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GREEN SUPPLY CHAIN MANAGEMENT PRACTICES AND PERFORMANCE OF ISO 14001 CERTIFIED MANUFACTURING FIRMS IN EAST AFRICA

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ABSTRACT *Increasing levels of environmental degradation by manufacturing firms has resulted in heterogeneous pressures from various organizational groups on the need for them to conduct environmentally friendly operations. A viable option for these firms has been the implementation of green supply chain practices. The key concern however is whether the implementing these practices actually lead to improved performance. The main objective of this study therefore was to examine the relationship between the implementation of GSCM practices and performance of ISO 14001 certified firms in East Africa. Through the use of positivist research paradigm and descriptive cross-sectional research design, primary data was collected from persons in charge of environmental issues in ISO 14001 manufacturing firms in East Africa. Based on the objective, the study establishes a statistically significant positive direct relationship between implementation of GSCM practices and organizational performance. The study therefore confirms existence of a positive link between GSCM practices and organizational performance thus helping to reduce the uncertainty which has arisen out of contradictory findings from past studies on whether it is beneficial to pursue these practices. The results support the natural resource based view that GSCM practices affords the firm an opportunity for competitive advantage and performance improvement through unique causally ambiguous and socially complex resources. The study recommends that manufacturing firms should implement environmentally sound practices in all phases of the supply chain, beginning with procurement of raw materials through to design, manufacture, packaging, distribution and end of life disposal of their products. Regulators can use the findings to scale up the level of implementation of GSCM practices by enforcing stricter environmental legislation and giving incentives to firms that have already implemented these practices. The findings also provide future researchers' with a useful conceptual and methodological reference to pursue further studies in this under-studied GSCM area especially in the African context.*

Key Words: Green Supply Chain, Management Practices, Organizational Performance, ISO Certified Firms, East Africa

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Background

Over the past decade there has been growing awareness of widespread environmental degradation facing current and future generations. Its importance emanates from increasing environmental problems such as air pollution, changing water quality and quantity, discharge of toxic substances and chemicals, increase in solid waste and climate change (Esty & Winston, 2009; Gutowski, Allwood, Herrmann & Sahni, 2013). These problems have largely been associated with the operations of manufacturing firms (Beamon, 1999). Consequently, the firms have found themselves receiving heterogeneous pressures from various organizational groups to conduct environmentally friendly operations. Green Supply Chain Management (GSCM) has therefore emerged as a key concept for firms seeking to become environmentally sustainable and globally competitive (Rao & Holt, 2005).

Srivastava (2007) defines green supply chain management as the integration of environmental thinking in product design, material sourcing and selection, manufacturing processes, delivery of the final product to the final consumer as well as end-of-life management of the product after its useful life. GSCM practices comprise activities in green procurement, environmentally responsible design, green manufacturing, green packaging, green distribution and reverse logistics. The synergistic interaction of these practices with one another is very important if maximum environmental benefit is to be attained (Kung, Huang & Cheng, 2012).

Green procurement is defined as environmentally conscious purchasing with a focus on involvement of activities which include the reduction, reuse and recycling of materials in the process of purchasing (Ninlawan, Seksan, Tossapol & Pilada, 2010). It includes all activities that are undertaken to ensure that the materials, equipment and services that are acquired by the firm have minimal or no impact on the natural environment. Potential indicators of green procurement for this study were obtained from the following papers (Min, & Galle, 1997, 2001; Rao & Holt, 2005; Vachon, 2007; Zhu, Sarkis & Lai, 2008a; Zhu, Sarkis & Lai, 2008b; Testa & Irlado, 2010; Diabat & Govindan, 2011; El-Tayeb, Zailani & Ramayah, 2011; Khisa, 2011; Laosirihongthong, Adebanjo & Tan, 2013; Mittra & Datta, 2013).

Environmentally responsible design is the practice of incorporating environmental concerns in product and process engineering design with the objective of developing products and processes that are compatible with the natural environment while maintaining quality, cost and performance standards (Allenby & Fullerton, 1991; Dewberry & Goggin, 1995; Dewberry, 1996). Environmentally responsible design also stresses the need to design products and processes which have the lowest environmental impact over their entire life cycle (Sarkis, 1998). It is important to note that the most efficient and effective point at which to catch problems is in the design stage (Handfield Melnyk, Calantone & Curkovic, 2001). Environmentally responsible product designs can bring down the resources required to manufacture the product and thus diminish the pollutants generated (Wu

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& Dunn, 1995). A list of environmentally responsible design practices for this study were taken from the following previous work (Kleiner, 1991; Manzini, 1994; Hart, 1995; Robert, 1995; Dewberry, 1996; Sarkis, 1998; Beamon, 1999; Lin, Jones & Hsieh, 2001; Zsidisin & Siferd, 2001; Asian Productivity Organization, 2004; Vachon, 2007; Choi, 2012; Mittra & Datta, 2013).

Designing green products and processes is not enough. It is possible that the actual product and process may turn out to be different from the design. Therefore, the objective of green manufacturing is to ensure reduction of negative environmental impacts of a firm's products and processes through elimination of waste by re-defining the existing production process or system (Handfield et al., 2001). This is achieved among other things by using inputs with low environmental impacts, highly efficient and ones which generate little or no waste or pollution. Based on early definitions of green manufacturing, this study emphasized the green manufacturing practices in the following works (Sarkis & Rasheed, 1995; Wu & Dunn, 1995; Atlas & Florida, 1998; Rao & Holt, 2005; Hu & Hsu, 2006; Vachon, 2007; Zhu et al., 2007; Zhu et al., 2008a; Zhu et al. 2008b; Gonzalez, Sarkis & Adenso-Diaz, 2008; Holt & Ghobadian, 2009; Paulraj, 2009).

