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

BY:
ODOCK, STEPHEN OCHIENG

RESEARCH THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT OF THE AWARD OF THE DEGREE OF DOCTOR OF PHILOSOPHY IN BUSINESS ADMINISTRATION, SCHOOL OF BUSINESS, UNIVERSITY OF NAIROBI

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DECLARATION

I declare that this research thesis is my original work and has not been submitted for examination for a degree in this or any other university.

Signed...Date……………………

Odock Stephen Ochieng

D80/8574/2003

The research thesis has been submitted with our approval as the university supervisors.

Signed...Date……………………

Dr. Muranga James Njihia,

Senior Lecturer, Department of Management Science,

School of Business, University of Nairobi.

Signed...Date……………………

Dr. W. N. Iraki,

Senior Lecturer, Department of Management Science,

School of Business, University of Nairobi.

Signed...Date……………………

Prof. Zachary Bolo Awino,

Associate Professor, Department of Business Administration,

School of Business, University of Nairobi.

QUOTE

The person who says it cannot be done should not interrupt the person who is doing it. – Chinese Proverb

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DEDICATION

To my late Dad, Clement Odock Aywaya, late Mum, Lucia Awuor Odock and late Step Mums, Juliana Anyango Odock and Antonina Adoyo Odock

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ABBREVIATIONS AND ACRONYMS

APO - Asian Productivity Organization

AVE - Average variance extracted

CEEST - Centre for Energy, Environment, Science and Technology

CFA - Confirmatory factor analysis

CO_2 - Carbon dioxide

CR - Composite reliability

DoE - Division of Environment

EMAS - European Union Eco-management and Audit Scheme

EMS - Environmental management system

EPEAT - Electronic Product Environmental Assessment Tool

GHGs - Green house gases

GDP - Gross Domestic Product

GSCM - Green supply chain management

GSCP - Green supply chain practices

ISO - International Organization for Standardization

IEA - International environmental agency

JIT - Just-in-time

KAM - Kenya association of manufacturers

KEBS - Kenya Bureau of Statistics

KMO - Kaiser-Meyer-Olkin

KIPPRA - Kenya Institute for Public Policy Research and Analysis

LCA - Life Cycle Assessment/Analysis

Mg/m^3 - milligramms per cubic meter

MMt - Million metric tonnes

MVA - Manufacturing value added

NEMA - National Environmental Management Authority

NRBV - Natural-resource-based view

PLS-SEM - Partial least squares structural equation modeling

RBV - Resource based view

RDT - Resource dependence theory

ABBREVIATIONS AND ACRONYMS Continued

REMA -	Rwanda Environment Management Authority
RSB -	Rwanda Standards Board
R & D -	Research and development
SCM -	Supply chain management
SEM -	Structural equation modeling
SMEs -	Small and medium enterprises
SRMR -	Standard root mean square residual
TCE -	Transaction cost economics
TQEM -	Total quality environmental management
TQM -	Total quality management
TRI -	Toxic release inventory
UNEP -	United Nations Environmental Program
UNFCCC -	United Nations Framework Convention on Climate Change
UNIDO -	United Nations Industrial Development Organization
UNSD -	United nations statistics division
USAID -	United States Agency for International Development
URT -	United Republic of Tanzania
USA -	United States of America
VAF -	Variance accounted for
VIF -	Variance inflation factors
WRMA -	Water Resource Management Authority
3PLs -	Third-party logistics

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. Specifically, the study investigated the key institutional pressures that cause firms to implement these practices and how environmental performance, operational performance, relational efficiency and firm characteristics influence the relationship between implementing the practices and organizational performance. To achieve the objectives, five broad hypotheses were formulated. 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. The study achieved a response rate of 62%. Based on the objectives, the study findings are that, first, coercive and normative pressures are significant in causing the firms to implement GSCM practices, mimetic pressures are not significant; second, there is a statistically significant positive direct relationship between implementation of GSCM practices and organizational performance; third, environmental and operational performance fully mediate the relationship between GSCM practices and organizational performance. It was also noted that the inclusion of environmental and operational performance constructs increased the variance explained in organizational performance from 14.2% to 59%; fourth, relational efficiency does not mediate the relationships between GSCM practices and environmental performance, GSCM practices and operational performance and GSCM practices and organizational performance. Fifth, firm size, firm age and spatial scope of the market served by the firm do not positively moderate the relationship 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. In essence, it can be concluded that a firm will experience improved marketing and financial performance as a result of GSCM activities having a positive impact on its operations or are giving positive environmental impression to its customers who would eventually provide more business opportunities to the firm. 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.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

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). Interest is also increasing on the relationship between implementation of GSCM practices and environmental, operational and organizational performance. This is revealed in literature by the mounting number of studies that investigate the relationships among these variables (Golicic & Smith, 2013; Ngniatedema & Li, 2014).

Theories which offer explanations why firms adopt GSCM practices and its relationship with organizational performance include the institutional theory, resource based view, natural resource based view, resource dependence theory, stakeholders' theory and transaction cost economics theory. The institutional theory focuses on direct impact of institutional pressures on organizations to adopt GSCM practices; Resource based view focuses on GSCM as a resource that can lead to a firm's competitive advantage (Sarkis, Zhu & Lai, 2011). Resource dependence theory proposes that for successful implementation of GSCM practices, firms should cooperate and coordinate with external members of the supply chain (Lee, Kim & Choi, 2012). The stakeholder theory emphasizes that stakeholders can influence GSCM practices adoption by exerting pressure on firms (Sarkis et al., 2011). Transaction cost economics theory focuses on how partners who do business protect themselves from the risks linked to exchange relationships (Williamson, 1979). This study was motivated by the fact that the dispute as to whether or not implementing GSCM practices results in enhanced organizational performance has still not been firmly decided due to contradictory findings of previous studies.

Over the past decade, the manufacturing sector in East Africa has grown rapidly. This growth has increased pressure on the environment in the form of air emissions, solid waste disposal, waste water discharges and resource depletion (United Nations Environment Programme, 2014). General increases in temperatures and decreases in rainfall have been observed. Consequently, a number of initiatives focused on sustaining atmospheric resources have been started. For example, The Kyoto Convention of 1997 and the United Nations Climate Change Conference of Copenhagen in 2009 have been key drivers in today's practices by firms (United Nations Framework Convention on Climate Change, 2009). A number of firms are seeking environmental management systems certification such as ISO 14001. ISO 14001 certification is a motivating factor for implementing GSCM practices (Handfield, Melnyk, Calantone & Curkovic, 2001; Arimura, Hibiki & Katayama 2008; Testa & Irlado, 2010).

1.1.1 Green Supply Chain Management

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 emphasize direct collaboration between the firm and its supply chain partners including suppliers and customers in finding solutions which will reduce or eliminate the negative effects of the firm's operations and products on the environment. This is in recognition of the fact that in today's environment, competition is between supply chains not firms (Min & Mentzer, 2004; Christopher, 2005; Defee & Stank, 2005).

The focus of GSCM is not only restricted to products and operations of the firm but also encompasses sourcing of materials and equipment with an emphasis on the immediate supplier to apply green efforts, and on the means by which more green operations or products might be achieved, and extends all the way to the customer, whose requirements are incorporated in the conceptualization of green supply chain and eventual disposal of the by-product after use (Bowen, Cousins, Lamming & Faruk, 2001; Zhu & Sarkis, 2004).

1.1.2 Green Supply Chain Management Practices

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). A brief explanation of each of these GSCM components follows.

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. Most past researchers have employed the term green purchasing. This study adopted green procurement because it is wider and more proactive, and focuses on strategic matters as opposed to the concept of green purchasing (Dobler & Burt, 1996). Based on earlier GSCM research (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), potential indicators for the green procurement construct are shown in appendix I (a).

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 et al., 2001). Environmentally responsible product designs can bring down the resources required to manufacture the product and thus diminish the pollutants generated (Wu &

Dunn, 1995). Environmentally responsible design practices based on 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) are included in appendix I (b).

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 (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), this study emphasized the green manufacturing practices in appendix I (c)

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 as supported by previous research (Wu & Dunn, 1995; Tseng, 2009; Ninlawan et al., 2010; Laosirihongthong et al., 2013) are shown in appendix I (d).

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 (lead, zinc, particulate matter) and gases (carbon monoxide, carbon dioxide, methane) into the atmosphere. They also make a lot of noise. 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) and these are contained in appendix I (e).

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. Earlier studies (Wu & Dunn, 1995; Florida & Atlas, 1997; Harps, 2002; Toffel, 2004; Vachon, 2007; Ninlawan et al., 2010) give potential item measures for the construct of reverse logistics practices as shown in appendix I (f).

1.1.3 Institutional Pressures for GSCM Practices Implementation

Institutional pressures are pressures that cause firms to implement certain strategies in order to be considered legitimate by the society (Zhu & Sarkis, 2007). Three sources of institutional pressures as identified by DiMaggio and Powell (1983) include coercive, mimetic and normative pressures. Coercive pressures come from the influence of those in power, for example, government agencies which enact laws that the firms are expected to adhere to (Rivera, 2004). Environmental laws from government cause firms to implement GSCM practices.

Mimetic pressures occur when a firm imitates the actions of competitors considered successful (DiMaggio & Powell, 1983). Mimetic pressures is a key driver for firms to adopt GSCM practices (Zhu & Sarkis, 2007). A third source of pressures are the normative pressures which are exerted by external stakeholders who have vested interest in the firm (DiMaggio & Powell, 1983). These stakeholders include customers, shareholders, employees, suppliers, environmental organizations, community groups, labor unions and trade associations. These stakeholders exert pressures to firms which lead them to implement GSCM practices. Firms that conform to these pressures are perceived to be more legitimate (Darnall, Henriques & Sadorsky, 2008; Sarkis et al., 2011).

1.1.4 Relational Efficiency

Relational efficiency is defined as enhanced trust and credibility in a relationship due to high level of collaboration with supply chain partners. Increased levels of trust, credibility and relationship effectiveness can be observed through transparency and openness between the firm and its supply chain partners in conducting their business processes (Lee et al., 2012). Trust is the belief, attitude, or expectation concerning the likelihood that the actions or outcomes of another individual, group or organization will be acceptable (Sitkin & Roth, 1993). Firms foster an atmosphere of trust when there is a high level of collaboration between them.

Credibility is the belief that a trading partner has the capability, knowledge and expertise to undertake a task. Zacharia, Nix and Lusch (2009) argue that firms which collaborate with a high level of credibility respect and appreciate each other more. Relationship effectiveness is the firm's satisfaction with their relationship with supply chain partners on collaboration (Stoel, 2002). A higher level of environmental collaboration among supply chain partners through more open information exchange leads to increased ability and willingness to work together and hence greater commitment and solidarity between the partners to fulfill environmental objectives. These elements of relational efficiency are operationalized in appendix II.

1.1.5 Firm Characteristics

Firm characteristics are internal features that are specific to a firm which have the capacity to positively or negatively affect the performance of the firm (Fatoki & Asah, 2011). In this study size, age and spatial scope of the market that the firm serves were considered as firm specific variables that influence the relationship between GSCM practice implementation and organizational performance (Testa & Irlado, 2010).

Size of the firm affects its ability to assemble resources to implement GSCM practices (Bowen, 2002) and also influence its performance (Majumdar, 1997). Firm size was measured in terms of the number of full-time employees. The firm's age is expressed in terms of the number of years the firm has been in operation. The more years of experience the firm has, the higher the possibility of building up resources and capabilities that may lead to improved performance (Birley & Westhead, 1990). The spatial scope of market where the firm competes is taken as a dummy variable where the firm is categorized as either serving a global or local market.

1.1.6 Environmental Performance

Environmental performance relates to the ability of firms to reduce air emissions, effluent waste and solid wastes and the ability to decrease consumption of hazardous and toxic materials, reduced frequency for environmental accidents, improved environmental situation of the firm (Zhu et al., 2008a).

Environmental performance is defined in terms of two broad dimensions as proposed by Shi, Koh, Baldwin and Cucchiella (2012). The first dimension is the environmental impact reduction whose measures include reduction in green house gas emissions, water use ratio, waste water, solid waste, hazardous waste and frequency of environmental accidents. The second dimension is environmental cost saving whose measures include: savings in green purchasing, environmental technology investment, material recovery, recycling of waste water, bulk transportation, energy and environmental penalties.

1.1.7 Operational Performance

Operational performance relates to a firm's ability to achieve competitive advantage over competitors through quality, cost, speed and flexibility (Ketchen, Rebarick, Hult & Meyer, 2008). In this study both internal and external measures of quality were employed. The internal measures include rejects, scrap rate and reworked products while the external measures include product returns and customer complaints during the warranty period. Cost reduction will be experienced through a reduction of inventory levels (Maani, Putterill & Sluti, 1994) and effective capacity utilization.

Speed measures include reductions in design times, cycle times, setup times, throughput times and delivery times (Tersine & Hummingbird, 1995) and amount of goods delivered on time (Zhu et al., 2008a). Flexibility measures incorporated include; mix flexibility, volume flexibility, new-product flexibility and delivery-time flexibility (Suarez, Cusumano & Fine, 1996).

1.1.8 Organizational Performance

Organizational performance has been conceptualized as a multidimensional construct depending on the stakeholders, market circumstances and time (Richard, Devinney, Yip & Johnson, 2009). In this study, organizational performance is the performance of the firm from the strategic point of view. It is taken as the ultimate dependent variable. It is the performance at the organizational level rather than at the process or work unit level. It therefore includes the market and financial performance of the organization as evaluated against the industry average (Green & Inman, 2005; Richard et al., 2009).

Financial performance centers on the firms profitability and its ability to generate returns on investment and sales as compared to industry average (Claycomb, Dröge & Germain, 1999). In this study the indicators of financial performance were cash flow, profit after tax, return on sales, return on investment, ability to fund business growth from profits and shareholder return. Market performance indicators included market share growth, sales volume growth, sales (in monetary units) growth (Green & Inman, 2005). This study takes the position that if a firm implements GSCM practices, then its environmental and operational performance are enhanced leading to improved organizational performance (Chopra & Meindil, 2004; Green, Zelbst, Meacham & Bhadauria, 2012; Lee et al., 2012).

1.1.9 Manufacturing Sector in East Africa

The Manufacturing sector plays a respectable role in the economies of the five East African countries which include Kenya, Tanzania, Uganda, Rwanda and Burundi. On average, this sector accounts for 9.8% of the region's Gross Domestic Product (World Bank, 2013). It is also responsible for 12.4% of total labour force in formal employment (United Nations Statistics Division, 2013; United Nations Industrial Development Organization, 2014). In addition, manufactured goods account for 12.5% of total exports (Kenya Institute for Public Policy Research and Analysis, 2013; UNSD, 2013). Over the past few years, the manufacturing sector in the five countries in East Africa has grown. This growth has been accompanied by increasing pressure on the environment. United Nations Environmental Programme (2006, 2014) noted that environmental pollution and resource depletion levels in the region is emerging as a problem and has identified manufacturing industries as one of the primary sources of this problem.

In Kenya, increased levels of particulate matter, green house gases, heavy metals, solid waste and waste water have been reported (National Environmental Management Authority, 2011). A joint study carried out by the University of Nairobi's Institute of Nuclear Sciences, Gothenburg University and Columbia University's Earth Institute revealed that the air around Nairobi contains 105 microgrammes per cubic meter of carcinogens. This is almost six times the level that is prescribed by the World Health Organization. These pollutants have mostly been attributed to manufacturing firms. According to the last survey by International Energy Agency (2013), Kenya produced 4.6 million metric tonnes of carbon dioxide from manufacturing industries and construction. This represented 0.038% of the total world carbon dioxide emissions (IEA, 2013) yet its manufacturing value added (MVA) accounted for only 0.0295% of the total world MVA (UNSD, 2013; KIPPRA, 2013; UNIDO, 2014).

In Tanzania, environmental degradation is increasingly being pointed towards manufacturing firms as the sector continues to grow (Wangwe et al., 2014). This is especially the case in urban areas where at least 80% of the manufacturing firms are situated (Division of Environment, Vice President's Office, United Republic of Tanzania, 2006). These firms discharge untreated or poorly treated effluents into water bodies. For example, Bwathondi, Nkotagu and Mkuula (1991) observed that textile mills release dyes, bleaching agents, alkalis and starch directly into the Msimbazi Creek in Dar-es-Salaam. Unpleasant smells are also emitted by some of these firms especially food, chemical and allied industries. For example, a factory in Dar es Salaam which produces a local brew from grains, releases an offensive odour, which is detectable 1.5 km away. Disposal of solid waste is a major challenge facing manufacturing firms in Tanzania. The waste sites are poorly managed resulting in very offensive smell. Industrial activities have also been blamed for noise pollution. Mbuligwe (2006) established that small-scale manufacturing firms in Dar es Salaam are a major cause of environmental noise pollution with noise levels higher than 90.0 dBA, the acceptable safe level of exposure. Green house gas emission levels have also increased, for example, Centre for Energy, Environment, Science and Technology (1999) reported that carbon dioxide emissions from Tanzania amounted to 55,208 gigagrams.

Manufacturing firms in Uganda contribute to pollution through air emissions, noise and wastewater discharge. Kampala and its outskirts host 93% of Uganda's chemical industries (Matagi, 2002). Studies conducted between 1990 and 2002 revealed that most of these industries lack appropriate systems for disposal of chemical waste (Droruga, 1990; Wasswa 1997; Matagi, 1993, 2002). Manufacturing establishments have also been blamed for harmful air emissions in Uganda. Coffee factories in Uganda have the highest dust emissions, between 1-25 milligrammes per cubic meter (mg/m^3), much higher than World Health Organization recommended levels of 0.2 mg/m^3 (Ministry of National Resource, 1994). A study by Nyangababo and Salmeen (1987) established that a steel mill located in Nalukolongo industrial area was liable for air pollution. Heavy metals pollution of Nakivubo Channel and Lake Victoria have been traced to car battery manufacturers, electric pole treatment plants, tanneries, paint factories (Wasswa, 1997). 'Wet' industries in the Central Industrial area which include soft drink factories, textile industries, abattoirs, soap factories, engineering workshops and a leather-tanning factory discharge their waste water in the Nakivubo Channel which flows into Murchison Bay of

Lake Victoria. A good number of these factories employ obsolete technologies and lack pre-treatment facilities for their waste waters (Matagi, 2002).

Rwanda has been touted as being amongst the world's ten fastest growing economies (United Nations Industrial Development Organization, November 2011). Its manufacturing sector has witnessed significant progress with both small and large scale manufacturing establishments increasing significantly in the last decade. Between 2006 and 2010, manufacturing contribution to GDP stood at an average of 6.44% (Rwanda Standards Board, 2012). This growth has been accompanied by an increase in the level of environmental degradation. According to Rwanda Environment Management Authority and United Nations Environment Programme (2009), fuel wood is utilized as a source of energy by the bulk of the firms. As a result, deforestation has led to soil erosion contributing to degradation of the land. In Kigali, a large number of manufacturing firms are found in wetlands. An insignificant proportion of these firms have proper waste disposal mechanisms (Republic of Rwanda, 2006; European Commission & Republic of Rwanda, 2006). Chemical effluents and by-products from these factories are released into the Gikondo-Nyabugogo wetland system into the Nyabarongo River and its tributaries. This eventually ends up in Lake Victoria through the Akarega River (REMA & UNEP, 2009).

Burundi has an underdeveloped manufacturing sector dominated by the state's presence and competition among firms in the country and outside is very stiff (Global Investment and Business Center, USA, 2013). Pollution from factories in Bujumbura has been blamed for the decline of fish population in Lake Tanganyika (United States Agency for International Development, 2006). This threatens the development of this small nation especially given the fact that Lake Tanganyika provides many options for sustainable economic development around trade and fisheries (Hobbs & Knausenberger, 2003).

Of more concern is that in these countries monitoring and control of pollution is not taken seriously. Additionally, there is no comprehensive research that has been carried out to establish the long term impact of environmental pollution either at the local or regional level (SustainAbility–UNEP, 2000; DoE, URT, 2006). This is the case in spite of the fact that environmental protection is important for the development of a nation's economy (National Environment Management Authority, 2010). Urgent action is therefore needed to achieve a change in the way manufacturing firms manage the natural environment (Lisney, Riley & Banks, 2004). Implementation of GSCM practices is a viable option for these firms. Here, the firm tries to reduce or eliminate the environmental footprints of its operations at each stage of the supply chain from raw materials through to end of life disposal.

1.1.10 ISO 14001 Manufacturing Firms in East Africa

The ISO 14001 standard was created by ISO in 1996 (International Organization for Standardization, 2015). ISO 14001 sets out a structure that a firm can follow to set up an effective environmental management system (EMS). The requirements of this standard include; forming a corporate environmental policy and committing to an EMS, coming up with a plan for implementing the policy, implementing and operating the EMS, monitoring and possible corrective action, and top management review and continuous improvement (Albuquerque, Bronnenberg & Corbett, 2007; Darnall et al., 2008). The firm must specify what is going to be done, how it will be done, who will do it and by when it will get done (Curkovic & Sroufe, 2011). The standard can be used by any organization whose objectives are resource efficiency improvement and waste and cost reductions.

As a result of heterogeneous pressures from various sources for environmentally friendly operations, the number of firms seeking EMS certifications is on the rise. The most popularly adopted EMSs by firms include; ISO 14000 series, Eco-Management and Audit Scheme (EMAS), Electronic Product Environmental Assessment Tool (EPEAT), Life Cycle Assessment/Analysis (LCA) and Total Quality Environmental Management (TQEM). ISO 14001 is the most important of the 14000 standards for organizations. The International Organization for Standardization survey of 2013 established that the number of firms with valid ISO 14001 certificates in the world increased by 5.97% from 284,654 to 301,647 in 171 countries. In Africa this number increased by 21.79% from 2,084 to 2,538 (ISO, 2015). In East Africa, a total of 108 firms have received ISO 14001 certification. This represents an increase of 50% from the figure that was reported in the 2012 survey. Table 1.1 shows how these firms are distributed among the five countries in East Africa. The table also shows the figures for the last five years.

Table 1.1: Valid ISO 14001 Certificates in East Africa in the Period 2009-2013

Year	**2009**	**2010**	**2011**	**2012**	**2013**
Kenya	18	*	33	32	51
Tanzania	4	3	1	30	36
Uganda	6	6	13	8	19
Rwanda	0	0	0	2	2
Burundi	0	0	0	0	0
Total	**28**	**9**	**47**	**72**	**108**

*No figure was reported Source: ISO survey 2013. From www.**iso**.org/survey

A greater concern is that even though these figures are increasing, they still represent a very small proportion of the total number of manufacturing firms in the region. This study's focus was on ISO 14001 certified firms because this characteristic provides some form of assurance that the impact of the firm's operations on the environment is being measured and improved (ISO, 2015). There is also overwhelming evidence that firms that possess an EMS certification are implementing GSCM practices. Gonzales et al. (2008) found out that firms which have an EMS certification specifically ISO 14001 and EMAS are likely to impose strict environmental standards on their suppliers, an element of GSCM practice. Handfield et al. (2001) assert that ISO 14001 certification may be a motivating factor for implementing environmental management practices such as GSCM practices. Several other researchers have also supported the idea that a firm which possesses an EMS certification is likely to implement GSCM practices (Kitazawa & Sarkis, 2000; Arimura et al., 2008; Irlado, Testa & Frey, 2009; Testa & Irlado, 2010).

1.2 Research Problem

Manufacturing firms are increasingly implementing GSCM practices in response to customers and government entities' demand for environmentally friendly operations (Green et al., 2012). Success in implementing these practices requires the integration of both downstream and upstream supply chain partners (Preuss, 2005). The implementation of GSCM practices is expected to result in improved environmental and operational performance. However, there is concern as to whether enhanced environmental and operational performance will eventually translate into improved organizational performance as measured by increased market share and profitability (Green & Inman, 2005). In addition, in order to understand the relationship between implementation of GSCM practices and organizational performance, it is essential to consider the institutional pressures that cause firms to implement these practices (Chien & Shi, 2007).

The Manufacturing sector plays a significant role in the East African economy in terms of contribution to GDP, employment and exports (KIPPRA, 2013; UNSD, 2013; World Bank, 2013). The growth of this sector in the region has created increased pressure on the environment. Increased levels of GHGs, solid waste, waste water, particulate matter, toxic gases, heavy metals and other environmental pollutants have been attributed to the growth of the sector (IEA, 2013; NEMA, 2011; UNEP, 2014; World Bank, 2013). Of more concern is that in these countries there are no proper systems to monitor or control this degradation and there is virtually no long-term study of pollutant impacts at the local or regional level (UNEP, 2014). In order to arrest this situation, firms are seeking EMS certification such as ISO 14001. ISO 14001 certification is a strong motivating factor for implementing environmental management practices such as GSCM practices (Handfield et al., 2001; Arimura et al., 2008; Testa & Irlado, 2010).

An issue of concern to operations and supply chain practitioners is whether implementing GSCM practices actually leads to improved organizational performance. A number of studies have been conducted to examine this relationship (Cordeiro & Sarkis, 1997; Zhu & Sarkis, 2004, 2007; Rao & Holt, 2005; Chien & Shi, 2007; Testa & Irlado, 2010; Azevedo, Carvalho & Cruz Machado, 2011; Kirchoff, 2011; Lee et al., 2012; Green et al., 2012; Kung et al., 2012; Kinoti, 2012; Perotti, Zorzini, Cagno & Micheli, 2012; Mitra & Datta, 2013; Laosirihongthong et al., 2013). Critical review of these studies reveals significant knowledge gaps.

First, the studies have established contradictory findings. Some studies established significant positive relationships between GSCM practices and organizational performance (Zhu & Sarkis, 2004; Rao & Holt, 2005; Chien & Shi, 2007). Some revealed no significant relationship between the variables (Testa & Irlado, 2010; Lee et al., 2012). Others showed a negative relationship (Cordeiro & Sarkis, 1997). Yet others found a combination of positive, negative and no relationships (Azevedo et al., 2011; Green et al., 2012; Laosirihongthong et al., 2013; Mittra & Datta, 2013). As such, the dispute of whether or not implementing GSCM practices results in enhanced organizational performance has still not been firmly decided, leaving practitioners puzzled as to what actions would be beneficial to pursue. 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.

Second, the difficulty in drawing precise conclusions from past research cannot only be blamed on the mixed findings but also on the fact that different researchers have operationalized the GSCM construct differently. A majority of them have a narrow perspective of the definition of GSCM and do not adequately cover all the facets of the construct. Wu and Dunn (1995) argue that as firms use resources to produce desired goods and services, pollutants are inherently produced as by products during each stage of the supply chain process. Hart (1995) noted that every activity at every step of the supply chain has an effect on the environment. Van Hoek (1999) argues that it is important for firms to focus on the entire supply chain in order to fully comprehend the effect of their operations on the natural environment. Consequently, every element in the supply chain should be considered in minimizing the firm’s total environmental impact (Wu & Dunn, 1995; Kung et al., 2012). This study made an attempt at considering all elements in the supply chain.

The few studies that have addressed the relationship between GSCM practice in its entirety and organizational performance (Rao & Holt, 2005; Kung et al., 2012; Perotti et al., 2012) have a limited scope on the performance variable. Weinzimmer, Nystrom and Freeman (1998) assert that firm performance is best captured by considering multiple aspects of it. Green et al. (2012) argue that in order to capture the performance variable better as a result of implementing GSCM practices, then environmental, operational and organizational performance measures should be included. Kung et al. (2012) only considered environmental performance. Rao and Holt (2005) focused on measures that were largely operational. Perotti et al. (2012) considered both environmental and operational performance. Chien and Shi (2007) looked at environmental and the financial aspect of organizational performance. This study considered environmental, operational and organizational performance.

Another common aspect of these studies is that they link GSCM practices directly to organizational performance, yet evidence shows that a firm will experience improved organizational performance as a result of enhanced environmental and operational performance (Green et al,. 2012) and relational efficiency (Lee et al., 2012). Green et al. (2012) considered the relationship between individual components of GSCM practices and performance. A study that considers all the elements of GSCM would be more valuable since pollution occurs at all stages of the supply chain (Wu & Dunn, 1995). Lee et al. (2012) studied the mediating effect of relational efficiency on the relationship between GSCM practices and business performance. However, their study focused on only four facets of GSCM practice. A study that looks at all the components of GSCM as proposed by Kung et al. (2012) and employs more specific performance measures as proposed by Shi et al. (2012) would bring out the relationship better.

In addition, variables moderating the outcomes of GSCM practices have not received sufficient attention. Lawson and Petersen (2012) argue that research investigating the relationship between GSCM practices and organizational performance has suggested that the link is complicated and that future research should explore moderating variables that could bring out this link more fully. Very few studies have recognized the moderating effect of key variables on the relationship between GSCM practices and performance. Examples include; JIT programs (Zhu & Sarkis, 2004), institutional pressures (Zhu & Sarkis, 2007), visibility and exploratory links (Lawson & Petersen, 2012), business strategy (Laosirihongthong et al., 2013). Aiming to fill this gap in the literature, the current study examined the moderating effects of specific firm characteristic variables.

Almost all studies that have been conducted on GSCM-performance relationship employed either structural equation modeling or regression analysis to analyze the data that is collected. Testa and Irlado (2010) used ordered probit model to establish the effect of GSCM practices on environmental and competitive performance. In line with the argument of Magutu (2013), a study that combines multiple data analysis techniques would make methodological contributions that can assist to progress supply chain and operations management research into the future. This study made an attempt to combine multiple data analysis techniques by applying rigorous multivariate statistical approaches of ordered probit, partial least squares structural equation modeling and moderated regression to analyze data that was collected through a questionnaire survey in multiple manufacturing subsectors across East Africa.

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). In East Africa, a study that comes close to the current study is Kinoti (2012) which sought to determine the relationship between green marketing and performance of ISO certified firms in Kenya. The study's focus was limited to green marketing leaving out other facets of GSCM practices. The focus of this study was on the entire supply chain and only considers firms that are ISO 14001 certified. Additionally, this study sought to link GSCM practices to organization performance through environmental and operational performance.

The effect of implementation of GSCM practices on organizational performance has been investigated in a number of prior studies, but these studies mainly covered very limited multinational boundaries (Zhu & Sarkis, 2004) and manufacturing subsectors (Zhu & Sarkis, 2007). Testa and Irlado (2010) assert that the findings of a study may have strong external validity if data is collected from firms operating in multiple sectors in more than one country. Therefore, to increase generalizability of the research findings consistent with Testa and Irlado argument, this study used data from firms operating in many manufacturing subsectors in five countries in East Africa.

From the foregoing discussion, it is evident that further research was needed to address the knowledge gaps raised. The current study therefore sought to address these gaps by answering to the following research questions: What are the institutional pressures behind

GSCM practices implementation? Does implementation of GSCM practices lead to improved organizational performance? What is the influence of environmental performance, operational performance, relational efficiency and firm characteristics on this relationship?

1.3 Research Objectives

The general objective of this study was to determine the relationship between GSCM practices and organizational performance. The specific objectives were to:

(i) Establish the institutional pressures of GSCM practices implementation among ISO 14001 certified manufacturing firms in East Africa.

(ii) Establish the relationship between GSCM practices and performance of ISO 14001 certified manufacturing firms in East Africa.

(iii) Determine the influence of environmental and operational performance on the relationship between GSCM practices and performance of ISO 14001 certified manufacturing firms in East Africa.

(iv) Examine the influence of relational efficiency on the relationship between GSCM practices and performance of ISO 14001 certified manufacturing firms in East Africa.

(v) Determine the influence of firm's characteristics on the relationship between GSCM practices and performance of ISO 14001 certified manufacturing firms in East Africa.

1.4 Value of the Study

The findings of this study can be significant to the management of the manufacturing firms in many ways. The study has established that implementing GSCM practices enhances marketing and financial performance. This finding is independent of the size or age of the firm or the scope of the market served by the firm. Managers of the firms now have a point of reference on the benefits of implementing GSCM practices. This effectively helps dismiss the fears of those firms that have not yet implemented GSCM practices. The recommendations may come in handy for the managers when making decisions regarding enhancing their processes and expanding their businesses. The study findings may also help manufacturers realize the importance of collection and recovery of used products and packaging and also promote the same to their consumers. Finally the results of this study can be used by manufacturing firms to formulate strategic responses to the factors influencing the implementation of GSCM practices.

The findings of this study are also significant to future academicians and researchers in that it add to the body of knowledge by extending GSCM research in manufacturing. It provides theoretical insights to GSCM researchers. The findings provide future academicians and researchers with a useful conceptual and methodological reference to pursue further studies in this under-explored GSCM research area especially in the African region.

Findings of this study also have direct implications for policy. The study provides regulatory authorities with a framework for evaluating the synergistic effect of implementing GSCM practices on performance. The study presented that government laws and policies on the environment are critical and main drivers of GSCM practices implementation. Therefore, the governments can increase the scale of GSCM practices implementation by taking steps in making the environmental regulations more stringent so as to promote environmental sustainability. Governments can also use the recommendations of this study as a basis to introduce and enforce legislation in their countries that places the responsibility for collection, recovery and disposal of used products and packaging on their manufacturers. Regulators may use the findings to persuade additional organizations to implement green supply chain management practices by offering incentives to organizations that have already implemented these practices.

1.5 Summary

This chapter introduced the concepts and context of the study. It began with brief discussions of the concepts, theoretical foundation and context of the study. It then proceeded to define all the variables of the study and linkages among them. This was followed by a detailed discussion of the context. The research problem and objectives were then stated. Finally, the chapter ended by looking at value of the study to policy, theory and practice.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The chapter begins by explaining the theoretical anchorage of the study. This is followed by sections that explain the relationship between the key variables in study. It concludes by looking at the conceptual framework and hypotheses.

2.2 Theoretical Foundation

The major theoretical perspectives of this study include the resource based view, natural resource based view, resource dependence theory, institutional theory, stakeholders' theory and transaction cost economics theory. These theories provide a sound theoretical lens to understand the potential effect of GSCM practices on the environmental, operational and hence financial and marketing performance of the firm.

2.2.1 Resource-Based View

Resource Based View (RBV) argues that sustained competitive advantage and improved organizational performance may be realized by exploiting resources that are valuable, rare, imperfectly imitable and non-substitutable (Barney, 1991; Hart, 1995; Crook, Ketchen, Combs & Todd, 2008). A valuable resource or bundle of resources allows an enterprise to harness opportunities and reduce threats in its environment. A rare resource or bundle of resources is one that is not possessed by a large number of firms. A non-sustitutable resource or bundle of resources is one for which an equivalent resource cannot easily be created by competing firm or firms. An imperfectly immitable resource or bundle of resources is one that is difficult to replicate or whose replication comes at a very significant cost to the firm (Barney, 1991; Hart, 1995; Crook et al., 2008).

Daft (1983) lists these resources as including all assets, capabilities, organizational processes, firm attributes, information and knowledge among others. Hart (1995) extended RBV to include natural resources while Helfat and Peteraf (2003) argued for dynamic capabilities, that is, resources can only increase the value of the firm if they are employed in a way that considers the dynamic external business environment (Sirmon, Hitt & Ireland, 2007). Mentzer, Min and Bobbitt (2004) add that these resources may be tangible or intangible.

Hart (1995) avers that one of the most important drivers of new resource and capability development for firms is the constraints and challenges posed by the natural environment. Almost all organizations are at a point where their business operations impact in one way or another on the natural environment (Esty & Winston, 2009). RBV in the context of environmental reponsibility requires that firms employ strategic resources and capabilities to create unique and difficult to imitate practices that can lower the effect of the firm's operations on the natural environment (Hart, 1995; Aragon-Correa & Sharma, 2003). Possession of knowledge and capabilities for the whole supply chain to be green is an important ingredient in implementing GSCM practices. Lai, Cheng and Tang (2010) assert that this is a resource that falls well within RBV dimensions. This is a strategic resource because it can lead to competitiveness and hence improved organizational performance (Hart, 1995; Russo & Fouts, 1997; Vachon & Klassen, 2008).

Knowledge concerning environmentally friendly practices can be acquired through collaboration with other supply chain partners. Zacharia et al. (2009) assert that RBV provides theoretical support for why firms collaborate, that is, access and deployment of resources and capabilities that they do not have in their own firm. Carter and Rodgers (2008) argue that supply chains which integrate environmental resources and knowledge may be more difficult to imitate, thus leading to economic sustainability hence improved organizational performance and competitiveness.

2.2.2 Natural-Resource-Based View

This is the key theory on which this study was anchored. The theory is an extension of RBV and it posits that a firm can build sustained competitive advantage based on its link with the natural or biophysical environment (Hart, 1995; Hart & Dowell, 2011). According to RBV, if a resource or bundle of resources is to afford a firm competitive advantage, then it must be valuable, non-substitutable, rare and inimitable (Barney, 1991). The natural-resource-based view (NRBV) argues that three characteristics are considered important for a resource or bundle of resources to be strategic (Hart, 1995; Vachon & Klassen, 2008; Shi et al., 2012). First, the resource or bundle of resources must be specific to a firm. Second, the resource or bundle of resources should be causally ambiguous or tacit. This implies that the resource is people based and difficult to observe in practice since people or teams acquire knowledge through repeated learning by doing and polish it as they gain more experience. Finally, the resource or bundle of resources should be socially complex. It should depend upon a large network of people or teams engaged in synchronized action which few individuals, if any have the ability to accomplish (Hart, 1995). The focus of this study is mainly on the last two properties.

This study adopted a GSCM framework which comprises activities in green procurement, environmentally responsible design, green manufacturing, green packaging, green distribution and reverse logistics. It argues that all these specific types of GSCM practices would translate into a firm's strategic resources that in turn lead to competitive advantage and performance improvement. Green manufacturing and green packaging practices are a firm's unique causally ambiguous resources. These practices are people based and depend on tacit skills that are developed by involving employees in the pursuit of the environmental objective (Lawler, 1992). This way, they not only learn by doing but will also refine their skills as they acquire more experience. The employees also work in teams to accomplish this objective (Willig, 1994). The decentralized and tacit nature of this competence makes it hard to observe in practice and, hence, difficult to imitate quickly (Shi et al., 2012). Consequently, the firm is afforded the opportunity for sustained competitive advantage through a unique causally ambiguous resource.

Green procurement, environmentally responsible design, green distribution and reverse logistics create socially complex resources since these activities depend upon a large network of people or teams engaged in coordinated action which few individuals, if any, have sufficient breadth of knowledge to execute (Hart, 1995; Vachon & Klassen, 2008; Shi et al., 2012). These activities require establishment of consensus among suppliers, customers, and other supply chain members and therefore involves multiple teams and organizations. In order to attain the goal of collaborative green supply chain, the firm should continuously coordinate their operations and interactions in undertaking these activities (Shi et al., 2012). This it can do through setting environmental goals jointly, shared environmental planning, and cooperating to reduce pollution. This requires easy communication and transfer of information across functions, departments and organizational boundaries. The balancing act among supply chain members to ensure that the execution of these activities is optimized without harming the natural environment is a socially complex resource which can create an opportunity for sustained competitive advantage for the firm (Hart, 1995; Vachon & Klassen, 2007; Shi et al., 2012).

2.2.3 Resource Dependence Theory

Resource dependence theory (RDT) is born out of the assumption that very few firms if any are internally self-sufficient with respect to strategic and critical resources, thereby leading to dependence on other firms (Heide, 1994). It proposes that organizations engage in exchanges with their environment in order to obtain resources. Pfeffer and Salancik (1978) argue that interdependence is very important to a firm because of the impact it has on the ability of the firm to achieve its desired outcome.

Dyer and Singh (1998) assert that an organization's critical resources span beyond it boundaries. Exemplary performance cannot be attained without support of the suppliers, customers and other supply chain partners (Scott, 2000; Spekman, Salmond & Lambe, 1997; Simatupang, Wright & Sridharan, 2002). The resources that organizations seek by building relationships with partner organizations include monetary and physical resources, information and social legitimacy (Pfeffer & Salancik, 1978). Through such interdependence, firms can synergistically combine their resource sets with complementary resources of the firms they are collaborating with; thereby creating a resource bundle that is unique and difficult to replicate (Harrison, Hitt, Hoskisson & Ireland, 2001). This is ultimately expected to translate into sustained competitive advantage (Paulraj & Chen, 2007; Dyer & Singh, 1998).

In order for GSCM practices to be implemented successfully throughout the whole supply chain, collaboration with suppliers, customers and other supply chain partners is extremely crucial (Zhu, Geng & Lai, 2010). Lamming and Hampson (1996) assert that, if a collaborative approach is employed in purchasing, suppliers may be able to help customers to understand the environmental effect of their causes in the supply chain. At the same time customers may help suppliers to understand the related issues such as potential competitive advantage and the criteria used for evaluation and rating. RDT therefore provides theoretical anchor for the role of environmental collaborations with supply chain partners (a GSCM practice) as a way to exploit complementary capabilities to achieve competitive advantage and hence improved organizational performance.

2.2.4 Institutional Theory

The institutional theory posits that enterprises embrace certain strategies in order to gain legitimacy or acceptance within society (Zhu & Sarkis, 2007). The theory explores the influence on a firm by external pressures (Hirsch, 1975). DiMaggio and Powell (1983) pinpoint three channels through which isomorphic change occurs. These include; coercive, mimetic and normative pressures.

Coercive pressures occur through the influence of those in power (Zhu & Sarkis, 2007). For example, governments influence how organizations act by enacting regulations which the firms are expected to adhere to (Rivera, 2004). The fear of repercussions for non compliance causes firms to engage in proactive environmental practices. Darnall et al. (2008) argue that in some instances, regulatory pressures for firms to implement GSCM practices can create opportunities for competitive advantage. Consequently, local firms that serve global markets have been forced to adopt rigorous environmental standards in order for them to stay competitive.

