Respondents of ( $\bar{x}$  = 4.1744, SD= 0.81207) agreed that your firm conducts product recalls to get back defective goods from the market to recapture value of the goods. A ( $\bar{x}$  = 4.0988, SD= 0.94689) of the respondents agreed that their firm reuses and recycles materials across the value chain. A ( $\bar{x}$  = 4.0291, SD= .76798) of the respondents agreed that firm does Screening for defective merchandise. Using a five-point scale Likert mean more than ( $\bar{x}$  = 4.2) it is clear that most respondents agreed with the statement about Reverse Logistics. It can be concluded from the findings that Reverse Logistics had a larger effect on the performance of building, mining and construction firms in Kenya.

The findings imply that reverse logistics practices such as monitoring production defects, establishing waste management procedures and protocols, conducting product recalls to get back defective goods from the market to recapture value of the goods and reusing and recycling materials across the value chain together with screening defective merchandise has been largely practiced as asserted by (Korir, 2014), Xie and Breen (2012) state that product recall requires organization to be able to reverse the normal logistics flow from suppliers to customers so that inventory deemed unsuitable can be located by customers and returned to suppliers in a timely and cost effective manner.

### 3.4.4.1. Respondent's Suggestions on the Role of Reverse Logistics Practices

Table 14 shows the respondents suggestions on how the reverse logistics practice plays a role in performance of Building, mining and construction firms

The table below show that majority of respondents suggested that redistribution, recalling salvage and stocking are among a key role played by reverse logistics to enhance performance with the following percentages 54%,33% and 13% respectively.

Statements	Frequency	Percent %
Redistribution	94	54
Recalling salvage	56	33
Restocking	22	13
Total	172	100

*Tables 14: Respondent's Suggestions on the Role of Reverse Logistics Practices*

### 3.4.5. Performance of Building, Mining and Construction Firms in Kenya

The study sought to determine the rate of profitability, customer service and Responsiveness of firms as a result of having green supply chains. Respondents were requested to state to what extent they agreed with the declarations of opinion about the rating performance of their manufacturing firms. Table below, shows a five- point Likert scale statement questions set for which the responses are presented.

Performance	Mean	Std. Deviation
Performance of Manufacturing Firms Green supply chain practices have a positive contribution to profitability of the organization by cost saving and increasing revenues	4.0116	.94892
Green supply chain practices reduce costs in the supply chain by bringing about efficiencies and minimizing defects	3.9419	.85641
Adoption of green supply chain practices have reduced customer complaints	4.3779	.75097
Green supply chain practices have improved your firm's reputation.	4.4360	.68525
The firm is flexible enough to adjust to required sustainability requirements.	4.2209	.83633

*Table 15: Descriptive Statistics for Performance*

Table above, indicates that most respondents strongly agreed with the statement that green supply chain practices have improved your firm's reputation. ( $\bar{x}$ = 4.4360, SD= 0.68525). For the statement that Adoption of green supply chain practices have reduced customer complaints majority of respondents strongly agreed ( $\bar{x}$ = 4.3779, SD= 0.75097). Respondents of ( $\bar{x}$ = 4.2209, SD= 0.83633) strongly agreed that the firm is flexible enough to adjust to required sustainability requirements. Respondents of ( $\bar{x}$ = 4.0116, SD= 0.94892) agreed that Performance of Manufacturing Firms Green supply chain practices have a positive contribution to profitability of the organization by cost saving and increasing revenues. A ( $\bar{x}$ = 3.9419, SD= 0.85641) of the respondents agreed that green supply chain practices reduce costs in the supply chain by bringing about efficiencies and minimizing defects. Using a five-point scale Likert mean greater than ( $\bar{x}$ = 4.2) evidently indicates that most respondents strongly agreed with the declarations concerning performance of building, mining and construction firms in Kenya. Consequently, it can be established that; profitability, Customer service and Responsiveness had great influence on firms' performance. The findings of the study concur with Terho et al. (2012) adds that, good customer service, leads to adequate customer satisfaction thus resulting to increased sales. The findings also are in agreement with Ninlawan et al. (2010) who argued that the green practices can lead to lower costs, reduced environmental and occupational safety expenses and production efficiency gains. Rao and Holt (2005) demonstrated a link between green supply chain management practices. The found out that GSCM practices led to competitiveness and better economic performance. This also correspond the findings presented.