Green packaging is the development and use of packaging which results in reduced negative impact on the environment. Packaging physically protects the product from harm and gives a medium for information transmission (Tseng, 2009). In spite of these and other important functions, packaging is an undesired item once the product is consumed. Wu and Dunn (1995) argue that better packaging can greatly reduce use of materials, increase space utilization in the warehouse and vehicle, and reduce the amount of handling required and therefore result in less environmental impact. Indicators of green packaging for this study are supported by the following previous research (Wu & Dunn, 1995; Tseng, 2009; Ninlawan et al., 2010; Laosirihongthong et al., 2013).

Green distribution involves employing forward freight distribution practices and strategies that are environmentally friendly and efficient (Rodrigue, Comtois & Slack, 2006). Shipping of the products to customers is the single largest source of environmental hazard in the logistics system (Wu & Dunn, 1995). Transport modes use petroleum products for fuel and produce toxic chemicals and gases into the atmosphere. Construction of transport infrastructure, for example, roads, airport, railways, and harbors have a significant impact on the environment. When these modes reach their end of life, they become an environmental menace. It is hence important to choose modes that reduce or eliminate these problems and therefore preserve the natural environment. A number of measures for green distribution have been adopted in previous research (Wu & Dunn, 1995; Rodrigue et al., 2006; Zhu et al., 2008a; Paulraj, 2009; Ninlawan et al., 2010).

Reverse logistics is the flow of materials and products from the point where they are consumed to the point where the original goods had been produced in order to recover or create value or for safe disposal with the overall objective of minimizing the negative impact of a firm's products on the environment (Carter & Ellram, 1998; Rogers & Tibben-Lembke, 1999, 2001; Srivastava & Srivastava, 2006). Toffel (2004) notes that firms engage in reverse logistics to reduce production costs, meet changing customer demands, protect aftermarkets and most importantly promote an image of an environmentally conscious firm. Potential reverse logistics practices for this study were derived from the following earlier studies (Wu & Dunn, 1995; Florida & Atlas, 1997; Harps, 2002; Toffel, 2004; Vachon, 2007; Ninlawan et al., 2010).

Literature Review

GSCM Practices and Organizational Performance

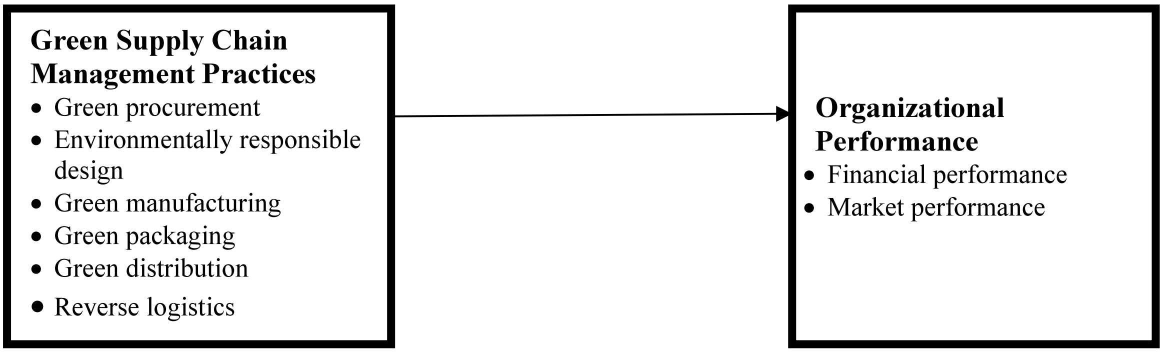
The relationship between GSCM practices and organizational performance is grounded on the natural RBV, RBV, institutional theory, stakeholders' theory and TCE. The implementation of GSCM practices could actually reduce production cost and improve product value or the image of the organization and therefore make it more competitive in the market (Porter & Van der Linde, 1995; Hart & Ahuja, 1996; Madsen & Ulhøi, 2003). GSCM practices are also likely to reduce costs in the long run due to reuse of materials, reduction in energy use and fines for flouting environmental regulations. The reduction in costs and increase in sales volumes results in improved financial and market performance. Molina-Azorin, Claver-Cortés, López-Gamero and Tarí (2009) have pointed out that implementing GSCM practices contributes positively to a firm's marketing performance. Welford (1995) established that implementing GSCM practices improves the reputation of firms thus strengthening business relations.

A number of studies addressing the direct link between GSCM practices and organizational performance have been conducted. These studies have established contradictory findings. Some studies established significant positive relationships between GSCM practices and organizational performance (Rao & Holt, 2005; Chien & Shi, 2007; Zeng, Meng, Yin, Tam & Sun, 2010; Kirchoff, 2011). Others revealed that there is no significant relationship between such practices and organizational performance (Pullman, Maloni & Dillard, 2010; Testa & Irlado, 2010; Lee, Kim & Choi, 2012). Others showed a negative relationship (Cordeiro & Sarkis, 1997). Yet others found a combination of positive, negative and no relationships (Azevedo, Carvalho & Cruz Machado, 2011; Eltayeb et al., 2011; Green, Zelbst, Meacham & Bhadauria, 2012; Laosirihongthong et al., 2013; Mittra & Datta, 2013). This is because they were investigating the relationship between individual GSCM practices and organizational performance. The lack of consensus on this link causes a research gap in the literature.