Mimetic pressures occur when an organization mimics the actions of successful competitors in the industry (Zhu & Sarkis, 2007). Mimetic pressures is a main driver for firms to implement GSCM practices. As a consequence of globalization, firms in developing countries can learn through self regulation, from their foreign competitors in developed countries on how to implement environmental management practices (Christmann & Taylor, 2001).

Normative pressures are put forth by external stakeholders who have vested interest in the firm (Zhu & Sarkis, 2007). These stakeholders include customers, social groups, shareholders and suppliers. Firms that yield to these pressures are perceived to be more legitimate. Sarkis et al. (2011) identify the customer as the core normative pressure to manufacturers to implement GSCM practices. Environmental and community groups draw the public's attention on the negative environmental effects of firms' operations by leading protests and boycotts. Labor unions also put pressure on these firms in order to ensure the safety of their union members from harm that may result from environmental accidents. Similarly, trade associations have begun to take a more active role in managing their members' environmental actions (Darnall et al., 2008). Another level of institutional pressure may come from its shareholders (Henriques & Sadorsky, 1996). A firm with a good environmental reputation is likely to attract investors. Henriques and Sadorsky (1999) add that environmentally conscious suppliers may shun firms that are not environmentally conscious in order to protect their own reputation.

Zhu and Sarkis (2007) argue that institutional pressures may cause firms to engage in proactive environmental practices such as GSCM. Firms that yield to these pressures are perceived to be more legitimate and are likely to gain competitive advantage and hence improved organizational performance (Zhu & Sarkis, 2007; Darnall et al., 2008).

2.2.5 Stakeholder Theory

Stakeholder theory recognizes the fact that other than shareholders, there are other individuals or groups who the organization is obligated to and who are likely to be directly influenced by the actions taken by it, or have an explicit contractual relationship with it (Freeman, 1984; Mainardes, Alves & Raposo, 2011). The stakeholders include customers, general public, suppliers, employees and financial institutions. These stakeholders specify what they expect from the organization, experience the effects of relating with it, assess the results obtained and act in accordance with these assessment, cementing their relationship with the organization or otherwise (Polonsky, 1996; Neville, Bell, & Mengüç, 2005). The expectations of these stakeholders are incompatible. The objectives of the organization should be such that they will balance these incompatible expectations.

With respect to the environment, some stakeholders expect that firms will operate in ways that minimize externalities such as water pollution, solid waste disposal, forest cover depletion and emission of environmentally harmful gases and assume greater responsibility to correct any negative effects that may occur (Alkhafaji, 1989). Failure by the organization to meet these expectations results in loss of legitimacy and subsequently diminishes its chances of survival. As the firm meets societal expectations, they should expect a decrease in government regulation and increase in societal support. This support is expected to translate into increase in performance of the firm.

From a strategic point, firms that adopt GSCM practices find these actions to be a source of competitive advantage, especially, if the firm's primary stakeholders value such environmental initiatives. Barney (1991) argues that reputation and image is considered a significant resource overall and that there is evidence linking these to GSCM practices which is considered to have business value (Sarkis, 2009; Foerstl, Reuter, Hartmann & Blome, 2010). Poksinska, Dalgaard and Eklund (2003) advance that being environmentally conscious and establishing a strong environmental image may help firms to attract environmentally conscious suppliers and customers eventually translating into improved marketing and financial performance.

2.2.6 Transaction Cost Economics

Transaction cost economics (TCE) argues that a firm will grow as long as it can conduct its operations in house cost effectively relative to getting the services from the market (Coase, 1937; Williamson, 1975). Sarkis et al. (2011) define transaction costs as the costs beyond that of a product or service required to exchange the product or service between two or more entities. According to Williamson (1979), these costs include; costs incurred in gathering important information on and meeting the partner with whom the exchange will take place, the cost of coming to a reasonable agreement and drawing up an appropriate contract, and the cost of ensuring that the party with whom the exchange relationship is entered carries out his part of the bargain and does not engage in self-seeking behaviour (Stump & Heide, 1996).

TCE recognizes the fact that in any economic exchange relationship between business partners, transaction costs are incurred and that the partners try to protect themselves from the risks associated with these relationships (Williamson 1975; Klein, Crawford & Alchian 1978; Hart & Moore, 1990). These risks stem from environmental uncertainty, opportunism, bounded rationality and core firm assets among others (Williamson, 1981). In order to reduce these risks, some firms invest in transaction-specific assets which may not easily find alternative use in the event that the exchange relationship breaks down. These assets include location, physical assets, human capital, dedicated capacity or brand name capital (Zsidisin & Siferd, 2001).

In the context of a supply chain, the risk of self-seeking conduct by other members of the supply chain requires costly monitoring (Stump & Heide, 1996) and hence increased transaction costs. These costs are likely to reduce if the legitimacy of a firm increases. Customers and suppliers are increasingly expecting firms to operate in ways that minimize their negative effect on the natural environment (Alkhafaji, 1999; Carter, Kale & Grimm, 2000). Failure by the firm to meet this expectation results in loss of legitimacy. Environmentally conscious customers may refuse products and services from such firms (Greeno & Robinson, 1992). Suppliers may also shun them in order to protect their own reputation (Henriques & Sadosky, 1999). If customers and suppliers withdraw, the transaction costs are likely to increase especially in cases where the firm has invested in transaction specific assets. The potential for self seeking behaviour is also significantly increased. If on the other hand the firm implements GSCM practices, these costs are greatly reduced resulting in increased organizational performance.

2.3 Institutional Pressures and GSCM Practices Implementation

As explained earlier, the institutional theory argues that enterprises may adopt certain practices in order to gain legitimacy or acceptance within society (Zhu & Sarkis, 2007). GSCM is one such practice. Coercive, mimetic and normative pressures have been identified as possible channels through which isomorphic change can occur (DiMaggio & Powell, 1983). Coercive pressures come from the influence of those in power (Rivera, 2004). This includes environmental regulations enacted which various scholars classify as domestic environmental regulations, government environmental policies and international environmental agreements (Sarkis, 1998; Hall, 2000; Zhu & Sarkis, 2006). Chien and Shi (2007) assert that domestic environmental regulations are a key source of pressure that prompts firms to implement strategies and practices that improve their environmental performance. Hui, Chan and Pun (2001) argue that governments have been forced to come up with policies and regulations on the environment because of the increasing environmental conscience of the public. This is a major force that has swayed firms to start implementing environmentally responsible practices such as GSCM practices. International agreements such as the climate Change Treaty, the Kyoto Agreement and the Montreal Protocol have also influenced very many firms to start implementing GSCM practices (Chien & Shi, 2007).

Mimetic pressures occur when a firm imitates the actions of competitors considered successful. These competitors may be local, national, regional or global. Advances in technology have elevated competition to a new level. Firms have found themselves competing with other firms at the global level irrespective of their size. This has intensified competition forcing firms to search for new opportunities such as excellence in environmental management in order to remain competitive (Arimura et al., 2008). Zhu and Sarkis (2007) argue that mimetic pressures are a key driver for firms to adopt GSCM practices. Aerts, Cormier and Magnan (2006) cited mimetic pressures as a main driver for firms in developed countries like Germany, Canada and France to adopt GSCM practices.

Normative pressures are exerted by stakeholders who have vested interest in the firm (DiMaggio & Powell, 1983). These stakeholders exert pressures to firms which lead them to implement GSCM practices. Firms that conform to these pressures are perceived to be more legitimate (Darnall et al., 2008; Sarkis et al., 2011). Chien and Shi (2007) single out suppliers, customers and community stakeholders as the major external stakeholders who have driven firms to implement green practices. The relationship between a firm and its suppliers is a key determinant of sustained competitive advantage for the firm (Sheth & Sharma, 1997; Cannon & Homburg, 2001). Suppliers are increasingly associating themselves with firms that are have a good environmental reputation (Henriques & Sadorky, 1999). Doonan, Lanoie and Laplante (2005) add that customer demands have also become a very important source of external pressure for GSCM practices implementation. Ball and Craig (2010) established that normative pressures are the key institutional driver for firms in developed countries specifically England and Canada to practice environmental management. Other stakeholders who exert pressure on the firm to adopt GSCM practices include shareholders, employees, environmental organizations, community groups, labor unions and trade associations (Darnall et al., 2008).

With many firms increasingly implementing GSCM practices, research on these practices have mostly focused on outcomes, rather than antecedents. Similarly, very few academic researchers have attempted to empirically investigate the institutional pressures behind implementation of such practices. Zhu and Sarkis (2007) concentrated on the institutional pressures on Chinese manufacturing firms. Their study did not look at all the components of GSCM practices. Chien and Shih (2007) focused on coercive and normative pressures on electrical and electronic firms in Taiwan but completely ignored mimetic pressures. Their study also concentrated only on green procurement and green manufacturing. It is possible that institutional pressures that encourage GSCM practices implementation may differ from context to context. This study therefore sought to establish the institutional pressures that result in implementation of such practices among manufacturing firms in East Africa. It proposed that all the three institutional pressures are significant in encouraging a firm to implement GSCM practices.

2.4 GSCM Practices, Environmental, Operational and Organizational Performance

This section theorizes a comprehensive GSCM practices and performance model. It is based on the argument that if a firm implements GSCM practices, its environmental and operational performance will improve resulting in improved organizational performance as has been established by several researchers (Chopra & Meindil, 2004; Green et al., 2012; Lee et al., 2012).

2.4.1 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 found out 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 et al., 2012). Yet others found a combination of positive and negative relationships because they were investigating the relationship between individual GSCM practices and organizational performance (Eltayeb, Zailani, & Ramayah, 2011; Mittra & Datta, 2013; Laosirihongthong et al., 2013). The lack of consensus on this link causes a research gap in the literature. The other gap arises from the fact that the 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. This study therefore proposed that the implementation of GSCM practices is positively related to organizational performance.

2.4.2 GSCM Practices and Environmental Performance

Negative environmental effects such as diminishing raw material resources, water pollution, solid waste disposal, forest cover depletion and emission of environmentally harmful gases have largely been blamed on the operations of firms (Beamon, 1999). These effects originate from all stages of the supply chain, starting with intensive use of virgin raw materials to waste generated from the production process and shipping, all the way to the final consumer. Therefore, the major objective of implementing GSCM practices by a firm should be to improve its environmental performance as proposed by the NRBV (Klassen & Whybark, 1999; Vachon & Klassen, 2008).

There is anecdotal evidence of positive links between the effectiveness of implementing GSCM practices and environmental performance (Zhu & Sarkis, 2004; Chien & Shi, 2007; Iraldo et al., 2009; Testa & Irlado, 2010; Perotti et al., 2012; Kung et al., 2012). A study by Pullman et al. (2010) established mixed results with some outcome being positive and others showing no support for a relationship between the two variables. Another research gap originates from the fact that most of the studies do not adequately cover all facets of GSCM. For example, Testa and Irlado (2010) concentrated on only two GSCM practices both of which fall under green procurement. Chien and Shi (2007) did not consider green distribution and packaging; there are also scanty details on reverse logistics as a GSCM practice. Very few studies have analyzed the relationship between GSCM in its entirety and environmental performance (Kung et al., 2012; Perotti et al., 2012). This study aimed to contribute to the scarce empirical evidence that is currently available in the literature on positive relationships between implementation of GSCM practices and environmental performance. It therefore proposes that the implementation of GSCM practices should lead to improved environmental performance.

2.4.3 GSCM Practices and Operational Performance

Implementing GSCM practices may enhance the capability of a firm to more efficiently produce and deliver products to customers. Several researchers have established evidence that environmental management can enhance the operational capabilities of the firm (Hart, 1995; Sharma & Vredenburg, 1998; Klassen & Whybark, 1999; Christmann, 2000; King & Lenox, 2001; Russo & Fouts, 1997; Vachon & Klassen, 2008). The theoretical anchorage behind this relationship is explained by RDT and the natural RBV which propose that GSCM can enable firms build up unique manufacturing capabilities which may be difficult for competitors to replicate (Klassen & Whybark, 1999; Vachon & Klassen, 2008). Firms that implement GSCM practices are best placed to discover novel solutions of tackling environmental challenges. Studies have determined that skills obtained from such undertakings may be similar and complementary to skills required to develop certain process related capabilities (Christmann, 2000), capabilities in quality management (Hart, 1995) and lean management (King & Lenox, 2001) all of which result in cost advantages relative to competitors (Vachon & Klassen, 2008).

Energy conservation, reduction of resource use, reuse and recycle of materials can be seen as a part of an integrated environmental management programme which may lead to improvement in operational efficiency of the firm (Lewis, 2000; Wu & Dunn, 1995). Lippman (2001) determined that improvement in quality and reductions in cycle time and cost have been attributed to implementation of GSCM practices. Lee (2009) notes that adoption of green management practices may lead to operational efficiencies such as reduction in waste, material and water use and generation of water. This has the overall effect of reducing production costs. In implementing GSCM practices, suppliers and customers are offered the opportunity to participate in operations decisions. This may enhance the firm's flexibility and speed of delivery through better synchronization and planning (Martínez Sánchez & Pérez Pérez, 2005).

Sharma and Vredenburg (1998) noted that proactive environmental practices result in unique organizational capabilities which account for a great proportion of the firms' competitive benefits. These benefits include process, product and operational innovations among other things. Waste minimization, a GSCM practice, is a core principle of lean production systems which has been associated with reduction in lead times, material and staff costs and increased productivity and quality (Lewis, 2000; King & Lenox, 2001). The concept of GSCM emphasizes pollution prevention which is similar to the total quality management principle that averting defects before they occur is better than detecting and correcting them at the end of the process (Imai, 1986; Hart 1995). Klassen and Whybark (1999) in a study of the furniture industry established that firms which invested in pollution prevention technologies, experienced improved cost, delivery and flexibility. Shrivatsava and Hart (1992) assert that pollution means that a manufacturing operation is inefficient and waste is a non-recoverable cost. Less waste means that the inputs are being utilized well thus less raw material and waste disposal costs are incurred (Schmidheiny, 1992).

In the literature, the few empirical studies addressing the relationship between GSCM and operational performance have focused, only on sections of GSCM (Rusinko, 2007;

Pullman et al., 2010; Azevedo et al., 2011; El-Tayeb et al., 2011; Mittra & Datta, 2013; Lai & Wong, 2012). Even then, their findings are mixed. For example, Rusinko (2007) only focused on green manufacturing practices and established that these practices are positively related to operational cost and quality. Mittra and Datta (2013) established an insignificant relationship between collaboration with suppliers (a GSCM practice) and some operational performance measures. Similarly, very few studies have attempted to link implementation of GSCM practice in its entirety and operational performance (Rao & Holt, 2005; Perotti et al., 2012) again with contradictory findings. This study therefore aimed at reconciling these differences by establishing precise conclusions about the anticipated effect on operational performance due to comprehensive implementation of GSCM practice. It proposes that implementation of GSCM practices leads to an improvement in the operational measures of quality, cost, speed and flexibility.

2.4.4 Environmental and Operational Performance

The environmental performance can influence operational performance of firms positively in many ways. When hazardous and non-hazardous wastes are minimized due to implementation of GSCM practices, it results in better utilization of natural resources, improved efficiency and higher productivity (Rao & Holt, 2005). Klassen and McLaughlin (1996) argue that improved environmental performance of the firm results in cost reduction due to the development of formal practices and plans which may strengthen a firm's competitive position for lower costs, prevention of toxic emissions and effluents which reduces penalty and liability costs and reduction in energy and material consumption. This leads to greater productivity and hence an improvement in operational performance.

A connection has also been established between environmental improvement and quality (Welford 1992; Corbett & Klassen, 2006). Top corporations view environmental and production waste as identical problems and therefore gain competitive advantage by taking a combined approach to eliminating both (McInerney, 1995). Several researchers have established a significant direct relationship between environmental performance and quality improvement in manufacturing companies (Klassen, 2000; King & Lenox, 2001; Pil & Rothenberg, 2003). Shi et al. (2012) argue that increased environmental performance would reduce or eliminate waste, improve quality and increase efficiency and thus improve the operational performance of the firm. World-class organizations, for example, LG and Samsung Electronics, claim that their operations are more effective and efficient in all dimensions as a result of environmental benefits derived from implementing GSCM practices (Lee et al., 2012).

Limited investigation has been conducted to establish the relationship between environmental and operational performance. Pullman, Maloni and Carter (2009) separately looked at the relationship between environmental performance and the operational performance measures of quality and cost. The study established a positive relationship with quality performance but a non-significant relationship with cost performance. Green et al. (2012) found a positive relationship between environmental and operational performance. Their study focused only on firms in the US yet the green movement has equal significance in other parts of the globe. This study sought to establish the relationship between environmental performance and combined operational performance measures of quality, cost, speed and flexibility. It therefore proposed that implementing GSCM practices should invariably lead to environmental outcomes that result in increased operational performance measures of quality, cost, speed and flexibility.

2.4.5 Environmental and Organizational Performance

Reduction in air emissions, effluent and solid waste, and decreased consumption of hazardous and toxic materials improves the firm's reputation and image and creates better relations with institutional stakeholders (Testa & Irlado, 2010). This causes the firm to sell more and hence increase profits. Barney (1991) arguing for RBV assert that reputation and image is considered a significant resource overall and that there is evidence linking these to improved environmental performance as a result of GSCM implementation which is considered to have business value (Foerstl et al., 2010; Sarkis, 2009). Rao and Holt (2005) argue that an improvement in a firm's environmental performance may lead to huge marketing advantage which results in improved revenue, increased market share, and new market opportunities.

Improved environmental performance also results in decreases in cost of materials and energy, fee for waste treatment and discharge and fines for environmental accidents (Klassen & McLaughlin, 1996; Zhu & Sarkis, 2004), and hence improved financial performance (Fuentes-Fuentes, Albacete-Saez & Llorens-Montes, 2004). Taylor and Buttel (1992) assert that firms that implement environmentally sustainable practices cut costs through effective environmental protection thus shielding them from expenses associated with environmental disputes, environmental accidents, environmental bans and boycotts by customers. Lower costs leads to enhanced cash flows and hence increased profitability (Hart, 1995). Poksinska et al. (2003) argue that firms may attract environmentally conscious suppliers and customers by being environmentally conscious and establishing a strong environmental image. Carter et al. (2000) established that 75% of US consumers purchased goods from firms with good environmental reputation. Additionally, 80% of the consumers were willing to pay a premium for green products.

Research addressing the relationship between environmental performance and organizational performance is still scanty. Most studies have attempted to link GSCM practices directly to organizational performance. The few studies that looked at the effect of environmental performance on organizational performance (Rao, 2002; Vachon & Klassen, 2008; Moneva & Ortas, 2010; De Giovanni & Esposito Vinzi, 2012; Green et al., 2012) have not established a clear-cut consensus on the direction of the relationship. Some established a positive relationship between the two variables (Vachon & Klassen, 2008; Moneva & Ortas, 2010; De Giovanni & Esposito Vinzi, 2012). Rao (2002) and Green et al. (2012) found no relationship between environmental and organizational performance. Moreover, these empirical studies have focused mostly on firms in Asia, North America and Europe where GSCM seems to be more diffused - yet evidence for concern of environmentally sustainable practices in supply chains extends throughout the globe (Golicic & Smith, 2013). Therefore, this study made the proposition that the firm's environmental performance has a direct and positive impact on its organizational performance.

2.4.6 Operational and Organizational Performance

An improvement in the operational measures of quality, cost, speed and flexibility can result in improved market and financial performance. Quality is linked to profitability, on both the market and cost sides (Chase, Jacobs & Aquilano, 2012). On the market side, increased quality may lead to higher perceived value which results in increased reputation of the firm and its products. The firm will then be able to sell more and/or may add a premium on its products leading to increased profits. On the cost side, increased quality improves productivity through less scrap and rework, less delays, few or no claims in warranties, better use of materials and machine time all leading to reduced costs (Crosby, 1979; Deming, 1986). According to Porter (2008), a low-cost position makes it possible for an organization to employ aggressive pricing and high sales volume, all of which result in increased profitability. On efficiency, the avoidance of unnecessary waste, expenditure and effort may result in less costs incurred and hence higher profits (Wu & Dunn, 1995). On flexibility, an organization that can respond to an increase in demand at short notice may capitalize on the opportunity and hence make more profits (Chase et al., 2012).

Although higher operational performance should lead to higher organizational performance (Voss, 1995) usually measured by financial and market indicators, this relationship has rarely been studied scientifically (Rao & Holt 2005; Zacharia et al., 2009; Chiou, Chan, Lettice & Chung, 2011; Green et al., 2012; Mittra & Datta, 2013). Besides, the outcomes of the studies are not uniform. Some of them established that improved operational performance is positively related to organizational performance (Rao & Holt 2005; Zacharia et al., 2009; Chiou et al., 2011; Green et al., 2012). Mittra and Datta (2013) found no evidence to support existence of this relationship. This study therefore made the proposition that the implementation of GSCM practices should invariably lead to operational outcomes that result in increased organizational performance.

2.4.7 Mediating Effect of Environmental and Operational Performance on the Relationship between GSCM Practices and Organizational Performance

As discussed earlier, a number of studies have shown that environmental performance can be enhanced by implementing GSCM practices (Zhu & Sarkis, 2004; Chien & Shi, 2007; Iraldo, Testa & Frey, 2009; Testa & Irlado, 2010; Perotti et al., 2012; Kung et al., 2012). In addition, it has also been established that environmental performance is positively associated with the organizational performance (Vachon & Klassen, 2008; Moneva & Ortas, 2010; De Giovanni & Esposito Vinzi, 2012). It is also expected that the environmental performance is positively related to operational performance (Pullman et al., 2009; Green et al., 2012).

It has also been determined that operational performance is influenced by implementing GSCM practices (Rusinko, 2007; Azevedo et al., 2011; El-Tayeb et al., 2011; Lai & Wong, 2011). Previous studies also present that there is a link between operational performance and organizational performance (Rao & Holt 2005; Zacharia et al., 2009; Chiou et al., 2011; Green et al., 2012). These arguments lead to the proposition that environmental performance and operational performance mediate the relationship between GSCM practices implementation and the organizational performance.

2.5 GSCM Practices, Relational Efficiency, Environmental, Operational and Organizational Performance

In an attempt to argue for the mediating effect of relational efficiency, this section discusses the relationships between GSCM practices and relational efficiency, relational efficiency and environmental, relational efficiency and operational and relational efficiency and organizational performance.

2.5.2 GSCM Practices and Relational Efficiency

GSCM practices which emphasize environmental collaboration with supply chain partners may affect relational outcomes such as trust, credibility and effectiveness of the relationship as emphasized by resource dependence theory (Lee et al., 2012). Firms foster an atmosphere of trust when there is a high level of collaboration between them (Zacharia et al., 2009). In this study, the argument that trust is developed over time based on experience with the partners is adopted so that it is taken as an effect of a high level of environmental collaboration, a GSCM practice. Zacharia et al. (2009) argue that firms which collaborate with a high level of credibility, respect and appreciate each other more. High levels of environmental collaboration should result in higher levels of credibility.

Relationship effectiveness is defined by an evaluation of the productivity of interactions among different functions in the firm (Fisher, Maltz & Jaworski, 1997) and communication ease and cooperation (Kahn, Reizenstein & Rentz, 2004). A higher level of environmental collaboration among supply chain partners through more open information exchange leads to increased ability and willingness to work together and hence greater commitment and solidarity between the partners to fulfill environmental objectives. Sharfman, Shaft and Anex (2009) established that when there is trust between a firm and its suppliers, then it is more likely to cooperate in implementing supply chain environmental management. Lee et al. (2012) found a significant positive relationship between GSCM practice implementation and relational efficiency in the electronics industry in Korea. It is thus expected that the more a firm and its supply chain partners collaborate in implementing GSCM practices, the higher will be the relational efficiency (Lamming & Hampson, 1996; Zacharia et al., 2009).

2.5.3 Relational Efficiency and Environmental Performance

Relational efficiency is the product of a high level of collaboration with supply chain partners. It can result in improved environmental performance. By collaborating with suppliers, retailers, clients, final customers and other supply chain partners, firms may gain access to knowledge and capabilities that would enable them operate green supply chains. Min and Galle (2001) assert that combined efforts between a buying firm and their suppliers are essential for synergistic improvements in the quality of the environment.

Testa and Irlado (2010) argue that an environmentally superior product or service can only be delivered to the customer if a firm makes continuous effort to inspire and involve its suppliers, retailers, clients, final customers and other supply chain partners in its improvement actions. This results in increased trust, credibility and relationship effectiveness which eventually translates to improved environmental performance. To the best of the researcher's knowledge, no study has attempted to relate relational efficiency and environmental performance. It is therefore expected that the trust, credibility and relationship effectiveness that results by collaborating with supply chain partners will lead to an increase in environmental performance of the firm.

2.5.4 Relational Efficiency and Operational Performance

Vachon and Klassen (2008) established that collaborative green practices with suppliers (for example, setting environmental goals jointly, shared environmental planning, and cooperating to reduce pollution) leads to improved manufacturing performance such as increased delivery, quality and flexibility. Zacharia et al. (2009) argue that the higher the level of collaboration, the more the improvement in both relational efficiency and operational outcomes and hence the better will be the business performance. Zacharia et al. (2009) maintain that enhanced trust, credibility and relationship effectiveness with collaborating partners improves the operational performance of a firm. Hence, relational outcome may also be related to operational performance.

Research on the relationship between relational efficiency and operational performance is scanty. The few related studies that have been done relate the antecedents of relational efficiency and operational performance. For example, both Azevedo et al. (2012) and Mittra and Datta, (2013) studied the effect of environmental collaboration with suppliers (an antecedent of relational efficiency) and operational performance. In both cases no evidence was found to confirm existence of a relationship. This study was therefore one of the pioneer studies to establish the relationship between relational efficiency and operational performance. It proposes that the relational efficiency measures of trust, credibility and relationship effectiveness are positively related to the operational performance measures of quality, cost, speed and flexibility.

2.5.5 Relational Efficiency and Organizational Performance

High levels of trust, credibility and relationship effectiveness between an organization and its supply chain partners helps to align its goals and plans with those of its supply chain partners. This result in improved product quality and higher value for the customer leading to improved financial and market performance (Monczka, Petersen, Handfield & Ragatz, 1998; Wong, Tjosvold & Zhang, 2005). According to resource dependence theory, the joint efforts between an organization and its suppliers and customers in various areas create the best opportunity for the firm to establish its business in the supply chain (Lamming & Hampson, 1996). Moreover, studies have demonstrated that well established, long-term relationships between a firm and its supply chain partners helps improve its organizational performance (Kaufmann & Carter, 2006; Liao, 2010). Zacharia et al. (2009) assert that as relationships with supply chain partners become more effective and productive their business performance may be enhanced. Dyer and Singh (1998) argue that collaboration between firms offers formal and informal means that support trust thus enhancing innovation and hence financial performance.

A study by Lee et al. (2012) of small and medium enterprises (SMEs) that serve as suppliers to large customer firms in the electronics industry in Korea established a significant positive relationship between relational efficiency and business performance. This finding had also been established by Zacharia et al. (2009). This study also sought to determine whether there is a relationship between relational efficiency and organizational performance of manufacturing firms in East Africa. It anticipates that increased levels of trust, credibility and relationship effectiveness will translate to improved financial and marketing performance.

2.5.6 Mediating Effect of Relational Efficiency on the Relationships between GSCM Practices and Environmental, Operational and Organizational Performance

Past research has shown that GSCM practices which emphasize environmental collaboration with supply chain partners leads to enhanced levels of trust, credibility and relationship effectiveness and hence improved relational efficiency (Lee et al., 2012). This implies that the more a firm collaborates with its supply chain partners in implementing GSCM practices, the higher will be the relational efficiency. These practices include setting environmental goals jointly, shared environmental planning and cooperating to reduce pollution.

Previous arguments have also indicated that increased levels of trust, credibility and relationship effectiveness due to collaboration with supply chain partners can result in improved environmental performance (Min & Galle, 2001; Testa & Irlado, 2010). Through these collaborations, a firm gains access to knowledge and capabilities that would enable them operate green supply chain. This is reflected in such outcomes as the reduction in green house gas emissions, water use, discharge of wastewater and solid waste and a reduction in the use of hazardous materials. It is thus expected that relational efficiency will be positively related to environmental performance.

Zacharia et al. (2009) established that improved operational performance is a product of enhanced trust, credibility and relationship effectiveness with collaborating partners. Vachon and Klassen (2008) posit that the benefits of collaborative green practices lead to increased delivery, quality and flexibility. It can therefore be inferred that relational efficiency will be positively related to operational performance and that implementation of GSCM practices will lead to enhanced operational performance if relational efficiency is improved.

As presented earlier, alignment of a firm's goals with those of its supply chain partners and hence improved organizational performance results from high levels of trust, credibility and relationship effectiveness (Monczka et al., 1998; Wong et al., 2005). Studies have also demonstrated improved marketing and financial performance as a result of well established, long term relationships between a firm and its supply chain partners (Kaufmann & Carter, 2006; Liao, 2010; Zacharia et al., 2009; Lee et al., 2012). It is thus expected that relational efficiency will be positively related to organizational performance.

The foregoing arguments lead to three propositions. First, relational efficiency mediates the relationship between GSCM practices implementation and environmental performance. Second, relational efficiency mediates the relationship between GSCM practices implementation and operational performance and lastly, relational efficiency mediates the relationship between GSCM practices implementation and organizational performance.

2.6 GSCM Practices, Firm Characteristics and Organizational Performance

The size, age and the spatial scope of the market that the firm serves are considered as firm characteristic variables that may affect the relationship between GSCM practices and organizational performance (Testa & Irlado, 2010). As widely reflected in the literature, the effect of firm size is positive both on GSCM practices and organizational performance. Large firms have the ability to assemble resources to implement GSCM practices (Klassen, 2001; Min & Galle, 2001; Bowen, 2002; Zhu & Sarkis, 2004; Wu & Pagell, 2011). They also face intense pressure to adopt these practices from regulators and the public (Ullman, 1985; Klassen, 2001). Zhu, Sarkis, Lai and Geng (2008) established that medium- and large-sized firms are at a higher level in the implementation of GSCM practices than their smaller-sized counterparts. Larger firms also tend to perform better than smaller firms (Majumdar, 1997). Furthermore, firm size has been regularly considered as a control variable in the studies relating GSCM practices and performance (Zhu & Sarkis, 2004, 2007; Testa & Irlado, 2010). Hui et al. (2013) argue that raw organizational management in some smaller firms can slow down growth of innovation in those firms. Therefore, this study proposed that the larger the firm, the higher the organizational performance as a result of GSCM practices implementation.

The age of a firm may also influence performance as a result of GSCM adoption. Perrow, Wilensky and Reiss (1986) argue that firms are dynamic and evolving. An older firm is likely build up resources and capabilities (Birley & Westhead, 1990). One such resource is the natural resource developed through implementation of GSCM practices (Hart, 1995). Innovative ideas on how to improve the firm's environmental performance can come from both internal and external sources including suppliers, customers and other members of the supply chain. Older firms have relationships with these supply chain partners already established. Lukas, Hult and Ferrell (1996) add that the level of experience at selecting and utilizing information is higher for older firms than for younger ones. Sørensen and Stuart (2000) established that experience and organizational competencies provided by age assist organizations to build their operations in a more efficient way. Therefore, the current study proposes that the relationship between the implementation of GSCM practices and organizational performance increases with firm age as they use information efficiently.

On the spatial scope of market where the firm competes, the relationship between GSCM practices and organizational performance is likely to differ between firms that serve local and global markets. Firms that serve global markets face numerous challenges and opportunities that local market firms do not. Firms that compete at the global level, face more intense competition. Therefore, to achieve success in the global marketplace, each product or service offered by the firm should cater to the needs and desires of the country and specifically community in which it is sold. These firms are subjected to environmental regulation of the countries that they serve which has caused an increase in institutional pressures for improved environmental regulation. Therefore, firms that compete at the global level are more likely to search for new opportunities, such as excellence in environmental management, in order to maintain a competitive edge (Arimura et al., 2008). Zhu and Sarkis (2007) established that exports and sales to foreign customers are two drivers that may convince Chinese manufacturers to adopt GSCM practices.

Research investigating the moderating effect of key variables on the relationship between GSCM practices and organizational performance remains scarce (Lawson & Petersen, 2012). These include; JIT programs (Zhu & Sarkis, 2004), institutional pressures (Zhu & Sarkis, 2007), visibility and exploratory links (Lawson & Petersen, 2012), business strategy (Laosirihongthong et al., 2013). Studies that have considered firm characteristics as a variable have looked at it as a control variable (Zhu & Sarkis, 2004, 2007; Testa & Irlado, 2010). Zhu and Sarkis (2004, 2007) focused only on firm size.

Testa and Irlado (2010) considered a number of firm characteristics which included: number of employees in the firm, whether the firm is listed on a stock exchange, the presence of an environmental department within the firm, position of the firm along the supply chain, spatial scope of market where the firm competes, firm's geographical location and its sector of operation. This study moved a step further to look at the moderating effect of some of these firm specific characteristics on the relationship between GSCM practices and organizational performance. The study also considers GSCM in its entirety, something that previous studies have overlooked. Based on arguments advanced, it is anticipated that firm size, age and spatial scope of the market that the firm serves positively moderate the relationship between GSCM practices implementation and organizational performance.

2.7 Summary of Key Studies and Knowledge Gaps

Empirical evidence on the relationship between GSCM practices and performance of the firm shows mixed findings of positive, negative, no relationship and even mixed associations. A number of studies have been done on GSCM practices and performance. A good number of them do not adequately cover all aspects and facets of GSCM yet researchers in GSCM have stressed the need to look at all aspects of GSCM (Hart, 1996; Kung et al., 2012).

Another common weakness of these studies is the fact that almost all of them are skewed towards the developed world. A summary of these studies have been given in Table 2.1 The summary outlines the author(s), focus of study, methodology, major findings, knowledge gaps and how this study addresses some of those gaps.

Table 2.1: Summary of Key Studies and Knowledge Gaps

Scholar (s)	Focus of study	Methodology	Major findings	Knowledge gaps	How gaps are addressed in current study
Laosirihongthong, Adebanjo & Tan (2013)	Investigate impact of proactive and reactive GSCM practices on environmental, economic and intangible performance with business strategy as the moderating variable.	A cross-sectional survey of 190 ISO 14001 certified manufacturing companies in Thailand. Study employs regression analysis as the main data analysis technique.	Reactive practices results in firm enhanced firm performance. Firms that pursue a quality and time-based strategy are more likely to invest in GSCM practices that lead to a stronger association with performance.	Study only looks at three components of GSCM. It does not consider the relationship between GSCM in its entirety and performance.	Study looks at all aspects of GSCM and is conducted in the context of East Africa. Study also considers a different moderating variable.
Mitra & Datta (2013)	To determine extent of adoption of GSCM practices and their impact on performance	An exploratory cross-sectional survey of 81 Indian manufacturing firms. Data analyzed using structural equation modeling.	Relationship between Collaboration with suppliers and competitiveness and economic performance is not significant. A significant relationship between environmentally sustainable product design and logistics and the measures of performance. Additionally study does not establish a significant relationship between competitiveness and economic performance.	Study does not consider GSCM in its entirety. Study is relatively exploratory and sample size is rather small for covariance-based SEM. Study conducted in the context of Indian firms.	Study looks at all aspects of GSCM and is conducted in the context of manufacturing firms in East Africa. Sample size is considered adequate for technique of analysis.
Lee, Kim & Choi (2012)	Examine the effect of GSCM efforts and other organizational factors (employee satisfaction, operational efficiency, and relational efficiency) on firm performance. Grounded on RDT	A cross-sectional survey of 223 SMEs in the electronics industry in Korea. Structural equation modeling used as the main technique of analysis.	No significant direct relationship between GSCM practice and business performance. A significant indirect relationship between GSCM practice implementation and business performance through operational and relational efficiency.	Data based only on electronic firms in Korea. Study focuses on only four dimensions of GSCM practice. Study doesn't distinguish among the various performance measures	Related study conducted in East Africa. Study will consider all elements of GSCM and distinguishes among various performance measures.

Source: Researcher, 2015

Table 2.1: Summary of Key Studies and Knowledge Gaps (Continued)

Scholar (s)	Focus of study	Methodology	Major findings	Knowledge gaps	How gaps are addressed in current study
Green, Zelbst, Meacham & Bhadauria (2012)	Determine the impact of each of the GSCM practices on organizational performance.	A cross-sectional survey of 159 manufacturing firms in the US. Data analyzed using structural equation modeling	Adoption of GSCM practices leads to better environmental and economic performance. This results in improved operational performance, ultimately leading to enhanced organizational performance	Inconsistency of results from those reported in earlier studies. Only considers firms in the US. Study does not consider all facets of GSCM.	Study considers manufacturing firms in East Africa. Looks at relationship between GSCM in its entirety and performance. Study also considers all GSCM aspects.
Kung, Huang & Cheng (2012)	Investigate the relationship between green management and environmental performance	Across-sectional survey of 118 Taiwanese manufacturers. Data analyzed using regression analysis	Positive relationship between comprehensive adoption of GSCM practice and environmental performance.	Study based only on manufacturers in Taiwan Operational and organizational performance measures not considered. Finally, sample based on early adopters of GSCM. practice	Considers East African manufacturers & looks at operational and organizational performance. Study also considers mature adopters of GSCM. Study applies more rigorous data analysis techniques.
Kinoti (2012)	Determine the relationships between green marketing practices, and performance. Establish the influence of corporate image and organizational characteristics on this relationship	A cross-sectional survey of 120 ISO 9000 and 14000 series certified organizations in Kenya. Study employs regression analysis as the main data analysis technique.	Green marketing practices influence performance. Corporate image does not mediate the relationship between green marketing practices and performance. Finally, organizational characteristics moderate the relationship between green marketing practices and performance	A pioneer study on a GSCM aspect to be conducted in the context of Kenya. However, study looks at only one aspect of GSCM practice. Most members of the population in the study (ISO 9001 firms) are considered early adopters of GSCM.	Study focuses on the entire supply chain. It also considers only 14001 certified firms which are more mature adopters of GSCM. Study distinguishes among environmental, operational and organizational performance.
Perotti Zorzini, Cagno & Micheli (2012)	Determine the level of adoption of GSCP and effect on company performance	An exploratory multi-case study of fifteen third-party logistics (3PLs) firms operating in Italy	Low level of adoption of GSCP hence limited effect on performance. Impact observed on environmental and economic but less on operational performance.	First, study focuses only on 3PLs firms operating in Italy. Second, the focus of the study is on early adopters of GSCM practices.	Study focuses on East African manufacturing firms which are more mature adopters of GSCM practice.

Source: Researcher, 2015

Table 2.1: Summary of Key Studies and Knowledge Gaps (Continued)

Scholar (s)	Focus of study	Methodology	Major findings	Knowledge gaps	How gaps are addressed in current study
Choi (2012)	Examines relationship between the governance mechanism and GSCM performance and thus the firm's competitiveness. Study grounded on transaction cost economics and relational view	A survey of 202 manufacturers and suppliers in South Korea. SEM used as the main technique of analysis	Governance mechanisms between suppliers and manufacturers are positively related to GSCM performance. It showed that formal governance is important in the process management side while and relational governance is suited to the knowledge sharing side in green management.	Study is based on firms in South Korea and focuses on only two GSCM practices. It only concentrates on environmental and financial performance.	Study is based on manufacturing firms in East Africa and focused on the entire supply chain. Study considers multiple performance aspects.
Eltayeb, Zailani & Ramayah (2011)	Assess effect of adoption of green supply chain initiatives on environmental, economic, cost reductions and intangible outcomes.	A survey of 132 ISO 14001 certified firms in Malaysia. Regression analysis technique employed to analyze the relationship between the variables.	Significant relationships between eco-design and all the outcomes (environmental, economic, cost reductions and intangible). Reverse logistics only positively related to cost reductions.	Study only looks at one aspect of operational performance (cost reductions). Study focuses on only three components of GSCM.	All components of GSCM are considered. Operational performance is well represented in this study as it considers the aspects of quality, cost, speed and flexibility.
Azevedo, Carvalho & Cruz Machado (2011)	Investigate the relationship between GSCM practices and supply chain performance	Case study of five companies belonging to the Portuguese automotive supply chain	Positive relationship between GSCM implementation and operational performance measures. GSCM also positively related to environmental performance and economic performance.	First, study doesn't explore motivations behind GSCM practices implementation. Second, it only focuses on the automotive industry in Portugal.	Study explores the pressures for GSCM adoption and focuses on firms in East Africa.
Kirchoff (2011)	Investigate the relationships among GSCM, environmental orientation, and supply chain orientation, and their impact on firm performance using the RBV theoretical lens.	Study employs quantitative research design using a survey of US-based companies in a diverse set of industries. SEM used as the main statistical analysis tool	GSCM practices in the firm positively impact firm performance, when an environmental orientation is pervasive in the firm. No relationship between supply chain orientation and GSCM, and bundle of resources and firm performance.	First, data based only on firms in US. Second, sample size is small for covariance-based SEM	Study looks at different antecedent variables, that is, institutional pressures. Study is based on manufacturing firms in East Africa. Sample considered adequate for partial least squares SEM

Source: Researcher, 2015

Table 2.1: Summary of Key Studies and Knowledge Gaps (Continued)

Scholar (s)	Focus of study	Methodology	Major findings	Knowledge gaps	How gaps are addressed in current study
Testa & Irlado (2010)	Determine the effect of GSCM on environmental and competitive performance	Study applies probit models, using survey data from 4188 manufacturing facilities operating in many sectors in seven OECD countries	GSCM measures considered significantly improve environmental performance but not profitability and competitiveness.	Focuses on only two GSCM practices. Study conducted outside Africa.	Study will consider all elements of GSCM and is conducted in East Africa
Zeng et al. (2010)	Determine the impact of cleaner production on a firm's business performance	A survey of 125 of manufacturing enterprises listed in the Directory of Audited Enterprises of Cleaner Production in China.SEM is employed to examine the relationship.	Positive impact of cleaner production on business performance. Also, activities of low-cost scheme have a bigger contribution to financial performance compared to non-financial performance,	Study focuses mainly on green manufacturing practices. Study conducted outside Africa.	Study considers all elements of GSCM and is conducted in East Africa.
Chien & Shih (2007)	Investigate relationship between GSCM practices and environmental and financial performance.	A survey of 151ISO 14001 certified electrical and electronic firms in Taiwan. SEM used as the main data analysis technique.	Implementing GSCM practices enhances the environmental and financial performance of firms.	Concentrates on only 2 facets of GSCM. Study does not consider mimetic pressures for GSCM adoption	Study considers all elements of the supply chain and conducted in East Africa. Looks at all the three institutional pressures.
Zhu & Sarkis (2007)	Determine the relationships between GSCM practice and environmental and economic performance, incorporating three moderating factors; market, regulatory and competitive institutional pressures	A cross-sectional survey of 341 manufacturing firms in China. Moderated hierarchical Regression analysis used	Market and regulatory pressures influence improved environmental performance especially on eco-design and green purchasing practices. Implementers of green purchasing and investment recovery face higher regulatory pressures. Competitive pressure significantly improves the economic benefits.	First, study does not consider influence of firm size on the relationship. Second, study does not consider all the facets of GSCM.	Study treats institutional pressures as an antecedent variable rather than a moderating variable. Study takes into account all the aspects of GSCM as advocated by Hart (1995).