### 3.4.5.1. Respondent's Performance of the Firms for the Past Three Years

Respondents were request to the performance of the firm for the past three years on a scale 10 to 100% using the given measures. The results obtained are showed in table 3.15

Measures	2018	2019	2020
	Percent %	Percent %	Percent%
Profitability	56.8781	62.7317	76.5528
Customer satisfaction	48.1208	64.4966	81.546
Responsiveness	47.4497	64.2282	80.7383

*Table 16: Respondent's Performance of the Firm for the Past Three Years*

The study endeavored to establish the performance rates based on various spectrums of measures including profitability, customer satisfaction and Responsiveness. For all the measures, annual increase was evidenced as reported on table 4.15 above. Profitability was at 56.8781% in 2018, increased to 62.7317% in 2019 and further increase to 76.5528% reported in 2020. Customer satisfaction was at 48.1208% in 2018, significantly increased to 64.4966% in 2019 and more increase of 81.546% registered in 2020. The responsiveness was at 47.4497% in 2018, improved to 64.2282% in 2019 and further escalated to 80.7383% in the year 2020.

### 3.5. Correlation of Study Variables

A statistical relationship between variables is referred to as correlation. It is a measure of how well the variables are related and to what direction and degree. Mugenda and Mugenda (2012) surmise that correlation coefficient informs a researcher the magnitude and direction of the relationship between the two variables. The correlation ratio can detect almost any functional dependency, it indicates the strength of a linear relationship between variables, and however, Mahdavi (2013) argues that its value generally does not completely characterize their relationship. The nature of the data determines the measure to use. In this study, the Pearson product-moment correlation was used. The result of correlation, represented by  $\rho$  is between -1 and +1. A result of -1 indicates that there is a perfect negative correlation between the two variables, while a result of +1 means that there is a perfect positive correlation between the two variables, while 0 indicates no relationship at all (Sekaran, 2006). Correlation can be high, moderate or low, depending on how close the value is to  $\pm 1$ , the bigger the coefficient, the stronger the association (Mugenda&Mugenda, 2012).

In order to specify the strength and direction of linear relationship between effects of green supply chain practices on the performance of building, mining and construction firms in Kenya, correlation analysis was conducted. The results are presented in the table below.

Correlations						
		Performance	Eco Design	Green Manufacturing	Green Procurement	Reverse Logistics
Performance	Pearson Correlation	1	.459**	.481**	.244**	.509**
	Sig. (2-tailed)		.000	.000	.001	.000
	N	172	172	172	172	172
Eco Design	Pearson Correlation	.459**	1	.260**	.643**	.700**
	Sig. (2-tailed)	.000		.001	.000	.000
	N	172	172	172	172	172
Green manufacturing	Pearson Correlation	.481**	.260**	1	.445**	.594**
	Sig. (2-tailed)	.000	.001		.000	.000
	N	172	172	172	172	172
Green Procurement	Pearson Correlation	.244**	.643**	.445**	1	.822**
	Sig. (2-tailed)	.001	.000	.000		.000
	N	172	172	172	172	172
reverse Logistics	Pearson Correlation	.509**	.700**	.594**	.822**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	172	172	172	172	172

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Table 17: Correlation Analysis

Table above shows Pearson's correlation coefficient between the eco design & eco labelling and performance being 0.459,  $p < 0.05$ , two-tailed, tested at 95% confidence level. The results showed a positive and significant relationship between eco design & eco labelling and performance. This indicates that Performance of building, mining and construction firms in Kenya is positively affected by improved eco design & eco labelling.

The Pearson's correlation coefficient between the green manufacturing and performance was 0.481,  $p < 0.05$ , two-tailed, tested at 95% confidence level. The results showed a positive and significant relationship between green manufacturing and performance. This indicates that Performance of building, mining and construction firms in Kenya affected by improved green manufacturing.