Another gap arises from the fact that a number of these studies have not looked at GSCM in its entirety as advocated by Kung et al., (2012) and Hart (1995). Moreover, the organizational performance variable for some studies (Rao & Holt, 2005; Chien & Shi, 2007; Pullman et al., 2010; Testa & Irlado, 2010) does not include both the financial and market component as emphasized by Green et al. (2012). Weinzimmer, Nystrom and Freeman (1998) assert that firm performance is best captured by considering multiple aspects of it. The influence of GSCM practices on organizational performance of firms in Africa and specifically in East Africa remains unclear. GSCM is a relatively new concept in this region. Previous research on this topic is currently skewed to countries, mostly in Asia, North America and Europe, yet there is evidence that throughout the world there is growing concern for environmentally sustainable supply chain practices (Golicic & Smith, 2013). Therefore, this study sought to extend this previous research into the East African context and gather more empirical evidence to establish if indeed there is a link between the implementation of GSCM practices and organizational performance. This leads to the hypothesis:

H1: Implementation of GSCM practices has a direct impact on the organizational performance.

Figure 1: Conceptual Framework



Research Methodology

The study employed cross-sectional survey research design which is appropriate where the overall objective is to establish whether there exist significant relationships among variables at some point in time (Mugenda & Mugenda, 2003; Cooper & Schindler, 2006). The population of the study comprised all ISO 14001 certified manufacturing firms operating in East Africa. A census of all 108 ISO 14001 certified manufacturing firms in East Africa was conducted.

Primary data was collected using a semi structured questionnaire. The respondents were required to respond to scales operationalizing the research variables from the questionnaire which contained direct measures and likert type scales. The senior manager responsible for environmental management from each of the manufacturing firms in the population was targeted. The survey questionnaire was administered personally, using mail and via email. For most of the firms in Kenya, the questionnaires were hand delivered. For firms in Tanzania, Uganda and Rwanda, the questionnaires were either sent by courier services or emailed to the informants.

Data Analysis and Findings

Out of the 108 manufacturing firms targeted, a total of 67 responded. 30 of the firms were from Kenya, 19 from Tanzania, 16 from Uganda and 2 from Rwanda. Thus, the study achieved a response rate of 62%. The respondents' characteristics are shown in Table 1.

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Table 1: Firm's Demographic Characteristics

Features	Category	Frequency	Percent
Ownership status of the firm	Fully locally owned	20	29.9%
	Fully foreign owned	13	19.4%
	Joint locally and foreign owned	34	50.7%
	Total	67	100%
Scope of the market that is served by the firm	Local	7	10.4%
	Global	60	89.6%
	Total	67	100%
Manufacturing sub-sector	Building, Construction & Mining	8	11.9%
	Chemical & Allied	6	9%
	Electrical & Electronics	3	4.5%
	Food Beverages & Tobacco	30	44.8%
	Metal & Allied	8	11.9%
	Motor Vehicle & Accessories	1	1.5%
	Paper & Board	3	4.5%
	glass and glass products	2	3%
	Imaging and phogrametry	1	1.5%
	General merchandise	3	4.5%
	Brush manufacturing	1	1.5%
	Fertilizer manufacturing	1	1.5%
	Total	67	100%

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Features	Category	Frequency	Percent
Length of operation of the firm	Less than 20 years	6	9.0%
	20 to 40 years	25	37.3%
	40 to 60 years	25	37.3%
	60 to 80 years	7	10.4%
	80 and above	4	6.0%
	Total	67	100%
Number of full-time employees in the firm	Less than 100	6	9.4%
	100 to 299 employees	12	18.8%
	300 to 499 employees	8	12.5%
	500 to 699 employees	9	14.1%
	700 and above	29	45.3%
	Total	64	100%

Source: Research Data, 2015

Measurement Model Estimation

Partial least squares structural equation modeling (PLS-SEM) approach was used to evaluate the relationship between GSCM practices and organizational performance and to determine the predictive power of the conceptual model for the 67 14001 ISO certified firms in East Africa. The statistical analysis process involved two stages. The first step was the estimation of the outer or measurement model which evaluates the relationship between the observable variables and the theoretical constructs they represent. The second stage was the specification of the inner or structural model and evaluation of the relationships proposed and testing of hypothesis (Bryne, 2001). A total of 8 measurement items representing two constructs were subjected to confirmatory factor analysis (CFA) as part of PLS outer model analysis. Each of the relationships between the observed variables and their respective factors were specified in an outer/measurement model. The constructs in the study were measured using multiple items. Details on the type of constructs are contained in the Table 2.

Table 2: Key Latent Constructs

Latent Construct	Type of Construct	Number of observed variables
GSCM practices	Reflective	Six items
Organizational performance	Reflective	Two items

Source: Research Data, 2015

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Construct Unidimensionality

Both the inner and outer models were first assessed for construct Unidimensionality before PLS-SEM analysis was done. In order to establish construct unidimensionality, item to total coefficients for all the indicators representing a construct were obtained. Factor loadings were also assessed using EFA and CFA. This was done at two levels. The first level entailed verifying the unidimensionality of the indicators of the constructs. This involved testing the reliability and validity of these constructs. At the second level item to total scores were obtained for the indicators representing each latent construct in the model.

Green Supply Chain Management Practices

The latent variable GSCM practice is made up of six subscales with each being an average of several items. These include green procurement practices (GSCM1) which is an average of 22 items, environmentally responsible design practices (GSCM2) which is an average of 11 items, green manufacturing practices (GSCM3) which is an average of 19 items, green packaging practices (GSCM4) which is an average of 8 items, green distribution practices which is an average of 8 items and reverse logistics practices (GSCM6) which is an average of 13 items. These subscales were first reviewed for reliability and construct validity before PLS-SEM was done. The following subsections reviews the results obtained from each of these practices.