Source: Researcher, 2015

Table 2.1: Summary of Key Studies and Knowledge Gaps (Continued)

Scholar (s)	Focus of study	Methodology	Major findings	Knowledge gaps	How gaps are addressed in current study
Rao & Holt (2005)	Find out if implementation of GSCM is related to competitiveness and economic performance	A survey of 52 ISO14001 certified companies in South East Asia. SEM employed as main data analysis technique	Study establishes a relationship between GSCM practices and competitiveness and performance.	First, sample used is small. Second, study conducted outside Africa. Study focuses mostly on operational performance measures.	A related study conducted in East Africa. Study captures multiple aspects of performance. Sample size considered adequate for PLS-SEM analysis.
Zhu & Sarkis (2004)	To examine the relationship between GSCM practice and environmental and economic performance. Investigate how quality management and JIT (or lean) manufacturing principles influence the relationship	Survey of 186 Chinese manufacturing firms. Moderated hierarchical regression used as the main tool for analysis	Positive relationships between GSCM practice and both environmental and economic performance. Quality programs along with GSCM practices performed better especially with respect to external GSCM and internal management programs. JIT programs with internal environmental management practices may have a negative effect on the environment.	First, sample based on early adopters of GSCM in China. Second, it employs convenience sampling instead of random sampling. Third, Study does not address the motivation behind the adoption of practices. Finally, it does not consider strategic financial and organizational performance.	Study is based on more mature adopters of GSCM practices, that is, ISO 14001 certified firms in East Africa. The whole population is taken hence bias brought by sampling is avoided. Study also addresses the motivation behind GSCM adoption. Financial as well as marketing performance measures have been considered.
Cordeiro & Sarkis (1997)	Determine the impact of corporate pro-environmental actions and strategies on corporate financial performance	A study of 523 US firms in the SEC disclosure database. Regression analysis used as the main data analysis technique.	A significant negative relationship between environmental proactivism (using Toxic Release Inventory, TRI, data) and industry 1- and 5-year earnings per share	Study doesn't look at GSCM in its entirety. Need to conduct another study in a different context in an attempt to determine why findings are not consistent with general belief	Study considers GSCM in its entirety and conducted in the context of East Africa.

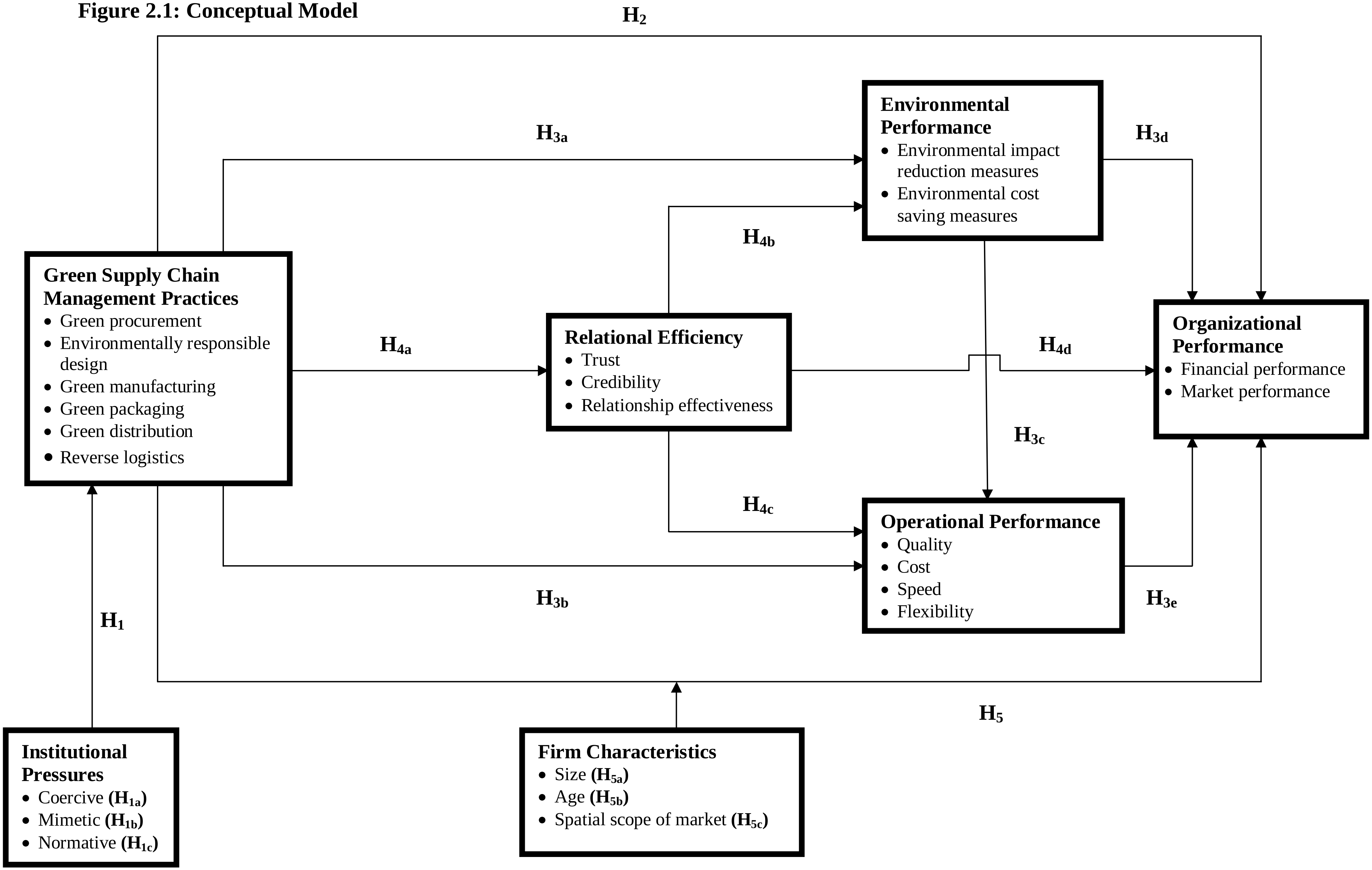
Source: Researcher, 2015

2.8 Conceptual Model

The study's conceptual model is shown in Figure 2.1. The study integrated the institutional, resource based, natural resource based, resource dependence, stakeholders and transaction cost economics theories to establish the relationships between GSCM practices, relational efficiency, environmental performance, operational performance and organizational performance. First, the study sought to determine the institutional pressures that result in GSCM practices implementation by manufacturing firms. Second, the model measured the direct link between GSCM practices and organizational performance.

Third, the conceptual model sought to measure the mediating effect of environmental and operational performance on the link between GSCM practices and organizational performance. Fourth, the model measured the mediating effect of relational efficiency on the relationships between GSCM practices and environmental performance, GSCM practices and operational performance and GSCM practices and organizational performance. Finally, the conceptual model measured the moderating effect of firm's characteristics on the relationship between GSCM practices and organizational performance. The results of this study addressed the gaps in current literature on GSCM practices and performance identified in Table 2.1.

Figure 2.1: Conceptual Model



2.9 Research Hypotheses

From the theoretical and empirical literature review, the study proposed the following broad hypotheses to explain the relationships that are outlined in the conceptual model.

Hypothesis 1: Institutional pressures encourage a firm to implement GSCM practices.

Hypothesis 2: Implementation of GSCM practices has a direct impact on the organizational performance.

Hypothesis 3: Environmental performance and operational performance mediate the relationship between GSCM practices implementation and organizational performance.

Hypothesis 4: Relational efficiency mediates the relationship between GSCM practices implementation and performance.

Hypothesis 5: The firm’s characteristics moderate the relationship between GSCM practices implementation and organizational performance.

2.10 Summary

In this chapter, the theoretical anchorage for the study was provided. The chapter also discussed the relationships among key variables in the study. Thereafter, a summary of key studies and knowledge gaps were reviewed. The chapter ended by looking at the conceptual model to investigate the relationship among the variable of interest. Five broad hypotheses were developed based on the reviewed literature.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the research methodology that was adopted by this study. It begins by outlining the research philosophy that guided the study. This is followed by sections that discuss the rationale for the research design and the population. It also provides an overview of the data collection methods, measurement scales operationalizing the main study variables as well as how the validity and reliability of the research instrument was evaluated. In conclusion the means that was used to analyze the data is explored.

3.2 Research Philosophy

Two major epistemological branches have been identified namely; positivist and interpretivist research philosophies (Galliers, 1991). Positivist research philosophy avers that characteristics and behaviour of subjects in the social world (human beings and their institutions) can be measured, controlled and explained (Collins, 2010) through objective methods. Studies that are biased towards this research philosophy are designed to test informed propositions called hypotheses which are developed from literature (Ramanathan, 2009). Crowther and Lancaster (2008) inform that as a general rule, positivist studies are deductive. They start with broad theories and assumptions and then scientifically test their implications using samples that are generally large (Easterby-Smith, Thorpe & Lowe, 2002). These studies are mostly quantitative and their success is judged by the extent to which their findings can be generalized (Ramanathan, 2009). According to Wilson (2014), the researcher is deemed independent and should therefore maintain minimal interaction with his subjects to avoid influencing them. When the final report is written, it is done from the third person.

On the other hand, the interpretivist research philosophy asserts that there is a stark difference between the subject matter of the natural sciences and social sciences. It argues that a simple fact has many truths and meanings which are suitable for every situation and research problem (Johnson & Christensen, 2010). The research philosophy perspective recognizes that there is a reality and that it cannot be measured directly. It can only be perceived by individuals and groups who interpret situations according to their experience, knowledge and expectations. Saunders, Lewis and Thornhill (2009) inform that interpretivist focus is on understanding the world of social actors from their own point of view rather than generalizing. Studies which fall in this philosophical domain are inductive, that is, they build explanations from scratch, based on what is discovered. As a result, they use qualitative data due to their subjective nature (Easterby-Smith et al., 2002). The success of the study under this philosophy is evaluated by its ability to discover new themes and explanations rather than its generalizability (Saunders et al., 2009). As a way of accepting the subjectivity of what interpretivist report, they write the final report from the first person rather than from the third person.

This study adopted a positivist approach. The primary aim of the study was to determine whether there is a relationship between implementation of GSCM practices and organizational performance. Hypotheses were developed from literature. The study required collection of quantitative data which was gathered through a questionnaire. The concepts in the study are operationalized to ensure clarity of definitions and its emphasis was to explain causal relationship between GSCM practices and organizational performance. The study was, deductive rather than inductive and theory testing, rather than theory building and aimed at generalizing its findings. Since positivists place great emphasis on these characteristics, this research philosophy seemed particularly suited to the focus of this study.

3.3 Research Design

The study employed cross-sectional survey research design. It is appropriate where the overall objective is to establish whether there exist significant relationships among variables at some point in time (Mugenda & Mugenda, 2003). The key objective of this study is to establish the relationship between GSCM practices and organizational performance. Cross-sectional studies are appropriate where the data will be collected across several firms at one point in time (Copper & Schindler, 2006).

The topical scope for this study is breadth rather than depth, it aims at collecting data across many different firms, that is, all ISO 14001 certified firms in East Africa. Several related studies have employed the same research design (Rao & Holt, 2005; Chien & Shi, 2007; Testa & Irlado, 2010; Eltayeb et al., 2011; Kirchoff, 2011; Choi, 2012; Lee et al., 2012; Green et al., 2012; Kung et al., 2012; Kinoti, 2012; Laosirihongthong et al., 2013; Aranga, 2014).

3.4 Population of the Study

The population of the study comprised all ISO 14001 certified manufacturing firms operating in East Africa. The countries in East Africa include Kenya, Tanzania, Uganda, Rwanda and Burundi. According to the latest ISO survey results which were released in September 2013, the total number of ISO 14001 certified manufacturing firms in East

Africa was 108. 51 of these firms are in Kenya, 36 in Tanzania, 19 in Uganda and 2 in Rwanda and none in Burundi (ISO, 2015). This list was obtained from institutions which offers ISO 14001 certification in East Africa. These organizations include Bureau Veritas, SGS, KEBS, NEMKO, DQS UL Kenya, and Quality Austria. All the 108 manufacturing firms were considered making the study a census of all ISO 14001 certified manufacturing firms in East Africa.

A census was appropriate for this study because one of the techniques proposed for data analysis, partial least squares structural equation modeling (PLS-SEM), requires a large sample. Hoyle (1995) asserts that a sample size of 100 to 200 is usually a good starting point in carrying out path modeling. Wong (2013) developed a simple lead on sample size selection based on the guidelines given by Marcoulides and Saunders (2006). Wong (2013) argues that if a study has a significance level of 5%, statistical power of 80% and R^2 values of at least 0.25, the sample size is determined by the maximum number of arrows pointing at a latent variable as shown in appendix VI. This study was based on a conceptual model with five latent variables. The latent variable that had the most number of arrows pointing to it is organizational performance with four arrows. According to Wong (2013), this requires that the least number of responses be 65. If the number of non-responses and inappropriate responses are taken into consideration a population 108 would leave at least 65 useful responses, thus the justification to conduct a census.

The study focused on manufacturing firms because they produce more air, land, and water pollution than service facilities (Stead & Stead, 1992). Possession of ISO 14001 certification offers some affirmation that the firm is concerned about the environment and therefore highly likely to implement GSCM practices (Gonzales et al., 2008; Handfield et al., 2001; Arimura et al., 2008; Irlado et al., 2009; Testa & Irlado, 2010). Similar past studies have also considered ISO 14001 certified firms (Rao & Holt, 2005; Chien & Shi, 2007; Eltayeb et al., 2011; Kinoti, 2012; Laosirihongthong et al., 2013).

3.5 Data Collection

This study employed primary data which was collected using a semi structured questionnaire (see appendix V). The respondents were required to respond to scales operationalizing the research variables from the questionnaire which contained direct measures and likert type scales. The questionnaire was divided into seven sections. Section A sought information on the firm's profile. Section B aimed to obtain information on the institutional pressures of GSCM practices implementation. Section C was designed to collect information on GSCM practices implemented by the firm. Section D sought information on relational efficiency. Sections E, F and G required information on the firm's environmental, operational and organizational performance respectively.

In order to avoid possible information duplication as a result of multiple responses, a single respondent from each of the manufacturing firms in the population was targeted. The respondent was a person who has detailed knowledge on the overall firm direction and is in charge of handling environmental management issues in the firm. Consequently, the senior manager responsible for environmental management was targeted. This is in line with Campbell (1955)'s argument that the key respondent should be individuals with detailed knowledge of what is being studied and should be willing to communicate this information. In addition, the perceptions of individuals in top management echo the collective perspective of the firm and therefore their responses to subjective questions on firm level data are likely to be highly reliable (Campbell, 1955; Pecotich, Purdie & Hattie, 2003). To ensure that only qualified persons who are knowledgeable based on the criteria set above, a market research firm was assigned the task of calling and pre-qualifying informants. The caller emphasized the need to participate and explained to the respondents what the output of the study would be in order to motivate them to take part.

This research utilized Dillman's mixed mode survey approach to collect data. This is where one survey instrument is used with two or more data collection modes (Dillman, 2000; Dillman et al., 2009). The survey questionnaire was thus administered personally, using mail and via email. This became necessary because the population of study is scattered all over East Africa. 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. The questionnaires were sent with an introduction letter briefly explaining the objectives and importance of the study together with instructions on how to fill it.

3.6 Operationalization of Research Variables

In order to measure latent constructs, they have to be operationalized in terms of their indicators. As observed from the conceptual model in Figure 2.1, this study had seven constructs, which include; GSCM practices, institutional pressures, firm characteristics, relational efficiency, environmental performance, operational performance and organizational performance. Each of these constructs is operationalized using multi-items indicators and measured with the aid of a Likert scale as shown in Table 3.1. A Likert scale is a psychometric scale which was developed by Rensis Likert in 1932 as a five-point bipolar response scale (Allen & Seaman, 2007). This scale is employed by researchers from almost all academic disciplines. Chimi and Russel (2009) argue that it is appropriate where; a value on a belief, opinion or affect is being sought, information required cannot be asked or answered definitively and precisely and information required is sensitive and the respondent may not give a response except categorically in ranges.

Some firms which formed part of the population of interest in this study are business units in multi-industry firms. Dess and Robinson (1984) assert that it is very difficult to allocate performance data, for example, assets and sales data of such firms hence making it very difficult to obtain objective data from them. Additionally, most of these firms are privately-held firms. Obtaining objective performance data from such firms would be a source of measurement error because of two major reasons; first, the confidential nature of the data makes access to such data severely restricted. Second, even if access to such data is obtained, there is a larger risk of error attributable to varying accounting procedures in these firms.

Dess and Robinson (1984) established a very strong positive correlation between objective and subjective performance data and hence recommend the use of the subjective or quasi-objective data where objective data is absent. The nature of the data which was collected in this study exhibits the characteristics which are given by Chimi and Russel (2009) which makes Likert type scale appropriate for the study. Moreover, Likert type questions are simple and provide a convenient means of gauging specific opinion (Aranga, 2014). Table 3.1 shows the operational definitions and measurement of the study variables.

Table 3.1: Operational Definitions and Measurement of the Study Variables

Latent construct	Sub-constructs	Indicators	Measurement scales	Informing literature	Question
Green Supply Chain Management Practices	Green procurement	Appendix I(a)	Ordinal scale - 5 point Likert scale	Min, & Galle (1997, 2001); Rao & Holt (2005); Vachon (2007); Zhu et al. (2008a); Zhu et al. (2008b); Testa & Irlado (2010); Diabat & Govindan (2011); El-Tayeb et al. (2011); Khisa (2011); Laosirihongthong et al.(2013); Mittra & Datta (2013)	Section B Question 15
	Environmentally responsible design	Appendix I(b)	Ordinal scale - 5 point Likert scale	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)	Section B Question 16
	Green manufacturing	Appendix I(c)	Ordinal scale - 5 point Likert scale	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 et al. (2008); Holt & Ghobadian (2009); Paulraj (2009)	Section B Question 17
	Green packaging	Appendix I(d)	Ordinal scale - 5 point Likert scale	Wu & Dunn (1995); Tseng (2009); Ninlawan et al. (2010); Laosirihongthong et al. (2013)	Section B Question 18
	Green distribution	Appendix I(e)	Ordinal scale - 5 point Likert scale	Wu & Dunn (1995); Rodrigue et al. (2006); Zhu et al. (2008a); Paulraj, (2009); Ninlawan et al. (2010)	Section B Question 19
	Reverse logistics	Appendix I(f)	Ordinal scale - 5 point Likert scale	Wu & Dunn (1995); Florida & Atlas (1997); Toffel (2004); Vachon (2007); Ninlawan et al. (2010)	Section B Question 20
Relational Efficiency	Trust	Appendix II(a)	Ordinal scale - 5 point Likert scale	Doney & Cannon (1997); Fisher, et al. (1997); Zacharia et al. (2009)	Section D Question 21
	Credibility	Appendix II(b)	Ordinal scale - 5 point Likert scale	Gundlach, Achrol & Mentzer (1995); Siguaw, Simpson & Baker (1998)	
	Relationship effectiveness	Appendix II(c)	Ordinal scale - 5 point Likert scale	Ruekert &Walker (1987); Fisher et al. (1997)	

Source: Researcher, 2015

Table 3.1: Operational Definitions and Measurement of the Study Variables (Continued)

Latent construct	Sub-constructs	Indicators	Measurement scales	Informing literature	Question
Environmental performance	Environmental impact reduction measures	• Green house gas emissions • Water Use Ratio (WUR) • Discharge of wastewater (in cubic meters) • Solid waste (e.g. packaging waste, scrap, etc) • Use of hazardous materials • Frequency of environmental accidents	Interval scale - 5 point Likert scale	Zhu et al., (2008a); Shi et al. (2012)	Section E Question 22
	Environmental cost saving measures	• Savings due to purchase of environmentally friendly raw materials • Investment in environmental technology • Savings due to material recovery • Savings due to recycling of waste water • Savings due transporting in bulk rather than in small quantities. • Energy cost savings • Fines/penalties for flouting environmental regulations	Interval scale - 5 point Likert scale	Zhu et al., (2008a); Shi et al. (2012)	Section E Question 23
Operational performance	Quality	• Products scrapped • Products reworked • Products returned by consumers • Number of complaints during warranty period	Interval scale - 5 point Likert scale	Ketchen et al. (2008); Slack, Chambers & Johnston (2007)	Section F Question 24
	Cost	• Inventory levels reduction • Improved capacity utilization • Cost per operation hour • Variance against budget	Interval scale - 5 point Likert scale	Maani, Putterill & Sluti (1994); Slack et al. (2007)	Section F Question 25
	Speed	• Design time • Cycle time • Machine set-up time • Through-put time • Order lead time	Interval scale - 5 point Likert scale	Tersine & Hummingbird (1995); Slack et al. (2007)	Section F Question 26
	Flexibility	• Increased number of product categories • Ability of the firm to vary production to match demand • Ability to introduce new products in case of demand • Ability of firm to vary delivery time to meet demand	Interval scale - 5 point Likert scale	Suarez, Cusumano & Fine (1996); Slack et al. (2007)	Section F Question 27

Source: Researcher, 2015

Table 3.1: Operational Definitions and Measurement of the Study Variables (Continued)

Latent construct	Sub-constructs	Indicators	Measurement scales	Informing literature	Question
Organizational performance	Financial performance	• Cash Flow • Profit after tax • Return on Sales • Return on Investment • Ability to Fund Business Growth from Profits • Return on Shareholders' Equity	Interval scale - 5 point Likert scale	Green & Inman (2005); Richard et al. (2009)	Section G Question 28
	Market performance	• Market share growth • Sales volume growth (in units) • Sales growth (in shillings)	Interval scale - 5 point Likert scale	Green & Inman (2005); Richard et al. (2009)	Section G Question 29
Institutional pressures	Coercive	• Domestic environmental regulations • Government environmental policy • International environmental agreements	Ordinal scale - 5 point Likert scale	Rivera (2004); Zhu & Sarkis (2006); Hall (2000); Sarkis (1998)	Section B Question 14
	Mimetic	• Local competitors • National competitors • Regional competitors • Global competitors	Ordinal scale - 5 point Likert scale	DiMaggio & Powell (1983); Zhu & Sarkis (2007)	Section B Question 14
	Normative	• Household consumers • Commercial buyers • Environmental groups or organizations • Community groups or organizations • Labor unions • Trade associations • Shareholders • Management employees • Non-management employees • Suppliers of goods and services • Banks and other lenders	Ordinal scale - 5 point Likert scale	DiMaggio & Powell (1983); Darnall et al. (2008); Sarkis et al. (2011)	Section B Question 14
Firm Characteristics	Age		Ratio scale - direct measure	Testa & Iraldo (2010)	Section A Question 4
	Size		Ratio scale - direct measure	Testa & Iraldo (2010)	Section A Question 5
	Spatial scope of market		Nominal Scale - dummy variable	Testa & Iraldo (2010)	Section A Question 6

Source: Researcher, 2015

3.7 Reliability and Validity Tests

In order for the study findings to be credible, reliability and validity have to be established. Tests for reliability and validity were established at various levels. The following subsections discuss the tests that were conducted.

3.7.1 Reliability Test

According to Kline (1998), reliability assessment involves establishing the consistency, precision and repeatability of the indicator. Cronbach's Alpha was used to verify the reliability of each construct and items used in the study. Values for this measure range between 0 (without reliability) to 1 (perfect reliability). A value of at least 0.5 is required, however, the recommended threshold of Cronbach's alpha should be 0.7 (Nunnally, 1978; Nunnally & Vernstein, 1994). All constructs and items used in this research were found to have Cronbach's Alpha of at least 0.7 implying that reliability was established.

Additionally, item to total correlation for all the indicators in the constructs were determined using SPSS version 21 to examine reliability of the measurement scale. Bryne (2001) suggests that the threshold for item to total correlations should be 0.3. The few indicators that were found to have total to item correlation scores of below 0.3 were dropped before further analysis could be done. In all the cases where this was done, the Cronbach's Alpha increased.

Composite reliability which measures the internal consistency of the latent constructs in the model was also assessed. Hatcher (1994) assert that reliability is high if the composite reliability score is larger than 0.6. All the latent constructs used in the structural model for this study were found to have composite reliability scores of at least 0.7 as recommended by Fornell and Larcker (1981) indicating high reliability. In order to measure the internal consistency of the model, AVE values were obtained from Smart PLS output. All the AVE scores were found to be greater than 0.5 implying that reliability of the instrument was good (Hatcher, 1994).

3.7.2 Validity Test

Validity is the extent to which the research tools actually measures what it intends to measure (Forzano & Gravetter, 2009). To ensure content validity, the measurement instrument was developed in two stages. First, it was developed from literature in consultation with academic experts on issues of clarity, readability, specificity, representativeness, content and face validity (Zacharia et al., 2009). Secondly, a pretest was done on five experts who have direct experience of managing a GSCM effort. In addition, five senior managers responsible for environmental management from manufacturing firms were asked to fill the questionnaire. All this was done to check on issues like wording, logic and content of the instrument. Hair, Money, Samouel and Page (2007) argue that a pretest of five to ten representative respondents is sufficient to validate the research instrument. The instrument was then adjusted to incorporate the issues raised by the pretest respondents before a final version was developed.

Construct validity refers to whether a measure correlates with the theorized latent construct that it purports to measure (Zeng et al., 2010). Preliminary analysis to establish construct validity was done for all items using exploratory factor analysis (EFA) with Varimax rotation, before subjecting the items to further analysis. Stevens (2002) recommends a factor loading of at least 0.4. Those items that were found not to have attained this threshold were not considered for further analysis which included ordered probit, PLS-SEM and moderated regression analyses. A few indicators of GSCM practices were dropped because they did not attain this threshold.

At the second level, construct validity was assessed by examining convergent and discriminant validity (Hair, Black, Babin & Anderson, 2010). Convergent validity was assessed by evaluating each latent variable's Average Variance Extracted (AVE). Hair et al. (2010) suggests that for convergent validity to be confirmed, each latent variable's AVE should be at least 0.5. Convergent validity was also evaluated through confirmatory factor analysis by examining the constructs' items' loadings and cross loadings. Convergent validity is confirmed if all items load heavily on their respective construct than on any other construct. Secondly, the loadings of the items on their respective constructs should be significant. This too was confirmed for all the latent constructs in that were used to estimate the structural models.

Discriminant validity was evaluated by using three criteria; first, factor loadings of indicators of the constructs were assessed to see if they loaded heavily on their associated constructs. Second, AVE estimates for each latent variable were compared with the squared interconstruct correlations associated with the construct. Fornell and Larcker (1981) argue that if all AVE estimates are greater than the corresponding interconstruct squared correlation then discriminant validity is ensured. Heterotrait-Monotrait criterion was also used to confirm discriminant validity. As will be explained in chapter four, these three criteria confirmed discriminant validity. The predictive validity dimensions were demonstrated by the results of hypotheses testing.

In addition to these validity tests, Kaiser-Meyer-Olkin (KMO) and Bartlett's Tests were conducted for all constructs in the measurement instrument to check whether it is proper to subject the items to factor analysis. All the constructs in the measurement instruments had KMO values above 0.7 and all their values of chi-square in Bartlett's Sphericity test were significant at a level less than 0.001. These tests suggest that it was proper to carry out the factor analysis.

3.8 Data Analysis

In order to achieve the objectives of the study, the data was analyzed using three key techniques; ordered probit, partial least squares structural equation modeling (PLS-SEM) and moderated regression analyses. The ordered probit model was used to analyze data in order to achieve the first objective. Greene (2003) argues that ordered probit model is the best data analysis technique when the dependent variable is defined on an ordinal scale. The dependent variable in this case was the extent of GSCM practices implementation, assumes values which are ordinal in nature. Using the ordered probit model, the following explanatory variables were included: coercive pressures, mimetic pressures, normative pressures and a set of firm specific exogenous variables that are expected to affect GSCM implementation. These include; size of the firm in terms of number of employees, age of the firm in years, spatial scope of market served by the firm (dummy variable), whether a firm has an environmental department (dummy variable) and perceived negative effect on environment in firm's sector of operation (dummy variable).

Partial least squares structural equation modeling (PLS-SEM) technique using SmartPLS software was used to analyze data to achieve objectives two, three and four. This approach was used to evaluate the relationship between the latent constructs and to determine the predictive power of the conceptual model. Wong (2013) defines PLS-SEM as a soft modeling approach to structural equation modeling with no assumptions about data distribution. It is the best alternative to covariance-based SEM if the researcher encounters one or more of the following circumstances; when the sample size is small, when predictive accuracy is of paramount importance, when the correct model specification cannot be ensured and when the applications have little available theory (Hwang, Malhotra, Kim, Tomiuk & Hong, 2010). This analysis was found relevant for this study because the sample size of sixty seven (67) is considered small for covariance-based analysis. Musuva-Musimba (2013) successfully employed PLS-SEM technique for a sample size of fifty (50) firms registered at the Nairobi Securities Exchange.

PLS-SEM analysis process involved two stages. The first step is the estimation of the outer or measurement model which specifies the relationships between the latent variables and their observed indicators (Wong, 2013). The second stage is the specification of the inner or structural model and evaluation of the relationships proposed and testing of hypothesis (Bryne, 2001). The inner model specifies the relationships between the exogenous and endogenous latent constructs. An exogenous construct does not have any path from any other construct going into it but has path arrows pointing to other constructs. On the other hand, an endogenous construct is dependent on other constructs and this dependence is represented visually by at least one path leading to it. (Hair et al., 2010; Wong, 2013).

The inner or structural model comprised of five latent constructs which include; GSCM practices, relational efficiency, environmental performance, operational performance and organizational performance. The exogenous latent construct was GSCM practices while the rest are endogenous. The latent constructs were measured using a total of 17 items. These items were subjected to confirmatory factor analysis (CFA) as part of PLS-SEM outer model analysis. Each of the relationships between the observed variables and their respective factors were specified in an outer/measurement model. The measurement model or outer model defines how each block of indicators relates to their respective latent variables.

Data to achieve objective five was analyzed using moderated regression analysis using the variance partitioning procedure outlined by Jaccard, Wan and Turrisi (1990). This procedure has also been successfully used by operations and supply chain management researchers (Dean & Snell, 1991; Tatikonda & Rosenthal, 2000; Zhu & Sarkis, 2004). The analysis was done in three steps. First, the combined GSCM practices variable was entered into the regression model. Second, the firm characteristic moderator was entered. Finally, the interaction term of GSCM practices and the moderator was entered. If the interaction term accounted for a significant amount of incremental variance in the dependent variable, then there is evidence to support moderation.

3.9 Hypotheses Testing

Table 3.2 shows a summary of the objectives of the study, their respective hypotheses and how they were tested and the acceptance/rejection criterion for each hypothesis.

Table 3.2: Summary of Hypotheses Testing

Objective	Hypotheses	Analysis	Accept/Reject Criteria
Objective 1: Establish the institutional pressures for GSCM practices implementation among ISO 14001 certified manufacturing firms in Kenya.	**Hypothesis 1:** Institutional pressures encourage a firm to implement GSCM practices.	Spearman's Rank correlation coefficient, Ordered probit Analysis. Likelihood ratio test	
	H_{1a}: Coercive institutional pressures encourage a firm to implement GSCM practices	Spearman's Rank correlation coefficient, Ordered probit Analysis. Likelihood ratio test	Hypothesis is supported if Spearman's Rank correlation coefficient is significant, p-value of coefficient is less than 0.05 and the likelihood test statistic is greater than critical chi-square value.
	H_{1b}: Mimetic institutional pressures encourage a firm to implement GSCM practices	Spearman's Rank correlation coefficient, Ordered probit Analysis. Likelihood ratio test	Hypothesis is supported if Spearman's Rank correlation coefficient is significant, p-value of coefficient is less than 0.05 and the likelihood test statistic is greater than critical chi-square value.
	H_{1c}: Normative institutional pressures encourage a firm to implement GSCM practices.	Spearman's Rank correlation coefficient, Ordered probit Analysis. Likelihood ratio test	Hypothesis is supported if Spearman's Rank correlation coefficient is significant, p-value of coefficient is less than 0.05 and the likelihood test statistic is greater than critical chi-square value.
Objective 2: Determine whether there is a direct link between GSCM practices and organizational performance of ISO 14001 certified manufacturing firms in Kenya.	**Hypothesis 2:** Implementation of GSCM practices has is positively related to the organizational performance.	PLS-SEM Analysis. Significance of SRMR and path coefficient	Hypothesis is supported if p-values of path coefficient and SRMR is less than 0.05

Source: Researcher, 2015

Table 3.2: Summary of Hypotheses Testing (Continued)

Objective	Hypotheses	Analysis	Accept/Reject Criteria
Objective 3: Establish whether there is an indirect link between GSCM practices and organizational performance through environmental and operational performance of ISO 14001 certified manufacturing firms in Kenya.	**Hypothesis 3:** Environmental performance and operational performance mediate the relationship between GSCM practices and organizational performance	PLS-SEM Analysis. Significance of SRMR, path coefficient. Baron and Kenny (1986) method for testing mediation in SEM.	Hypothesis is supported if p-values of all path coefficients, SRMR and indirect effect are less than 0.05.
	H_{3a}: Implementation of GSCM practices by a firm has a positive effect on its environmental performance.	PLS-SEM Analysis. Significance of path coefficient	Hypothesis is supported if p-value of path coefficient is less than 0.05
	H_{3b}: Implementation of GSCM practices by a firm has a positive effect on its operational performance.	PLS-SEM Analysis. Significance of path coefficient	Hypothesis is supported if p-value of path coefficient is less than 0.05
	H_{3c}: The environmental performance of the firm has positive effect on its operational performance.	PLS-SEM Analysis. Significance of path coefficient	Hypothesis is supported if p-value of path coefficient is less than 0.05
	H_{3d}: The environmental performance of the firm has a positive effect on its organizational performance.	PLS-SEM Analysis. Significance of path coefficient	Hypothesis is supported if p-value of path coefficient is less than 0.05
	H_{3e}: The Operational performance of the firm has a positive effect on its organizational performance.	PLS-SEM Analysis. Significance of path coefficient	Hypothesis is supported if p-value of path coefficient is less than 0.05
Objective 4: Establish the influence of relational efficiency on the relationship between GSCM practices and organizational performance of ISO 14001 certified manufacturing firms in Kenya.	**Hypothesis 4:** Relational efficiency mediates the relationship between GSCM practices and performance.	PLS-SEM Analysis. Significance of path coefficient	
	H_{4a}: Implementation of GSCM practices by a firm has a positive effect on its relational efficiency.	PLS-SEM Analysis. Significance of path coefficient	Hypothesis is supported if p-value of path coefficient is less than 0.05.
	H_{4b}: Relational efficiency of the firm with its supply chain partners is positively related to its environmental performance.	PLS-SEM Analysis. Significance of path coefficient	Hypothesis is supported if p-value of path coefficient is less than 0.05.
	H_{4c}: Relational efficiency of the firm with its supply chain partners is positively related to its operational performance.	PLS-SEM Analysis. Significance of path coefficient	Hypothesis is supported if p-value of path coefficient is less than 0.05.
	H_{4d}: Relational efficiency of the firm with its supply chain partners is positively related to its organizational performance.	PLS-SEM Analysis. Significance of path coefficient	Hypothesis is supported if p-value of path coefficient is less than 0.05.

Source: Researcher, 2015

Table 3.2: Summary of Hypotheses Testing (Continued)

Objective	Hypotheses	Analysis	Accept/Reject Criteria
	H_{4e}: Relational Efficiency mediates the relationship between GSCM practices and environmental performance.	PLS-SEM Analysis. Significance of Indirect effect. Significance of Sobel Test Statistic.	Hypothesis is supported if p-values of indirect effect and Sobel test statistic are less than 0.05. Hypotheses H4a and H4b should be supported.
	H_{4f}: Relational Efficiency mediates the relationship between GSCM practices and operational performance.	PLS-SEM Analysis. Significance of Indirect effect. Significance of Sobel Test Statistic.	Hypothesis is supported if p-values of indirect effect and Sobel test statistic are less than 0.05. Hypotheses H4a and H4b should be supported.
	H_{4g}: Relational Efficiency mediates the relationship between GSCM practices and organizational performance.	PLS-SEM Analysis. Significance of Indirect effect. Significance of Sobel Test Statistic.	Hypothesis is supported if p-values of indirect effect and Sobel test statistic are less than 0.05. Hypotheses H4a and H4b should be supported.
Objective 5: Determine the influence of firm's characteristics on the relationship between GSCM practices and organizational performance of ISO 14001 certified manufacturing firms in Kenya.	**Hypothesis 5:** The firm's characteristics moderate the relationship between GSCM practices and organizational performance.		
	H_{5a}: The firm's size positively moderates the relationship between GSCM practices and organizational performance.	Hierarchical Regression analysis. Significance of Incremental F and Interaction term	Hypothesis is supported if p-values of Incremental F and Interaction term are less than 0.05.
	H_{5b}: The firm's age positively moderates the relationship between GSCM practices and organizational performance.	Hierarchical Regression analysis. Significance of Incremental F and Interaction term	Hypothesis is supported if p-values of Incremental F and Interaction term are less than 0.05.
	H_{5c}: The spatial scope of market served by a firm positively moderates the relationship between GSCM practices and organizational performance.	Hierarchical Regression analysis. Significance of Incremental F and Interaction term	Hypothesis is supported if p-values of Incremental F and Interaction term are less than 0.05.

Source: Researcher, 2015

3.10 Summary

This chapter presented the research methodology that was adopted by this study. The study took a positivist position and employed a descriptive cross-sectional survey research design. The population of study comprised of all ISO 14001 manufacturing firms operating in East Africa. Primary data was collected through a structured questionnaire. The chapter has also presented the key study variables and their operationalization and demonstrates how the validity and reliability of the study instrument was ensured. Finally, data analysis and hypotheses testing procedures are described.

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.1 Introduction

This chapter presents the analyses conducted to test the relationships in conceptual model and reports the results of this study. It provides information on population demographics and respondent characteristics, response rates and data screening. The chapter also looks at the descriptive statistics for all the variables and their indicators. The findings are presented based on the study objectives. Ordered probit analysis is undertaken to analyze data on the institutional pressures of GSCM practices implementation. In addition, details on measurement and structural model estimation using PLS-SEM are discussed. The chapter ends by conducting moderated regression analysis to establish the moderating effect of firm characteristics on the relationship between GSCM practices and organizational performance.

4.2 Background Information

The general objective of this research was to establish the relationship between implementation of GSCM practices and organizational performance of ISO 14001 certified manufacturing firms in East Africa. Specifically, the study first sought to establish the institutional pressures that cause manufacturing firms to implement GSCM practices. The second objective of the study was to determine the relationship between GSCM practices and organizational performance. The third objective sought to establish the mediating effect of environmental and operational performance on the relationship between GSCM practices and organizational performance.

The study also sought to determine the mediating effect of relational efficiency on the relationship between GSCM practices and environmental performance, GSCM practices and operational performance and GSCM practices and organizational performance. Lastly, the research looked at the moderating effect of firm characteristics (size, age, and spatial scope of the market served by the firm) on the relationship between GSCM practices and organizational performance.

The study concentrated on ISO 14001 certified manufacturing firms because this characteristic provides some form of affirmation that the impact of the firm on the environment is being measured and improved (ISO, 2015). In addition, there is overwhelming evidence that firms that possess an EMS certification are implementing GSCM practices (Gonzales et al., 2008; Handfield et al., 2002; Arimura et al., 2008; Irlado et al., 2009; Testa & Irlado, 2010). Details on the response rate, respondent firm demographics and descriptive statistics are discussed in the following subsections.