The Pearson's correlation coefficient between the green procurement and performance was 0.244,  $p < 0.05$ , two-tailed, tested at 95% confidence level. The results showed a positive and significant relationship between green

procurement and performance. This indicates that Performance of building, mining and construction firms in Kenya is positively affected by improved green procurement.

The Pearson's correlation coefficient between the reverse logistics and performance was 0.509,  $p < 0.05$ , two-tailed, tested at 95% confidence level. The results showed a positive and significant relationship between reverse logistics and performance. This indicates that Performance of building, mining and construction firms in Kenya is positively affected by improved reverse logistics.

### 3.6. Regression Analysis

#### 3.6.1. Model Summary

Table 18 of the model summary indicate that there is a positive relationship between the green supply chain practices reference model metrics (independent variable) and performance ( $R = .676$ ,  $R^2 = .457$ ). The  $R^2$  explains the variations in the dependent variable that can be explained by the independent variables.  $R^2$  of .457 indicates that 44% of the variations in performance of building, mining and construction firms in Kenya can be attributed to green supply chain practices reference model metrics. Therefore, the finding confirms that there is a significant effect of green supply chain practices reference model metrics on the performance of building, mining and construction firms in Kenya.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.676 <sup>a</sup>	.457	.444	.35077
a. Predictors: (Constant), reverse Logistics, Green manufacturing, Eco Design, Green Procurement				

Table 18: Model Summary

#### 3.6.2. Analysis of Variance

Table 18 shows ANOVA model used to show the ability of the independent variables to predict the study dependent variable. The output resulted in  $F = 35.128$ ,  $p = .000$ . Since the  $p$  value is less than 0.05, it implies that the independent variables significantly predict the dependent variable i.e., performance.

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	17.288	4	4.322	35.128	.000 <sup>b</sup>
	Residual	20.548	167	.123		
	Total	37.836	171			
a. Dependent Variable: Performance						
b. Predictors: (Constant), reverse Logistics, Green manufacturing, Eco Design, Green Procurement						

Table 19: Analysis of Variance

#### 3.6.3. Multiple Regression Analysis

The results in Table 19 indicate that the relationship between Eco-design & Eco labelling and performance was positive and significant ( $Beta = 0.379$ ,  $p = .000$ ). For every unit increase in Eco-design & Eco labelling, performance increase by 0.379. A positive and significant relationship was as well noted between the rest of the independent variables i.e., green manufacturing ( $Beta = 0.328$ ,  $p = 0.000$ ), Green procurement ( $Beta = 0.575$ ,  $p = 0.000$ ) and reverse Logistics ( $Beta = 0.521$ ,  $p = 0.000$ ).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.204	.225		9.788	.000
	Eco Design	.236	.052	.379	4.517	.000
	Green manufacturing	.238	.053	.328	4.452	.000
	Green Procurement	.274	.049	.575	5.643	.000
	reverse Logistics	.269	.065	.521	4.135	.000
a. Dependent Variable: Performance						

Table 20: Coefficients

A regression model depicted in the table above is represented by the equation:

Multiple Linear Regression Equation:

$$Y = 2.204 + 0.379X_1 + 0.328X_2 + 0.575X_3 + 0.521X_4$$

Performance = 2.204 + 0.379Eco Design & Eco labelling + 0.328Green manufacturing + 0.575 Green Procurement + 0.521Reverse Logistics

The model illustrates that when all variables are held at constant, the value of the firm performance would be 2.204. Holding other factors constant, a unit increase in Eco Design & Eco labelling practices would lead to 0.379 with a significant value of 0.000 less than 0.05 indicating a significant effect of Eco Design & Eco labelling. Thus, a unit improvement in Eco Design & Eco labelling would lead to a 0.379 units improvement in performance of the firms.

The results also show that the performance of the firms is positively and significantly related to green manufacturing. This is indicated by a regression coefficient of 0.328, which is a positive coefficient and a p-value of 0.000 less than 0.05 showing the significance of the relationship. Thus, a unit improvement in eco design practices would lead to 0.328 times increase in the performance.