Green Procurement Practices

This construct was measured using 22 practices. Each practice was rated on a five point Likert scale with 1 being “not at all”, and 5 being “very great extent”. As presented in Table 3, the highest rating was 3.81 for the practice “favor products which provide information about their environmental impact”. The practice “require suppliers to take back packaging” had the lowest rating with a mean of 2.94. The grand mean for green procurement practices was 3.437 implying that the manufacturing firms had implemented them to slightly above moderate extent. All the factor loadings are above the threshold of 0.4 and Item to total correlations of above 0.3 was achieved for all the items in the scale. The Cronbach’s Alpha is 0.912 higher than the threshold of 0.7

Table 3: Green Procurement Practices

GP	Green Procurement Practice	N	Mean	Std. Dev.
1	Provide design specification on environmental requirements to suppliers for purchased items.	67	3.40	1.045
2	Cooperate with suppliers in order to attain environmental objectives.	67	3.52	0.927
3	Evaluate second-tier supplier for environmentally friendly practices.	67	3.36	0.847
4	Require suppliers to take back packaging.	67	2.94	1.217
5	Eco-labeling of products.	67	3.36	0.980
6	Reduce use of paper during the purchasing process (e.g. ordering via email).	67	3.49	1.211
7	Develop environmental awareness among employees in the procurement department.	67	3.64	0.916
8	Favor products which provide information about their environmental impact.	67	3.81	0.875
9	Require suppliers to reduce packaging to minimum required to protect supplied items.	67	3.25	1.106
10	Make purchases from suppliers who are compliant with legislation on the environment.	67	3.48	0.990
11	Purchase raw materials in bulk in order to minimize use of energy, labour, and packaging materials.	67	3.75	0.943
12	Require that suppliers must possess EMS certification (e.g. ISO 14001, BS7750 or EMAS).	67	3.51	0.943
13	Purchase products with bio-degradable or recyclable packaging.	67	3.33	1.106
14	Develop a database with information on suppliers' environmental conduct.	67	3.39	1.058
15	Purchase energy saving equipment (e.g. machines or vehicles with higher capacity and are fuel efficient).	67	3.63	1.057
16	Disclose environmental impact or safety information of product content using green seals	67	3.33	1.006
17	Audit suppliers to evaluate compliance with environmental requirements.	67	3.46	1.092
18	Hold environmental awareness seminars periodically where suppliers and contractors meet to share knowledge on clean production technologies.	67	3.42	0.987
19	Guide suppliers to set up their own programs for environmental management	67	3.42	0.873
20	Pressurize suppliers to take disciplinary action for environmental non-compliance by their employees and suppliers.	67	2.96	1.021
21	Develop long-term relationships with the suppliers through collaboration.	67	3.52	0.927
22	Working to control the environmental risk resulting from suppliers' operations.	67	3.66	0.880

Cronbach's alpha = 0.912, Grand mean = 3.437

Source: Research Data, 2015

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Environmentally Responsible Design Practices

Environmentally responsible design construct was measured using 13 practices with each practice being was rated on a five point Likert scale. As shown in Table 4, the highest rating was 3.81 for the practice "design of products and processes in a way that ensures reduction or elimination of environmentally hazardous materials." The practice "collaboration with customers during design process to ensure integration of green issues" had the lowest rating with a mean of 3.24. The grand mean for environmentally responsible design practices was 3.532, slightly higher than that for green procurement practices. Again, this implies that the manufacturing firms had implemented them to slightly below great extent. The 11 items had a Cronbach's Alpha of 0.852 and all the factor loadings are also above 0.4.

Green Manufacturing Practices

Green manufacturing construct was measured using 19 items. The results are shown in Table 5. The highest rating was 4.06 for the practice "top management is totally committed to environmentally friendly manufacturing." The least rated green manufacturing practice was "availing firm's environmental impact information to the public for open discussion" which had a mean of 3.27. The grand mean for green manufacturing practices was 3.70, which is higher than both green procurement and environmentally design practices. The implication is that the firms had implemented green manufacturing practices to slightly below great extent.

The loadings ranged from 0.460 to 0.783 with most being above 0.6. Cronbach's Alpha was 0.883 which is higher than 0.7. Eighteen (18) practices had item to total correlations of above 0.3. Only one practice "reduce use of virgin raw materials by using recycled materials or reusing materials for product manufacturing" (GM 2) had an item to correlation score of 0.244. However, this practice had a very high loading of 0.769. Therefore, all the nineteen (19) practices were considered for further analysis.

Table 4: Environmentally Responsible Design Practices

ED	Environmentally Responsible Design Practice	N	Mean	Std. Dev.	F loa
1	Collaboration with customers during design process to ensure integration of green issues.	67	3.24	0.955	
2	Design of products and processes in a way that ensures reduction or elimination of environmentally hazardous materials (such as lead, mercury, chromium, cadmium etc).	67	3.81	0.909	
3	Design in a way that facilitates reuse of a product or part of it with or without minimal treatment of the used product.	67	3.57	0.857	
4	Design for recycle by ensuring that disassembly of the waste product, separation of parts according to material, and reprocessing of the material can be facilitated.	67	3.54	1.005	
5	Design for remanufacture, by ensuring that repair, rework, and refurbishment activities are facilitated with the aim of returning the product to the new or better than new condition.	67	3.37	0.982	
6	Design that incorporates reduction of material use by a product.	67	3.37	1.057	
7	Design that promotes use of renewable resources in accordance to their rates of replenishment.	67	3.60	1.001	
8	Design a product in such a way that its environmental impacts are considered across its entire lifecycle, from raw material acquisition to end of life disposal.	67	3.78	0.867	
9	Design products with biodegradable materials.	67	3.37	1.042	
10	Design products that have longer useful life.	67	3.60	1.045	
11	Design products with physical characteristics (lighter, alternative materials) or production processes that allow for a higher transport density of parts.	67	3.61	0.92	