4.2.1 Response Rate

The study focused on all 108 ISO 14001 certified manufacturing firms in East Africa. 51 of the firms were in Kenya, 36 in Tanzania, 19 in Uganda and 2 in Rwanda. Out of the 108 questionnaires sent to the respondents, a total of 75 questionnaires were received back, 35 from Kenya, 21 from Tanzania, 17 from Uganda and 2 from Rwanda. A total of 33 firms, 16 from Kenya, 15 from Tanzania and 2 from Uganda did not respond. This was because of various reasons ranging from ‘no-survey policy’, difficulty in monitoring due to geographical distance, unavailability and flat refusal by the respondent to respond to the questionnaire. This resulted in a response rate of 69.4%.

Careful screening of the returned questionnaires revealed that 8 had at least 15% missing data or had missing data on key performance variables. These questionnaires were eliminated from preliminary analysis leaving a total of 67 usable questionnaires. A few missing responses were found randomly in another five questionnaires. This may have been due to the oversight by the respondent and perceived confidentiality of data. A sub-group mean value replacement function was used to replace those missing values (Hair, Hult, Ringle & Sarstedt, 2013). This resulted in 67 usable questionnaires resulting in an adjusted response rate of 62%. Table 4.1 presents information on response rate.

Table 4.1: Response Rate

Country	Population	Responses	Response rate (%)	Usable	Adjusted response rate (%)
Kenya	51	35	68.6%	30	58.8%
Tanzania	36	21	58.3%	19	52.8%
Uganda	19	17	89.5%	16	84.2%
Rwanda	2	2	100%	2	100%
Total	108	75	69.4%	67	62%

Source: Research Data, 2015

4.2.2 Firm's Demographic Characteristics

Table 4.2 presents the characteristics of the responding firms. Majority of the responding firms are joint locally and foreign owned (50.7%), 29.9% are fully locally owned, while the rest (19.4%) are fully foreign owned. In terms of the spatial scope of the market served by the firms, 89.6% of these manufacturing firms indicated that they serve global markets. Only 10.6% serve local markets. These two characteristics imply that these firms compete on a global level making it necessary for them to search for new opportunities, such as excellence in environmental management, in order to beat the competition which is very intense at this level. The results in Table 4.2 also show that almost all the manufacturing sub-sectors were represented in the study, with the bulk of the firms (44.8%) coming from the food, beverages and tobacco sub-sector.

In terms of length of time the firms had been in operation, 9% of them reported that they had been in operation for less than 20 years. Most of the firms involved in the study (74.6%) had been in existence for a period of between 20 and 60 years. A total of 11 firm representing 16.4% had operated for 60 years and above. The average number of years that the firms had been in operation was 43.3 years. This is a reasonable length of time within which a firm is likely to build up resources and capabilities that may lead to improved performance.

The respondents were also required to indicate the number of full-time employees working in their firms. The bulk of the firms (45.3%) are classified as large with 700 and above full-time employees. 6 firms (9.4%) had less than 100 employees, 12 firms (18.8%) had between 100 and 299 full-time employees, 8 firms (12.5%) had between 300 and 499 employees and 9 firms (14.1%) had between 500 and 699 employees. This would imply that the bulk of the firms have the ability to assemble resources to implement GSCM practices because of their size.

Table 4.2: 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%
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

4.2.3 Firm's Environmental Consciousness

In an attempt to assess how seriously the manufacturing firms were taking environmental management issues, the respondents were required to answer a series of questions. The results are shown in Table 4.3 and discussed thereafter.

Table 4.3: Firm's Environmental Consciousness Indicators

Feature	Category	Frequency	Percent
Whether respondent was in the firm during ISO 14001certification	Yes	44	65.7%
	No	23	34.3%
	Total	67	100%
Whether the firm has an environmental management department	Yes	61	91.0%
	No	6	9.0%
	Total	67	100%
Number of employees in the environmental management department	Less than 5 employees	13	21.3%
	5-10 employees	20	32.8%
	More than 10 employees	28	45.9%
	Total	61	100%
Whether the firm is registered with an environmental management body	Yes	64	95.5%
	No	3	4.5%
	Total	67	100%
Whether the firm has an environmental management policy	Yes	66	98.5%
	No	1	1.5%
	Total	67	100%
Frequency of inter-departmental meetings to discuss environmental issues	1-2 times	13	19.4%
	3-4 times	22	32.8%
	5 or more times	32	47.8%
	Total	67	100%
Whether the firm has a budget for research and development specifically related to environmental issues	Yes	56	83.6%
	No	11	16.4%
	Total	67	100%
Approximate amount of budget for research and development allocated to environmental management in a year	Less than Ksh. 50,000	1	1.8%
	Ksh. 50,001- Ksh. 100,000	5	8.9%
	Ksh. 100,001- Ksh.150,000	8	14.3%
	Above Ksh. 150,000	42	75.0%
	Total	56	100%

Source: Research Data, 2015

In order to get an indication of the respondent's familiarity with the environmental management history of the firm, the respondents were asked to state whether they were present when the firm received ISO 14001 certification. 44 respondents representing 65.7% were in the firm and they further indicated that they were part of the team that prepared the firm to receive the certificate. Only 23 were not in the firm. This is a good indication that most of the respondents have a deeper understanding of the environmental management history of their respective firms.

Another question asked whether the firm had an environmental department and if so how many employees were working under the department. As reported in Table 4.3, 61 (91%) firms have an environmental management department. Out of these 61 firms, 13 (21.3%) have less than 5 employees in the department, 20 (32.8%) have between 5 and 10 staff members dealing with environmental issues and majority of the firms (45.9%) had more than 10 employees working in the environmental management department. This is a good indicator that most of the firms that participated in the study have a more organized approach to environmental management.

The respondents were also asked to indicate how often in a month they convened inter-departmental meetings in which environmental issues and problems are discussed. Most of the firms (47.8%) convened a meeting 5 or more times a month to discuss environmental issues. 22 firms (32.8%) indicated that they had meetings 3 to 4 times a month and 13 firms representing 19.4% arrange a meeting 1 to 2 times a month to discuss environmental management issues.

The last question in the section sought to determine whether the manufacturing firms had a budget for research and development specifically allocated to environmental management issues. 56 firms (83.6%) responded yes to this question. Of the firms that indicated yes, 1 firm (1.8%) allocated the equivalent of less than Ksh. 50,000 a year, 5 firms (14.3%) apportioned the equivalent of between Ksh. 50,001 and 100,000 a year while 8 firms representing 14.3% allocated the equivalent of between ksh. 100,001 and ksh. 150,000 a year. Majority of the firms (75%) set aside the equivalent of more than Ksh. 150,000 a year for research and development for environmental management. The response to the last two questions is a strong pointer that majority of the manufacturing firms have given priority to environmental management.

4.3 Reliability and Construct Validity

This research had a total of seven broad constructs which included institutional pressures for GSCM practices implementation, GSCM practices, relational efficiency, environmental performance, operational performance and organizational performance. Each of these constructs was further subdivided into sub constructs. In total the study had 20 sub constructs. Three were classified under institutional pressures for GSCM practices implementation, six under GSCM practices, three under relational efficiency, two under environmental performance, four under operational performance and two under organizational performance.

To evaluate construct unidimensionality, the indicators of each sub construct were subjected to reliability and exploratory factor analyses. Exploratory factor analysis (EFA) was done using principal component analysis with varimax rotation. Before assessing the factor loadings, Kaiser-Meyer-Olkin Measures of sampling adequacy and p-values for Barlett's Test of Sphericity were evaluated to check the factorability of the items. For every EFA, it was found that manifest variables had KMO Measures of Sampling Adequacy above the threshold of 0.6 (Kaiser, 1974). All p-values in Barlett's test of Sphericity were also found to be less than the significance level of 0.05 (Barlett, 1954).

Factor loadings for all the items of each construct in the study were then assessed. Items that were found to have factor loadings below 0.4 were dropped from further analysis.

In addition, the reliability and internal consistency of the items representing each construct was estimated. This was done by obtaining item to total correlation scores for each item for all the constructs in the study. The measurement scale for each construct was further refined by only retaining indicators that had item to total correlation values of above 0.3 for further analysis (Hair et al., 2010). For constructs that were subjected to PLS-SEM analysis, confirmatory factor analysis (CFA) was performed using SmartPLS software for measurement model estimation. The rationale of CFA was to establish the degree to which the observed data validated and fit the pre-specified theoretically based model. The following subsections explain in detail how scale purification was done for each of the constructs.

4.3.1 Institutional Pressures for GSCM Implementation

The institutional pressures that cause firms to implement GSCM practices were categorized into three groups; coercive pressures, mimetic pressures and normative pressures. Each of these pressures was treated as a separate indicator for the latent variable, institutional pressures in ordered probit analysis. Before this analysis each of these sources of pressure was analyzed for reliability and construct validity. The following subsections discuss the results obtained for each of the sources of pressures.

4.3.1.1 Coercive Pressures

Coercive pressures were conceptualized as originating from three sources. The respondents were asked to indicate the extent to which each of the three coercive pressures had influenced them to implement GSCM practices on a Likert scale. The scale ranged from 1 representing “not at all” to 5 representing “to a very large extent.” Government environmental policy was rated as the greatest source of pressure with a mean of 4.13 (SD = 0.864, N =64). Domestic environmental regulations was ranked second with a mean of 3.84 (SD = 0.963, N = 64). The least rated source of pressure was international environmental agreements (for example, Kyoto Agreement, The Climate Change Treaty, The Montreal Protocol, etc) with an average of 3.61 (SD = 1.093, N = 64). Grand mean was found to be 3.86. This indicated that the respondents on average believed that their firms were influenced by these pressures to a large extent.

The Cronbach Alpha for the scale was high at 0.725. Exploratory factor analysis using principal component analysis with Varimax rotation revealed that all the factor loadings were above the acceptable threshold of 0.4 (they ranged from 0.508 to 0.777). Item to total correlations scores ranged from 0.443 to 0.670. Therefore, all the items under coercive pressures were retained for further analysis since reliability and construct validity was confirmed. These results are shown in Table 4.4.

Table 4.4: Coercive Pressures

CP		N	Mean	Std. Dev.	Factor loadings	Item-Total Correlation	Alpha if Item Deleted
1	Domestic environmental regulations	64	3.84	0.963	0.650	0.552	0.630
2	Government environmental policy (e.g. NEMA, WRMA)	64	4.13	0.864	0.508	0.443	0.750
3	International environmental agreements (e.g. Kyoto Agreement, The Climate Change Treaty, The Montreal Protocol, etc)	64	3.61	1.093	0.777	0.670	0.471

Cronbach’s Alpha = 0.725, Grand mean = 3.86 Source: Research Data, 2015

4.3.1.2 Mimetic Pressures

Mimetic pressures originates from four sources; local, national, regional and global competitors. On a scale of 1 to 5, the respondents were asked to check the extent to which each of these sources had influenced their firms to implement GSCM practices. Since most of the firms served global markets, global competitors was cited as the largest source of pressure that influenced the implementation of GSCM practices with mean of 4.11 and standard deviation of 0.857 from 64 responses. National competitors was ranked second with a mean of 3.98 (SD = 0.826, N = 64). This was followed by regional competitors and local competitors with means of 3.95 and 3.78 respectively. On average, mimetic pressures influenced implementation of GSCM practices to a large extent as indicated by the grand mean of 3.96.

Loadings ranged from 0.544 to 0.730 and all item to total correlation values were above the required threshold of 0.3, indicating convergent validity The Cronbach's Alpha for the scale was high at 0.840, a confirmation of high reliability of the construct. Consequently, all the four pressures were considered in the ordered probit model. These results are shown in Table 4.5.

Table 4.5: Mimetic Pressures

MP		N	Mean	Std. Dev.	Factor loadings	Item-Total Correlation	Alpha if Item Deleted
1	Local competitors	64	3.78	0.806	0.544	0.566	0.841
2	National competitors	64	3.98	0.826	0.730	0.720	0.777
3	Regional competitors	64	3.95	0.898	0.726	0.712	0.780
4	Global competitors	64	4.11	0.857	0.707	0.699	0.785

Cronbach's alpha = 0.840, Grand mean = 3.96 Source: Research Data, 2015

4.3.1.3 Normative Pressures

Eleven sources of pressures were theorized under normative pressures. As was the case with coercive and mimetic pressures, the respondents were required to indicate the extent to which each of the sources had influenced them to implement the practices on a scale of 1 to 5. The results from Table 4.6 indicate that the responses ranged from a mean of 2.86 to 3.66. The least rated normative pressure was non management employees with a mean of 2.86 (SD = 1.096, N = 64). The highest ranked was pressure from management employees with a mean of 3.66 (SD =0.912, N = 64). This means that management employees are a major source of normative pressure for manufacturing firms in East Africa to implement GSCM practices. The grand mean was 3.27, slightly lower than those of coercive and mimetic pressures.

Cronbach Alpha was high at 0.815. Factors loadings ranged from 0.499 to 0.803. Two items; commercial buyers and shareholders had item to total correlation scores of 0.198 and 0.129 respectively. Since these are below 0.3, they were not considered for further analysis. The remaining 9 sources had item to total correlation values of 0.486 to 0.649 and an improved Cronbach's Alpha of 0.845. All factor loadings were also above the 0.4 (ranged from 0.480 to 0.793). These are the items that were subjected to ordered probit analysis.

Table 4.6: Normative Pressures

NP		N	Mean	Std. Dev.	Factor loadings	Item-Total Correlation	Alpha if Item Deleted
1	Household consumers	64	3.30	1.019	0.542	0.628	0.786
2	Commercial buyers	64	3.47	0.992	0.499	0.198	0.826
3	Environmental groups or organizations	64	3.56	0.924	0.585	0.435	0.805
4	Community groups or organizations	64	3.14	1.139	0.649	0.547	0.793
5	Labor unions	64	3.13	0.968	0.581	0.621	0.787
6	Trade associations	64	3.05	0.898	0.650	0.529	0.796
7	Shareholders	64	3.50	0.854	0.623	0.129	0.828
8	Management employees	64	3.66	0.912	0.589	0.550	0.794
9	Non-management employees	64	2.86	1.096	0.803	0.573	0.791
10	Suppliers of goods and services	64	3.11	1.071	0.674	0.568	0.791
11	Banks and other lenders	64	3.23	1.065	0.540	0.495	0.799

Cronbach's alpha = 0.815, Grand mean = 3.27 Source: Research Data, 2015

4.3.2 Green Supply Chain Management Practices

GSCM practices construct was measured using six subscales each with several practices. These include green procurement practices, environmentally responsible design practices, green manufacturing practices, green packaging practices, green distribution practices and reverse logistics practices. These subscales were first reviewed for reliability and construct validity before ordered probit, PLS-SEM and moderated regression analyses were done. The following subsections reviews the results obtained from each of these practices.

4.3.2.1 Green Procurement Practices

The green procurement construct was measured using twenty six 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 4.7, the responses ranged from a mean of 2.94 to 3.81 implying that the respondents practiced green procurement from a moderate to great extent. The highest rating was 3.81 for the practice “favor products which provide information about their environmental impact” with a standard deviation of 0.875 from 67 responses. The practice “require suppliers to take back packaging” had the lowest rating with a mean of 2.94 and standard deviation of 1.217 from 67 responses. The grand mean for green procurement practices was 3.46 implying that the manufacturing firms had implemented them to slightly above moderate extent.

The factor loadings ranged from 0.591 to 0.844. The Cronbach’s Alpha was 0.812. Item to total correlations of above 0.3 was not achieved for all the items in the scale. The practices “purchasing equipment that is easy to repair” (GP 7), “purchase products that are energy efficient or products which require less energy to manufacture” (GP 13), “purchase materials and parts with desirable green attributes such as recycled or reusable items” (GP 18) and “purchase materials and parts that do not contain environmentally harmful elements” (GP 19) had item to correlation scores of 0.292, 0.265, 0.244 and 0.292 respectively. Since these four items did not meet the required thresholds for reliability and construct validity, they were dropped from the list of items for the measurement model. The remaining 22 items had an improved Cronbach’s Alpha of 0.912 which is high and all the factor loadings are also above 0.4.

Table 4.7: Green Procurement Practices

GP	Green Procurement Practice	N	Mean	Std. Dev.	Factor loadings	Item-Total Correlation	Alpha if Item Deleted
1	Provide design specification on environmental requirements to suppliers for purchased items.	67	3.40	1.045	0.653	0.624	0.902
2	Cooperate with suppliers in order to attain environmental objectives.	67	3.52	0.927	0.739	0.689	0.901
3	Evaluate second-tier supplier for environmentally friendly practices.	67	3.36	0.847	0.660	0.492	0.905
4	Require suppliers to take back packaging.	67	2.94	1.217	0.727	0.533	0.904
5	Eco-labeling of products.	67	3.36	0.980	0.602	0.597	0.903
6	Reduce use of paper during the purchasing process (e.g. ordering via email).	67	3.49	1.211	0.697	0.417	0.907
7	Purchasing equipment that is easy to repair.	67	3.52	0.877	0.651	0.292	0.908
8	Develop environmental awareness among employees in the procurement department.	67	3.64	0.916	0.742	0.422	0.906
9	Favor products which provide information about their environmental impact.	67	3.81	0.875	0.629	0.618	0.903
10	Require suppliers to reduce packaging to minimum required to protect supplied items.	67	3.25	1.106	0.601	0.576	0.903
11	Make purchases from suppliers who are compliant with legislation on the environment.	67	3.48	0.990	0.687	0.607	0.903
12	Purchase raw materials in bulk in order to minimize use of energy, labour, and packaging materials.	67	3.75	0.943	0.669	0.327	0.908
13	Purchase products that are energy efficient or products which require less energy to manufacture.	67	3.55	0.909	0.610	0.265	0.909
14	Require that suppliers must possess EMS certification (e.g. ISO 14001, BS7750 or EMAS).	67	3.51	0.943	0.640	0.480	0.905
15	Purchase products with bio-degradable or recyclable packaging.	67	3.33	1.106	0.844	0.361	0.908
16	Develop a database with information on suppliers' environmental conduct.	67	3.39	1.058	0.663	0.620	0.902
17	Purchase energy saving equipment (e.g. machines or vehicles with higher capacity and are fuel efficient).	67	3.63	1.057	0.691	0.366	0.907
18	Purchase materials and parts with desirable green attributes such as recycled or reusable items.	67	3.43	0.908	0.702	0.244	0.909
19	Purchase materials and parts that do not contain environmentally harmful elements.	67	3.79	0.962	0.759	0.292	0.908
20	Disclose environmental impact or safety information of product content using green seals	67	3.33	1.006	0.591	0.646	0.902
21	Audit suppliers to evaluate compliance with environmental requirements.	67	3.46	1.092	0.623	0.646	0.902
22	Hold environmental awareness seminars periodically where suppliers and contractors meet to share knowledge on clean production technologies.	67	3.42	0.987	0.788	0.567	0.903
23	Guide suppliers to set up their own programs for environmental management	67	3.42	0.873	0.782	0.518	0.904
24	Pressurize suppliers to take disciplinary action for environmental non-compliance by their employees and suppliers.	67	2.96	1.021	0.721	0.638	0.902
25	Develop long-term relationships with the suppliers through collaboration.	67	3.52	0.927	0.632	0.636	0.902
26	Working to control the environmental risk resulting from suppliers' operations.	67	3.66	0.880	0.731	0.549	0.904

Cronbach's alpha = 0.908, Grand mean = 3.46 Source: Research Data, 2015

4.3.2.2 Environmentally Responsible Design Practices

Environmentally responsible design construct was measured using thirteen (13) practices. Each practice was rated on a five point Likert scale with 1 being “not at all”, and 5 being “very great extent”. As shown in Table 4.8, the responses ranged from a mean of 3.24 to 3.81 implying that the respondents practiced environmentally responsible design from a moderate to great extent. 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” (SD = 0.909, N = 67). The practice “collaboration with customers during design process to ensure integration of green issues” had the lowest rating with a mean of 3.24 and standard deviation of 0.955 from 67 responses. The grand mean for environmentally responsible design practices was 3.52, slightly higher than that for green procurement practices. Again, this implies that the manufacturing firms had implemented them to slightly below great extent.

The loadings ranged from 0.482 to 0.827. The Cronbach’s Alpha was 0.839. Just like for green procurement practices, item to total correlations of 0.3 and above was not achieved for all the items in the scale. Two practices which include “collaboration with suppliers during the design process to ensure integration of green issues” (ED 1) and “design that incorporates reduction of energy consumption by a product, in addition to promoting use of renewable sources of energy” (ED 9) had item to correlation scores of 0.241 and 0.222 respectively. Since these two practices did not meet the required thresholds for reliability and construct validity, they were dropped from the list of items for estimating the measurement model. The remaining 11 items had an improved Cronbach’s Alpha of 0.852 is achieved and all the factor loadings are also above 0.4.

Table 4.8: Environmentally Responsible Design Practices

ED	Environmentally Responsible Design Practice	N	Mean	Std. Dev.	Factor loadings	Item-Total Correlation	Alpha if Item Deleted
1	Collaboration with suppliers during the design process to ensure integration of green issues.	67	3.31	0.908	0.729	0.241	0.846
2	Collaboration with customers during design process to ensure integration of green issues.	67	3.24	0.955	0.780	0.453	0.832
3	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	0.740	0.629	0.821
4	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	0.778	0.569	0.825
5	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	0.616	0.628	0.820
6	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	0.672	0.490	0.830
7	Design that incorporates reduction of material use by a product.	67	3.37	1.057	0.574	0.616	0.820
8	Design that promotes use of renewable resources in accordance to their rates of replenishment.	67	3.60	1.001	0.482	0.541	0.826
9	Design that incorporates reduction of energy consumption by a product, in addition to promoting use of renewable sources of energy.	67	3.63	0.775	0.827	0.222	0.845
10	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	0.606	0.606	0.823
11	Design products with biodegradable materials.	67	3.37	1.042	0.505	0.484	0.831
12	Design products that have longer useful life.	67	3.60	1.045	0.633	0.444	0.834
13	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	0.736	0.447	0.833

Cronbach's alpha = 0.839, Grand mean = 3.52 Source: Research Data, 2015

4.3.2.3 Green Manufacturing Practices

Green manufacturing construct was measured using nineteen (19) items. Respondents were asked to indicate the extent to which their firms had implemented each green manufacturing practice on a five point Likert scale with 1 representing “not at all” and 5 representing “very great extent”. The results are shown in Table 4.9. The responses ranged from a mean of 3.27 to 4.06 implying that the respondents practiced green manufacturing to a great extent. The highest rating was 4.06 for the practice “top management is totally committed to environmentally friendly manufacturing” with a standard deviation of 0.756 from 67 responses. 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 (SD = 1.067, N = 67). 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 4.9: Green Manufacturing Practices

GM	Green Manufacturing Practices	N	Mean	Std. Dev.	Factor loadings	Item-Total Correlation	Alpha if Item Deleted
1	Top management is totally committed to environmentally friendly manufacturing.	67	4.06	0.756	0.603	0.462	0.878
2	Reduce use of virgin raw materials by using recycled materials or reusing materials for product manufacturing.	67	3.54	1.005	0.769	0.244	0.886
3	Putting in place measures for recycling and reuse of waste water.	67	3.73	0.863	0.484	0.576	0.875
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	0.671	0.555	0.875
5	Decreased consumption or total elimination of hazardous and toxic materials (e.g. changing to aqueous cleaners).	67	3.85	0.839	0.710	0.487	0.877
6	Separation of hazardous and non-hazardous waste.	67	3.87	0.886	0.515	0.567	0.875
7	Use of controls and filters for harmful discharges and emissions.	67	3.78	0.935	0.783	0.393	0.881
8	Reduce energy consumption by using alternative sources of energy (e.g. biogas, solar, wind etc).	67	3.39	1.029	0.611	0.373	0.882
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	0.593	0.544	0.875
10	Use of standardized components and parts to facilitate reuse.	67	3.48	0.911	0.460	0.426	0.879
11	Risk-prevention systems to cover possible environmental accidents and emergencies.	67	3.84	0.914	0.678	0.505	0.877
12	Training employees in safer production and accident prevention.	67	3.96	0.928	0.674	0.580	0.874
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	0.733	0.703	0.870
14	Reward of environmentally positive behaviour among employees.	67	3.48	1.092	0.783	0.418	0.880
15	Integrate total quality environmental management (TQEM) into planning and operation processes.	67	3.63	0.902	0.561	0.626	0.873
16	Establishment and maintenance of proper procedures and actions for noncompliance with environmental policies.	67	3.72	0.849	0.647	0.699	0.871
17	Availing firm's environmental impact information to the public for open discussion.	67	3.27	1.067	0.779	0.390	0.881
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	0.659	0.534	0.876
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	0.530	0.537	0.876

Cronbach's Alpha = 0.883, Grand mean = 3.70 Source: Research Data, 2015

4.3.2.4 Green Packaging Practices

Green Packaging construct was measured using eleven (11) items. As was with the previous GSCM practices, responses were rated on a five-point Likert scale with 1 representing “not at all” and 5 representing “very great extent”. The results for green packaging practices are displayed in Table 4.10. The lowest rating was 2.16 for the practice “deliver product without using any packaging at all” (SD = 1.081, N = 67). The highest rated green packaging practice was “reduce the use of hazardous materials in packaging” with a mean of 3.81 (SD = 0.909, N = 67). The grand mean was 3.31. This implies that the manufacturing firms implemented green packaging practices to slightly above moderate extent.

Cronbach’s Alpha was 0.773 which is higher than 0.7. Ten items had loadings ranging from 0.473 to 0.787 with most being above 0.6. However, one item, “making sure that packaging material has recyclable contents or can be reused” (GPP 10) had a factor loading of 0.373. In addition, two (2) practices had item to total correlations of below 0.3. These are “deliver product without using any packaging at all” (GPP 1) and “adopt systems that encourage returnable packaging methods” (GPP 7) which had item to total correlation values of 0.182 and 0.274 respectively. Therefore, the three items were not considered for further analysis since they did not meet the set thresholds for reliability and construct validity. This means that only eight (8) practices were considered for further analysis. They had an improved Cronbach’s Alpha of 0.776 and all their factor loadings are above the threshold of 0.4, ranging from 0.470 to 0.725.

Table 4.10: Green Packaging Practices

GPP	Green Packaging Practices	N	Mean	Std. Dev.	Factor loadings	Item-Total Correlation	Alpha if Item Deleted
1	Deliver product without using any packaging at all.	67	2.16	1.081	0.714	0.182	0.780
2	Use life cycle assessment to evaluate environmental load of packaging during design.	67	3.27	0.914	0.552	0.582	0.730
3	Reduce or downsize overall packaging of products.	67	3.22	0.902	0.604	0.311	0.761
4	Cooperate with the vendor to standardize packaging.	67	3.09	1.125	0.473	0.424	0.749
5	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
6	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
7	Adopt systems that encourage returnable packaging methods.	67	3.37	1.153	0.628	0.274	0.770
8	Use biodegradable material (e.g. bioplastics, bio-nano composites, etc) for packaging.	67	3.09	1.138	0.613	0.655	0.715
9	Reduce the use of hazardous materials in packaging.	67	3.81	0.909	0.562	0.398	0.751
10	Make sure that packaging material has recyclable contents or can be reused.	67	3.49	0.959	0.373	0.409	0.750
11	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 = 0.773, Grand mean = 3.31 Source: Research Data, 2015

4.3.2.5 Green Distribution Practices

A total of eleven (11) 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 4.11. 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 and standard deviation of 0.913 from 67 responses. 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 (SD = 1.122, N = 67). Most of the green distribution practices had a mean above 3. The grand mean was 3.41. This implies that the manufacturing firms implemented green packaging practices to slightly above moderate extent.

Cronbach's Alpha for this construct is 0.748 which is considered high enough. All the eleven (11) items have loadings ranging from 0.578 to 0.756 which is above the threshold of 0.4. Three (3) practices, "employ transport modes that generate less air and noise pollution (e.g. rail, water as opposed to road and air)" (GD 3), "employ transport modes that use alternative fuel (e.g. electricity, ethanol, biodiesel, hydrogen etc) (GD 6) and "proper maintenance programmes of vehicles to keep them in safe and efficient working condition" (GD 10) had item to total correlations of 0.176, 0.286 and 0.246 respectively. The items were therefore not considered for further analysis. The remaining eight (8) practices were found to have an improved Cronbach's Alpha of 0.767 and all the loadings above the threshold level of 0.4.

Table 4.11: 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	Employ transport modes that generate less air and noise pollution (rail, water as opposed to road and air).	67	2.81	1.145	0.747	0.286	0.743
4	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
5	Deliver products directly to the user site.	67	3.67	0.894	0.729	0.435	0.721
6	Employ transport modes that use alternative fuel (e.g. electricity, ethanol, biodiesel, hydrogen etc).	67	2.21	1.122	0.673	0.176	0.758
7	Locate near customers to reduce resources consumed in getting the product to them.	67	3.36	1.025	0.679	0.478	0.714
8	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
9	Usage of warehousing facilities that have been certified as environmentally efficient.	67	3.64	1.011	0.691	0.530	0.706
10	Proper maintenance programmes of vehicles to keep them in safe and efficient working condition.	67	3.78	0.775	0.756	0.246	0.742
11	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 = 3.41 Source: Research Data, 2015

4.3.2.6 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).” This practice had a standard deviation of 0.857 from 67 responses. 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 and 1.198 respectively from 67 responses. The grand mean was 3.12 indicating that the firms were practicing reverse logistics practices to a moderate extent.

Cronbach’s Alpha of 0.853 was attained. Loadings were also high enough ranging from 0.507 to 0.796 with most having a loading of above 0.6. Ten (10) practices had item to total correlation values ranging from 0.420 to 0.666. One (1) practice, “safe disposal of unrecyclable or unreusable waste (especially hazardous waste)” (RL 5) had a very low item to correlation score of only 0.031. However, this item had a very high loading of 0.749, hence all the thirteen (13) items were retained for further analysis. These results are presented in Table 4.12.

Table 4.12: 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 = 3.12 Source: Research Data, 2015

4.3.3 Relational Efficiency

The latent construct, relational efficiency was measured using three subscales; trust, credibility and relationship effectiveness. These subscales were first reviewed for reliability and construct validity before partial least squares SEM analysis was done. Each subscale was treated as a separate indicator for relational efficiency in the PLS-SEM analysis. The following subsections reviews the results obtained from each of these indicators of relational efficiency.

4.3.3.1 Trust

Trust construct was measured using seven (7) indicators. Each indicator was rated on a five point likert scale ranging from 1 for “not at all” to 5 for “very great extent.” The average ratings for this element of relational efficiency ranged from a low of 3.48 to a high of 3.72. The lowest rated indicator of trust was “increased appreciation for our collaboration partners” with a mean of 3.48 (SD = 0.99, N = 67). The highest average rating was 3.72 which was shared by two indicators, “enhanced commitment to work together in the future” and “enhanced feeling of partnership and solidarity among us.” Both indicators had a standard deviation of 0.934 from 67 responses. The overall mean for the indicators of trust was 3.62 implying that the manufacturing firms practiced this element of relational efficiency to slightly below great extent.

The trust construct achieved loadings of 0.689 to 0.764 and item to total correlations of 0.767 to 0.818. The Cronbach’s Alpha was 0.933. All the scale items were therefore maintained for measurement model estimation as they achieved the required thresholds for reliability and convergent validity. These details on trust construct are presented in Table 4.13.

Table 4.13: Trust Measures

RT	Trust	N	Mean	Std. Dev.	Factor loadings	Item-Total Correlation	Alpha if Item Deleted
1	Increased appreciation for our collaboration partners.	67	3.48	0.990	0.689	0.767	0.924
2	Increased respect for the skills and capabilities of our collaboration partners.	67	3.51	0.943	0.738	0.805	0.920
3	Increased overall respect for our collaboration partners.	67	3.70	0.888	0.717	0.786	0.922
4	Improved level of honesty.	67	3.66	0.863	0.713	0.783	0.923
5	More open sharing of information with our partners.	67	3.57	1.076	0.695	0.772	0.924
6	Enhanced commitment to work together in the future.	67	3.72	0.934	0.696	0.767	0.924
7	Enhanced feeling of partnership and solidarity among us.	67	3.72	0.934	0.764	0.818	0.919

Cronbach's Alpha = 0.933, Grand mean = 3.62 Source: Research Data, 2015

4.3.3.2 Credibility

Six (6) indicators were used to measure the credibility construct. A five point Likert scale with 1 denoting "not at all" and 5 denoting "very great extent" was used to rate each the indicators. As shown in Table 4.14, the mean ratings for ranged from 3.16 to 3.55. The highest rated indicator of credibility, "increased level of frankness by our supply chain partners in dealing with us" had a mean of 3.55 (SD = 0.909, N = 67). The lowest rated indicator was "our supply chain partners disclose confidential information about industry/market conditions, competitors, and channel partners" had a mean of 3.16 (SD = 1.053, N = 67). The grand mean of 3.43 though lower than that of trust implies that the firms practiced this element of relational efficiency to slightly above moderate extent.

The construct had loadings of 0.442 to 0.738 and item to total correlations ranging from 0.552 to 0.774. The Cronbach's Alpha was 0.880 which is above the recommended level of 0.7. Since this construct met all the set levels for reliability and construct validity, all the six items were retained for further analysis. The details are shown in Table 4.14.

Table 4.14: Credibility Measures

RC	Credibility	N	Mean	Std. Dev.	Factor loadings	Item-Total Correlation	Alpha if Item Deleted
1	Increased level of frankness by our supply chain partners in dealing with us.	67	3.55	0.909	0.667	0.715	0.856
2	Increased reliability of promises made by our supply chain partners.	67	3.51	0.927	0.723	0.749	0.850
3	Increased knowledge of our supply chain partners regarding their role in the supply chain.	67	3.51	0.927	0.738	0.774	0.846
4	Our supply chain partners have no problems answering our questions regarding green supply chain management issues.	67	3.49	1.078	0.442	0.552	0.885
5	Our supply chain partners disclose confidential information about industry/market conditions, competitors, and channel partners.	67	3.16	1.053	0.603	0.676	0.863
6	Our supply chain partners promised resources and support (e.g., market research and help in decision making).	67	3.34	0.930	0.648	0.702	0.858

Cronbach's Alpha = 0.880, Grand mean = 3.43 Source: Research Data, 2015

4.3.3.3 Relationship Effectiveness

This construct was measured using three (3) items. Respondents were asked to indicate the extent to which the items applied to their firms on a Likert scale ranging from 1 to five with 1 representing "not at all" and 5 representing "very great extent." The indicator "time and effort spent developing and maintaining these relationships are worthwhile" was rated highest with mean of 3.69 (SD =0.802, n = 67). This was followed by the indicator "overall, we are satisfied with the relationship with our supply chain partners" which had a mean of 3.63 and standard deviation of 0.850 from 67 responses. The least rated indicator was "the relationship with our supply chain partners is productive as far as adoption of environmentally friendly practices is concerned" with a mean rating of 3.61 (SD = 0.953, N = 67). An overall mean of 3.64 was recorded for the relationship effectiveness construct implying that the firms practiced this element of relational efficiency to slightly below great extent.

The construct had a Cronbach's Alpha of 0.803. Loadings for all the three items were above 0.4. Additionally, all item to total correlation scores were above 0.3. This means that the construct achieved all the set levels for reliability and construct validity, hence all the three items were retained for further analysis. Details are presented in Table 4.15.

Table 4.15: Relationship Effectiveness Measures

RE	Relationship Effectiveness	N	Mean	Std. Dev.	Factor loadings	Item-Total Correlation	Alpha if Item Deleted
1	The relationship with our supply chain partners is productive as far as adoption of environmentally friendly practices is concerned.	67	3.61	0.953	0.736	0.667	0.717
2	Time and effort spent developing and maintaining these relationships are worthwhile.	67	3.69	0.802	0.714	0.648	0.736
3	Overall, we are satisfied with the relationship with our supply chain partners.	67	3.63	0.850	0.709	0.642	0.737

Cronbach's Alpha = 0.803, Grand mean = 3.64 Source: Research Data, 2015

4.3.4 Environmental Performance

Environmental performance comprised of two broad measures. Environmental impact reduction which measures the reduction in negative impact on the environment and environmental cost saving measures which measures the savings in cost incurred as a result of implementing sound environmental practices. In order to measure these constructs, respondents were required to indicate the percentage reduction/saving that their firms had experienced as a result of implementing GSCM practices. These ranges were organized into five groups. 1 represents a reduction/saving of 10% and below, 2 represents a reduction/saving of 11 to 20%, 3 represents a reduction/saving of 21 to 30%, 4 represents a reduction/saving of 31 to 40% and 5 represents a reduction/saving of over 40%.

Environmental impact reduction sub construct had a total of six (6) items. On average, the highest reduction was reported for discharge of wastewater and frequency of environmental accidents both with means of 3.18 (standard deviations of 1.180 and 1.230 respectively). The lowest reduction was reported for green house gas emissions with a mean of 2.76 (SD = 1.169, N = 67). The mean reduction on these measures was 2.96. This means that on average, the firms had experienced a reduction of slightly below 21% as a result of implementing GSCM practices. The factor loadings ranged from 0.524 to 0.719 and item to total correlations ranged from 0.599 to 0.750. The Cronbach's Alpha was 0.872 which indicated high reliability. This information is shown in Table 4.16.

Table 4.16: Environmental Impact Reduction Measures

EIR	Environmental Impact Reduction	N	Mean	Std. Dev.	Factor loadings	Item-Total Correlation	Alpha if Item Deleted
1	Green house gas emissions	67	2.76	1.169	0.524	0.599	0.862
2	Water Use Ratio (WUR)	67	2.99	0.961	0.688	0.731	0.843
3	Discharge of wastewater	67	3.18	1.180	0.719	0.750	0.836
4	Solid waste	67	2.82	1.154	0.604	0.664	0.851
5	Use of hazardous materials	67	2.85	1.197	0.572	0.648	0.854
6	Frequency of environmental accidents	67	3.18	1.230	0.588	0.665	0.851

Cronbach's Alpha = 0.872, Grand mean = 2.96 Source: Research Data, 2015

Environmental cost saving variable had seven indicators. From Table 4.17, the highest savings was reported for "savings due transporting in bulk rather than in small quantities" with a mean of 3.00 (SD = 1.044, N = 67). "Savings in fines/penalties for flouting environmental regulations was cited as the one with the lowest saving with a mean of 2.69 and standard deviation of 1.406 from 67 responses. Overall average savings on these measures was 2.86. Hence, on average, the firms had experienced savings of almost 21%

as a result of implementing GSCM practices. The loadings for environmental cost saving ranged from 0.518 to 0.841 and item to total correlations ranged from 0.528 to 0.801. Cronbach's Alpha was 0.872. All these indicate high reliability and construct validity.

Table 4.17: Environmental Cost Saving Measures

ECS	Environmental Cost Reduction	N	Mean	Std. Dev.	Factor loadings	Item-Total Correlation	Alpha if Item Deleted
1	Savings due to purchase of environmentally friendly raw materials.	67	2.78	1.139	0.841	0.801	0.821
2	Investment in environmental technology.	67	2.90	1.116	0.737	0.686	0.837
3	Savings due to material recovery (by reusing or recycling materials).	67	2.91	1.151	0.745	0.660	0.841
4	Savings due to recycling of waste water.	67	2.82	1.127	0.518	0.560	0.855
5	Savings due transporting in bulk rather than in small quantities.	67	3.00	1.044	0.778	0.639	0.844
6	Energy cost savings	67	2.90	.940	0.541	0.528	0.858
7	Fines/penalties for flouting environmental regulations.	67	2.69	1.406	0.763	0.602	0.854

Cronbach's Alpha = 0.864, Grand mean = 2.86 Source: Research Data, 2015

4.3.5 Operational Performance

Operational performance was measured using four sub constructs. These include quality, cost, speed and flexibility measures. To measure quality, cost and speed, respondents were asked to indicate the percentage reduction in poor quality, cost and time indicators that their firms had experienced since they started implementing GSCM practices. This was done on a scale of 1 to 5 where 1 stood for a reduction of 10% and below, 2 for a reduction of 11 to 20%, 3 for a reduction of 21 to 30%, 4 for a reduction of 31 to 40% and 5 for a reduction of over 40%.

Quality sub construct had four (4) indicators. The greatest reduction was realized for "products reworked" with a mean of 2.55 (SD = 1.374, N = 67), this was followed by "number of complains during warranty period" with a mean of 2.39 (SD = 1.359, N =

67), and products scrapped with a mean of 2.37 (SD = 1.253, N = 67). The least reduction was realized for “products returned by consumers” with a mean of 2.33 (SD = 1.330, N = 67). The grand mean was 2.41 indicating that on average, the manufacturing firms realized an improvement in quality indicators by between 21 and 30%. The factor loadings ranged from 0.844 to 0.882 and item to total correlations ranged from 0.856 to 0.889. The Cronbach’s Alpha was 0.947 which indicated high reliability. This information is presented in Table 4.18.