The results also show that the performance of the firms is positively and significantly related to green procurement. This is indicated by a regression coefficient of 0.575, which is a positive coefficient and a p-value of 0.000 less than 0.05 showing the significance of the relationship. Thus, a unit increase in green procurement would lead to 0.575 times increase in the performance.

The results also show that the performance of the firms is positively and significantly related to reverse logistic practices. This is indicated by a regression coefficient of 0.521, which is a positive coefficient and a p-value of 0.000 less than 0.05 showing the significance of the relationship. Thus, a unit increase in reverse logistic practices would lead to a 0.521 times increase in the performance.

## 4. Conclusion

### 4.1. Summary of Findings

#### 4.1.1. Eco Design & Eco Labelling

The study established that Eco-design and Eco-labeling affect performance of building, mining and construction firms in Kenya to a great extent. Eco-design and Eco-labeling are independent factor that influence performance of building, mining and construction firms in Kenya. The study showed that firms in building, mining and construction sectors designs products for reduced material and energy consumption; firms in building, mining and construction sectors designs products for reuse, recycle, recovery of materials and parts. The results showed a positive and significant relationship between eco design & Eco labelling and performance.

This implies that the first objective of the study has been achieved. From results, regression analysis showed that there is a strong relationship between Eco-design and Eco-labeling and performance of firms in building, mining and construction firms in Kenya. This indicates that Performance of building, mining and construction firms in Kenya is positively influenced by increased eco design & Eco labelling. The finding corresponds to those of (Kipruto& Noor, 2018).

#### 4.1.2. Green Manufacturing

The study established that green manufacturing affect performance of building, mining and construction firms in Kenya to a great extent. Green manufacturing is independent factor that influence performance of building, mining and construction firms in Kenya. The study showed that firms in building, mining and construction sectors Produces products that have packages which can be recycled, firm does risk assessment for energy and resource use, firms have got efficient processes to reduce solid waste, air emissions and conserve energy and maximize production out, firms have adopted environmental management system (EMS) to enhance environmental performance, uses machines or tools which consume less energy, water and fuel, firms Replaces hazardous substances with that are environmentally friendly; firms in building, mining and construction sectors Controls power consumption in the products, firm has occupational health and safety policy in place and firms does minimization of overall output of waste. The results showed a positive and significant relationship between green manufacturing and performance.

The second objective of the study has been accomplished. It can be generally concluded that green manufacturing will assist building, mining and construction firms in Kenya to improve the performance. The results showed a positive and significant relationship between green procurement and performance. This indicates that Performance of building, mining and construction firms in Kenya is positively influenced by increased green procurement.

#### 4.1.3. Green Procurement

The study established that Green Procurement affect performance of building, mining and construction firms in Kenya to a great extent. Green Procurement is independent factor that influence performance of building, mining and construction firms in Kenya. The study showed that firms in building, mining and construction sectors; awards tenders/quotations to suppliers whose products are considered green based on environmental assessment, Evaluate Suppliers on specific environmental criteria, select and develops suppliers who uses green materials, conduct Environmental audits of supply base, cooperates with suppliers to jointly meet environmental objectives, firm has an elaborate supplier development program, Require suppliers to have ISO 14001 and recognizes the importance to include suppliers and purchasers in developing the environmental performance of the supply chain.

This implies that the third objective of the study has been achieved. From results, regression analysis showed that there is a strong relationship between green procurement and performance of firms in building, mining and construction firms in Kenya. This indicates that Performance of building, mining and construction firms in Kenya is positively influenced by increased green procurement practices. The finding corresponds to those of (Kipruto& Noor, 2018).

#### 4.1.4. Reverse Logistics

The study also established that reverse Logistics affect performance of building, mining and construction firms in Kenya. Reverse Logistics is independent factor that influence performance of building, mining and construction firms in Kenya. The study showed that firms in building, mining and construction sectors firms have system for monitoring production defects, firms conduct Processing for returned merchandise, firms have a well-established waste management

procedures and protocols, firm conducts product recalls to get back defective goods from the market to recapture value of the goods, they reuse and recycle materials across the value chain and firms conduct Screening for defective merchandise.