Cronbach's alpha = 0.852, Grand mean = 3.532

Source: Research Data, 2015

Table 5: Green Manufacturing Practices

GM	Green Manufacturing Practices	N	Mean	Std. Dev.	Fa load
1	Top management is totally committed to environmentally friendly manufacturing.	67	4.06	0.756	0
2	Reduce use of virgin raw materials by using recycled materials or reusing materials for product manufacturing.	67	3.54	1.005	0
3	Putting in place measures for recycling and reuse of waste water.	67	3.73	0.863	0
4	Putting in place measures to control leakages, emanating from damaged pipes, spillages, losses due to improper handling or faulty machinery.	67	3.93	0.858	0
5	Decreased consumption or total elimination of hazardous and toxic materials (e.g. changing to aqueous cleaners).	67	3.85	0.839	0
6	Separation of hazardous and non-hazardous waste.	67	3.87	0.886	0
7	Use of controls and filters for harmful discharges and emissions.	67	3.78	0.935	0
8	Reduce energy consumption by using alternative sources of energy (e.g. biogas, solar, wind etc).	67	3.39	1.029	0
9	Maintain an inventory of the firm's environmental impacts and identification of proper indicators of improvement (waste, emissions, and effluent generation).	67	3.66	0.993	0
10	Use of standardized components and parts to facilitate reuse.	67	3.48	0.911	0
11	Risk-prevention systems to cover possible environmental accidents and emergencies.	67	3.84	0.914	0
12	Training employees in safer production and accident prevention.	67	3.96	0.928	0
13	Involve production workers in green manufacturing to increase their awareness on the implication of their actions on the natural environment.	67	3.60	0.938	0
14	Reward of environmentally positive behaviour among employees.	67	3.48	1.092	0
15	Integrate total quality environmental management (TQEM) into planning and operation processes.	67	3.63	0.902	0
16	Establishment and maintenance of proper procedures and actions for noncompliance with environmental policies.	67	3.72	0.849	0
17	Availing firm's environmental impact information to the public for open discussion.	67	3.27	1.067	0
18	Practice quality management to ensure products with fewer defects are produced, hence reducing the need to ship it back or reprocess it.	67	3.75	0.893	0
19	Reduction in energy consumption by switching off idle machines, lights after working hours, installation of translucent roofing and glass blocks.	67	3.79	0.913	0

Cronbach's Alpha = 0.883, Grand mean = 3.70

Source: Research Data, 2015

Green Packaging Practices

Green Packaging construct was measured using 8 items. The results for green packaging practices are displayed in Table 6. The lowest rating was 2.16 for the practice "deliver product without using any packaging at all." The highest rated green packaging practice was "reduce the use of hazardous materials in packaging" with a mean of 3.81. The grand mean was 3.416. All the factor loadings are above the threshold of 0.4, ranging from 0.470 to 0.725. Cronbach's Alpha was found to be 0.776 which is higher than 0.7.

Table 6: Green Packaging Practices

GPP	Green Packaging Practices	N	Mean	Std. Dev.	Factor loadings	Item-Total Correlation	Alpha if Item Deleted
1	Use life cycle assessment to evaluate environmental load of packaging during design.	67	3.27	0.914	0.552	0.582	0.730
2	Reduce or downsize overall packaging of products.	67	3.22	0.902	0.604	0.311	0.761
3	Cooperate with the vendor to standardize packaging.	67	3.09	1.125	0.473	0.424	0.749
4	Package product in such a way that time and effort required to unpack is reduced.	67	3.58	0.940	0.787	0.608	0.726
5	Ensure that the size, shape, and materials for packaging promote efficiency (e.g. space utilization) during storage and transportation of the product.	67	3.75	0.785	0.653	0.532	0.739
6	Use biodegradable material (e.g. bioplastics, bio-nano composites, etc) for packaging.	67	3.09	1.138	0.613	0.655	0.715
7	Reduce the use of hazardous materials in packaging.	67	3.81	0.909	0.562	0.398	0.751
8	Make a continuous effort to find new reusable materials for packaging.	67	3.52	0.804	0.518	0.301	0.761

Cronbach's Alpha = 0.776, Grand mean = 3.416 Source: Research Data, 2015

Green Distribution Practices

A total of 8 items were used to measure the green distribution construct. Just like the previous GSCM practices, respondents were required to check the extent to which they had implemented the given green distribution practices on a on a five-point Likert scale ranging from 1 to 5. The responses were analyzed giving the results shown in Table 7. The practice "sale of vehicles that have reached their end of useful life rather than leave them to fill the parking yard" was rated the highest with a mean of 3.88. The lowest rated green distribution practice, "employ transport modes that use alternative fuel (e.g. electricity, ethanol, biodiesel, hydrogen etc)" with a mean of 2.21. The grand mean was 3.544. This implies that the manufacturing firms implemented green packaging practices to slightly above moderate extent. Cronbach's Alpha for

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this construct is 0.767 and all the loadings are above the acceptable level of 0.4.