Table 4.18: Quality Measures

OQ	Quality	N	Mean	Std. Dev.	Factor loadings	Item-Total Correlation	Alpha if Item Deleted
1	Products scrapped	67	2.37	1.253	0.882	0.889	0.927
2	Products reworked	67	2.55	1.374	0.882	0.888	0.927
3	Products returned by consumers	67	2.33	1.330	0.853	0.863	0.934
4	Number of complaints during warranty period	67	2.39	1.359	0.844	0.856	0.937

Cronbach’s Alpha = 0.947, Grand mean = 2.41 Source: Research Data, 2015

Four indicators of cost were utilized. The lowest reduction was reported for “cost per operation hour” which had a mean of 2.64 (SD = 1.190, N = 67), followed by “variance against budget” with mean being 2.75 (SD = 1.146, N = 67). This was followed closely by the indicator “inventory levels reduction” with a mean of 2.78 (SD = 1.139, N = 67). The greatest improvement was experienced in the indicator “capacity utilization” with a mean and standard deviation of 2.82 and 1.114 respectively for 67 responses. A grand mean of 2.75 was recorded implying average reduction in cost of almost 30%. The loadings ranged from 0.725 to 0.795 and item to total correlations recorded ranged from 0.736 to 0.796. The Cronbach’s Alpha was 0.889. All these indicated high reliability and construct validity. This information is presented in Table 4.19.

Table 4.19: Cost Measures

OC	Cost	N	Mean	Std. Dev.	Factor loadings	Item-Total Correlation	Alpha if Item Deleted
1	Inventory levels reduction	67	2.78	1.139	0.746	0.751	0.859
2	Capacity utilization	67	2.82	1.114	0.735	0.743	0.862
3	Cost per operation hour	67	2.64	1.190	0.795	0.796	0.842
4	Variance against budget	67	2.75	1.146	0.725	0.736	0.865

Cronbach's Alpha = 0.889, Grand mean = 2.75 Source: Research Data, 2015

Speed variable had five (5) determinants; design time, cycle time, machine set-up time, through-put time and order lead time. The mean reduction for these determinants of speed ranged from 2.52 to 2.78. The mean reduction time reported for the elements in order from the largest to the smallest is as follows; order lead time (mean = 2.78, SD = 1.165), machine set-up time (mean = 2.69, SD = 1.131), cycle time (mean = 2.61, SD = 1.086), throughput time (mean = 2.55, SD = 1.158) and design time (mean = 2.52, SD = 1.185). The grand mean of 2.63 indicates that on average, an improvement in speed indicators of between 21 and 30% was realized. As shown in Table 4.20, the factor loadings, item to total correlation values and Cronbach's Alpha (0.950) indicates high reliability and construct validity.

Table 4.20: Speed Measures

OSS	Speed	N	Mean	Std. Dev.	Factor loadings	Item-Total Correlation	Alpha if Item Deleted
1	Design time	67	2.52	1.185	0.829	0.857	0.939
2	Cycle time	67	2.61	1.086	0.885	0.904	0.931
3	Machine set-up time	67	2.69	1.131	0.786	0.823	0.945
4	Through-put time	67	2.55	1.158	0.873	0.894	0.932
5	Order lead time	67	2.78	1.165	0.800	0.834	0.943

Cronbach's Alpha = 0.950, Grand mean = 2.63 Source: Research Data, 2015

The flexibility sub construct had four (4) indicators. The respondents were required to specify the extent to which the indicators had been enhanced since their firms started implementing GSCM practices. This was done on a scale of 1 to 5 with 1 representing "not at all" while 5 representing "very great extent." The results indicate that the indicators "ability to introduce new products in case of demand" and "ability of firm to vary delivery time to meet demand" were rated highest with mean of 3.52 and standard deviations of 0.911 and 0.894 respectively from 67 responses. These were followed by the indicator "ability of the firm to increase production should an increase in demand arise and vice versa" with a mean of 3.37 (SD = 0.918, N = 67). The least rated indicator of flexibility was "increased number of product categories" with a mean of 2.96 (SD = 0.991, N = 67). The grand mean was 3.34 indicating that on average, flexibility had been enhanced to a moderate extent. Items factor loadings ranged from 0.622 to 0.786. Item to total correlations ranged from 0.626 to 0.776. Cronbach's Alpha was 0.849. Therefore, reliability and construct validity were confirmed. This information is presented in Table 4.21.

Table 4.21: Flexibility Measures

OF	Flexibility	N	Mean	Std. Dev.	Factor loadings	Item-Total Correlation	Alpha if Item Deleted
1	Increased number of product categories.	67	2.96	0.991	0.622	0.629	0.836
2	Ability of the firm to increase production should an increase in demand arise and vice versa.	67	3.37	0.918	0.786	0.776	0.770
3	Ability to introduce new products in case of demand.	67	3.52	0.911	0.736	0.729	0.791
4	Ability of firm to vary delivery time to meet demand.	67	3.52	0.894	0.624	0.626	0.834

Cronbach's Alpha = 0.849, Grand mean = 3.34 Source: Research Data, 2015

4.3.6 Organizational Performance

Organizational performance comprised of two broad aspects, financial performance and market performance. Details of the measurement scales for financial performance are presented in Table 4.22. 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 4.22: Financial Performance Measures

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 4.23. 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 4.23: Market Performance Measures

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

4.4 KMO and Bartlett's Tests

To check the factorability of the items in the latent constructs, Kaiser-Meyer-Olkin (KMO) and Bartlett’s tests were carried out. KMO measure of sampling adequacy was obtained for all the latent constructs of the study. All KMO Measures were found to be above the threshold of 0.6 (Kaiser, 1974). Bartlett’s Test of Sphericity revealed that all latent constructs have values of chi-square that are significant at a level less than 0.001 (Barlett, 1954). These two tests imply that it was proper to subject the items representing the latent constructs to factor analysis. This information is presented in Table 4.24.

Table 4.24: Results of KMO and Bartlett's Tests

Latent construct	KMO measure	Approx. Chi-Square	df	Sig.
Coercive pressures	0.608	43.399	3	0.000
Mimetic pressures	0.803	98.407	6	0.000
Normative pressures	0.786	204.959	36	0.000
Green Procurement practices	0.821	718.050	231	0.000
Environmentally responsible design	0.803	270.623	55	0.000
Green manufacturing practices	0.790	527.283	171	0.000
Green packaging practices	0.745	151.239	28	0.000
Green distribution practices	0.749	125.392	28	0.000
Reverse logistics practices	0.800	337.681	78	0.000
Trust	0.918	335.425	21	0.000
Credibility	0.845	202.254	15	0.000
Relationship effectiveness	0.713	61.859	3	0.000
Environmental impact reduction	0.806	195.774	15	0.000
Environmental cost saving	0.822	221.903	21	0.000
Quality	0.872	251.620	6	0.000
Cost	0.719	161.890	6	0.000
Speed	0.894	323.364	10	0.000
Flexibility	0.769	115.744	6	0.000
Financial performance	0.843	249.799	15	0.000
Market performance	0.758	137.812	3	0.000

Source: Research Data, 2015

4.5 Institutional Pressures and GSCM Practices Implementation

The first objective of this study was to establish the institutional pressures that caused the manufacturing firms to implement GSCM practices. In order to achieve this, the ordered probit model was used. This was because, the dependent variable, extent of GSCM practices implementation, is defined on an ordinal scale (Greene, 2003; Jamieson, 2004). Using this model, the following explanatory variables were included: coercive pressures, mimetic pressures, normative pressures and a set of firm specific exogenous variables that are expected to affect GSCM implementation. These include; size of the firm in terms of number of employees, age of the firm in years, spatial scope of market served by the firm (dummy variable), whether a firm has an environmental department (dummy variable) and perceived negative effect on environment in firm's sector of operation (dummy variable). The descriptive statistics for these variables are shown in Table 4.25.

Table 4.25: Descriptive Statistics for GSCM practices, Institutional Pressures and Firm Characteristics

Variable	Mean	Std. Deviation	Minimum	Maximum	N
GSCM practices	3.63	0.678	1	5	64
Coercive pressures	3.81	0.794	1	5	64
Mimetic pressures	4.11	0.758	2	5	64
Normative pressures	3.38	0.766	1	5	64
Control variables					
Number of full time employees	1437	1908	25	7300	64
Length of operation (years)	42.86	20.09	4	120	64
Market scope	0.91	0.294	0	1	64
Environmental department	0.11	0.315	0	1	64
Manufacturing sub-sector	0.39	0.492	0	1	64

Source: Research Data, 2015

These explanatory variables were used to predict the probabilities of extent of implementation of GSCM practices as shown in the following model:

$$y_i^* = \beta_0 + \beta_1 \text{ COERCIVE}_i + \beta_2 \text{ MIMETIC}_i + \beta_3 \text{ NORMATIVE}_i + \beta_4 \text{ SIZE}_i + \beta_5 \text{ AGE}_i + \beta_6 \text{ MKTSCOPE}_i + \beta_7 \text{ ENVDEPT}_i + \beta_8 \text{ SECTOR} + \varepsilon_1$$

Where,

y_i^* = unobserved extent of implementation of GSCM practices.

y_i = extent of implementation of GSCM practices.

$y_i = 1$ if $y_i^* \leq u_1$, indicating that the firm has not implemented GSCM practices at all.

$y_i = 2$ if $u_1 < y_i^* \leq u_2$, indicating that the firm has implemented GSCM practices to a small extent.

$y_i = 3$ if $u_2 < y_i^* \leq u_3$, indicating that the firm has implemented GSCM practices to a moderate extent.

$y_i = 4$ if $u_3 < y_i^* \leq u_4$, indicating that the firm has implemented GSCM practices to a great extent.

$y_i = 5$ if $y_i^* > u_4$, indicating that the firm has implemented GSCM practices to a very great extent.

μ_1, μ_2, μ_3 & μ_4 are jointly estimated threshold values which establish extent of implementation of GSCM practices.

$COERCIVE_i$ = extent to which coercive pressures have influenced implementation of GSCM practices.

$MIMETIC_i$ = extent to which mimetic pressures have influenced implementation of GSCM practices.

$NORMATIVE_i$ = extent to which normative pressures have influenced implementation of GSCM practices.

$SIZE_i$ = the number of full time employees.

AGE_i = the number of years the firm has been in operation.

$MKTSCOPE_i$ is a dummy variable. It equals 0 for firms that serve local markets and 1 for firms that serve global markets.

$ENVDEPT_i$ is a dummy variable. It equals 0 for firms that do not have an environmental department and 1 for firms that have an environmental department.

$SECTOR_i$ is a dummy variable. It equals 0 for firms in sub-sectors whose perceived negative effect on environment is low and 1 for firms in sub-sectors whose perceived negative effect on environment is high.

ε_i = error term which is normally distributed with a mean of zero and standard deviation of one.

Correlation analysis was done to establish significance of individual relationships among the variables included in the model. The results reveal that both coercive and normative pressures have statistically significant individual relationship with extent of GSCM practices implementation with spearman's rank correlation coefficients of 0.734 and 0.708 respectively. Mimetic pressures variable was found to have an insignificant relationship with GSCM practices implementation with a correlation coefficient of 0.267. The correlation matrix shown in Table 4.26 was obtained.

Table 4.26: Correlation matrix (Spearman correlation)

	GSCM	CP	MP	NP	SZ	AG	MS	ED	ST
GSCM	1								
CP	0.734**	1							
MP	0.267*	0.144	1						
NP	0.708**	0.723**	0.393**	1					
SIZE (SZ)	0.203	0.054	0.238	0.137	1				
AGE (AG)	0.128	-0.161	-0.102	-0.08	0.256*	1			
MKTSCOPE (MS)	-0.175	-0.449**	0.076	-0.22	0.171	0.13	1		
ENVDEPT (ED)	-0.224	-0.133	-0.164	-0.07	-0.08	-0.02	-0.06	1	
SECTOR (ST)	0.028	-0.063	0.235	0.07	-0.04	0.2	0.148	-0.08	1

***p<0.001; **p<0.05, *p<0.1 Source: Research Data, 2015

StataSE 12 computer package was used to estimate the ordered probit model. The predictor variables were first checked for multicollinearity by running the 'quietly regress' command in Stata. The results in Table 4.27 shows that for this model, multicollinearity would not be a problem since all the predictor variables had VIF values of less than 5 (Hair et al., 2011).

Table 4.27: VIF Values for Predictor Variables in the Model

Variable	VIF	1/VIF
COERCIVE	2.91	0.343935
NORMATIVE	2.70	0.369736
MIMETIC	1.43	0.701504
MKTSCOPE	1.34	0.746009
SIZE	1.20	0.830730
ENVDEPT	1.13	0.881897
AGE	1.10	0.909555
SECTOR	1.09	0.921093
Mean VIF	1.61	

Source: Research Data, 2015

Next the 'oprobit' command was executed. This resulted in the estimated ordered-probit model results in Table 4.28a.

Table 4.28a: Ordered Probit Model Predicting GSCM Practices Implementation

Ordered probit regression

Number of obs = 64
LR chi2 (8) = 83.21
Prob > chi2 = 0.0000
Log likelihood = -18.29326
Pseudo R^2 = 0.6946

GSCM	Coef.	Std. Err.	Z	P>|z|	[95% Conf.	Interval]
COERCIVE	2.79371	0.956784	2.92**	0.004	0.91845	4.66897
MIMETIC	0.45512	0.489753	0.93	0.353	-0.50478	1.41502
NORMATIVE	2.08948	0.883157	2.37**	0.018	0.35852	3.82043
SIZE	-0.00004	0.000166	-0.22	0.823	-0.00036	0.00029
AGE	0.05283	0.021403	2.47**	0.014	0.01088	0.09478
MKTSCOPE	-0.50093	0.967395	-0.52	0.605	-2.39699	1.39513
ENVDEPT	-1.82776	1.001909	-1.82*	0.068	-3.79147	0.13594
SECTOR	-0.13515	0.565061	-0.24	0.811	-1.24265	0.97235
/cut1	8.21582	14.296630			-19.80505	36.23669
/cut2	14.18893	4.767684			4.84444	23.53342
/cut3	20.09912	6.061534			8.21873	31.97950
/cut4	27.44227	7.815498			12.12418	42.76037

***p<0.001; **p<0.05, *p<0.1

Source: Research Data, 2015

From Table 4.28a, it is seen that the final log likelihood is -18.29326. It can also be observed that all the 64 observations in the data set were used in the analysis. The likelihood ratio chi-square of 83.21 with a p-value of 0.0000 shows that the model as a whole is statistically significant and shows some association between the variables, as compared to the null model with no predictors. This probability value indicates that the explanatory variables used in the ordered probit model are appropriate. The pseudo-R-squared of 0.6946 is considered satisfactory. The cut points shown at the bottom of the output indicate where the latent variable is cut to make the five groups that can be observed in the data.

Further examination of Table 4.28a indicates that coercive and normative pressures are the dominant institutional pressures which cause GSCM practices implementation with the z statistics of 2.92 (p-value = 0.004) and 2.37 (p-value = 0.018). Both are statistically significant at the level of 0.05. Mimetic pressures are insignificant with a z-value of 0.93 (p-value = 0.353). For coercive pressures, a one unit increase in coercive pressures (i.e., going from 1 to 2), would result in a 2.79 increase in the log odds of being in a higher level of GSCM practices implementation, given all of the other variables in the model are held constant. For a one unit increase in normative pressures, a 2.09 increase in the log odds of being in a higher level of GSCM practice implementation is expected, given that all of the other variables in the model are held constant.

Of the control variables, a manufacturing firm's age is significant with a z-value of 2.47 (p-value = 0.014) at 0.05 level. This indicates that firms that have been in operation for a long time are likely to be advanced in implementing GSCM practices. The dummy variable, whether a firm has an environmental department is partially significant at the 0.1 level. The estimated coefficients for the variables firm's size, market scope and sub-sector of operation are insignificant. This is because all their p-values are greater than the significance levels of 0.1 and 0.05. Because these control variables were found to be insignificant, they were dropped from the model. The resulting model is shown in Table 4.28b.

Table 4.28b: Ordered Probit Model with Insignificant Control Variables Dropped

Ordered probit regression				Number of obs	=	64
				LR chi2(5)	=	82.85
				Prob > chi2	=	0.0000
Log likelihood = -18.473156				Pseudo R2	=	0.6916

GSCM	Coef.	Std. Err.	Z	P>|z|	[95% Conf.	Interval]
COERCIVE	2.68257	0.853178	3.14**	0.002	1.01037	4.35476
MIMETIC	0.35215	0.419232	0.84	0.401	-0.46953	1.17383
NORMATIVE	2.03955	0.859943	2.37**	0.018	0.35409	3.72501
AGE	0.04693	0.016159	2.90**	0.014	0.01525	0.07860
ENVDEPT	-1.79389	0.979896	-1.83*	0.067	-3.71445	0.12668
/cut1	8.01043	9.724396			-11.04903	27.06990
/cut2	13.74525	4.292126			5.33284	22.15767
/cut3	19.44379	5.507016			8.65024	30.23735
/cut4	26.21873	6.929121			12.63790	39.79956

***p<0.001; **p<0.05, *p<0.1 Source: Research Data, 2015

To determine the effect of removing the three control variables from the model the likelihood ratio test was conducted to establish whether the observed difference in model fit is statistically significant. This test does this by comparing the log likelihoods of the two models, if this difference is statistically significant, then the less restrictive model (the one with more variables) is said to fit the data significantly better than the more restrictive model (Johnston & DiNardo, 1997). The formula for the likelihood ratio test statistic is:

LR = 2(log likelihood for model 1 - log likelihood model 2)

Where model 1 is the less restrictive model and model 2 is the more restrictive model. The resulting test statistic follows a chi-square distribution with degrees of freedom equal to the number of variables removed from the model. The log likelihood for the model with all the control variables was -18.29326 and that of the model without the three control variables is -18.473156, the test statistic is computed as follows:

LR = 2 * (-18.29326 + 18.473156) = 0.359792

The likelihood ratio test statistic is therefore 0.360 (distributed chi-squared), with three degrees of freedom. The critical chi-square at 5% level of significance, three degrees of freedom is 7.815. Since the computed likelihood ratio test statistic (0.360) is less than the critical chi-square value (7.815) it can be concluded that the model fit does not change significantly when the three control variables, size of the firm, the scope of the market served by the firm and the manufacturing subsector are dropped. This means that the more restrictive model can be used for further analysis.

4.6 Measurement Model Estimation

Partial least squares structural equation modeling approach was used to evaluate the relationship between the latent constructs and to determine the predictive power of the conceptual model for the 67 14001 ISO certified firms in East Africa. Three PLS-SEM models were estimated each for objectives two, three and four. This analysis was found relevant for this study because the sample size of 67 is considered small for covariance-based SEM analysis. Past researchers have also used PLS-SEM technique successfully with small sample sizes (Henseler, Ringle & Sarstedt., 2009; Musuva-Musimba, 2013).

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 17 measurement items representing five 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 measurement model or outer model defines how each block of indicators relates to their respective latent variables. The constructs in the study were measured using multiple items. Details on the type of constructs are contained in the Table 4.29.

Table 4.29: Key Latent Constructs

Latent Construct	Type of Construct	Number of observed variables
GSCM practices	Reflective	Six items
Relational efficiency	Reflective	Three Items
Environmental performance	Reflective	Two items
Operational performance	Reflective	Four Items
Organizational performance	Reflective	Two items

Source: Research Data, 2015

If the observed variables for a latent construct are highly correlated and interchangeable, then it is reflective and should therefore thoroughly examined for reliability and validity (Haenlein & Kaplan, 2004; Petter, Straub & Rai, 2007; Hair et al., 2013; Wong, 2013). This characteristic is true for all the latent constructs in this study, hence making them all to be reflective. The latent variable GSCM practice is made up of six observed indicators 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.

Relational efficiency is a reflective construct comprising of three observed variables; the first one is trust (RE1) which is an average of 7 indicators, the second one was credibility (RE2), an average of 6 indicators and the third was relationship effectiveness (RE3) which is an average of three indicators. Environmental performance is also a reflective latent construct which was comprised of two observed indicators; environmental impact reduction (EP1) which had a total of 7 indicators and environmental cost saving (EP2) which was derived by averaging 6 items.

The latent construct operational performance was obtained from four observed indicators; quality (OPP1), cost (OPP2), speed (OPP3) and flexibility (OPP4) derived by finding the means of 4 items, 4 items, 5 items and 4 items respectively. This too was conceptualized as a reflective construct. The last construct which 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. Since all these variables are reflective, they were thoroughly checked for reliability, validity and unidimensionality by conducting confirmatory factor analysis (CFA) using SmartPLS software. Table 4.30 shows the descriptive statistics for all the latent constructs in the outer model. The results shows that the data for all the variables are fairly normal because all the skewness and kurtosis values fall between -1 and +1, with the exception of environmentally responsible design practices, trust and cost latent variables.

Table 4.30: Descriptive Statistics for Measurement Scales

Latent Construct	Indicator Items	Code	Number of items	Mean	Std. Deviation	Skewness	Kurtosis
GSCM practices (GSCM)	Green Procurement	GSCM1	22	3.437	0.596	-0.626	0.869
	Environmentally responsible design	GSCM2	11	3.532	0.616	-0.213	1.133
	Green manufacturing	GSCM3	19	3.699	0.526	0.296	0.317
	Green packaging	GSCM4	8	3.416	0.591	-0.018	0.076
	Green distribution	GSCM5	8	3.544	0.617	-0.136	0.511
	Reverse logistics	GSCM6	13	3.117	0.677	-0.708	-0.208
Relational efficiency (RE)	Trust	RE1	7	3.620	0.801	-0.842	1.507
	Credibility	RE2	6	3.428	0.770	-0.808	0.607
	Relationship effectiveness	RE3	3	3.642	0.737	-0.380	0.413
Environmental performance (EP)	Environmental impact reduction	EP1	7	2.963	0.899	0.242	-0.685
	Environmental cost saving	EP2	6	2.855	0.845	0.250	-0.535
Operational performance (OPP)	Quality	OPP1	4	2.410	1.236	0.520	-0.928
	Cost	OPP2	4	2.746	0.994	0.098	-1.141
	Speed	OPP3	5	2.630	1.046	0.182	-0.803
	Flexibility	OPP4	4	3.343	0.771	-0.676	0.648
Financial performance (ORP)	Financial performance	ORP1	6	3.014	0.769	-0.137	-0.337
	Market performance	ORP2	3	3.010	1.015	-0.162	-0.868

Source: Research Data, 2015

4.7 Construct Unidimensionality

Construct unidimensionality refers to the existence of one underlying measurement construct (dimension) that accounts for variation in the responses (Yu, Popp, DiGangi & Jannasch-Pennell, 2007). It ensures that all the indicators of a latent construct actually measure the construct. In order to establish construct unidimensionality, item to total coefficients for all the indicators representing a construct are obtained. As a rule of thumb, an indicator should have an item to total score of at least 0.3 in order to be confidently included on a scale (Kidder, 1981). Unidimensionality is also evaluated by assessing the factor loadings through EFA and CFA.

This was done at two levels. The first level entailed verifying the unidimensionality of the indicators of the first level constructs. This involved testing the reliability and validity of these constructs. This was done in the previous section and indicators that were found to either have lower loadings (less than 0.4) or lower item to total correlation scores (less than 0.3) were dropped. After this refinement, the remaining indicators were then subjected to PLS-SEM analysis using SmartPLS 3.0.

At the second level item to total scores were obtained for the indicators representing each latent construct in the model. Table 4.31 shows that the corrected item-total correlation scores for all the indicators representing the latent constructs are above the threshold of 0.3. These values ranged from 0.469 for quality to 0.847 for credibility. Additionally, confirmatory factor analysis results show that that the indicator items loaded heavily on the relevant latent constructs. Results in Table 4.50 indicate that all items loaded on their respective construct from a lower bound of 0.637 to an upper bound of 0.950. This implies that all indicators of the latent constructs in the model 'load onto' the constructs thus ensuring unidimensionality of the constructs.

Table 4.31: 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
Relational efficiency	Trust	0.745
	Credibility	0.847
	Relationship effectiveness	0.604
Environmental performance	Environmental impact reduction	0.714
	Environmental cost saving	0.714
Operational performance	Quality	0.469
	Cost	0.674
	Speed	0.700
	Flexibility	0.562
Organizational performance	Financial performance	0.798
	Market performance	0.798

Source: Research Data, 2015

4.8 GSCM Practices and Organizational Performance

The second objective for this study was to establish the direct relationship between GSCM practices and organizational performance. In order to pursue this objective PLS-SEM analysis using SmartPLS was used. Since the two constructs, GSCM practices and organizational performance are both reflective, they were first thoroughly checked for reliability and validity before the final results were interpreted. The following subsections discuss the reliability and validity of the model.

4.8.1 Outer Model Loadings

The first task was to evaluate the indicators of each of the two latent constructs in the SEM model. Table 4.32 presents the results of these evaluations. The results show that all of the indicators of the two latent constructs have individual indicator reliability values that are larger than the minimum acceptable level of 0.4 and most are more than the preferred level of 0.7 (Hulland, 1999; Wong, 2013). Additionally, bootstrapping results (using 500 resamples) show that all of the p-values are less than the significance level of 0.05. Therefore, it can be concluded that all the outer model loadings are highly significant.

Table 4.32: 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

4.8.2 Internal Consistency Reliability

Internal consistency reliability was assessed from composite reliability values. From Table 4.33, the composite reliability values for the two latent variables are all larger than 0.6 (Bagozzi & Yi, 1988). Additionally, bootstrapping results using 500 resamples shows that the t-statistics for both composite reliability scores are significant. This demonstrates high levels of internal consistency reliability among the two reflective latent variables. The results from Table 4.33 also show that the Cronbach's Alpha values for the two constructs are above the threshold of 0.7 and are also statistically significant implying internal consistency of the constructs (Hair Jr. et al., 2010).

Table 4.33: 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

4.8.3 Convergent Validity

In order to verify convergent validity, each latent variable's Average Variance Extracted (AVE) was evaluated. As shown in Table 4.33, it is established that the AVE values for the two latent constructs are greater than the acceptable threshold of 0.5 and therefore convergent validity is confirmed (Hair et al., 2010). Bootstrapping results using 500 resamples show that these AVE scores are significant. Convergent validity was also assessed by extracting the factor and cross loadings of all indicator items to their respective latent constructs. As shown in Table 4.34, the constructs' items' loadings and cross loadings presented and the highly significant p-value for each individual item loading both confirm convergent validity.

Table 4.34: 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

4.8.4 Discriminant Validity

Discriminant validity was verified using the Fornell-Larcker Criterion, observing factor loadings and the Heterotrait-Monotrait **(**HTMT) criterion. Table 4.35 shows the Fornell-Larcker Criterion analysis results.

Table 4.35: 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

The square root of AVE for the latent variable GSCM practices of 0.585 (from Table 4.33), 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).

Discriminant validity was also checked by assessing the factor loadings of individual items to their respective construct. From Table 4.34, it is observed that each item loads highest on its associated construct than on any the construct. Further, the HTMT value between GSCM practices and organizational performance constructs is 0.411. This value is less than 0.9 implying that discriminant validity is well established (Gold, Malhotra, & Segars, 2001; Teo, Srivastava & Jiang, 2008).

4.8.5 Overall Model Fit

The standardized root mean square residual (SRMR) is a goodness of fit measure for PLS-SEM. It is the difference between the observed correlation and the predicted correlation (Henseler et al., 2014). It allows assessment of the average magnitude of the discrepancies between observed and expected correlations as an absolute measure of (model) fit criterion. A value less than 0.10 and of 0.08 are considered a good fit.

The composite model SRMR was found to be 0.056. This value is less than 0.1. In addition, bootstrapping results shows that the composite SRMR is significant at 0.05 implying that this model has a good fit. This information is presented in Table 4.36.

Table 4.36: Composite Model SRMR Statistics

Original Sample	Sample Mean	Standard Error	T Statistic	P Value
0.056	0.089	0.022	2.576**	0.01

**p < 0.05 Source: Research Data, 2015

4.8.6 Target Endogenous Variable Variance and Significance of Path Coefficient

After evaluating the validity and reliability of both the outer and inner models, the next step was to interpret the coefficient of determination (R^2) and path coefficients. From Figure 4.1, it is noted that the coefficient of determination, R^2, is 0.142 for the organizational performance endogenous latent variable. This means that the GSCM practices only account for 14.2% of the variance in organizational performance. In social science research, R^2 of 0.75 is substantial, 0.50 is moderate, and 0.25 is weak (Wong, 2013). Thus, from the results, it can be concluded that the proportion of variance in organizational performance that is accounted for by GSCM practices is weak.

The inner model suggests that the path coefficient for the hypothesized path relationship between GSCM practices and organizational performance is 0.377 (from Figure 4.1). This path coefficient is significant (t = 3.782, p-value = 0.000) as shown in Figure 4.2.

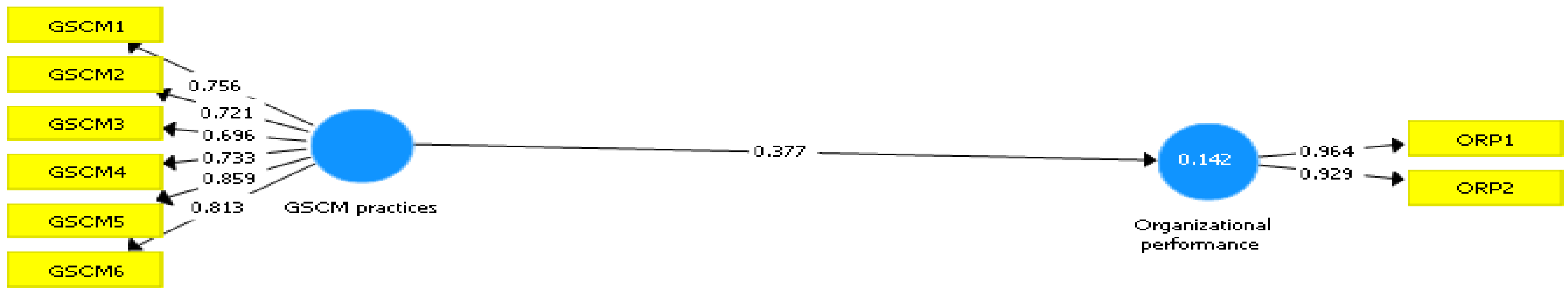


Figure 4.1: Structural Equation Model Diagram with Path Coefficients

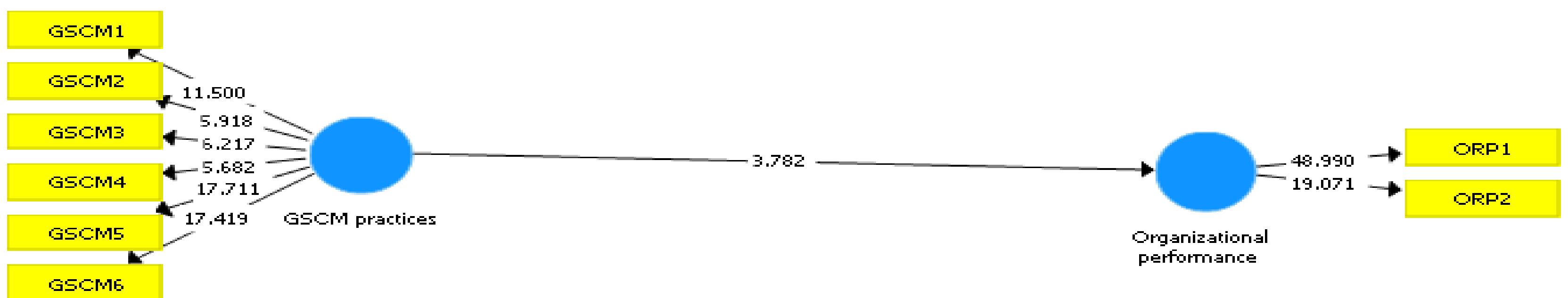


Figure 4.2: Structural Equation Model Diagram with T-Values

4.9 GSCM Practices, Environmental Performance and Operational Performance and Organizational Performance

The third objective was to determine the mediating effect of both environmental performance and operational performance on the relationship between GSCM practices and organizational performance. This objective was pursued by conducting PLS-SEM analysis using SmartPLS. The four latent constructs in the model are first checked for reliability. The subsections that follow discuss the reliability and validity analysis for the model before the PLS-SEM analysis results are interpreted.

4.9.1 Outer Loadings for the Model

Table 4.37 shows that all of the indicators of the four latent constructs in this model have individual indicator reliability values that are greater than the threshold of 0.4 and most are more than the preferred level of 0.7 (Hulland, 1999; Wong, 2013).

Table 4.37: Results Summary for Reflective Outer Models

Latent Variable	Indicators	Loadings	Indicator Reliability	T Statistics	P Values
GSCM practices	GSCM1	0.745	0.554	9.731	0.000
	GSCM2	0.738	0.544	7.530	0.000
	GSCM3	0.734	0.539	12.537	0.000
	GSCM4	0.739	0.546	8.960	0.000
	GSCM5	0.845	0.714	18.304	0.000
	GSCM6	0.790	0.624	40.798	0.000
Environmental performance	EP1	0.921	0.848	52.821	0.000
	EP2	0.931	0.866	14.976	0.000
Operational performance	OPP1	0.639	0.408	6.150	0.000
	OPP2	0.869	0.755	34.259	0.000
	OPP3	0.875	0.765	36.988	0.000
	OPP3	0.749	0.561	13.592	0.000
Organizational performance	ORP1	0.950	0.902	87.486	0.000
	ORP2	0.947	0.896	71.126	0.000

Source: Research Data, 2015

Additionally, bootstrapping results with 500 resamples show that all factor loadings are significant with their t-statistics being greater than 1.96 (all p-values are less than 0.05). Thus, it can be concluded that all the outer model loadings are highly significant.

4.9.2 Internal Consistency Reliability

In order to ensure internal consistency reliability, composite reliability scores were obtained from smartPLS output. It is observed from Table 4.38 that these values for the four latent constructs are greater than the threshold of 0.6 (Bagozzi & Yi, 1988). Bootstrapping results show that these scores are all statistically significant (all have p-values less than 0.05). Thus, a high level of internal consistency reliability among all four reflective latent variables is demonstrated. In addition, The Cronbach's Alpha values for all the four constructs are above the threshold of 0.7 and are also statistically significant, implying internal consistency of the constructs used (Hair Jr. et al., 2010).

Table 4.38: Composite Reliability, Cronbach's Alpha and AVE of Latent Constructs

Latent Variable	Composite Reliability	Cronbach's Alpha	AVE
GSCM practices	0.895	0.859	0.587
Environmental performance	0.923	0.833	0.857
Operational performance	0.867	0.794	0.622
Organizational performance	0.947	0.888	0.899

Source: Research Data, 2015

4.9.3 Convergent Validity

In order to verify convergent validity, each latent variable's AVE was evaluated. As shown in Table 4.38, it can be observed that all of the AVE values are greater than the threshold of 0.5. The p-values for the AVEs are all less than 0.05 implying that they are statistically significant. Convergent validity is therefore confirmed (Hair et al., 2010). In addition, the constructs' items' load highly onto the constructs and their p-values are highly significant. This information is presented in Table 4.39.

Table 4.39: Confirmatory Factor Analysis Results

	GSCM practices	Environmental performance	Operational performance	Organizational performance
GSCM1	**0.745**	0.381	0.508	0.294
GSCM2	**0.738**	0.460	0.324	0.206
GSCM3	**0.734**	0.488	0.448	0.210
GSCM4	**0.739**	0.511	0.393	0.280
GSCM5	**0.845**	0.467	0.513	0.348
GSCM6	**0.790**	0.408	0.422	0.315
EP1	0.523	**0.921**	0.663	0.567
EP2	0.569	**0.931**	0.668	0.639
OPP1	0.288	0.425	**0.639**	0.419
OPP2	0.640	0.691	**0.869**	0.663
OPP3	0.477	0.667	**0.875**	0.634
OPP4	0.325	0.425	**0.749**	0.572
ORP1	0.400	0.629	0.721	**0.950**
ORP2	0.286	0.607	0.673	**0.947**

Source: Research Data, 2015

4.9.4 Discriminant Validity

Three criteria were used to evaluate discriminant validity, that is, the Fornell and Larcker criterion, evaluation of factor loadings on their associated constructs and the HTMT criterion. In order to verify discriminant validity using Fornell and Larcker criterion, a table was created in which the square root of AVE was manually determined and written in bold on the diagonal of the table. The correlations between the latent variables were copied from the "Latent Variable Correlation" section of the default report and are placed in the lower left triangle of the Table 4.40.

Table 4.40: Fornell-Larcker Criterion Analysis for Checking Discriminant Validity

	GSCM practices	Environmental performance	Operational performance	Organizational performance
GSCM practices	**0.766**			
Environmental performance	0.591	**0.926**		
Operational performance	0.572	0.718	**0.789**	
Organizational performance	0.363	0.652	0.735	**0.948**

Source: Research Data, 2015

The square root of AVE for the latent variable GSCM practices (0.766) is greater than the correlation values in the column of GSCM practices (0.591, 0.572 and 0.363). The square root of AVE for environmental performance (0.926) is greater than the correlation values in the column of environmental performance (0.718 and 0.652) and also larger than the value in the row of environmental performance (0.591). The square root of AVE for operational performance (0.789) is greater than the correlation value in its column (0.735) and those in its row (0.572 and 0.718). Similar observations can be made for the latent variable, organizational performance. These results confirm that discriminant validity is well established (Fornell & Larcker, 1981).

Looking at Table 4.39, it is observed that each item loads highest on its respective constructs than on other constructs. Further, the computed HTMT values for all the pairs of constructs in Table 4.41 fall below the threshold value of 0.9 (Gold et al., 2001; Teo et al., 2008). These results further verify discriminant validity.

Table 4.41: Heterotrait-Monotrait Ratios and Their Significance

	HTMT Ratio	T Statistics	P Values
GSCM practices -> Environmental performance	0.698	6.822	0.000
Operational performance -> Environmental performance	0.862	8.933	0.000
Operational performance -> GSCM practices	0.661	8.196	0.000
Organizational performance -> Environmental performance	0.756	8.079	0.000
Organizational performance -> GSCM practices	0.411	3.237	0.001
Organizational performance -> Operational performance	0.866	14.166	0.000

Source: Research Data, 2015

4.9.5 Assessing Collinearity

Collinearity was evaluated for both the inner and the outer model. The following subsections discuss the results for both assessments.

4.9.5.1 Collinearity for the Outer Model

VIF values for the measurement model were obtained from SmartPLS output. These values were used to determine the tolerance levels for each of the item in the outer model. The results are shown in the Table 4.42.

Table 4.42: Outer Tolerance and VIF Values

	Tolerance	VIF
GSCM1	0.536	1.864
GSCM2	0.502	1.991
GSCM3	0.559	1.790
GSCM4	0.574	1.743
GSCM5	0.375	2.667
GSCM6	0.432	2.314
EP1	0.490	2.043
EP2	0.490	2.043
OPP1	0.777	1.286
OPP2	0.486	2.060
OPP3	0.456	2.194
OPP4	0.655	1.528
ORP1	0.363	2.757
ORP2	0.363	2.757

Source: Research Data, 2015

As is observed from Table 4.42, all the indicators of the four latent constructs in the inner model have VIF values less than 5 (or tolerance levels greater than 0.2). This confirms that multicollinearity is not a problem in the outer model (Hair et al., 2011).

4.9.5.2 Collinearity for the Inner Model

In order to assess multicollinearity of the inner model, the latent variable scores were used as input for multiple regression in IBM SPSS. The exogenous latent variables which include GSCM practices, environmental performance and operational performance were configured as independent variables, whereas organizational performance was configured as the dependent variable. The collinearity statistics are shown in Table 4.43.

Table 4.43: Collinearity Statistics of Exogenous Variables

Exogenous variable	Collinearity Statistics	
	Tolerance	VIF
GSCM practices	0.606	1.651
Environmental performance	0.436	2.294
Operational performance	0.450	2.221

Source: Research Data, 2015

From Table 4.43 it can be seen that the VIF values for all the exogenous latent variables are lower than the threshold of 5 (or tolerance levels are higher than 0.2). This suggests that collinearity is not a problem in the inner model.

4.9.6 Predictive Relevance - Q^2

Predictive relevance of the model was established through blindfolding procedure. This is a sample re-use technique that computes a cross-validated predictive relevance criterion, the Stone-Geisser's Q^2 value (Stone, 1974; Geisser, 1974). Hair et al. (2014) argue that when a PLS-SEM model exhibits predictive relevance, it accurately predicts the data points of the indicators in reflective measurement models of multi-item endogenous constructs. A good SEM model should have Q^2 values for all reflective endogenous variables larger than 0. Figure 4.3 and Table 4.44 show the blindfolding results for all endogenous variables in the model using the cross validated redundancy approach.

Table 4.44: Q^2 values for all Endogenous Variables in the Model

Endogenous Latent Variable	Q^2 Value
Environmental performance	0.276
Operational performance	0.311
Organizational performance	0.489

Source: Research Data, 2015

Hair et al. (2014) argues that a Q^2 value of 0.02 indicates that an exogenous construct has a small predictive relevance for a selected endogenous variable. Q^2 values of 0.15 and 0.35 indicate medium and large predictive relevance respectively. Table 4.44 and Figure

4.3 show that all Q^2 values are considerably above zero, thus providing support for the model's predictive relevance for the three endogenous constructs. Based on guidelines given by Hair et al. (2014), organizational performance (Q^2 = 0.489) and operational performance (Q^2 =0.311) have large predictive relevance. Environmental performance has a medium predictive relevance (Q^2 =0.276).