The third objective of the study has been accomplished. It can be generally concluded that reverse logistics will assist building, mining and construction firms in Kenya to improve the performance. The results showed a positive and significant relationship between Reverse Logistics and performance. This indicates that Performance of building, mining and construction firms in Kenya is positively influenced by increased green procurement.

#### 4.2. Conclusions

The general objective of the study was to establish the effect of the green supply chain practices on the performance of building, mining and construction firms in Kenya. The study concluded that green supply chain practices had a positive significant effect on firms' performance. The study showed that there was a strong relationship between Eco design & Eco labelling on the performance of building, mining and construction firms in Kenya and therefore it is worth concluding that Eco-design & ecolabelling embraced by the firm's management, effects the performance of Building, mining and construction firms in Kenya.

##### 4.2.1. Eco design & Ecolabelling

Given that majority of the building, mining and construction firms in Kenya practice Eco design & Ecolabelling have enhanced the designs products, and processes in consideration of the entire lifecycle of the products, consider re-using and recycling the packages, has optimal manufacturing designs and product packing for eco-friendly production, designs products for reduced materials and energy consumption, designs products, in consideration of characteristics such as functionality, product safety, comfort, efficiency, and aesthetics, provides the end customers with accurate information concerning the environmental qualities of a product including information about the product lifecycle, consider collection of used packages for proper disposal and provides eco-labels for the product portfolio and considers downsize packaging with the following means; 4.5814, 4.3314, 4.3023, 4.2384, 4.1744, 4.1221, 4.0698 and 3.9709 respectively, therefore the study concludes that eco design & ecolabelling positively affect the performance of the building, mining and construction firms in Kenya.

Based on the findings the study concluded that Eco-design & eco- ecolabelling plays a significant role in building, mining and construction firms in Kenya by ensuring that the firms have happier consumers, higher quality products and Fewer emissions.

##### 4.2.2. Green Manufacturing

Given that majority of the building, mining and construction firms in Kenya practice Green Manufacturing have enhanced their production to Produce products that have packages which can be recycled, firms conducts risk assessment for energy and resource use, got efficient processes to reduce solid waste, air emissions and conserve energy and maximize production out, implemented environmental management system ( EMS) to enhance environmental performance, uses machines or tools which consume less energy, water and fuel, Controls power consumption in the products, firms has occupational health and safety policy in place and green manufacturing results in overall minimization of overall output of waste with the following means; 4.6221, 4.5523, 4.5116, 4.4360, 4.2558, 4.2500, 4.2267 and 4.0581 respectively, therefore the study concludes that Green Manufacturing positively affect the performance of the building, mining and construction firms in Kenya.

The study also established that green manufacturing affects the performance of building, mining and construction firms in Kenya. This can be explained using Pearson green manufacturing, correlation coefficient which revealed that the effect was positive significant.

Therefore, the study concluded Improve environmental, reduce environmental burdens and production efficiency played a significant role in the performance of building, mining and construction firms in Kenya.

##### 4.2.3. Green Procurement

Given that majority of the building, mining and construction firms in Kenya practice Green procurement have enhanced their Suppliers evaluation on specific environmental criteria, firms awards tenders/quotations to suppliers whose products are considered green based on environmental assessment, select and develops suppliers who uses green materials, conduct Environmental audits of supply base, cooperates with suppliers to jointly meet environmental objectives, firm has an elaborate supplier development program, frequently select suppliers who use energy conservation, Requires suppliers to have ISO 14001 and finally companies recognizes the importance to include suppliers and purchasers in developing the environmental performance of the supply with the following means; 4.4884, 4.4709, 4.4302, 4.3133, 4.1744, 4.1221, 4.0756, 4.058 and 4.0523 respectively, therefore the study concludes that Green procurement positively affect the performance of the building, mining and construction firms in Kenya.