Table 7: Green Distribution Practices

GPP	Green Distribution Practices	N	Mean	Std. Dev.	Factor loadings	Item-Total Correlation	Alpha if Item Deleted
1	Distribute products together, rather than in smaller batches to ensure full vehicle loads for efficiency.	67	3.84	0.828	0.659	0.292	0.738
2	Employ transport modes that use less energy or use energy more efficiently.	67	3.22	0.918	0.736	0.412	0.723
3	Use a good information system and innovative management for efficient loading, scheduling and routing.	67	3.69	0.941	0.627	0.619	0.695
4	Deliver products directly to the user site.	67	3.67	0.894	0.729	0.435	0.721
5	Locate near customers to reduce resources consumed in getting the product to them.	67	3.36	1.025	0.679	0.478	0.714
6	Use logistics firms that abide to environmentally friendly principles or have EMS certification (e.g. ISO 14001, BS7750, EMAS), in case transport is outsourced.	67	3.39	1.086	0.752	0.555	0.701
7	Usage of warehousing facilities that have been certified as environmentally efficient.	67	3.64	1.011	0.691	0.530	0.706
8	Sale of vehicles that have reached their end of useful life rather than leave them to fill the parking yard.	67	3.88	0.913	0.578	0.320	0.735

Cronbach's Alpha = 0.748, Grand mean = 3.544 Source: Research Data, 2015

Reverse Logistics Practices

The reverse logistics scale consisted of thirteen (13) items. Each scale was rated on a five point likert scale ranging from 1 for "not at all" to 5 for "very great extent." Mean ratings for this practice ranged from 2.51 to 3.81. The highest mean rating was 3.81 for the practice "safe disposal of unrecyclable or unreusable waste (especially hazardous waste)." The least rated practice was "giving bonuses to employees who collect sizeable amounts of recyclable materials" with a mean and standard deviation of 2.51. The grand mean was 3.117. Cronbach's Alpha of 0.853 was attained. These results are presented in Table 8.

Table 8: Reverse Logistics Practices

GPP	Green Distribution Practices	N	Mean	Std. Dev.	Factor loadings	Item-Total Correlation	Alpha if Item Deleted
1	Spread awareness among customers on the firm's product or packaging return or take-back policy.	67	3.46	0.943	0.654	0.534	0.842
2	Install collection points for used products and packaging for reuse and recycling.	67	3.12	1.162	0.650	0.634	0.835
3	Employ individuals or firms to collect waste generated by the firm's products.	67	3.24	1.088	0.507	0.433	0.848
4	Maintain a database on the quantities and value of material and end of life products or packaging collected from consumers.	67	3.28	1.070	0.764	0.666	0.834
5	Safe disposal of unrecyclable or unreusable waste (especially hazardous waste).	67	3.81	0.857	0.749	0.031	0.866
6	Offer special incentives to those who return packaging materials.	67	2.73	1.201	0.664	0.540	0.841
7	Giving bonuses to employees who collect sizeable amounts of recyclable materials (e.g. broken bottles in case of soft drinks or beer companies).	67	2.51	1.198	0.708	0.498	0.844
8	Provide appropriate advice to customers on the environmental aspects of handling, use, and disposal of the firm's products.	67	3.12	0.993	0.796	0.438	0.847
9	Return used products and packaging to suppliers for reuse or recycling.	67	2.94	1.290	0.667	0.634	0.834
10	Remind customers not to purchase the firm's products unless it is absolutely necessary.	67	2.55	1.340	0.641	0.574	0.839
11	Consolidate freight in case where used material and packaging is to be shipped back to the firm.	67	3.04	1.236	0.711	0.613	0.836
12	Put in place systems to monitor reverse flows of materials.	67	3.21	1.175	0.739	0.563	0.840
13	Work to ensure proper product use by customers.	67	3.51	0.943	0.710	0.420	0.848

Cronbach's Alpha = 0.853, Grand mean = 3.117 Source: Research Data, 2015

Organizational Performance

The organizational performance construct is also reflective comprised of two observed indicators; financial performance (ORP1) obtained by averaging 6 items and marketing performance (ORP2) which was obtained by averaging 3 items. Details of the measurement scales for financial performance are presented in Table 9. The mean item scores for financial performance ranged from 2.90 to 3.12. The factor loadings ranged from 0.575 to 0.776 and item to total correlations ranged from 0.661 to 0.818. The Cronbach's Alpha was 0.901. All these indicate that the financial performance had high reliability and construct validity.

Table 9: Financial Performance

FP	Financial Performance	N	Mean	Std. Dev.	Factor loadings	Item-Total Correlation	Alpha if Item Deleted
1	Cash Flow	67	2.99	0.879	0.729	0.775	0.878
2	Profit after tax	67	3.01	0.977	0.690	0.738	0.883
3	Return on Sales	67	2.90	0.855	0.659	0.718	0.886
4	Return on Investment	67	3.12	0.946	0.776	0.818	0.871
5	Ability to Fund Business Growth from Profits	67	3.12	0.946	0.575	0.661	0.894
6	Return on Shareholders' Equity	67	2.96	1.021	0.619	0.692	0.891

Cronbach's Alpha = 0.901, Grand mean = 3.01 Source: Research Data, 2015

Details of the measurement scales for market performance are shown in Table 10. The mean item scores for perceptual organizational performance ranged from 2.90 to 3.12 for market performance. For market performance, loadings ranged from 0.845 to 0.874, item to total correlation ranged from 0.819 to 0.850. Cronbach's Alpha was 0.916. Thus, high reliability and construct validity can be confirmed for the market performance construct.

Table 10: Market Performance

MAP	Market Performance	N	Mean	Std. Dev.	Factor loadings	Item-Total Correlation	Alpha if Item Deleted
1	Market share growth	67	2.90	1.075	0.852	0.827	0.882
2	Sales volume growth (in units)	67	3.12	1.052	0.845	0.819	0.889
3	Sales growth (in shillings)	67	3.01	1.161	0.874	0.850	0.864

Cronbach's Alpha = 0.916, Grand mean = 3.01 Source: Research Data, 2015

Construct Unidimensionality for the Inner Model

Table 11 shows that the corrected item-total correlation scores for all the indicators representing the latent constructs are above the threshold of 0.3. Additionally, confirmatory factor analysis results show that that the indicator items loaded heavily on the relevant latent constructs. This implies that all indicators of the latent constructs in the model 'load onto' the constructs thus ensuring unidimensionality of the constructs.