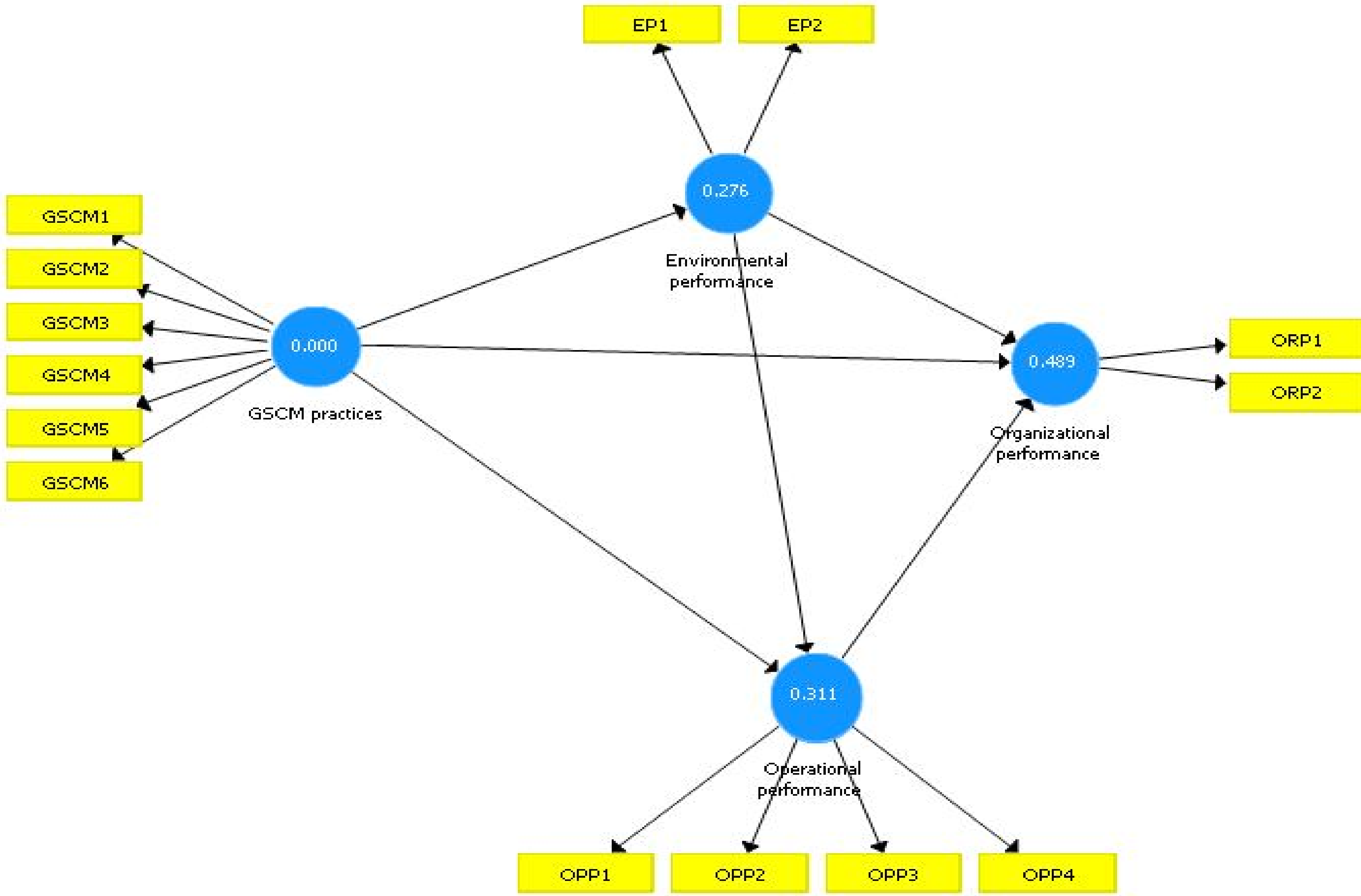


Figure 4.3: Q² values for all Endogenous Variables in the Model

4.9.7 Overall Model Fit

The goodness of fit measure, SRMR for this model was found to be 0.081. Henseler et al. (2014) recommends that, for a model to be considered to have a good fit, then the value for SRMR should be less than 0.10 and preferably 0.08. This implies that, this model has a good fit. In order to establish the significance of this SRMR (0.081), bootstrapping with 500 resamples was run. The results presented in Table 4.45 show that the SRMR is statistically significant at 0.001 level.

Table 4.45: Composite Model SRMR Statistics

Original Sample	Sample Mean	Standard Error	T Statistic	P Value
0.081	0.109	0.018	4.585***	0.000

***p < 0.001 Source: Research Data, 2015

4.9.8 Target Endogenous Variable Variance

From Figure 4.4, it is observed that the endogenous latent variable, organizational performance has a coefficient of determination (R^2) of 0.590. This implies that the three latent constructs (GSCM practices, environmental performance and operational performance) explain 59% of the variance in organizational performance. This represents a big improvement in variance explained compared to when the latent variables, environmental performance and operational performance are excluded from the model (R^2 improved from 14.2% to 59%).

GSCM practices account for 34.9% of the variation in environmental performance while GSCM practices and environmental performance all explain 55% of the variance in operational performance. Thus, from the results, it can be concluded that the R^2 values for operational performance (0.55) and organizational performance (0.59) are moderate. The R^2 value of environmental performance (0.349) is slightly weak (Wong, 2013).

4.9.9 Inner Model Path Coefficient Sizes and Significance

The inner model suggests that the hypothesized path relationships between GSCM practices and environmental performance (0.591) and GSCM practices and operational performance (0.227) are statistically significant with p-values of 0.000 and 0.014 respectively. However, the path relationship between GSCM practices and organizational performances (-0.172) is insignificant with a p-value of 0.179. The relationship between environmental performance and operational performance with a path coefficient of 0.584 is also statistically significant with a p-value of 0.000.

The findings also show that operational performance has the strongest effect on organizational performance ($\beta = 0.604$, $t = 5.148$, p-value = 0.000), followed by environmental performance ($\beta = 0.320$, $t = 2.097$, p-value = 0.036) and GSCM practices (-0.172). Thus, it can be concluded that: environmental performance and operational performance are both moderately strong predictors of organizational performance, but GSCM practices does not predict organizational performance directly. This is a strong signal that organizational performance will only be enhanced if environmental performance and operational performance are enhanced. This information is presented in Table 4.46 and Figure 4.4

Table 4.46: Inner Model Path Coefficient Sizes and Significance

Hypothesized Path Relationship	Path Coefficient	T Statistics	P Values
GSCM practices -> Environmental performance	0.591***	6.939	0.000
GSCM practices -> Operational performance	0.227**	2.476	0.014
GSCM practices -> Organizational performance	-0.172	1.347	0.179
Environmental performance -> Operational performance	0.584***	5.125	0.000
Environmental performance -> Organizational performance	0.320**	2.097	0.036
Operational performance -> Organizational performance	0.604***	5.148	0.000

***p < 0.001, **p < 0.05 Source: Research Data, 2015

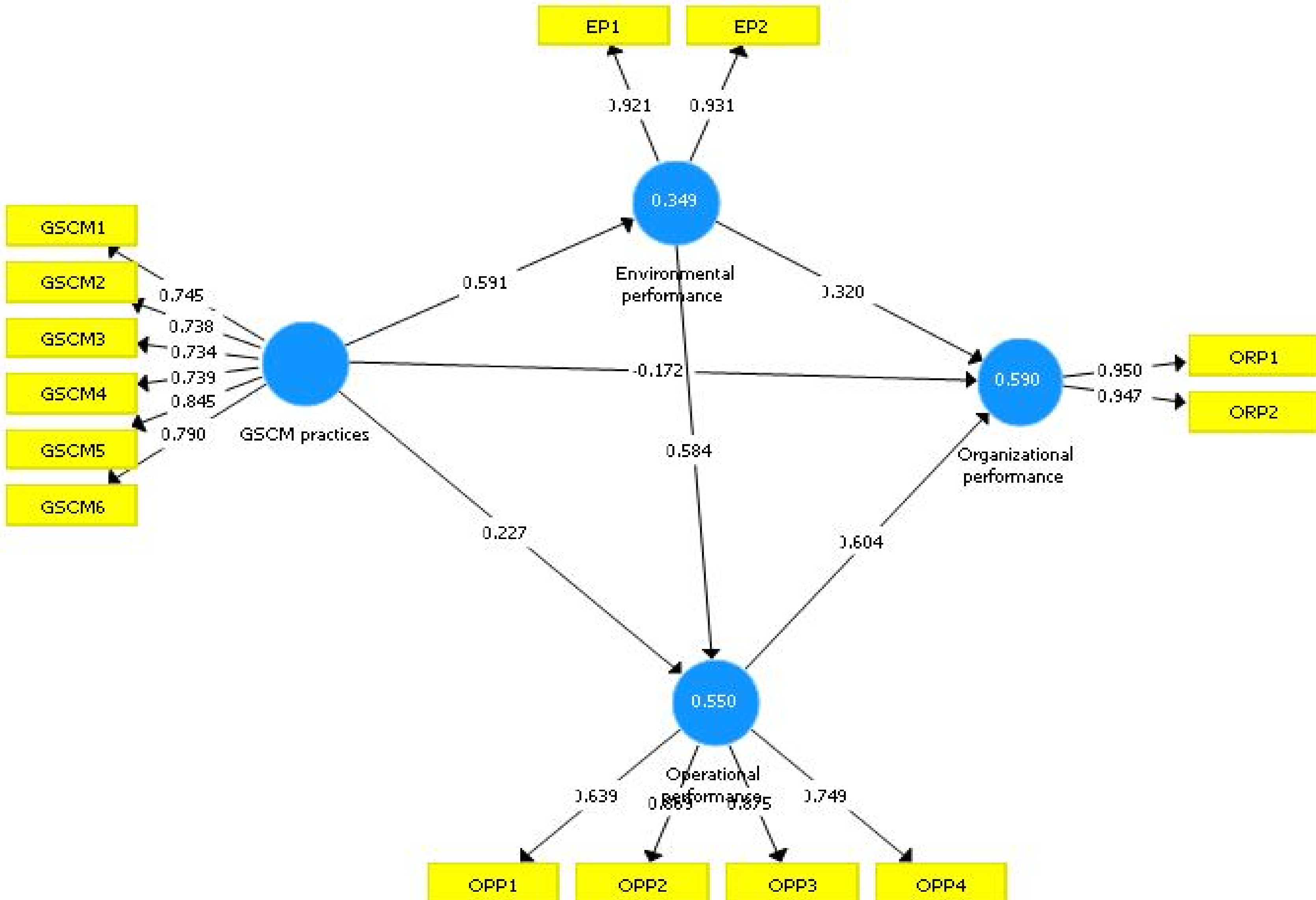


Figure 4.4: Structural Equation Model Diagram with Path Coefficients

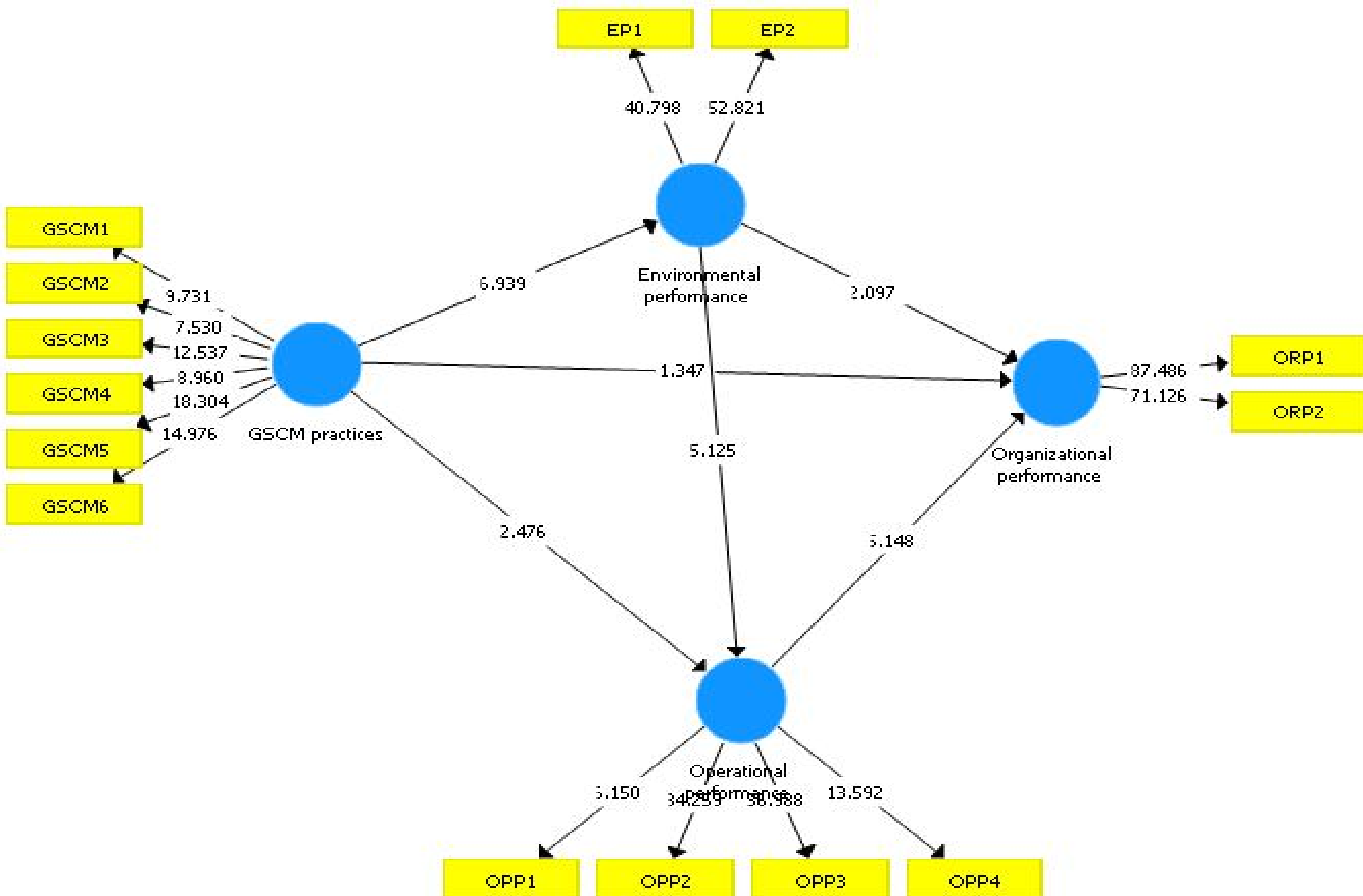


Figure 4.5: Structural Equation Model Diagram with T-Values

4.9.10 Total Effect Analysis

The findings shown in Table 4.47 indicate that all the six hypothesized path relationships have statistically significant total effects. It is also noted that even though the direct relationship between GSCM practices and organizational performance was not significant ($\beta = -0.172$, $t = 1.347$, p-value = 0.179), this path relationship becomes significant when the total effect is considered ($\beta = 0.363$, $t = 2.963$, p-value = 0.003). This finding reinforces the fact that the relationship between GSCM practices and organizational performance is enhanced when the two mediating constructs are considered. Additionally, environmental performance (EP = 0.672) has the strongest total effect on organizational performance, followed by operational performance (OPP = 0.604) and GSCM practices (GSCM = 0.363).

Table 4.47: Total Effect Analysis

Hypothesized Path Relationship	Total Effect	T Statistics	P Values
GSCM practices -> Environmental performance	0.591***	6.939	0.000
GSCM practices -> Operational performance	0.572***	7.255	0.000
GSCM practices -> Organizational performance	0.363**	2.963	0.003
Environmental performance -> Operational performance	0.584***	5.125	0.000
Environmental performance -> Organizational performance	0.672***	4.764	0.000
Operational performance -> Organizational performance	0.604***	5.148	0.000

***p < 0.001, **p < 0.05 Source: Research Data, 2015

4.10 GSCM Practices, Relational Efficiency, Environmental Performance, Operational Performance and Organizational Performance

The fourth objective of the study was to determine the mediating effect of relational efficiency on the relationships between GSCM practices and environmental performance, GSCM practices and operational performance and GSCM practices and organizational performance. Just like the second and third objectives, this objective was also pursued by conducting PLS-SEM analysis using SmartPLS. The latent construct, relational efficiency was added to the previous model so that the model would now have five latent constructs. As is the case with the previous models, the latent constructs in the model are first checked for validity and reliability because all the five constructs are reflective.

4.10.1 Outer Model Loadings

The results in Table 4.48 show that all of the indicators of the five latent constructs have individual indicator reliability values that are larger than the minimum acceptable level of 0.4 and most are more than the preferred level of 0.7 (Hulland, 1999; Wong, 2013). Additionally, bootstrapping with 500 resamples show that all of the p-values are less than the significance level of 0.05. Therefore, it can be concluded that all the outer model loadings are highly statistically significant.

Table 4.48: Results Summary for Reflective Outer Models

Latent Variable	Indicators	Loadings	Indicator Reliability	P Values
GSCM practices	GSCM1	0.757	0.573	0.000
	GSCM2	0.737	0.543	0.000
	GSCM3	0.727	0.529	0.000
	GSCM4	0.725	0.526	0.000
	GSCM5	0.845	0.715	0.000
	GSCM6	0.796	0.634	0.000
Relational efficiency	RE1	0.900	0.810	0.000
	RE2	0.944	0.891	0.000
	RE3	0.794	0.630	0.000
Environmental performance	EP1	0.921	0.848	0.000
	EP2	0.931	0.866	0.000
Operational performance	OPP1	0.637	0.406	0.000
	OPP2	0.868	0.754	0.000
	OPP3	0.875	0.765	0.000
	OPP3	0.752	0.565	0.000
Organizational performance	ORP1	0.950	0.902	0.000
	ORP2	0.947	0.897	0.000

Source: Research Data, 2015

4.10.2 Internal Consistency Reliability

This was assessed from composite reliability values. From Table 4.49, the composite reliability values for all the latent variables are larger than 0.6 (Bagozzi & Yi, 1988). This demonstrates high levels of internal consistency reliability among all five reflective latent variables. Bootstrapping results with 500 resamples also show that all these composite reliability scores are statistically significant since all have p-values of 0.000. In addition, The Cronbach's Alpha values for all the five constructs are above the threshold of 0.7. The results of bootstrapping also show that all the Cronbach's Alpha values are statistically significant. This implies internal consistency of the constructs used (Hair Jr. et al., 2010).

Table 4.49: Composite Reliability, Cronbach's Alpha and AVE of Latent Constructs

Latent Variable	Composite Reliability	Cronbach's Alpha	AVE
GSCM practices	0.895	0.859	0.587
Relational efficiency	0.912	0.854	0.777
Environmental performance	0.923	0.833	0.857
Operational performance	0.867	0.794	0.623
Organizational performance	0.947	0.888	0.899

Source: Research Data, 2015

4.10.3 Convergent Validity

In order to verify convergent validity, each latent variable's AVE was evaluated. As shown in Table 4.49, it is established that all of the AVE values are greater than the acceptable threshold of 0.5 and all are statistically significant implying that all the latent constructs account for at least 50% of the variance in their observed indicators, and therefore convergent validity is confirmed (Hair et al., 2010). Convergent validity was also assessed by extracting the factor and cross loadings of all indicator items to their respective latent constructs. As shown in Table 4.50, the constructs' items' loadings and cross loadings presented and the highly significant p-value for each individual item loading both confirm convergent validity.

Table 4.50: Confirmatory Factor Analysis Results

Indicator	GSCM practices	Relational efficiency	Environmental performance	Operational performance	Organizational performance
GSCM1	**0.757**	0.710	0.381	0.508	0.294
GSCM2	**0.737**	0.521	0.460	0.323	0.206
GSCM3	**0.727**	0.524	0.488	0.449	0.210
GSCM4	**0.725**	0.461	0.511	0.392	0.280
GSCM5	**0.845**	0.636	0.467	0.512	0.348
GSCM6	**0.796**	0.620	0.408	0.421	0.315
RE1	0.625	**0.900**	0.412	0.506	0.380
RE2	0.728	**0.944**	0.421	0.486	0.317
RE3	0.666	**0.794**	0.405	0.279	0.123
EP1	0.520	0.416	**0.921**	0.662	0.567
EP2	0.566	0.448	**0.931**	0.667	0.639
OPP1	0.287	0.200	0.425	**0.637**	0.419
OPP2	0.642	0.483	0.691	**0.868**	0.663
OPP3	0.477	0.400	0.667	**0.875**	0.634
OPP4	0.328	0.415	0.425	**0.752**	0.572
ORP1	0.402	0.358	0.629	0.721	**0.950**
ORP2	0.286	0.245	0.607	0.673	**0.947**

Source: Research Data, 2015

4.10.4 Discriminant Validity

Fornell-Larcker Criterion Analysis results are presented in Table 4.51. The square root of AVE for the latent variable GSCM practices (0.766) is greater than the correlation values in the column of GSCM practices (0.762, 0.587, 0.573 and 0.363). Similar observation is also made for the latent variables relational efficiency, environmental performance, operational performance and organizational performance. According Fornell and Larcker (1981), this result indicates that discriminant validity is well established.

Table 4.51: Fornell-Larcker Criterion Analysis for Checking Discriminant Validity

	GSCM	RE	EP	OPP	ORP
GSCM practices (GSCM)	**0.766**				
Relational efficiency (RE)	0.762	**0.881**			
Environmental performance (EP)	0.587	0.467	**0.926**		
Operational performance (OPP)	0.573	0.489	0.718	**0.789**	
Organizational performance (ORP)	0.363	0.319	0.652	0.736	**0.948**

Source: Research Data, 2015

Careful observation of Table 4.50 reveals that each item loads highly and significantly on its respective construct than on any other construct. Further, when all the constructs in the model are paired with each other and HTMT values computed for each pair (Table 4.52), it is noted that all of them are below 0.9 (Gold et al., 2001; Teo et al., 2008; Henseler, Ringle & Sarstedt, 2015). All these outcomes verify discriminant validity.

Table 4.52: Heterotrait-Monotrait Ratios

	HTMT Ratio	T Statistics	P Values
GSCM practices -> Environmental performance	0.698	6.745	0.000
Operational performance -> Environmental performance	0.862	8.545	0.000
Operational performance -> GSCM practices	0.661	7.840	0.000
Organizational performance -> Environmental performance	0.756	8.366	0.000
Organizational performance -> GSCM practices	0.411	3.296	0.001
Organizational performance -> Operational performance	0.866	13.946	0.000
Relational efficiency -> Environmental performance	0.555	4.671	0.000
Relational efficiency -> GSCM practices	0.887	16.867	0.000
Relational efficiency -> Operational performance	0.569	5.107	0.000
Relational efficiency -> Organizational performance	0.356	2.942	0.003

Source: Research Data, 2015

4.10.5 Assessing Collinearity

This was done for both the outer and inner models. The following subsections gives the results obtained for each of the assessments.

4.10.5.1 Collinearity for the Outer Model

As shown in Table 4.42, the VIF and tolerance values for the measurement model of GSCM practices, environmental performance, operational performance and organizational performance had already been found to meet the required thresholds for collinearity not to be a problem. Table 4.53 shows the VIF and tolerance levels for the indicators of relational efficiency.

Table 4.53: Outer Tolerance and VIF Values for Relational Efficiency

	Tolerance	VIF
RE1	0.317	3.158
RE2	0.255	3.927
RE3	0.589	1.698

Source: Research Data, 2015

As is observed from Tables 4.42 and 4.53, all the indicators of the five latent constructs in the outer model have VIF values less than 5 (or tolerance levels greater than 0.2). This confirms that multicollinearity is not a problem in the outer model.

4.10.5.2 Collinearity for the Inner Model

In order to assess collinearity of the inner model, the latent variable scores were used as input for multiple regression in IBM SPSS. The exogenous latent variables which include GSCM practices, relational efficiency, environmental performance, and operational performance were configured as independent variables, whereas organizational performance was configured as the dependent variable. The collinearity statistics are shown in Table 4.54.

Table 4.54: Collinearity Statistics of Exogenous Variables

Exogenous variable	Collinearity Statistics	
	Tolerance	VIF
GSCM practices	0.344	2.904
Relational efficiency	0.415	2.409
Environmental performance	0.439	2.280
Operational performance	0.446	2.243

Source: Research Data, 2015

From Table 4.54, all VIF values for all the exogenous latent variables are lower than threshold of 5 (or tolerance levels are higher than 0.2). This suggests that collinearity is not a problem in this model.

4.10.6 Predictive Relevance - Q^2

Predictive relevance of the model was established through blindfolding procedure. Figure 4.6 and Table 4.55 show that all Q^2 values are above zero, thus providing support for the model's predictive relevance for the four endogenous constructs. Based on guidelines given by Hair et al. (2014), organizational performance (0.481), relational efficiency (0.438) and operational performance (0.313) have large predictive relevance. Environmental performance has a medium predictive relevance (0.258).

Table 4.55: Q^2 values for all Endogenous Variables in the Model

Endogenous Latent Variable	Q^2 Value
Environmental performance	0.258
Operational performance	0.313
Organizational performance	0.481
Relational efficiency	0.438

Source: Research Data, 2015

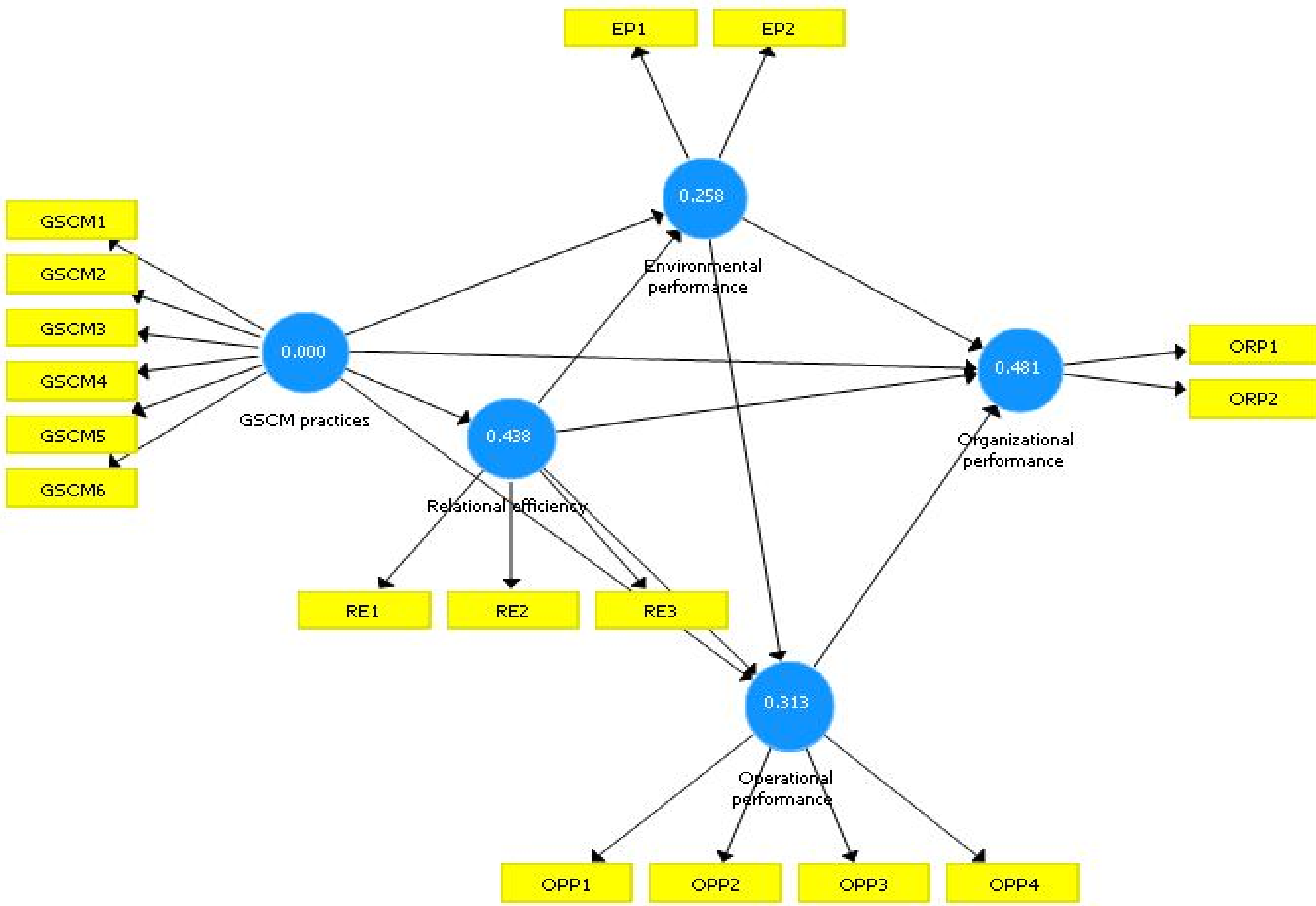


Figure 4.6: Q² values for all Endogenous Variables in the Model

4.10.7 Overall Model Fit

The model was found to have a standardized root mean square residual (SRMR) of 0.086. This value is less than 0.1 and is closer to 0.08. Bootstrapping results shows that the SRMR is statistically significant at 0.001 implying that this model has a good fit. This information is presented in Table 4.56.

Table 4.56: Composite Model SRMR Statistics

Original Sample	Sample Mean	Standard Error	T Statistic	P Value
0.086	0.113	0.023	3.770***	0.000

***p < 0.001 Source: Research Data, 2015

4.10.8 Target Endogenous Variable Variance

From Figure 4.7, it is noted that the coefficient of determination (R^2) is 0.590 for the organizational performance endogenous latent variable. This means that GSCM practices, relational efficiency, environmental performance and operational performance account for 59% of the variance in organizational performance. It can also be noted that the addition of the latent construct, relational efficiency does not result in an increase in variance explained in organizational performance. This is a strong pointer that this variable is not a significant mediator in this model. GSCM practices account for 58% of the variance in relational efficiency. GSCM practices and relational efficiency explain 34.5% of the variation in environmental performance while GSCM practices, relational efficiency and environmental performance all account for 55.4% of the variance in operational performance. Thus, from the results, it can be concluded that the R^2 values of relational efficiency (0.580), operational performance (0.554) and organizational performance (0.590) are moderate. In contrast, the R^2 value of environmental performance (0.345) is slightly weak (Wong, 2013).

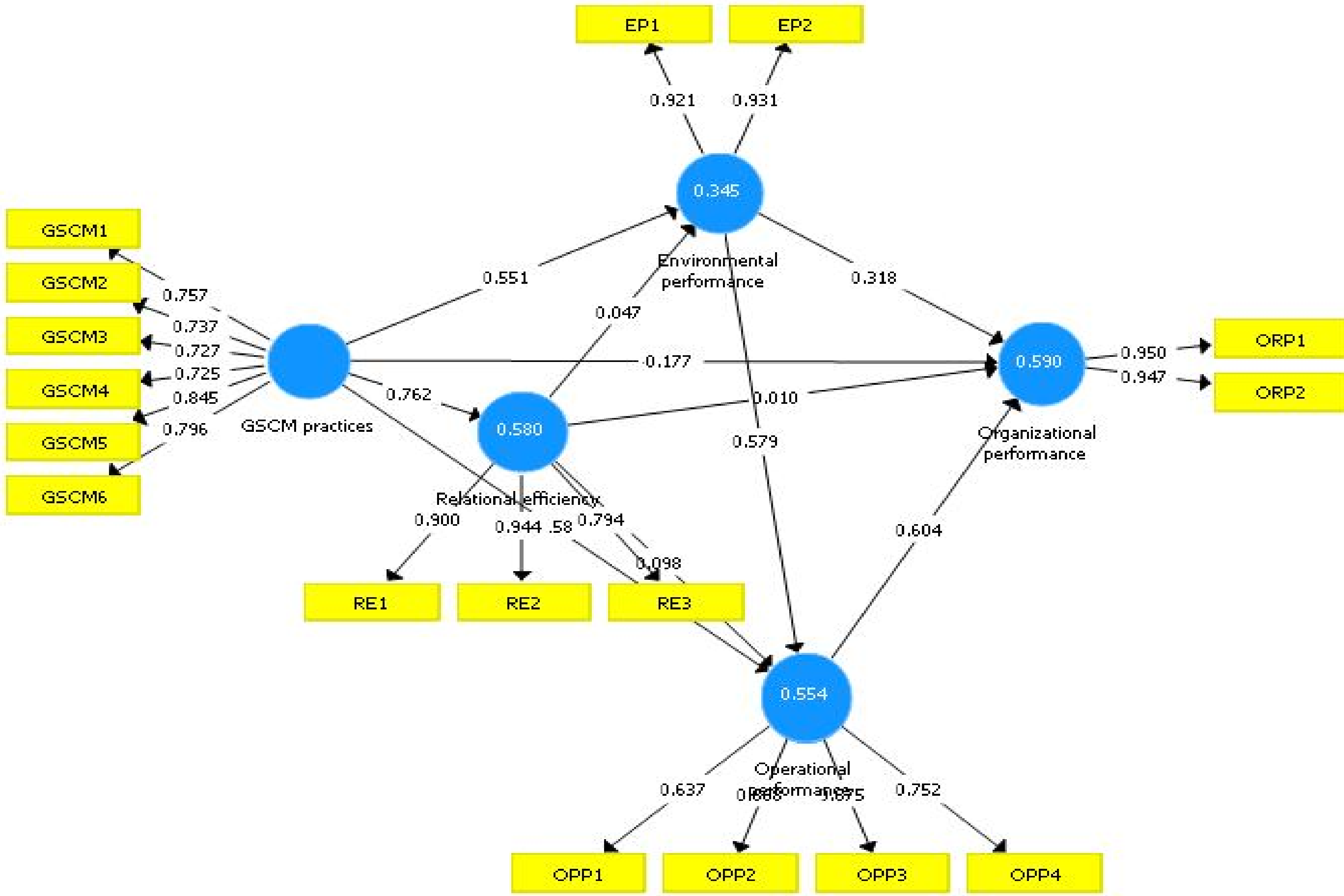


Figure 4.7: Structural Equation Model Diagram with Path Coefficients

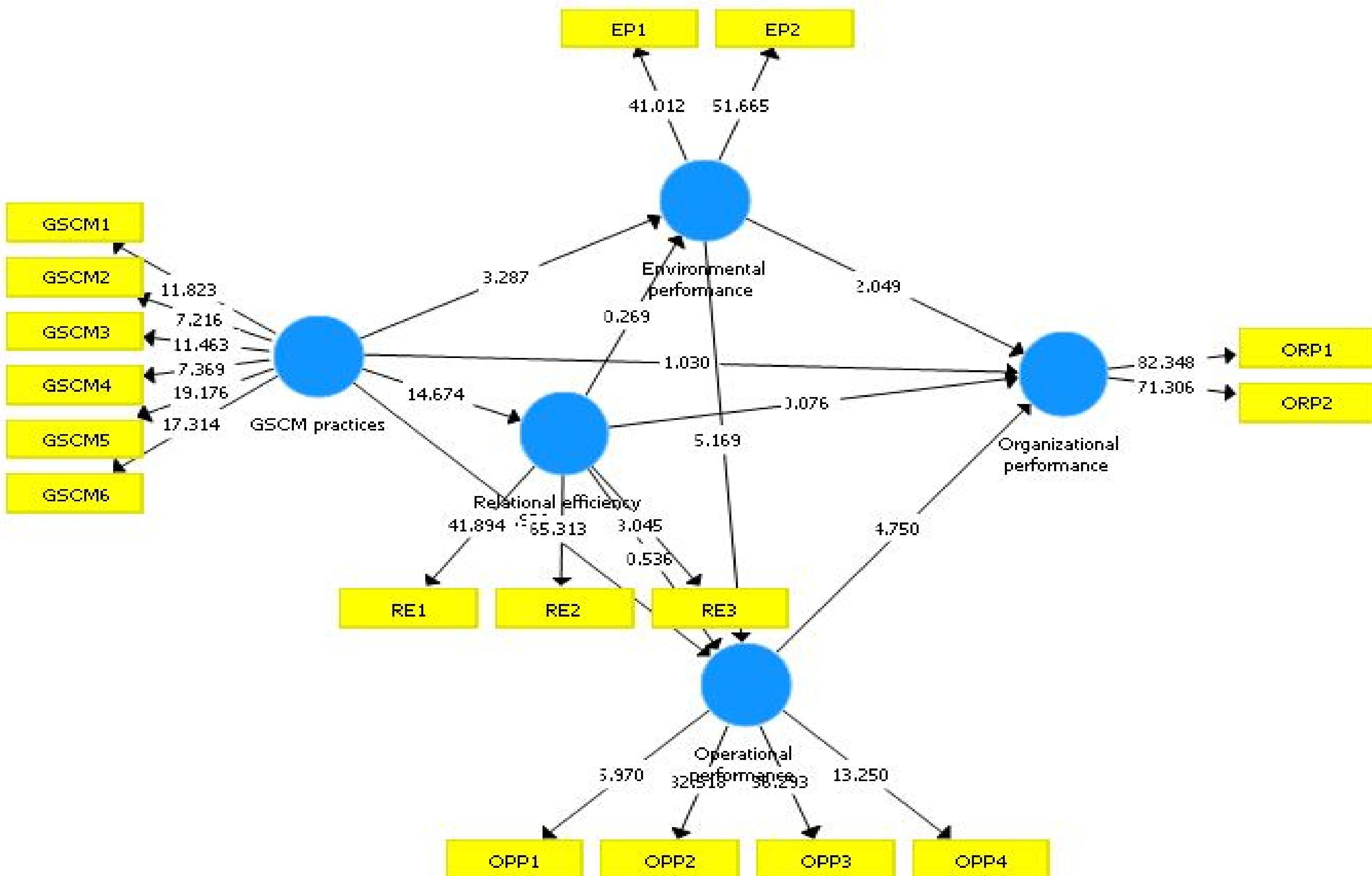


Figure 4.8: Structural Equation Model Diagram with T-Values

4.10.9 Inner Model Path Coefficient Sizes and Significance

The inner model suggests that the hypothesized path relationships between GSCM practices and environmental performance (0.551) and GSCM practices and relational efficiency (0.769) are significant with p-values of 0.004 and 0.000 respectively. However, the path relationship between GSCM practices and operational (0.158) and organizational performances (-0.177) are insignificant with p-values of 0.349 and 0.304 respectively. The relationship between relational efficiency and environmental performance (0.047), relational efficiency and operational performance (0.098) and relational efficiency and organizational performance (0.010) are all insignificant with p-values of 0.788, 0.592 and 0.939 respectively. This information is shown in Figure 4.7 and Table 4.57.

The findings also show that operational performance has the strongest effect on organizational performance (0.604), followed by environmental performance (0.318) and GSCM practices (-0.177). Relational efficiency has the least effect on organizational performance (0.010). The hypothesized path relationship between GSCM practices and organizational performance is not statistically significant (p-value = 0.304). Similarly the hypothesized path relationship between relational efficiency and organizational performance is also not statistically significant (p-value = 0.939).

However, the hypothesized path relationship between environmental performance and organizational performance (0.318) is statistically significant. This is because its p-value (0.041) is less than the significance level of 0.05. Similarly, the hypothesized path relationship between operational performance and organizational performance (0.604) is also statistically significant (p-value = 0.000). Thus, it can be concluded that: environmental performance and operational performance are both moderately strong predictors of organizational performance, but GSCM practices does not predict organizational performance directly.

Table 4.57: P-values and Significance of Path Coefficients (Inner Model)

Hypothesized Path Relationship	Path Coefficient	T Statistics	P Values
GSCM practices -> Environmental performance	0.551***	3.287	0.001
GSCM practices -> Operational performance	0.158	0.938	0.349
GSCM practices -> Organizational performance	-0.177	1.030	0.304
GSCM practices -> Relational efficiency	0.762***	14.674	0.000
Relational efficiency -> Environmental performance	0.047	0.269	0.788
Relational efficiency -> Operational performance	0.098	0.536	0.592
Relational efficiency -> Organizational performance	0.010	0.076	0.939
Environmental performance -> Operational performance	0.579***	5.169	0.000
Environmental performance -> Organizational performance	0.318**	2.049	0.041
Operational performance -> Organizational performance	0.604***	4.750	0.000

***$p < 0.001$, **$p < 0.05$ Source: Research Data, 2015

It can also be noted in Table 4.57 that, five of the ten structural paths are significant based on a two-tailed test at 5% level of significance. Five are not statistically significant; three of these involve relational efficiency and each of the three measures of performance. This is a strong indicator that relational efficiency may not be a significant mediating variable.

4.10.10Total Effect Analysis

The four driver constructs for organizational performance are the exogenous constructs on the left side of the SEM model. The findings shown in Table 4.58 indicate that seven out of ten hypothesized path relationships have significant total effects. It can also be noted that even though the direct relationship between GSCM practices and organizational performance was not significant (p-value = 0.304), this path relationship becomes significant when the total effect is considered (p-value = 0.003). Additionally, environmental performance (0.667) has the strongest total effect on organizational performance, followed by operational performance (0.604), GSCM practices (0.363) and relational efficiency (0.100).

Table 4.58: Total Effect Analysis

Hypothesized Path Relationship	Total Effect	T Statistics	P Values
GSCM practices -> Environmental performance	0.587***	6.162	0.000
GSCM practices -> Operational performance	0.573***	7.082	0.000
GSCM practices -> Organizational performance	0.363**	2.963	0.003
GSCM practices -> Relational efficiency	0.762***	14.674	0.000
Relational efficiency -> Environmental performance	0.047	0.269	0.788
Relational efficiency -> Operational performance	0.125	0.621	0.535
Relational efficiency -> Organizational performance	0.100	0.476	0.634
Environmental performance -> Operational performance	0.579***	5.169	0.000
Environmental performance -> Organizational performance	0.667***	4.913	0.000
Operational performance -> Organizational performance	0.604***	4.750	0.000

***p < 0.001, **p < 0.05 Source: Research Data, 2015

The three hypothesized path relationships that have statistically insignificant total effects include relational efficiency and environmental performance (p-value = 0.788), relational efficiency and operational performance (p-value = 0.535) and relational efficiency and organizational performance (p-value = 0.634). This finding further reinforces the fact that the relational efficiency is not a significant mediating variable.