Therefore, the study concluded supplier Certification, Supplier Environment Management Systems and Supplier Compliance Auditing played a significant role in the performance of building, mining and construction firms in Kenya.

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### Appendix

S/No	Name	Subsector
1	ARISTOCRATS CONCRETE LIMITED	Building and Construction Accessories
2	BOYAMA BUILDING MATERIALS	Building and Construction Accessories
3	CEMEX HOLDING LTD	Building and Construction Accessories
4	DITTMAN CONSTRUCTION CO. LTD	Building and Construction Accessories
5	ELEGANT FITTINGS LIMITED	Building and Construction Accessories
6	EUROCON TILES PRODUCTS LTD	Building and Construction Accessories
7	GJENGE MAKERS LIMITED	Building and Construction Accessories
8	HYDRO WATER WELL (K) LIMITED	Building and Construction Accessories
9	INTERNATIONAL GREEN STRUCTURES MANUFACTURING KENYA LIMITED	Building and Construction Accessories
10	KEDA (KENYA) CERAMICS COMPANY LTD	Building and Construction Accessories
11	KENBRO INDUSTRIES LTD	Building and Construction Accessories
12	KENYA BUILDERS & CONCRETE LTD	Building and Construction Accessories
13	KOTO HOUSING KENYA LTD	Building and Construction Accessories
14	ERDEMANN GYPSUM LIMITED	Building and Construction Accessories
15	LAXMANBHAI CONSTRUCTION LIMITED	Building and Construction Accessories
16	LEXCON ENTERPRISES LTD	Building and Construction Accessories
17	MINERAL ENTERPRISES LTD	Building and Construction Accessories
18	QUESTWORKS LIMITED	Building and Construction Accessories
19	REXE ROOFING PRODUCTS	Building and Construction Accessories
20	ROOFINGS KENYA LIMITED	Building and Construction Accessories
21	SAJ CERAMICS LTD	Building and Construction Accessories
22	SKYLARK CONSTRUCTION LTD	Building and Construction Accessories
23	SPACE AND STYLE LTD	Building and Construction Accessories



S/No	Name	Subsector
24	TILE & CARPET CENTRE	Building and Construction Accessories
25	WOTECH KENYA LIMITED	Building and Construction Accessories
26	BAMBURI CEMENT LIMITED	Cement Production
27	EAST AFRICAN PORTLAND CEMENT COMPANY LIMITED	Cement Production
28	KARSAN RAMJI AND SONS LIMITED	Cement Production
29	MOMBASA CEMENT LTD	Cement Production
30	NATIONAL CEMENT LIMITED	Cement Production
31	RAI CEMENT LIMITED	Cement Production
32	SAVANNAH CEMENT LTD	Cement Production
33	AFRIKSTONES LIMITED	Mining & Quarrying
34	AFRICAN DIATOMITE INDUSTRIES	Mining & Quarrying
35	BLUE STONE LIMITED	Mining & Quarrying
36	COAST CALCIUM LIMITED	Mining & Quarrying
37	ELDORET QUARRY LIMITED	Mining & Quarrying
38	HALAI CONCRETE QUARRIES	Mining & Quarrying
39	SHAJANAND CREATIVE LIMITEDSD	Mining & Quarrying
40	SILVERSTONE QUARRY LIMITED	Mining & Quarrying
41	SUPERSTONE 2006 LTD	Mining & Quarrying
42	TIPTOP CONSTRUCTIONS LIMITED	Mining & Quarrying
43	VALLEM CONSTRUCTION LTD	Mining & Quarrying
44	VIRJI VISHRAM PATEL & SON'S LTD	Mining & Quarrying
45	NORTH RIFT CONCRETE WORKS LTD	Precast and Ready-Mix Concrete
46	BAMBURI SPECIAL PRODUCTS LTD	Precast and Ready-Mix Concrete
47	KISUMU CONCRETE PRODUCTS	Precast and Ready-Mix Concrete
48	RELIABLE CONCRETE WORKS LTD	Precast and Ready-Mix Concrete

Table 21