Table 11: Item to Total Correlation Coefficients

Latent Construct	Indicator Items	Corrected Item-Total Correlation
GSCM practices	Green Procurement	0.615
	Environmentally responsible design	0.635
	Green manufacturing	0.602
	Green packaging	0.610
	Green distribution	0.742
	Reverse logistics	0.693
Organizational performance	Financial performance	0.798
	Market performance	0.798

Source: Research Data, 2015

3 Test of Hypothesis and Interpretation

To test the hypothesis, partial least squares structural equation modeling (PLS-SEM) analysis was conducted using SmartPLS 3.0. The analysis started by confirming the reliability and validity of the outer and inner models. All the measurement items for the two latent constructs were found to have individual indicator reliability scores greater than the threshold of 0.4 (Wong, 2013). This is shown in Table 12.

Table 12: Results Summary for Reflective Outer Models

Latent Variable	Indicators	Loadings	Indicator Reliability	T Statistics	P Values
GSCM practices	GSCM1	0.756	0.572	12.339	0.000
	GSCM2	0.721	0.519	4.900	0.000
	GSCM3	0.696	0.485	5.549	0.000
	GSCM4	0.733	0.537	4.836	0.000
	GSCM5	0.859	0.737	16.459	0.000
	GSCM6	0.813	0.661	15.418	0.000
Organizational performance	ORP1	0.964	0.930	69.824	0.000
	ORP2	0.929	0.864	21.088	0.000

Source: Research Data, 2015

Table 13: Confirmatory Factor Analysis Results

Indicator	GSCM practices	Organizational performance
GSCM1	**0.756**	0.294
GSCM2	**0.721**	0.206
GSCM3	**0.696**	0.210
GSCM4	**0.733**	0.280
GSCM5	**0.859**	0.348
GSCM6	**0.813**	0.315
ORP1	0.402	**0.964**
ORP2	0.286	**0.929**

Source: Research Data, 2015

In addition, confirmatory factor analysis results in Table 13 show that all these indicators also loaded highly and significantly on their respective constructs than on any other constructs thus confirming convergent and discriminant validity of the outer model. Composite reliability scores larger than 0.6 and Cronbach's Alpha values greater than 0.7 confirmed internal consistency reliability of the two constructs in the inner model. Convergent validity was also assessed for the model where it was established that all AVE values of the constructs were greater than the acceptable threshold of 0.5 (Table 14).

Table 14: Composite Reliability, Cronbach's Alpha and AVE of Latent Constructs

Latent Variable	Composite Reliability	Cronbach's Alpha	AVE
GSCM practices	0.894	0.859	0.585
Organizational performance	0.946	0.888	0.897

Source: Research Data, 2015

Discriminant validity of the inner model was evaluated by assessing the factor loadings of individual items to their respective construct, using Heterotrait-Monotrait and Fornell-Larcker criteria. From Table 13, it is observed that each item loads highest on its associated construct than on any the construct. The HTMT value between GSCM practices and organizational performance constructs was found to be 0.411. This value is less than 0.9 implying that discriminant validity is well established (Gold, Malhotra, & Segars, 2001; Teo, Srivastava & Jiang, 2008). Using the Fornell-Larcker Criterion (Table 15), it is observed that the square root of AVE for the latent variable GSCM practices is 0.765. This number is greater than the correlation value in the column of GSCM practices (0.377). Similarly, the square root of AVE for the latent construct organizational performance (0.947) is larger than the correlation value in the row of organizational performance (0.377). This result indicates that discriminant validity is well established (Fornell & Larcker, 1981).

Table 15: Fornell-Larcker Criterion Analysis for Checking Discriminant Validity

	GSCM Practices	Organizational performance
GSCM practices	**0.765**	
Organizational performance	0.377	**0.947**

Source: Research Data, 2015

An overall model fit measure, standardized root mean square residual (SRMR), confirmed that the model is fit with a composite SRMR of 0.056. This SRMR was found to be significant at 0.05 level. The inner model path coefficient was assessed for significance using bootstrapping with 500 resamples (Chin, 1998). The results established a significant positive relationship between GSCM practices and organizational performance. GSCM practices construct was found to explain 14.2% of the variance in

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organizational performance. The path coefficient was found to be positive and statistically significant at the 0.001 level ($\beta = 0.377$, $t = 3.782$, p-value = 0.000, $f^2 = 0.166$) (Figures 2 and 3). This means that, if GSCM practices is omitted from the model the change in variance explained in organizational performance will be medium based on Cohen (1992) guidelines for assessing f^2 values. From these results, the hypothesis is supported implying that implementation of GSCM practices has a significant positive effect on the organizational performance.