4.11 GSCM Practices, Firm Characteristics and Organizational Performance

The fifth objective sought to establish whether specific firm characteristics moderate the relationship between GSCM practices and organizational performance. All the six GSCM practices were aggregated into one variable. The same was done for the organizational performance variable. The firm characteristic variables included size of the firm expressed in terms of number of full time employees, number of years the firm had been in operation and the scope of the market served by the firm (dummy variable). The descriptive statistics for all the variables used in this analysis are shown in Table 4.59.

Table 4.59: Descriptive Statistics for GSCM practices, Organizational Performance and Firm Characteristics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Organizational performance	64	1.222	5.000	3.010	0.819
GSCM practices	64	2.228	4.493	3.465	0.465
Firm characteristics					
Number of full time employees	64	25	7300	1437	1908
Number of years in operation	64	4	120	42.86	20.09
Scope of market served by the firm	64	0	1	0.906	0.294

Source: Research Data, 2015

Moderated regression analysis using the variance partitioning procedure outlined by Jaccard et al. (1990) was followed. The analysis was done in three steps. First, the combined GSCM practices variable was entered into the regression model. Second, the specific firm characteristic moderator was entered. Finally, the interaction term of GSCM practices and the moderators was entered. If the interaction term contributed to a significant incremental variance in organizational performance as indicated by the incremental F-statistic, then there is evidence of moderation (Dean & Snell 1991; Zhu & Sarkis, 2004).

In order to reduce the effects of multicollinearity between the firm characteristics variables and the corresponding interaction term with the GSCM practices variable, all the predictor variables were first standardized. When this was done, all variance inflation factors (VIF) became acceptable, that is, they are all are less than the threshold of 5. The following subsections explain the moderating effect of each of the firm characteristics variable on the relationship between GSCM practices and organizational performance.

4.11.1 GSCM Practices, Firm Size and Organizational Performance

Table 4.60 presents the results for hierarchical regression analysis with the firm's size as the moderator. The analysis was done in three steps. First, the GSCM practices variable was entered into the regression model. Second, the firm's size was entered. Finally, the interaction term of GSCM practices and firm size was entered.

Table 4.60: Results of Hierarchical Regression with Firm Size as Moderator

	Organizational Performance (n=64)		
Variable entered	**Step 1**	**Step 2**	**Step 3**
(Constant)	3.010***	3.010***	3.019***
GSCM practices	0.303**	0.294**	0.281**
Number of full time employees		0.159	0.150
GSCM*SIZE			-0.158*
R	0.369***	0.417***	0.460***
Adjusted R squared	0.122	0.147	0.172
F for the regression	9.783**	6.421**	5.369**
F Change	9.783***	2.778**	2.873*

***p<0.001, **p<0.05,*p<0.10 Source: Research Data, 2015

Findings show that the correlation coefficient remains significant at 0.001 for all the three steps. The percentage of variability accounted for in organizational performance went up from 12.2% to 14.7% when the variable size was added. This further increased to 17.2% when the interaction term between the GSCM practices and size was added. The incremental F for the step introduction of the interaction term is partially significant at 10% significance level for organizational performance variable (p-value = 0.095). However, the beta is negative. Explanations for this outcome are provided in section 5.7.

The overall observation is that even though the model remains significant as indicated by F (F = 5.369, p-value = 0.002), the firm size has a slight negative moderating effect above and beyond the effect of GSCM practices. The interaction term of GSCM practices and firm size is slightly negatively significant at 0.1 level (t = -1.695, p-value = 0.095).

4.11.2 GSCM Practices, Firm Age and Organizational Performance

This analysis was also done in three steps. First, the GSCM practices variable was entered into the regression model. Second, the firm's age was entered. Finally, the interaction term of GSCM practices and firm's age was entered. Table 4.61 shows the results.

Table 4.61: Results of Hierarchical Regression with Firm's Age as Moderator

	Organizational Performance (n=64)		
Variable entered	**Step 1**	**Step 2**	**Step 3**
(Constant)	3.010***	3.010***	3.039***
GSCM practices	0.303**	0.297**	0.327**
Number of years in operation		0.031	0.078
GSCM*AGE			-0.160
R	0.369***	0.371**	0.415***
Adjusted R squared	0.122	0.109	0.131
F for the regression	9.783**	4.871**	4.166**
F Change	9.783***	0.101	2.516

***p<0.001, **p<0.05,*p<0.10 Source: Research Data, 2015

The coefficient of correlation for steps 1 and 3 are significant at 0.001 while that of step 2 is significant at 5% level of significance. The proportion of variation explained decreased from 12.2% to 10.9% when the variable firm age was added. This figure increased to 13.1% when the interaction term between GSCM practices and firm age was added. The incremental F for step 2 (incremental F = 0.101, p-value = 0.752) and 3 (incremental F = 2.516, p-value = 0.118) are both statistically insignificant at 5% significance level.

The overall observation is that even though the model remains significant as indicated by F (F = 4.166, p-value = 0.010), the variable firm age does not have an effect above and beyond the effects of GSCM practices on organizational performance. The interaction term of GSCM practices and firm age is insignificant (t = -1.586, p-value = 0.118).

4.11.3 GSCM Practices, Market Scope Served by Firm and Organizational Performance

As was the case with the variables firm size and age, the analysis for the variable market scope served by firm was also done in three steps. This variable is a dummy variable with 0 representing a firm that serves the local market and 1 representing a firm that serves the global market. Table 4.62 shows the findings for the hierarchical regression analysis with the market scope as the moderating variable.

Table 4.62: Results of Hierarchical Regression with Market Scope as Moderator

	Organizational Performance (n=64)		
Variable entered	**Step 1**	**Step 2**	**Step 3**
(Constant)	3.010***	3.010***	2.980***
GSCM practices	0.303**	0.289**	0.307**
Scope of market served by the firm		-0.075	0.014
GSCM*MKTSCOPE			-0.163
R	0.369***	0.380**	0.411***
Adjusted R squared	0.122	0.116	0.128
F for the regression	9.783**	5.142**	4.074**
F Change	9.783***	0.569	1.803

***p<0.001, **p<0.05,*p<0.10 Source: Research Data, 2015

The coefficient of correlation for steps 1 and 3 are significant at 0.001 while that of step 2 is significant at 5% level of significance. The variance in organizational performance accounted for decreased from 12.2% to 11.6% when the variable market scope was added. This figure increased to 12.8% when the interaction term between GSCM practices and market scope was added - not much of an increase. The incremental F (0.569) for step 2 with a p-value of 0.454 is statistically insignificant at 5% level of significance. The same finding also applies to the incremental F (1.803) for step 3 with a p-value of 0.184.

The interaction term of GSCM practices and market scope is insignificant (t = -1.343, p-value = 0.184) at 5% level of significance. The overall observation is that even though the model remains significant as indicated by F (F = 4.074, p-value = 0.011), the variable market scope does not have an effect above and beyond the effects of GSCM practices on organizational performance.

4.12 Summary

In this chapter, the results of statistical analysis were reported. Response rate, demographic characteristics of respondent firms and descriptive statistics are discussed in details. Exploratory factor and reliability analyses were performed in order to assess construct validity and reliability. KMO measure of sampling adequacy and Bartlett's test of Sphericity were also scrutinized to assess factorability of the items of each latent construct. In data analysis, first, ordered probit analysis is performed to establish the institutional pressures that cause firms to implement GSCM practices. Second, PLS-SEM analysis with Smart PLS 3.0 was conducted to test hypotheses from the research model. Finally, the moderating effect of firm characteristics variables; size, age and spatial scope of market served by firm, on the relationship between GSCM practices and organizational performance are assessed using moderated regression analysis.

CHAPTER FIVE

TEST OF HYPOTHESES, INTERPRETATIONS AND DISCUSSIONS

5.1 Introduction

The central theme of this study was to establish the relationship between the implementation of GSCM practices and performance of ISO 14001 certified manufacturing firms in East Africa. In order to answer the research questions, a conceptual model and a set of hypotheses were developed. The proposed model integrated a total of seven latent constructs which were operationalized from literature. These constructs included; Institutional pressures for GSCM practices implementation, GSCM practices, firm characteristics, relational efficiency, environmental performance, operational performance and organizational performance.

The analysis started by confirming the reliability and validity of the latent constructs. This was done by performing exploratory factor analysis to each of the seven latent constructs in order to evaluate the unidimensionality of the constructs. The indicators of the constructs that were found to have low factor loadings and item to total correlation scores were dropped before further analysis was done. The descriptive statistics were then determined. This was followed by further analysis of the refined data to achieve the five study objectives using three data analysis techniques; ordered probit, PLS-SEM and moderated regression analyses.

This chapter therefore builds from the preceding research results and provides the results of the tests of hypotheses and analyses and the interpretation of relationships among the seven latent constructs in the conceptual framework in five major sections: Institutional pressures for GSCM practices implementation; GSCM practices and organizational performance; GSCM practices, environmental performance, operational performance and organizational performance; GSCM practices, relational efficiency, environmental performance, operational performance and organizational performance; and GSCM practices, firm characteristics and organizational performance.

5.2 Institutional Pressures for GSCM Implementation

The first objective of this study was to establish the institutional pressures that cause manufacturing firms to implement GSCM practices. A review of the literature identified three sources of institutional pressures for GSCM practices implementation which include coercive, mimetic and normative pressures. Coercive pressures come from the influence of those in power, for example, government agencies which enact laws that the firms are expected to adhere to. Mimetic pressures occur when a firm imitates the actions of competitors considered successful. Normative pressures are exerted by external stakeholders who have vested interest in the firm. These stakeholders include customers, shareholders, employees, suppliers, environmental organizations, community groups, labor unions and trade associations. It was anticipated that all the three sources would be significant in pressurizing the firms to implement GSCM practices. Therefore, the following hypothesis was tested:

H_1: Institutional pressures encourage a firm to implement GSCM practices.

Three sub hypotheses ($H_{1a,}$ H_{1b} and H_{1c}) were derived from this hypothesis. In order to test these hypotheses, Spearman's rank correlation coefficients were obtained to determine the significance of the relationship between individual institutional pressures and GSCM practices implementation. This was followed by ordered probit analysis. The initial ordered probit model had five control variables but three were dropped because they were found not to be significant. This resulted in a refined statistically significant model with a likelihood ratio chi-square of 82.85 (p-value of 0.000) and a satisfactory pseudo-R-squared of 0.6916. In addition, the effect of dropping each of the three institutional pressure variables from the ordered probit model was evaluated using the likelihood ratio test. The following subsections discuss the findings of tests of the sub-hypotheses.

5.2.1. Influence of Coercive Pressures on GSCM Practices Implementation

The following sub-hypothesis was tested.

> H_{1a}**:** Coercive institutional pressures encourage a firm to implement GSCM practices.

The hypothesis predicted that coercive institutional pressures are significant in pressurizing firms to implement GSCM practices. Review of literature identified three sources of these pressures. These include domestic environmental regulations, Government environmental policy and international environmental agreements (for example, Kyoto Agreement, Climate Change Treaty, Montreal Protocol). Preliminary correlation analysis using Spearman's correlation revealed a significant relationship between coercive pressures and GSCM practices implementation ($r = 0.734$, $p< 0.01$). Further analysis using ordered probit analysis indicated that the coefficient for coercive pressures was statistically significant with a z statistic of 3.14 and p-value of 0.002.

To determine the effect of removing the coercive institutional pressure variable from the model, the likelihood ratio test was conducted to establish whether the observed difference in model fit was statistically significant. The log likelihood for the model with all the three institutional pressure variable and two control variables was found to be -18.473156. The log likelihood for the model when coercive institutional pressure variable is dropped is -28.833458. The log likelihood test statistic value is 20.721. If this likelihood ratio test statistic is compared to the critical chi-square at 5% level of significance, one degree of freedom which is 3.841, it is found that the model fit will change significantly when coercive pressures is dropped from the model since its log likelihood test statistic (20.721) is much greater than the critical chi-square of 3.841. These findings provide support for hypothesis 1a which states that coercive institutional pressures encourage a firm to implement GSCM practices.

5.2.2. Influence of Mimetic Pressures on GSCM Practices Implementation

The sub-hypothesis which states as follows was tested:

> H_{1b}**:** Mimetic institutional pressures encourage a firm to implement GSCM practices.

The hypothesis predicted that mimetic institutional pressures are significant in pressurizing firms to implement GSCM practices. The respondents were asked to indicate the extent to which local, national, regional and global competitors had influenced them to implement GSCM practices. The relationship between mimetic pressures and GSCM practices implementation was found to be insignificant with a Spearman's rank correlation coefficient of 0.267. Further analysis using ordered probit analysis indicated that the coefficient for mimetic pressures was statistically insignificant with a z statistic of 0.84 and p-value of 0.401.

When mimetic institutional pressure variable is removed from the model, the log likelihood for the model changes from -18.473156 to -18.843669. This change resulted in a log likelihood test statistic value of 0.741. If this likelihood ratio test statistic is compared to the critical chi-square at 5% level of significance, one degree of freedom which is 3.841, it is found that the model fit will not change significantly when mimetic pressures is dropped from the model since its log likelihood test statistic (0.741) is less than the critical chi-square of 3.841. From these findings, hypothesis 1b which states that mimetic institutional pressures encourage a firm to implement GSCM practices is not supported.

5.2.3. Influence of Normative Pressures on GSCM Practices Implementation

The following sub-hypothesis was tested:

> H_{1c}**:** Normative institutional pressures encourage a firm to implement GSCM practices.

This hypothesis predicted that normative institutional pressures are significant in pressurizing firms to implement GSCM practices. Preliminary correlation analysis revealed a significant Spearman's Rank correlation coefficient in a relationship between normative pressures and GSCM practices implementation ($r = 0.708$, $p< 0.01$). The ordered probit model further revealed that normative pressures variable was statistically significant with a z-statistic of 2.37 and p-value = 0.018.

In order to establish if the observed difference in model fit would change significantly as a result of dropping the normative institutional pressures variable from the model, the likelihood ratio test was conducted. The log likelihood for the model changed from -18.473156 to -23.806006. This resulted in a log likelihood test statistic value of 10.666. This value is greater than the critical chi-square at 5% level of significance, one degree of freedom (3.841). This implies that the model fit will change significantly when normative pressures is dropped from the model. Thus, hypothesis 1c which states that normative institutional pressures encourage a firm to implement GSCM practices is supported.

5.3 GSCM Practices and Organizational Performance

The second objective sought to determine whether a direct relationship exists between GSCM practices and organizational performance. In order to answer the research question, a structural model and a hypothesis were developed. The model integrated one exogenous latent construct, GSCM practices and one endogenous latent construct, organizational performance. This structural model is presented in Figures 4.1 and 4.2. The path between the two latent constructs represents hypothesis 2 which is stated as follows:

> H_2**:** Implementation of GSCM practices has a positive effect on the organizational performance.

This hypothesis predicted a significant positive relationship between GSCM practices and organizational performance. To test this hypothesis, 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 outer model loadings were found to be significant with all indicator reliability values being greater than the minimum acceptable level of 0.4 (Wong, 2013). 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 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, $f^2 = 0.166$). Cohen (1992) gave the guidelines for assessing f^2 values as follows; if f^2 value is 0.02 then the effect size is small; if it is 0.15, then the effect size is medium and if the f^2 value is 0.35, then the effect size is large. This means that, if GSCM practices is omitted from the model the change in variance explained in organizational performance will be medium. From these results, hypothesis 2 is therefore supported implying that implementation of GSCM practices has a significant positive effect on the organizational performance.

5.4 GSCM Practices, Environmental Performance, Operational Performance and Organizational Performance

The third objective sought to establish the mediating effect of environmental and operational performance on the relationship between GSCM practices and organizational performance. In order to achieve this objective, a structural model that incorporates four latent constructs was estimated. These constructs included one exogenous construct, GSCM practices and three endogenous constructs; environmental performance, operational performance and organizational performance. Two of the three endogenous constructs, environmental performance and operational performance had an intervening effect in the structural model. The paths between the latent constructs represent each hypothesis.

All the measurement items for the four latent constructs were found to have individual indicator reliability scores greater than the threshold of 0.4. 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 all the four 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.

Discriminant validity was evaluated using Fornell-Larcker and Heterotrait-Monotrait criteria. HTMT values computed for each pair of constructs for all the constructs were found to be below 0.9. Both the outer and inner models were also assessed for collinearity where it was established that all the VIF values were below 5. In checking predictive relevance, it was determined that the Q^2 values for all endogenous constructs were larger than 0 indicating a good SEM model. SRMR was determined as 0.081. This value is very close to 0.08 indicating a model with good overall fit. Further, bootstrapping results with 500 resamples established that this SRMR ($t = 4.585$, p-value $= 0.000$) is statistically significant at 0.001 level of significance. The final model is presented in Figures 4.4 and 4.5.

The findings revealed that GSCM practices, environmental performance and operational performance explain 59% of the variance in organizational performance. This is a big improvement in variance explained (from 14.2% to 59%) compared to variance explained when environmental and operational performance are excluded from the model. GSCM practices accounted for 34.9% of the variation in environmental performance while GSCM practices and environmental performance all explain 55% of the variance in operational performance. The inner model suggests that the hypothesized path relationships among the latent constructs in the model produced the findings in Table 5.1. The significance of the path coefficients were assessed using bootstrapping with 500 resamples (Chin, 1998; Musuva-Musimba, 2013).

Table 5.1: Significance of Path Coefficient in the Model

Hypothesized Path Relationship	Path Coefficient	P Values	Effect size - f^2
GSCM practices -> Environmental performance	0.591***	0.000	0.536
GSCM practices -> Operational performance	0.227**	0.014	0.075
GSCM practices -> Organizational performance	-0.172	0.179	0.044
Environmental performance -> Operational performance	0.584***	0.000	0.493
Environmental performance -> Organizational performance	0.320**	0.036	0.109
Operational performance -> Organizational performance	0.604***	0.000	0.401

**p < 0.001, **p < 0.05 Source: Research Data, 2015

The hypothesis to be tested to achieve objective three predicted that environmental performance and operational performance mediate the relationship between GSCM practices and organizational performance. In order to test the hypothesis, five sub hypotheses (H_{3a}, H_{3b}, H_{3c}, H_{3d} and H_{3e}) were tested using PLS analysis. This was followed by mediation analysis for multiple mediators using Baron and Kenny (1986) approach. The results for tests of the sub hypotheses are discussed in the following subsections.

5.4.1 Hypothesized Effect of GSCM Practices on Environmental Performance

H_{3a}: Implementation of GSCM practices by a firm has a positive effect on its environmental performance.

This hypothesis predicted a positive relationship between GSCM practices and environmental performance. The PLS-SEM analysis results indicated that implementation of GSCM practices by a firm has a significant positive effect on its environmental performance with the path coefficient (β = 0.551) being statistically significant at the 0.05 level of significance (t = 6.939, p-value = 0.004). The effect size (f^2) was 0.536 which is very large based on Cohen (1992) guidelines. Thus, hypothesis H3a which stated that there is a positive relationship between GSCM practices and environmental performance is supported.

5.4.2 Hypothesized Effect of GSCM Practices on Operational Performance

H_{3b}: Implementation of GSCM practices by a firm has a positive effect on its operational performance.

This hypothesis predicted that the relationship between GSCM practices and operational performance is positive. The partial least squares SEM analysis results show that the relationship between GSCM practices and operational performance is statistically significant at 0.05 level (β = 0.227, t = 2.476, p-value = 0.014). The effect size (f^2) was found to be 0.075. based on Cohen (1992) guidelines, this is considered small. Therefore, hypothesis 3b which states that there is a positive relationship between GSCM practices and operational performance is supported.

5.4.3 Hypothesized Effect of Environmental Performance on Operational Performance

H_{3c}: The environmental performance of the firm has a positive effect on its operational performance.

This hypothesis predicted a positive relationship between the environmental performance and the operational performance of a firm. The PLS-SEM analysis results show that the relationship between environmental and operational performance is significant at 0.001 level of significance ($\beta = 0.584$, $t = 5.125$, p-value = 0.000). The effect size (f^2) was established as 0.493 which was large. Based on these results, hypothesis 3c which states that there is a positive relationship between the environmental and operational performance is strongly supported.

5.4.4 Hypothesized Effect of Environmental Performance on Organizational Performance

H_{3d}: The environmental performance of the firm has a positive effect on its organizational performance.

Hypothesis 3d predicted a positive relationship between the environmental performance and organizational performance. PLS-SEM analysis results established that the path coefficient of 0.320 is significant at the 0.05 level ($t = 2.097$, p-value = 0.036). The effect size (f^2) was found to be 0.109 which according to Cohen (1992) is categorized as medium. These findings provide support for hypothesis 3d which states that there is a positive relationship between the firm's environmental performance and organizational performance.

5.4.5 Hypothesized Effect of Operational Performance on Organizational Performance

H_{3e}: The Operational performance of the firm has a positive effect on its organizational performance.

Hypothesis 3e predicted a positive relationship between the operational performance and the organizational performance. Partial least squares SEM analysis results found a path coefficient of 0.604 for this relationship with a p-value of 0.000 ($t = 5.148$), implying a statistically significant relationship at 0.001 level. The effect size (f^2) is 0.401 which indicates that if operational performance was to be excluded from the model, then the change in variance explained on organizational performance would be very large (Cohen, 19992). These outcomes provide very strong support for hypothesis 3e which states that there is a positive relationship between the operational performance of a firm and its organizational performance.

5.4.6 Mediating Effect of Environmental Performance and Operational Performance on GSCM Practices and Organizational Performance

H_3: Environmental performance and operational performance mediate the relationship between GSCM practices and organizational performance.

This hypothesis predicted that the implementation of GSCM practices would result in improved organizational performance if the environmental performance and operational performance are enhanced. To examine the mediating effects of environmental and operational performance on the relationship between GSCM practices implementation and organizational performance, the PLS-SEM analysis was adopted following Baron and Kenny (1986) approach. Bootstrapping was used to determine the strength and significance of the mediation.

Initially, the direct effect of GSCM practices implementation on organizational performance was determined without any mediators (β = 0.377, t = 3.782, p-value = 0.000). This relationship was found to be significant at a significance level of 0.001. Next the two mediators, environmental performance and operational performance were added and the direct and indirect effects determined. A statistically insignificant path coefficient of -0.172 (t = 1.347, p-value = 0.179) was established for the direct effect.

Meanwhile, tests of hypotheses revealed that GSCM practices implementation was significantly and positively related to environmental performance (β = 0.591, t = 6.939, p-value = 0.000) and operational performance (β = 0.227, t = 2.746, p-value = 0.014). The findings also presented that environmental performance (β = 0.320, t = 2.097, p-value = 0.036) and operational performance (β = 0.604, t = 5.148, p-value = 0.000) have a positive and statistically significant relationship with organizational performance. The indirect effect was found to be significant at 0.001 level with a path coefficient of 0.535 (t = 4.973, p-value = 0.000). The variance accounted for (VAF) was 147.38%. This information provides support for hypothesis 3 which states that environmental performance and operational performance fully mediate the relationship between GSCM practices and organizational performance. Details of these computations are shown in Table 5.2.

Table 5.2: Mediating Effect of Environmental and Operational Performance on GSCM Practices and Organizational Performance

Direct Path	Direct without mediation	Direct with mediation	Mediated Path	Path Coefficient	T-statistic	Indirect Effect	Significance of Indirect Effect	Total Effect	Variance Accounted For (VAF)
GSCM - ORP	0.377***	-0.172 ns	GSCM - EP	0.591***	6.939	0.535***	4.973	0.363	147.38%
			EP - ORP	0.320**	2.097				
			EP - OPP	0.584***	5.125				
			GSCM - OPP	0.227**	2.476				
			OPP - ORP	0.604***	5.148				

***p < 0.001, **p < 0.05, ns – not significant

Source: Research Data, 2015

5.5 GSCM Practices, Relational Efficiency, Environmental Performance, Operational Performance and Organizational Performance

Objective number four sought to determine the mediating effect of relational efficiency on the relationships between GSCM practices and environmental performance, GSCM practices and operational performance and GSCM practices and organizational performance. This objective was pursued by estimating a structural model with one exogenous latent construct, GSCM practices and four endogenous latent constructs; relational efficiency, environmental performance, operational performance and organizational performance. Three of the four endogenous latent constructs had an intervening effect in the model.

The model was first checked for validity and reliability before interpretation of the PLS-SEM. results was done. All the indicators of the five latent constructs had individual indicator reliability scores larger than 0.4 and loaded highly and significantly on their associated constructs thus confirming convergent and discriminant validity of the outer model. Internal consistency reliability of all the five latent constructs in the inner model was established since all composite reliability values were greater than 0.6 and Cronbach's Alpha scores were greater than the threshold of 0.7. All AVE scores of the constructs in the inner model were found to be greater 0.5 thus ensuring convergent validity.

Fornell-Larcker and HTMT criteria were used as additional measures to ensure discriminant validity of the five constructs in the structural model. Multicollinearity may be a serious problem in PLS-SEM analysis if it is present. To check presence of multicollinearity, VIF and tolerance levels were obtained for the elements in both the inner and the outer models. It was established that all the VIF values for the elements were below the recommended level of 5 and all tolerance levels were above 0.2. This ensured that multicollinearity was not a problem in this model. Q^2 values for all endogenous latent constructs were found to be greater than 0 thus confirming predictive relevance. Overall, the model was found to have a good fit with a standardized root mean square residual of 0.086 which was found to be significant at 0.001 level of significance (t = 3.770, p-value = 0.000). The final model is presented in Figures 4.7 and 4.8.

PLS-SEM analysis results established that GSCM practices, relational efficiency, environmental performance and operational performance explain 59% of the variance in organizational performance. The figure is the same as the one in the earlier model, that is, when relational efficiency is excluded from the model. Thus it can be said that relational efficiency does not result in an increase in variance explained in organizational performance. The findings also revealed that GSCM practices account for 58% of the variance in the relational efficiency. GSCM practices and relational efficiency explain 34.5% of the variation in environmental performance while GSCM practices, relational efficiency and environmental performance all account for 55.4% of the variance in operational performance.

The inner model suggested that the hypothesized path relationship between GSCM practices and relational efficiency (0.762) is statistically significant with a p-value of 0.000. However, the path coefficients between relational efficiency and environmental performance (0.047), relational efficiency and operational performance (0.098) and relational efficiency and organizational performance (0.010) were all found to be statistically insignificant with p-values of 0.788, 0.592 and 0.939 respectively as shown in Table 5.3. These path coefficients still remain statistically insignificant even when the total effect is taken into consideration, another strong pointer that relational efficiency is not a significant mediator.

Table 5.3: Significance of Path Coefficients Involving Relational Efficiency

Hypothesized Path Relationship	Path Coefficient	P Values	Effect size - f^2
GSCM practices -> Relational efficiency	0.762***	0.000	1.384
Relational efficiency -> Environmental performance	0.047	0.788	0.001
Relational efficiency -> Operational performance	0.098	0.592	0.009
Relational efficiency -> Organizational performance	0.010	0.939	0.000

**p < 0.001, **p < 0.05 Source: Research Data, 2015

These results provided the basis for testing hypothesis 4 which predicted that relational efficiency mediates the relationships between GSCM practices and environmental performance, GSCM practices and operational performance and GSCM practices and organizational performance. In order to test the hypothesis, four sub hypotheses (H_{4a}, H_{4b}, H_{4c} and H_{4d}) were tested using PLS-SEM analysis. This was followed by mediation analysis. The results for the tests are discussed in the following subsections.

5.5.1 Hypothesized Effect of GSCM practices on Relational Efficiency

> H_{4a}: Implementation of GSCM practices by a firm has positive effect on its relational efficiency.

Hypothesis 4a predicted a positive relationship between implementation of GSCM practices and relational efficiency. Partial least squares SEM analysis results found a path coefficient of 0.762 for this relationship with a p-value of 0.000, implying a statistically significant relationship at 0.001. The effect size (f^2) is 1.384 which indicates that if GSCM practices construct was to be excluded from the model, then the effect size on relational efficiency would be very large (Cohen, 1992). Thus, hypothesis 4a which states that there is a positive relationship between GSCM practices and relational efficiency with suppliers, customers and other members of the supply chain is supported.

5.5.2 Hypothesized Effect of Relational Efficiency on Environmental Performance

H_{4b}: Relational efficiency of the firm with its supply chain partners is positively related to its environmental performance.

This hypothesis predicted a positive relationship between relational efficiency and environmental performance. PLS-SEM analysis results show that the relationship between relational efficiency and the environmental performance is insignificant at 0.05 level of significance ($\beta = 0.047$, $t = 0.269$, p-value = 0.788). The effect size was found to be 0.001 which was very small. Therefore, hypothesis 4b which states that there is a positive relationship between the relational efficiency of the firm with its supply chain partners and its environmental performance is not supported.

5.5.3 Hypothesized Effect of Relational Efficiency on Operational Performance

H_{4c}: Relational efficiency of the firm with its supply chain partners is positively related to its operational performance.

This hypothesis predicted a positive relationship between relational efficiency and operational performance. PLS-SEM analysis findings reveal that the relationship between relational efficiency and the operational performance is insignificant at 0.05 level of significance ($\beta = 0.098$, $t = 0.536$, p-value = 0.592). The effect size was found to be 0.009 which was very small. Therefore, hypothesis 4c which states that there is a positive relationship between the relational efficiency of the firm with its supply chain partners and its operational performance is not supported.

5.5.4 Hypothesized Effect of Relational Efficiency on Organizational Performance

H_{4d}: Relational efficiency of the firm with its supply chain partners is positively related to its organizational performance.

Hypothesis 4d predicted a positive relationship between relational efficiency and the organizational performance. Partial least squares SEM analysis results found a path coefficient of 0.010 for this relationship with a p-value of 0.939 (t = 0.076), implying a statistically insignificant relationship at 0.05. The effect size (f^2) is 0.000 which indicates that if relational efficiency construct was to be excluded from the model, then the change in variance explained in organizational performance would be zero. This is a strong pointer that the latent construct, relational efficiency, is not a significant mediating variable between GSCM practices and organizational performance. Thus, hypothesis 4d which states that there is a positive relationship between the relational efficiency of the firm with its supply chain partners and its organizational performance is not supported.

5.5.5 Mediating Effect of Relational Efficiency on GSCM Practices and Performance

The following three sub-hypotheses were tested:

H_{4e}: Relational Efficiency mediates the relationship between GSCM practices and environmental performance.

H_{4f}: Relational Efficiency mediates the relationship between GSCM practices and operational performance.

H_{4g}: Relational Efficiency mediates the relationship between GSCM practices and organizational performance.

The strength and significance of the effect of the mediator relational efficiency was determined by employing two approaches; bootstrapping and the Sobel Tests. The results of bootstrapping (which used 500 resamples with replacements) are as follows; First, relational efficiency does not mediate the relationship between GSCM practices and environmental performance as indicated by a path coefficient of 0.035 ($t = 0.251$, p-value = 0.802). Thus hypothesis 4e is not supported. Second, relational efficiency does not mediate the relationship between GSCM practices and operational performance ($\beta = 0.076$, $t = 0.531$, p-value = 0.608), hence hypothesis 4f is not supported. Finally, relational efficiency does not mediate the relationship between GSCM practices and organizational performance ($\beta = 0.071$, $t = 0.441$, p-value = 0.660), therefore hypothesis 4g is not supported. These details of computations are presented in Table 5.4.

Using the Sobel test, the path coefficient of the direct relationship without mediation between the dependent and independent variables was first obtained. Secondly, the path coefficient of the direct relationship with mediation was obtained. The Sobel test statistic was then computed using four values; the path coefficient and standard error of the independent variable – mediator relationship, and the path coefficient and standard error of the mediator – dependent variable relationship. This resulted in a Sobel test statistic and p-value to determine the strength of the mediation. The results for the three Sobel's tests confirm the results obtained from bootstrapping implying that hypotheses 4e, 4f and 4g are not supported. This means that relational efficiency is not a significant mediator of the relationships between GSCM practices and environmental performance, GSCM practices and operational performance and GSCM and organizational performance. These results are presented in Table 5.5

Table 5.4: Bootstrapping Results for Mediation

Direct Path	Direct without mediation	Direct with mediation	Mediated Path	Path Coefficient	T-statistic	Indirect Effect	Significance of Indirect Effect	Total Effect	Variance Accounted For (VAF)
GSCM - EP	0.597***	0.554**	GSCM - RE	0.765***	14.388	0.035 ns	0.251	0.588	5.95%
			RE - EP	0.045 ns	0.254				
GSCM - OPP	0.594***	0.514**	GSCM - RE	0.768***	16.500	0.076 ns	0.531	0.59	12.88%
			RE - OPP	0.099 ns	0.521				
GSCM - ORP	0.377***	0.303 ns	GSCM - RE	0.768***	15.814	0.071 ns	0.441	0.374	18.98%
			RE - ORP	0.092 ns	0.448				

***p < 0.001, **p < 0.05, ns – not significant

Source: Research Data, 2015

Table 5.5: Sobel Test Results for Mediation

Direct Path	Direct without mediation	Direct with mediation	Mediated path	Path Coefficient	Standard Error	Sobel Test Statistic	P-value (2 tailed)
GSCM - EP	0.597***	0.554**	GSCM - RE	0.765***	0.053	0.254 ns	0.799
			RE - EP	0.045 ns	0.177		
GSCM - OPP	0.594***	0.514**	GSCM - RE	0.768***	0.047	0.524 ns	0.601
			RE - OPP	0.099 ns	0.189		
GSCM - ORP	0.377***	0.303 ns	GSCM - RE	0.768***	0.049	0.446 ns	0.655
			RE - ORP	0.092 ns	0.206		

***p < 0.001, **p < 0.05, ns – not significant

Source: Research Data, 2015

5.6 GSCM Practices, Firm Characteristics and Organizational Performance

The fifth objective sought to establish whether specific firm characteristics moderate the relationship between GSCM practices and organizational performance. The literature review and theoretical reasoning led to the belief that all the three specific firm characteristic variables would moderate the relationship between implementation of GSCM practices and organizational performance. The firm characteristic variables considered included size of the firm, age of the firm and scope of the market served by the firm. It was predicted that these firm characteristics would have a positive and significant moderating effect on the relationship between GSCM practices and organizational performance. Hence, the following broad hypothesis was tested:

> H_5: The firm characteristics positively moderate the relationship between GSCM practices and organizational performance.

Three sub-hypotheses; H_{5a}, H_{5b} and H_{5c} were derived from this hypothesis. Moderated regression analysis using the variance partitioning procedure was employed to test each of the sub-hypothesis. The analyses were done in three steps. All the six GSCM practices were aggregated into one variable. The same was done for the organizational performance variable. Before performing the analysis, the predictor variables were standardized in order to reduce the numerical instability associated with multicollinearity. The following subsections explain the moderating effect of each of the firm characteristic variables on the relationship between GSCM practices and organizational performance.

5.6.1. Moderating Effect of Firm Size on the Relationship between GSCM Practices and Organizational Performance

The following sub-hypothesis was tested:

> H_{5a}: The firm's size positively moderates the relationship between GSCM practices and organizational performance.

This hypothesis predicted that firm size measured by the number of full-time employees positively moderates the relationship between GSCM practices and organizational performance. Moderated regression analysis results show that the correlation coefficient remains significant at 0.001 for all the three steps. Adjusted R^2 changed from 12.2% to 14.7% when the variable size was added. This increased to 17.2% when the interaction term between the GSCM practices and size is added.

The incremental F for the step introduction of the interaction term is partially significant at 10% level of significance (Incremental F = 2.873, p-value = 0.095). The interaction term of GSCM practices and firm size is slightly negatively significant at 0.1 level (t = -1.695, p-value = 0.095). Thus, Hypotheses 5a is opposite the hypothesized relationship. This means that, hypothesis 5a which states that the firm size positively moderates the relationship between GSCM practices and organizational performance is not supported.

5.6.2. Moderating Effect of Firm Age on the Relationship between GSCM Practices and Organizational Performance

The following sub-hypothesis was tested:

> H_{5b}: The firm's age positively moderates the relationship between GSCM practices and organizational performance.

This hypothesis predicted that the firm's age measured by the number of years the firm had been in operation positively and significantly moderates the relationship between GSCM practices and organizational performance. The findings of moderated regression analysis revealed that the coefficient of correlation for steps 1 (R = 0.369) and 3 (R = 0.415) are significant at 0.001 while that of step 2 (R = 0.371) is significant at 0.05 level of significance. Adjusted R^2 declined from 12.2% to 10.9% when the variable firm age is added. This figure increased to 13.1% when the interaction term between GSCM practices and firm age was added.

The incremental F for step 2 (incremental F = 0.101, p-value = 0.752) and 3 (incremental F = 2.516, p-value = 0.118) are both statistically insignificant at 5% significance level. The interaction term of GSCM practices and firm age is insignificant (t = -1.586, p-value = 0.118). From these findings it can be concluded that firm age does not have an effect above and beyond the effects of GSCM practices on organizational performance. Hypothesis 5b which states that firm's age positively moderates the relationship between GSCM practices and organizational performance is not supported.

5.6.3. Moderating Effect of Market Scope Served by Firm on the Relationship between GSCM Practices and Organizational Performance

The third sub-hypothesis to be tested stated as follows:

> H_{5c}: The spatial scope of market served by a firm moderates the relationship between GSCM practices and organizational performance.

The hypothesis predicted that the spatial scope of the market that is served by the firm positively and significantly moderates the relationship between GSCM practices and organizational performance. Spatial scope of the market was represented as a dummy variable with 0 representing firms that serve local markets and 1 representing firms that serve global markets. Moderated regression analysis results established that the coefficient of correlation for steps 1 and 3 were significant at 0.001 while that of step 2 is significant at 0.05. Adjusted R^2 reduced from 12.2% to 11.6% when the variable market scope is added and increased to 12.8% when the interaction term between GSCM practices and firm market scope is added.

The incremental F for step 2 (incremental F = 0.569, p-value = 0.454) and step 3 (incremental F = 1.803, p-value = 0.184) were both found to be statistically insignificant at 5% level of significance. The interaction term of GSCM practices and market scope is also insignificant (t = -1.343, p-value = 0.184). This means that the variable market scope does not have an effect above and beyond the effects of GSCM practices on organizational performance. It can thus be concluded that the scope of the market served by the firm does not moderate the relationship between GSCM practices and organizational performance. Thus, hypothesis 5c is not supported.

Table 5.6: Summary of Test of Hypotheses Results

Objective	Hypotheses	Results	Interpretation and Remark
Objective 1: Establish the institutional pressures for GSCM practices implementation among ISO 14001 certified manufacturing firms in East Africa.	**Hypothesis 1:** Institutional pressures encourage a firm to implement GSCM practices	Ordered probit model is statistically significant model with a likelihood ratio chi-square = 82.85, p-value of 0.000 and pseudo-R-squared = 0.6916.	
	H_{1a}: Coercive institutional pressures encourage a firm to implement GSCM practices	Spearman's r = 0.734, p< 0.001, coefficient is significant with z statistic of 3.14 and p-value of 0.002, LR statistic = 20.721 > 3.841 implying that model fit significantly changes if variable is dropped from model.	Hypothesis 1a is supported implying that coercive pressures are significant in causing a firm to implement GSCM practices.
	H_{1b}: Mimetic institutional pressures encourage a firm to implement GSCM practices	Spearman's r = 0.267, p> 0.05, coefficient is insignificant with z statistic of 0.84 and p-value of 0.401, LR statistic = 0.79<3.841 implying that if variable is dropped, model fit does not change significantly.	Hypothesis 1b is not supported implying that mimetic pressures are not significant in causing a firm to implement GSCM practices.
	H_{1c}: Normative institutional pressures encourage a firm to implement GSCM practices.	Spearman's r = 0.708, p< 0.001, coefficient is significant with z statistic of 2.37 and p-value of 0.018, LR statistic = 10.666 > 3.841, implying if variable is dropped, model fit significantly changes.	Hypothesis 1c is supported implying that normative pressures are significant in causing a firm to implement GSCM practices.
Objective 2: Establish the relationship between GSCM practices and organizational performance of ISO 14001 certified manufacturing firms in East Africa.	**Hypothesis 2:** Implementation of GSCM practices is positively related to the organizational performance.	SRMR = 0.056, p-value = 0.010, path coefficient = 0.377, t = 3.782, p-value = 0.000, f^2 = 0.166, r^2 = 0.142. The path coefficient is statistically significant at 0.001 level of significance.	Hypothesis 2 is supported. This implies a significant positive relationship between GSCM practices and organizational performance

Source: Research Data, 2015

Table 5.6: Summary of Test of Hypotheses Results (Continued)

Objective	Hypotheses	Results	Interpretation and Remark
Objective 3: Establish mediating effect of environmental performance and operational performance on the relationship between GSCM practices and organizational performance of ISO 14001 certified manufacturing firms in East Africa.	**Hypothesis 3:** Environmental performance and operational performance mediate the relationship between GSCM practices and organizational performance.	SRMR = 0.081, p = 0.000, r^2 = 0.59, indirect effect = 0.535, t = 4.973, p-value = 0.000. VAF = 147.38%. All the path coefficients in the model are significant.	Hypothesis 3 is supported implying that environmental performance and operational performance fully mediate the relationship between GSCM practices and organizational performance
	H_{3a}: Implementation of GSCM practices by a firm has a positive effect on its environmental performance.	Path coefficient = 0.551, t = 6.939, p-value = 0.004, f^2 = 0.536. The path coefficient is statistically significant at 0.05 level	Hypothesis 3a is supported implying a significant relationship between GSCM practices and environmental performance
	H_{3b}: Implementation of GSCM practices by a firm has a positive effect on its operational performance.	Path coefficient = 0.227, t = 2.476, p-value = 0.014, f^2 = 0.075. The path coefficient is statistically significant at 0.05 level	Hypothesis 3b is supported implying a significant relationship between GSCM practices and operational performance
	H_{3c}: The environmental performance of the firm has positive effect on its operational performance.	Path coefficient = 0.584, t = 5.125, p-value = 0.000, f^2 = 0.493. The path coefficient is statistically significant at 0.001 level	Hypothesis 3c is supported implying that there is a positive relationship between the environmental and operational performance.
	H_{3d}: The environmental performance of the firm has a positive effect on its organizational performance.	Path coefficient = 0.320, t = 2.097, p-value = 0.036, f^2 = 0.109. The path coefficient is statistically significant at 0.05 level	Hypothesis 3d is supported implying that there is a significant positive relationship between the firm's environmental performance and its organizational performance.
	H_{3e}: The operational performance of the firm has a positive effect on its organizational performance.	Path coefficient = 0.604, t = 5.148, p-value = 0.010, f^2 = 0.401. The path coefficient is significant at 0.001 level.	Hypothesis 3e is supported implying that there a significant positive relationship between the firm's operational performance and its organizational performance.