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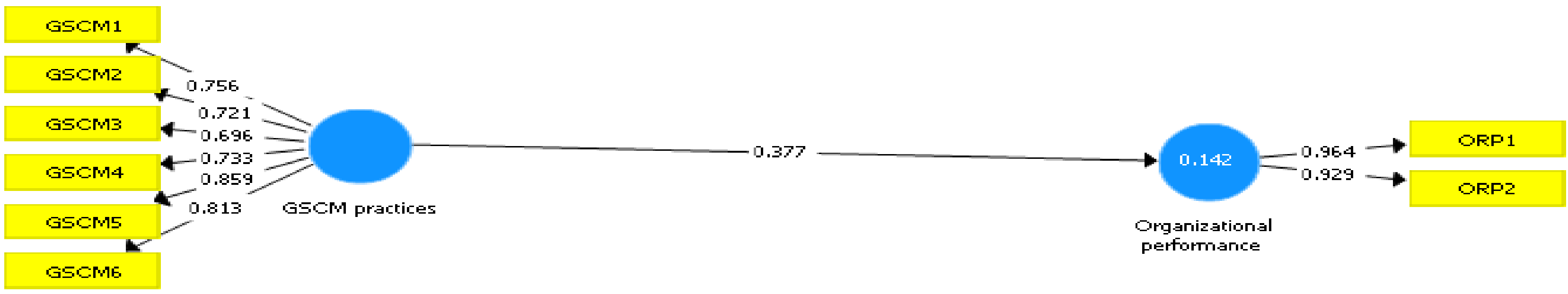

Figure 2: Structural Equation Model Diagram with Path Coefficients

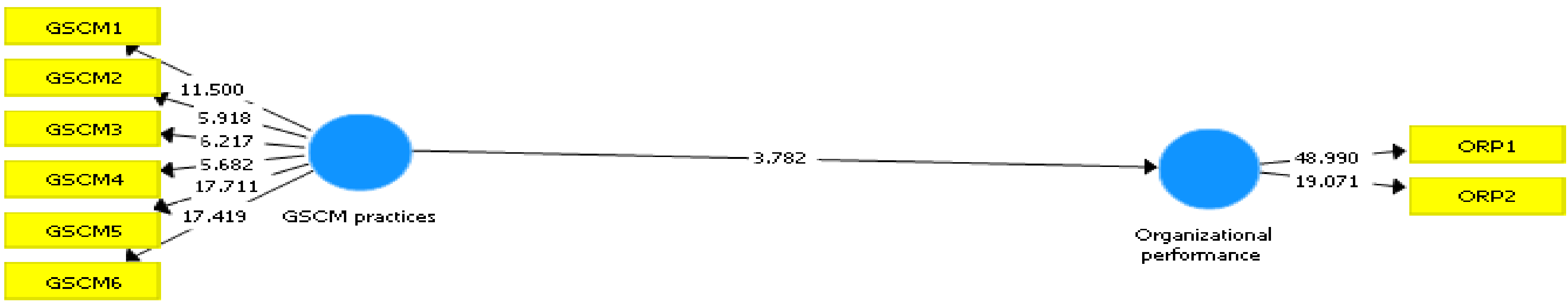

Figure 3: Structural Equation Model Diagram with T-Values

Conclusion

This study concludes that implementing GSCM practices in totality leads to enhanced organizational performance in the form of improved financial and marketing performance (Rao & Holt, 2005; Lee et al., 2012; Green et al., 2012). Therefore, manufacturing firms should implement environmentally sound practices in all phases of the supply chain, beginning with procurement of raw materials and supplies through to design, manufacture, packaging, distribution of their products and end of life disposal. In doing so, they are likely to perform better financially and marketwise.

One of the most commonly ignored GSCM practice is reverse logistics. Past research has confirmed that the recovery of products and packaging that have reached the end of their useful life significantly reduces environmental footprints left by the firm's operations (Green et al., 2012; Mittra & Datta, 2013; Laosirihongthong et al., 2013). This is because it eliminates the need for disposal and additional consumption and enhances the firm's image and hence its profitability. The government should therefore re-examine the regulatory framework which can facilitate product recovery. The government and manufacturers should promote awareness on the advantages of collection and recovery of used products and packaging among consumers. This would lead to an increase in the market for remanufactured/refurbished products leading to a reduction in the import bill for the country. The end result is that all stakeholders, that is, the manufacturer, customer, government and most importantly the environment benefit.

Implications of the Study

It was hypothesized that the implementation of GSCM practices is positively related to the organizational performance. The findings confirmed this hypothesis. The result of this empirical investigation follows conclusions from other studies (Rao & Holt, 2005; Chien & Shi, 2007; Zeng et al., 2010; Kirchoff, 2011). The study therefore extends literature by contributing to the positive links between GSCM practices and organizational performance thus helping to reduce the uncertainty which has arisen out of contradictory findings from past studies on whether it is beneficial to pursue these practices. The findings also supports the natural RBV, RBV, institutional theory, stakeholders' theory and transaction cost economics which provided theoretical anchorage to this relationship.

Most importantly, this study extends knowledge to existing literature by taking a holistic view of the GSCM construct. Past studies have concentrated on sections of GSCM (Rao & Holt, 2005; Chien & Shi, 2007; Zeng et al., 2010; Kirchoff, 2011). Wu and Dunn (1995) argued that as firms use resources to produce desired goods and services, pollutants are produced at every stage of the supply chain process. Consequently, Hart (1995) and Van Hoek (1999) stressed the need for firms to target their environmental management effort on the entire supply chain. This is one of the few studies that have made an attempt at considering all elements in the supply chain thus addressing the weaknesses of past studies.

The study also takes a much broader look at the organizational performance variable by looking at both the financial and the marketing aspects of organizational performance. The financial aspects explored include cash flow, profit after tax, return on sales, return on investment, ability to fund business growth from profits and return on shareholders' equity. The marketing aspects are market share, sales volume in physical units and sales in monetary terms. This lends credence to Weinzimmer et al. (1998) assertion that firm performance is best captured by considering multiple aspects of it.

Last and most importantly, the findings also advance understanding of the GSCM-performance relationship in East Africa. GSCM is a relatively new management concept for majority of firms in the region. This study presents one of the earliest studies on GSCM practices in East Africa and also in the context of a developing country where the level of GSCM practice diffusion is still low. It is therefore expected that the findings of this study would scale up the level of implementation of GSCM practices by firms in this region.

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