Source: Research Data, 2015

Table 5.6: Summary of Test of Hypotheses Results (Continued)

Objective	Hypotheses	Results	Interpretation and Remark
Objective 4: Establish the influence of relational efficiency on the relationship between GSCM practices and organizational performance of ISO 14001 certified manufacturing firms in East Africa.	**Hypothesis 4:** Relational efficiency mediates the relationship between GSCM practices and performance.	SRMR = 0.086, p-value = 0.000 implying that model is significant, r^2 = 0.59. This implies that the addition of the construct relational efficiency does not increase variance explained in organizational performance.	
	H_{4a}: Implementation of GSCM practices by a firm has a positive effect on its relational efficiency.	Path coefficient = 0.762, t = 14.67, p-value = 0.000, f^2 = 1.384. Path coefficient is statistically significant at 0.001 level.	Hypothesis 4a is supported implying that there is a significant positive relationship between GSCM practices and its relational efficiency.
	H_{4b}: Relational efficiency of the firm with its supply chain partners is positively related to its environmental performance.	Path coefficient = 0.047, t = 0.269, p-value = 0.788, f^2 = 0.001. Path coefficient is statistically insignificant at 0.05 level.	Hypothesis 4b is not supported. This implies an insignificant positive relationship between the relational efficiency and its environmental performance.
	H_{4c}: Relational efficiency of the firm with its supply chain partners is positively related to its operational performance.	Path coefficient = 0.098, t = 0.536, p-value = 0.592, f^2 = 0.009. Path coefficient is statistically insignificant at 0.05 level.	Hypothesis 4c is not supported. This implies an insignificant positive relationship between the relational efficiency and its operational performance.
	H_{4d}: Relational efficiency of the firm with its supply chain partners is positively related to its organizational performance.	Path coefficient = 0.010, t = 0.076, p-value = 0.939, f^2 = 0.000. Path coefficient is statistically insignificant at 0.05 level.	Hypothesis 4d is not supported. This implies an insignificant positive relationship between the relational efficiency and its operational performance.
	H_{4e}: Relational Efficiency mediates the relationship between GSCM practices and environmental performance.	Indirect effect = 0.035, t = 0.251, p-value = 0.802, VAF = 5.95% Relationship between relational efficiency and environmental performance is not significant. Sobel Test Statistic = 0.254, p-value = 0.799.	Hypothesis 4e is not supported. Thus, relational efficiency does not mediate the relationship between GSCM practices and environmental performance.

Source: Research Data, 2015

Table 5.6: Summary of Test of Hypotheses Results (Continued)

Objective	Hypotheses	Results	Interpretation and Remark
	H_{4f}: Relational Efficiency mediates the relationship between GSCM practices and operational performance.	Indirect effect = 0.076, t = 0.531, p-value = 0.608, VAF = 12.88%. Relationship between relational efficiency and operational performance is not significant. Sobel Test Statistic = 0.524, p-value = 0.601.	Hypothesis 4f is not supported. Thus, relational efficiency does not mediate the relationship between GSCM practices and operational performance.
	H_{4g}: Relational Efficiency mediates the relationship between GSCM practices and organizational performance.	Indirect effect = 0.071, t = 0.441, p-value = 0.660, VAF = 18.98%. Relationship between relational efficiency and organizational performance is not significant. Sobel Test Statistic = 0.446, p-value = 0.655.	Hypothesis 4g is not supported. Thus, relational efficiency does not mediate the relationship between GSCM practices and organizational performance.
Objective 5: Determine the influence of firm's characteristics on the relationship between GSCM practices and organizational performance of ISO 14001 certified manufacturing firms in East Africa.	**Hypothesis 5:** The firm's characteristics moderate the relationship between GSCM practices and organizational performance.		
	H_{5a}: The firm's size positively moderates the relationship between GSCM practices and organizational performance.	Adjusted r^2 = 12.2% for step 1, 14.7% for step 2 and 17.2% for step 3. Incremental F = 2.873, p-value = 0.095. Interaction term t = -1.695, p-value = 0.095 hence slightly negatively significant at 0.1 level	Hypothesis 5a is not supported. Thus, firm size slightly negatively moderates the relationship between GSCM practices and organizational performance.
	H_{5b}: The firm's age positively moderates the relationship between GSCM practices and organizational performance.	Adjusted r^2 = 12.2% for step 1, 10.9% for step 2 and 13.1% for step 3. Incremental F = 2.516, p-value = 0.118 for step 3. Interaction term t = -1.586, p-value = 0.118 interaction term is insignificant at 0.05 level	Hypothesis 5b is not supported. Thus, firm age does not moderate the relationship between GSCM practices and organizational performance.

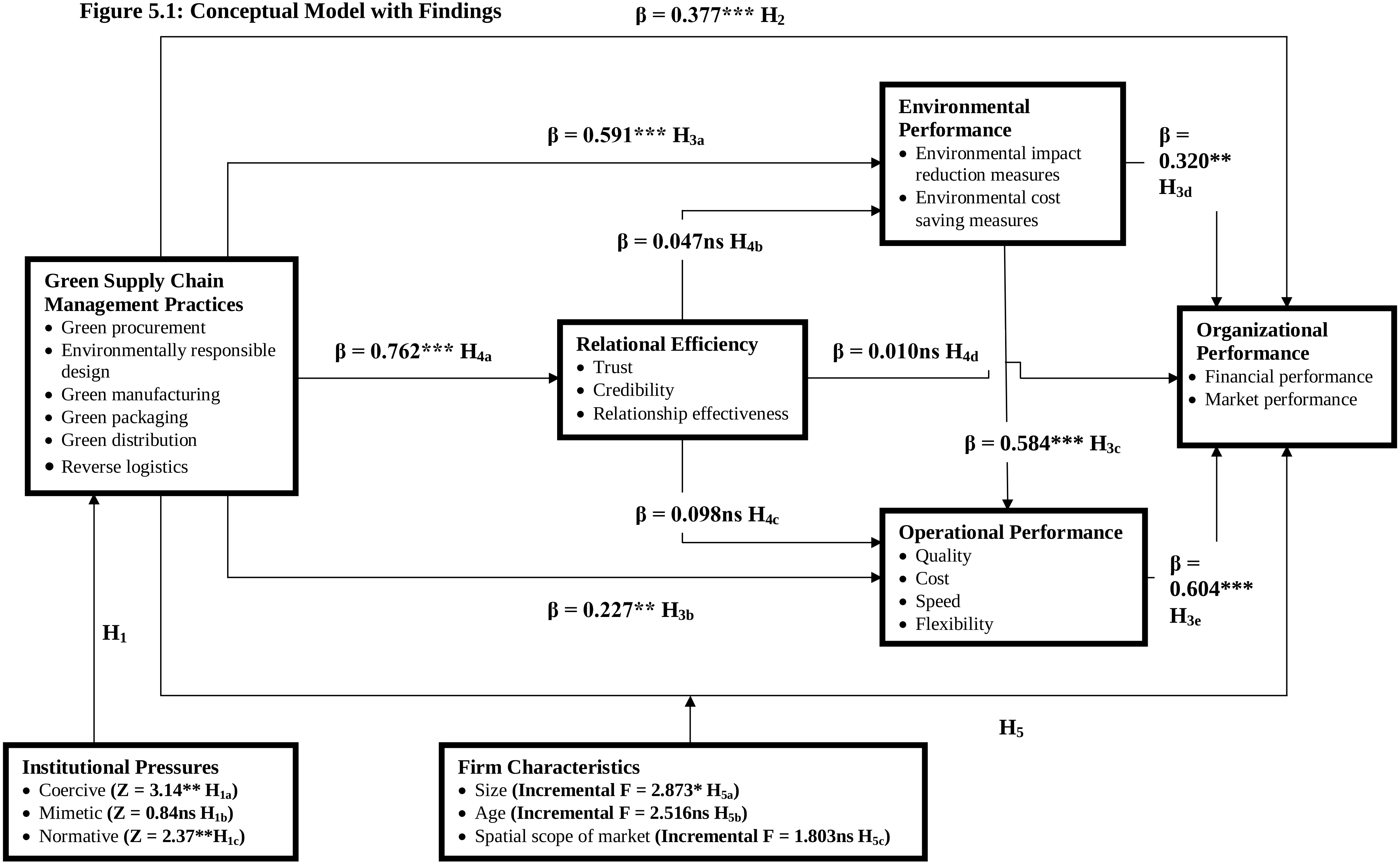
Source: Research Data, 2015

Table 5.6: Summary of Test of Hypotheses Results (Continued)

	H_{5c}: The spatial scope of market served by a firm positively moderates the relationship between GSCM practices and organizational performance.	Adjusted r^2 = 12.2% for step 1, 11.6% for step 2 and 12.8% for step 3. Incremental F = 1.803, p-value = 0.184 for step 3 hence not significant. Interaction term t = -1.343, p-value = 0.184. Hence interaction term is insignificant at 0.05 level	Hypothesis 5c is not supported. Thus, spatial scope of market served by the firm does not moderate the relationship between GSCM practices and organizational performance.

Source: Research Data, 2015

Figure 5.1: Conceptual Model with Findings



***p < 0.001, **p < 0.05, *p < 0.10, ns – not significant

5.7 Discussion of Findings

This section discusses the findings of the study based on the five objectives and major hypotheses.

5.7.1 The Institutional Pressures for GSCM Practices Implementation

The institutional theory posits that enterprises embrace certain strategies in order to gain legitimacy or acceptance within society (Zhu & Sarkis, 2007). One of the key issues of concern is the level of environmental degradation that is currently taking place. Manufacturing operations have been identified as one of the key sources of this degradation (Bearmon, 1999). Pressures are emerging from all corners on the need for firms to conduct their operations in an environmentally friendly way. Firms that fail to comply to these demands lose legitimacy. DiMaggio and Powell (1983) pinpoint three channels of institutional pressures which include coercive, mimetic and normative pressures. This study anticipated that all these three sources would cause firms to implement GSCM practices. The findings of the study present that coercive and normative pressures are the key sources of pressures that sway manufacturing firms in East Africa to implement GSCM practices with coercive pressures being the stronger of the two.

These findings agree with those of Chien and Shi (2007) who established that coercive pressures from domestic environmental regulation, government environmental policy and international environmental agreements were the most significant forces behind implementation of environmental management practices. Normative pressures mainly from suppliers, customers and community stakeholders were also found to be significant.

This research extended knowledge by looking at additional sources of normative pressures which include environmental groups, labour unions, trade associations, shareholders, employees, bank and other lenders all of which were found to play a role in prompting firms to implement GSCM practices. The study also emphasized on the need to target all the elements in the supply chain for green practices as advocated by Hart (1995). Chien and Shi (2007) only concentrated on the procurement and manufacturing elements. The results of this study also partly supports the results of Ball and Craig (2010) who established that normative pressures are the key institutional drivers for GSCM implementation for firms in developed countries, specifically England and Canada.

The study also adds knowledge to the current literature by looking at the influence of mimetic pressures. On this it established that mimetic pressures were not significant in causing the firms to implement GSCM practices. This finding goes contrary to the finding of Aerts et al. (2006) who cited these pressures as the main driver for firms in developed countries like Germany, Canada and France to implement GSCM practices. This difference in findings may be explained by the fact that in developing countries, competition among firms is not as intense as it is in the developed world. Studies have also shown that environmental conservation is taken more seriously in the developed world and that it is regarded as one of the key competitive priorities alongside other priorities like quality, cost, delivery, flexibility and innovation (Krause, Vachon & Klassen, 2009).

5.7.2 GSCM Practices and Organizational Performance

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.

5.7.3 GSCM Practices, Environmental Performance, Operational Performance and Organizational Performance

The research empirically tested a model which was developed based on the argument that if a firm implements GSCM practices, its environmental and operational performance will be enhanced resulting in improved organizational performance. To validate this model the following relationships were tested; GSCM practices and environmental performance, GSCM practices and operational performance, GSCM and organizational performance, environmental performance and operational performance, environmental performance and organizational performance and operational performance and organizational performance.

It was anticipated that the implementation of GSCM practices would result in improved environmental performance. The result of this empirical investigation supports this claim. This finding adds support to the findings of positive links of past studies on the relationship between GSCM practices and environmental performance (Zhu & Sarkis, 2004; Chien & Shi, 2007; Iraldo et al., 2009; Testa & Irlado, 2010; Lawson & Petersen, 2012; Perotti et al., 2012; Kung et al., 2012). This is an important additional step in understanding the GSCM-environmental performance relationship, since previous studies have generally assumed it exists but with little empirical confirmation (Rao & Holt, 2005; Kinoti, 2012). The study also considered GSCM in its entirety, an issue that was overlooked by previous studies. Environmental performance is also defined broadly to include both environmental impact reduction and environmental cost saving measures as was emphasized by Shi et al. (2012).

The theoretical anchorage behind the relationship between GSCM practices and operational performance is explained by RDT and natural RBV which propose that implementing GSCM practices can enable firms build up unique manufacturing capabilities which may be difficult for competitors to replicate (Klassen & Whybark, 1999; Vachon & Klassen, 2008). Implementation of GSCM practices thus has been found to have a positive and significant relationship with operational performance (Lewis, 2000; Lippman, 2001; Martínez Sánchez & Pérez Pérez, 2005; Lee, 2009). The current study found that there exist a positive and significant relationship between implementation of GSCM practices and operational performance. This is similar to previous research findings (Rao & Holt, 2005; Rusinko, 2007; Pullman et al., 2010; Azevedo et al., 2011; El-Tayeb et al., 2011; Lai & Wong, 2012). In addition to considering all the dimensions of GSCM practices, the current study also extends knowledge by looking at operational performance in a broader sense. It considers the quality, cost, speed and flexibility aspects of operational performance.

This study also established a positive and significant relationship between environmental and operational performance thus confirming the findings of Green et al. (2012). The results are also similar to those of other researchers who have looked at environmental performance and individual operational performance measures. These include cost (Klassen & McLaughlin, 1996) and quality (Welford, 1992; Klassen 2000; King & Lenox, 2001; Pil & Rothenberg, 2003; Corbett & Klassen, 2006; Pullman et al., 2009).

Again the strength of this study lies in the fact that it comprehensively considered the four key operational performance dimensions of quality, cost, speed and flexibility.

Past literature has reported mixed results on the relationship between environmental performance and organizational performance with some reporting positive relationships (Vachon & Klassen, 2008; Moneva & Ortas, 2010; De Giovanni & Esposito Vinzi, 2012) and others establishing no relationship between the two variables (Rao, 2002; Green et al., 2012). In the current study, environmental performance was found to have a positive and significant effect on organizational performance. This finding supports the resource based and natural-resource based views and helps lift the lid on the puzzle that has surrounded the relationship between the two variables.

The relationship between operational performance and organizational performance was found to be positive and significant. This implies that an improvement in the operational performance measures of quality, cost, speed and flexibility results in improved financial and marketing performance. The observations corroborate the findings of other studies on the relationship between the two variables (Rao & Holt 2005; Zacharia et al., 2009; Chiou et al., 2011; Green et al., 2012).

The model reveals a statistically insignificant direct link between GSCM practices implementation and organizational performance. However, the results of mediation show that environmental performance and operational performance are significant mediators in the relationship between GSCM practices and organizational performance. The inclusion of the two mediators increased the variance explained in organizational performance by almost four times. This finding partly confirms the findings of Lee et al. (2012) who established that operational efficiency was one of the significant mediators in the relationship between GSCM practices implementation and business performance. In comparison to the model that was developed by Lee et al. (2012), the strength of the current model lies in the fact that it defines the GSCM practice construct comprehensively by considering all the elements in the supply chain as advocated by Hart (1995) and Van Hoek (1999). This study also adds knowledge to existing literature by considering one more significant mediator, environmental performance. It also looks at operational performance in a broader sense.

Green et al. (2012) developed and validated a similar model. However, their model considered relationships between individual components of GSCM and performance. This study considered a GSCM practices construct that combined all the components which include practices in green procurement, environmentally responsible design, green manufacturing, green packaging, green distribution and reverse logistics. This is in recognition of the fact that the synergistic interaction of these components with one another is very important for the realization of maximum environmental benefits (Kung et al., 2012). The study also emphasizes comprehensive definition of the environmental, operational and organizational performance constructs. The model is also an improvement of the model that was developed by Chien and Shi (2007) since it clearly separates and comprehensively defines environmental, operational and organization performance constructs bringing out the fact that improved organizational performance results from enhanced environmental and operational performance as emphasized by Chopra and Meindil (2004), Green et al. (2012) and partly, Lee et al. (2012). In essence, the study concludes that a firm will experience improved marketing and financial performance as a result of GSCM activities having a positive impact on its operations or are giving positive environmental impression to its customers who would eventually provide more business opportunities to the firm.

5.7.4 GSCM Practices, Relational Efficiency, Environmental Performance, Operational Performance and Organizational Performance

The fourth specific objective of the study was to determine if relational efficiency mediates the relationship between GSCM practices and performance of ISO 14001 certified manufacturing firms in East Africa. Seven sub hypotheses were derived from this objective. The objective was based on a structural model that integrated five latent constructs with three having an intervening effect. In the model, relational efficiency was playing an intervening role between GSCM practices and environmental performance, GSCM practices and operational performance and GSCM practices and organizational performance.

The relationship between GSCM practices and relational efficiency was based on the argument that these practices emphasize environmental collaboration with supply chain partners which may affect relational outcomes such as trust, credibility and relationship effectiveness as emphasized by resource dependence theory. The current research established a strong positive and significant relationship. This is in line with Lee et al. (2012) who in a survey of 223 SMEs in the electronics industry in Korea found that the implementation of GSCM practice enhances the relational efficiency. These results imply that as the firm engages in environmental collaboration with supply chain partners, it is likely that the level of trust, respect and appreciation among them will increase. In addition, ease of communication and cooperation are likely to be experienced and hence the partners are likely to be more open with each other. This enhances the ability and willingness to work together in achieving future environmental objectives.

Relational efficiency was found to have an insignificant positive effect on environmental performance. It was expected that the enhanced trust, credibility and relationship effectiveness attained by collaborating with supply chain partners, would offer an opportunity to firms to gain access to knowledge and capabilities to operate green supply chains that would translate to improved environmental performance. This finding contradicts the assertion of Min and Galle (2001) that combined efforts between a buying firm and its supply chain partners are essential ingredients for trust and credibility which results in synergistic improvements in the quality of the environment. The findings could imply that there is a possibility of insincerity on the part some supply chain partners who betray the trust and credibility given to them by using the information and knowledge gained from collaboration to sabotage the achievement of the firm's environmental objectives.

Contrary to expectation, this study also found a positive insignificant relationship between relational efficiency and the operational performance measures of cost, quality, speed and flexibility. This finding does not support Zacharia et al. (2009) position that enhanced trust, credibility and relationship effectiveness with collaborating partners improves the operational performance of a firm. A possible explanation may be obtained from Lee et al. (2012) who claim that ensuring operational efficiency will promote relational efficiency and not the other way round. The firm is likely to build long term, stable working relationships with their supply chain partners as a result of the trust and respect gained from their operational skills and capabilities.

Resource dependence theory provides that the joint efforts between an organization and its supply chain partners in various areas create the best opportunity for the firm to establish its business in the supply chain (Lamming & Hampson, 1996). It is thus expected that high levels of trust, credibility and relationship effectiveness which results from environmental collaboration would lead to increased performance of the organization. This study established an insignificant positive relationship between relational efficiency and organizational performance. This finding contradicts the findings of Lee et al. (2012) and Zacharia et al. (2009) both of whom established a significant positive relationship between relational efficiency and business performance.

The empirical test results also show no support for the mediating role of relational efficiency on the relationships between GSCM practices and environmental performance, GSCM practices and operational performance and GSCM practices and organizational performance. This means that the environmental, operational and organizational performance will not be greater when firms accomplish relational efficiency. This is contrary to a study by Lee et al. (2012) who established that business performance will be enhanced on implementation of GSCM practices only if relational efficiency is enhanced. One likely explanation would be that there is a possibility that some supply chain partners are not honest and are likely to use the knowledge and information obtained to work against the firm. This is likely to be the case because in the developing world there are a lot of unfair business practices and a good number of firms are yet to appreciate the value of collaborations with suppliers, customers and other important supply chain members.

5.7.5 GSCM Practices, Firm Characteristics and Organizational Performance

When firm characteristics positively moderate the relationship between GSCM practices and organizational performance, the gross effect is supposed to be higher compared to the direct relationship. The three firm characteristic variables that were considered include size of the firm, age of the firm and the spatial scope of the market served by the firm. Interestingly, all the three firm characteristic variables were found not moderate the relationship between GSCM practices and organizational performance.

Based on arguments advanced from literature, it was expected that the implementation of GSCM practices would result in greater performance for a large organization than for a small organization. However the results show that size is not a factor in determining performance of an organization as a result of implementing GSCM practices. On the contrary, the study established that size partly negatively moderates the relationship. These findings are in line with of the assertions of previous researchers of organizational adaptation who argue that large organizations experience great difficulty in responding to changing conditions (Chandler, 1962; Downs, 1967). Large firms have been constantly associated with differentiation and formalization, characteristics which make it hard for them to adjust to change (Blau & Schoenherr, 1971; Dean & Shell, 1991). Saeed, Murtaza and Sohail (2013) argue that communication among board of directors is difficult for a large organization. Dean and Shell (1991) argue that the complexity of large organizations makes it very difficult for managers in these organizations to effect change. As the public’s demands for organizations to be environmentally conscious continue to increase, large organizations are slow in responding due to bureaucracy and because of this, they don’t reap the benefits associated with GSCM implementation fast.

Therefore, it is not obvious that firm`s size will help increase the positive linkage between implementation of GSCM practices and organizational performance.

The study also rejected the hypothesis that firm's age positively moderates the relationship between GSCM practices and organizational performance. These findings contradict the claim by past scholars that older firms are likely to build capabilities and resources that makes it easier for them to implement new strategies which translate to enhanced organizational performance (Birley & Westhead, 1990; Lukas et al., 1996; Sørensen & Stuart, 2000; Hui et al., 2013). However, the results are partially supported by Carr, Haggard, Hmieleski and Zahra (2010) who assert that a firm's age may be a liability in the sense that, the decision to implement a new strategy may be disruptive to systems and practices that had previously given established firms an edge over their rivals. These firms find it difficult to adjust quickly to new environmental conditions (Barron, West & Hannan, 1994). Younger firms have few established routines and organizational processes and are therefore likely to be flexible in implementing GSCM practices and reaping from its benefits fast. Past research present that younger firms are highly adaptive and alert in reallocating and assembling resources as well as building relationships and networks (Oviatt & McDougall, 1994; Carr et al., 2010). These are key ingredients in implementing GSCM practices. Autio, Sapienza and Almeida (2000) add that they can learn fast from successful competitors and then use this knowledge to organize their resources into capabilities that translate to better organizational performance.

The third firm characteristic variable that was considered is the spatial scope of the market served by the firm. This was a dichotomous variable which categorized the firms as either serving local or global markets. The inclusion of the variable was based on the argument that firms that serve global markets face more intense competition and are subjected to environmental regulation of the countries that they serve. These firms are therefore forced to excel in environmental management in order to maintain a competitive edge. And because they are serving an expanded market, their performance is higher. The results were that spatial scope of market served does not moderate the relationship between GSCM practices and organizational performance. These results run contrary to positions taken by past researchers (Zhu & Sarkis, 2007; Arimura et al., 2008 Testa & Irlado, 2010). A possible explanation is that firms serving domestic markets have found themselves competing on the same platform with those that serve foreign markets. These multinational corporations implement GSCM practices voluntarily. This has caused increased market pressures for firms serving domestic markets to implement environmentally responsible practices in order to survive (Zhu & Sarkis, 2004; Mittra & Datta, 2013). In response, consumers have maintained their preference for local firms due to heightened level of campaigns to promote local firms.

5.8 Summary

This chapter built on the preceding research findings and provided the results of the tests of hypotheses and their interpretations. The chapter ended by discussing the findings of the study based on the objectives and major hypotheses of the research.

CHAPTER SIX

SUMMARY, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter presents a summary of the findings alongside with the conclusions and contributions of the study. It begins by looking at the summary of the findings. This is followed by a section that discusses the contribution of the study to knowledge, theory, policy and practice. Thereafter, conclusions are presented. Finally, the limitations of the study are pointed out and the suggestions for future research made.

6.2 Summary of Findings

The current study aimed to examine the relationship between the implementation of GSCM practices and performance of ISO 14001 certified firms in East Africa. Specifically, the study investigated the key institutional pressures that cause firms to implement these practices and how relational efficiency, environmental performance, and operational performance influence the relationship between these practices and organizational performance.

The first objective of the study was to establish the institutional pressures of GSCM practices implementation among ISO 14001 certified manufacturing firms in East Africa. The relationship between extent of GSCM practices implementation and the extent to which the various institutional pressures influenced their implementation was tested through ordered probit model. Details of the hypotheses and results are presented in Table 5.6. Coercive and normative pressures were found to be significant in causing the firms to implement GSCM practices. Of the two sources, coercive pressures had the strongest influence on GSCM practices implementation. Mimetic pressures were not significant. Government environmental policy was determined as the key coercive pressure while environmental groups and management employees were the dominant sources of normative pressures. National competitors were determined as leading source of mimetic pressures followed closely by regional competitors. Additionally, age of the firm was found to be a significant control variable which influenced implementation of GSCM practices. The implication was that firms that have been in operation for a long time are likely to be advanced in implementing GSCM practices.

The second objective was to establish the relationship between GSCM practices and organizational performance. In order to pursue this objective, PLS-SEM analysis was used. The model was based on the two latent constructs. The findings of the study showed that there is a significant positive relationship between implementation of GSCM practices and organizational performance. However, GSCM practices construct was found to explain only 14.2% of variance in organizational performance. The effect size of GSCM on organizational performance was also found to be small going by the guidelines given by Cohen (1992). This means that if GSCM practices construct was to be omitted from the model, the change in the variance explained in organizational performance would not be substantive implying that there are other variables that explain the variation organizational performance.

The third objective sought to determine the mediating effect of environmental and operational performance on the relationship between GSCM practices and organizational performance. A SEM model based on four latent constructs with two having an intervening effect was employed. Results of hypotheses tests through PLS-SEM analysis established that GSCM practices had a strong positive and significant relationship on environmental performance. GSCM practices also had a significant positive relationship with operational performance and an insignificant negative relationship with organizational performance. Environmental performance was found to have a strong, significant and positive relationship with operational performance and a significant and positive relationship with organizational performance. It was also established that operational performance had a strong positive and significant relationship with organizational performance. In addition, it was established that environmental performance had the strongest total effect on organizational performance. It was also noted that the inclusion of environmental and operational performance constructs increased the variance explained in organizational performance from 14.2% to 59%. Tests also established that environmental and operational performance fully mediates the relationship between GSCM practices and organizational performance.

The fourth objective of the research was to examine the influence of relational efficiency on the relationship between GSCM practices and performance of the firms. In order to achieve this objective, a fifth construct, relational efficiency, with an intervening effect was added to the previous SEM model. PLS-SEM analysis results revealed that the relationship between GSCM practices and relational efficiency is positive and significant. However, the relationships between relational efficiency and environmental performance, relational efficiency and operational performance and relational efficiency and organizational performance were all found to be positive but insignificant. Even when the total effect was considered, these relationships still remained insignificant. Further, the variance explained in the organizational performance variable remained the same at 59% when relational efficiency was introduced in the model. Further tests showed that relational efficiency does not mediate the relationships between GSCM practices and environmental performance, GSCM practices and operational performance and GSCM practices and organizational performance.

The last objective of this study aimed at determining the moderating effect of firm characteristics on the relationship between GSCM practices and organizational performance. Moderated regression analysis using variance partitioning procedure was employed to pursue this objective. The specific firm characteristic variables studied included size of the firm, length of operation of firm and scope of the market served by the firm. The findings revealed that none of these variables had a significant positive moderating effect on the relationship between GSCM practices and organizational performance. However, firm size was found to have a slightly significant negative moderating effect on the relationship.

6.3 Conclusions

The key conclusion of this study is that the implementation of GSCM practices in totality leads to competitive benefits in the form of improved environmental and operational performance which ultimately translates to enhanced financial and marketing performance (Rao & Holt, 2005; Lee et al., 2012; Green et al., 2012). This conclusion is true irrespective of how small the firm is, period of time the firm has been in operation or the spatial scope of the market that is served by the firm. In addition, coercive and normative pressures are the dominant institutional drivers that cause firms to implement GSCM practices (Chien & Shi, 2007).

Specifically, the implementation of GSCM practices contributes to a relatively broad range of competitive benefits. It results in improved environmental performance that is observed through reduced green house gas emissions, water use ratio, discharge of wastewater, solid waste, use of hazardous materials and frequency of environmental accidents. Cost savings are also realized in purchasing environmentally friendly raw materials, investment in environmental technology, reuse and recycling of materials and waste water, energy costs, fines or penalties for flouting environmental regulations (Zhu & Sarkis, 2004; Chien & Shi, 2007; Iraldo et al., 2009; Testa & Irlado, 2010; Perotti et al., 2012; Kung et al., 2012). Improved environmental performance enhances the firm's reputation and image thus creating better relations with institutional stakeholders. The ultimate outcome is increased sales and hence better marketing and financial performance (Vachon & Klassen, 2008; Moneva & Ortas, 2010; De Giovanni & Esposito Vinzi, 2012).

The implementation of GSCM practices and enhanced environmental performance also leads to improved operational performance in the form of enhanced quality, cost, speed and flexibility (Rusinko, 2007; Pullman et al., 2010; Azevedo et al., 2011; El-Tayeb et al., 2011; Green et al., 2012; Klassen & McLaughlin, 1996; Welford, 1992; Klassen, 2000; King & Lenox, 2001; Pil & Rothenberg, 2003; Corbett & Klassen, 2006; Pullman et al., 2009). The study has proved that when hazardous and non-hazardous wastes are minimized due to implementation of GSCM practices, it results in better utilization of natural resources, improved efficiency and higher productivity thus enhancing the capability of a firm to more efficiently produce and deliver products to customers (Rao & Holt, 2005).

A firm that implements GSCM practices is in the best position to discover innovative solutions for dealing with environmental challenges. Results from this study support the assertion that the skills obtained from such actions are similar and complementary to skills necessary to develop certain process related capabilities (Christmann, 2000), capabilities in quality management (Hart, 1995) and lean management (King & Lenox, 2001) all of which result in enhanced operational efficiency of the firm relative to competitors. In addition, in implementing GSCM practices, suppliers and customers are afforded the chance to take part in operations decisions which may enhance the firm's flexibility and speed of delivery through better synchronization and planning (Martínez Sánchez & Pérez Pérez, 2005). Improvements in these operational measures offers a further synergistic mechanism to achieve competitive gains which results in improved organizational performance through improved market and financial performance.

The study also concludes that relational efficiency does not mediate the relationship between GSCM practices and environmental performance, GSCM practices and operational performance and GSCM practices and organizational performance. Finally, the study concludes that none of the three firm characteristics; size, age, spatial scope of market served, positively moderate the relationship between GSCM practices and organizational performance. This simply means that the implementation of GSCM practices results in improved organizational performance irrespective of the firm's size, age or the spatial scope of the market that it serves.

6.4 Implications of the Study

While it is essential to reflect on the results of this study against the backdrop of previous studies, evaluating the implications eventually creates the foundation for methodical improvement in practice and future empirical work. The following subsections therefore look at the contributions that the study makes to knowledge, theory, policy and practice.

6.4.1 Contribution to Knowledge

The key contribution to knowledge of this study is that it establishes with a sound theoretical foundation and prior empirical analysis that the implementation of GSCM practices has a positive direct effect on organizational performance. Effectively, the finding adds to the body of knowledge on positive links between the effectiveness of implementing GSCM practices and organizational performance. This finding helps clear the air on the true effect of implementing GSCM practices on organizational performance.

Second, this study extends the literature by employing a measurement model of GSCM practices construct that takes into account all the phases of the supply chain. It considers separate environmental practices in procurement, design, manufacturing, packaging, distribution and end of life disposal as different indicator variables as emphasized by various scholars (Hart, 1995; Van Hoek, 1999; Kung et al., 2012). This is based on the strength of the argument by Wu and Dunn (1995) that as firms use resources to produce desired goods and services, pollutants are produced at every stage of the supply chain. This research therefore addresses the weaknesses of past studies which concentrated only on sections of GSCM (Kinoti, 2012; Green et al., 2012; Lee et al., 2012).

Third, the research adds to the pool of knowledge by investigating the paths that enhance organizational performance on implementation of GSCM practices. The findings imply that the marketing and financial performance will be improved if environmental performance and operational performance are enhanced after implementing GSCM practices. In addition, this study demonstrates that successful environmental performance plays a critical role in accomplishing successful operational performance. The study defines these three performance variables very comprehensively.

Fourth, this study adds to existing literature by looking at relational efficiency as a mediating variable. This is in line with recommendations of past researchers (Green et al., 2012; Lee et al., 2012) on the need to explore mediating variables that could help bring out the link between GSCM practices and organizational performance more fully, The findings provide that relational efficiency does not play a mediating role in the relationships between implementation of GSCM practices and environmental, operational and organizational performance. This in effect opens up opportunities for future research to investigate the explanations given for these counter-intuitive outcomes. This study also adds to knowledge by being a pioneer study to look at the mediating effect of relational efficiency on the relationships between GSCM practices and environmental and GSCM practices and operational performance.

Fifth, the current research also broadens knowledge by considering the moderating effect of firm characteristics on the relationship between GSCM practices and marketing and financial performance. This advances the argument of Lawson and Petersen (2012) on the need to consider moderating variables that can bring out the relationship more fully. Interestingly, the results suggest that all the three firm characteristic variables are not key facilitators to successful organizational performance improving GSCM practices. The findings therefore contribute to the debate on the influence of firm characteristics on the relationship between GSCM and organizational performance thus opening the gates for further research.

Sixth, the study adds to knowledge by advancing the evidence of the existence of heterogeneity of pressures for GSCM practices implementation. It looks at these pressures as antecedents of GSCM practices implementation adding to limited investigations on the issue since most past research has focused on outcomes of implementing GSCM practices. This research also extends knowledge by looking at other additional sources of normative pressures which include environmental groups, labour unions, trade associations, shareholders, employees, bank and other lenders all of which were found to play a role in prompting firms to implement GSCM practices.

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.

6.4.2 Contribution to Theory

This study was anchored on six theories which include the RBV, natural RBV, RDT, institutional, TCE and stakeholders' theories. The key theory on which this study was grounded is the natural RBV. The study adopted a GSCM framework which comprised of activities in green procurement, environmentally responsible design, green manufacturing, green packaging, green distribution and reverse logistics. The study took the position that the implementation GSCM practices affords the firm an opportunity for competitive advantage and performance improvement through unique causally ambiguous and socially complex resources. When a firm involves all its employees in implementing green manufacturing and green packaging practices, it gives them an opportunity to acquire tacit skills which are refined as they gain more experience. Since these skills are hard to observe in practice, competitors find it difficult to imitate them quickly. Hence, an opportunity for sustained competitive advantage and performance improvement is availed to the firm through a unique causally ambiguous resource.

The study further argued that green procurement, environmentally responsible design, green distribution and reverse logistics depend upon a large network of people or teams engaged in coordinated action which few individuals, if any, have sufficient breadth of knowledge to execute (Hart, 1995; Vachon & Klassen, 2008; Shi et al., 2012). These activities require establishment of consensus across functions, departments and organizational boundaries. The balancing act among supply chain partners to ensure that the execution of these activities is optimized without harming the natural environment is a socially complex resource which can create an opportunity for sustained competitive advantage for the firm (Hart, 1995; Vachon & Klassen, 2007; Shi et al., 2012). This study provide empirical evidence that the implementation of GSCM practices results in improved organizational performance because the firm builds a causally ambiguous and socially complex resource that is difficult to replicate consistent with the natural resource-based view (Hart, 1995).

The results of this study have also demonstrated that the resource based view of the firm is an important theory in the study of the relationship between GSCM practices and organizational performance. This extends the conceptual and empirical research in areas related to GSCM by suggesting that possession of knowledge and capabilities to implement GSCM practices is a resource that is valuable, rare, imperfectly imitable and non-substitutable (Barney, 1991; Hart, 1995; Crook et al., 2008). The findings of this research show that this is a strategic resource because it leads to competitiveness in the form of improved environmental and operational performance which ultimately translates to enhanced organizational performance.

The findings of this study are also consistent with arguments of the institutional, transaction cost economics and stakeholders theories. TCE argues that, if a firm implements GSCM practices, the risk of self-seeking behavior by supply chain partners is substantially reduced thus resulting in the lower costs of monitoring transaction relationships (Stump & Heide, 1996) and hence improved organizational performance. Institutional and stakeholders theories share the assertion that implementing GSCM practices will cause an increase in the legitimacy of a firm thus creating better relations with institutional stakeholders who include customers, suppliers and investors (Greeno & Robinson, 1992; Henriques & Sadosky, 1999). This eventually results in better market and financial performance. The study further demonstrates the significance of the institutional theory in comprehending the influence of the existence and type of external institutional pressures on the implementation of GSCM practices.

6.4.3 Contribution to Policy and Practice

The findings of this research also have direct implications for policy and practice. The study provides regulatory authorities and management practitioners with a framework for evaluating the synergistic effect of implementing GSCM practices on performance. The study established that an increase in the level of implementation of GSCM practices will be accompanied by an increase in the firm's market share and hence profit. This conclusion effectively helps dismiss the fears of those firms that have not yet implemented GSCM practices. The research demonstrates that not all institutional pressures influence the implementation of GSCM practices equally and that careful thought of the operational practices and manufacturing context is vital for managers in these different circumstances.

This study also revealed that very few firms are environmentally conscious in East Africa. This is evidenced by the fact that less than 2% of manufacturing firms are ISO 14001 certified. One of the reasons is that environmental regulation in these countries is still less stringent. The findings of this study indicated that government laws and policies on the environment are critical and main drivers of GSCM practices implementation. It is thus expected that this finding would assist in the development of an appropriate regulatory framework in East Africa's pursuit of environmental sustainability.

6.5 Recommendations

This study has established that implementing GSCM practices leads to improved organizational performance. 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.

The study also established that coercive pressures are the most significant source of GSCM practices implementation. Therefore, the governments can increase the scale of GSCM practices implementation by taking steps in making the environmental regulations more stringent in line with the same in developed countries. To encourage the implementation GSCM practices, governments of these East African countries should introduce and promote ideas such as extended producer responsibility. Further efforts by governments and manufacturers are also required to encourage the firms to extend GSCM practices implementation beyond manufacturer boundaries.

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.

Even though the findings provide that relational efficiency does not play a mediating role in the relationships between implementation of GSCM practices and performance, this study recommends that it should be emphasized. Past researchers have indicated that collaboration between the firm and its supply chain partners is very important (Zhu, Sarkis & Geng, 2005; Krause et al., 2009; Pagell & Wu, 2009; Carter & Easton, 2011; Green et al. 2012; Zhu, Sarkis & Lai, 2012). Specifically, enhanced environmental collaboration and coordination with supply chain partners results in innovative solutions to environmental problems and therefore improved organizational performance (Geffen & Rothenberg, 2000). Lee et al. (2012) argue that cooperation between firms and their suppliers in implementing GSCM practices enhances environmental management capabilities and business performance.

According to transaction cost economics theory, the risk of self-seeking conduct by a firm's supply chain partners requires costly monitoring if the firm is not involved in collaborative relationships with them (Carter & Rogers, 2008). Lamming and Hampson (1996) add that cooperation results in mutual benefits to all parties involved. It is therefore expected that firms will recognize that relational efficiency, translates into long term benefits through improved environmental, operational and organizational performance as a result of implementing GSCM practices.

6.6 Limitations of the Study

This study has a few limitations that would point out areas of consideration for future studies. First, the study only concentrated on a small sample of manufacturing firms in East Africa that are ISO 14001 certified. The focus on these firms leaves out the ones with no formal environmental management accreditation, but may have well established non-accredited environmental programs. Therefore, the results may not have strong external validity. To increase generalizability of the research, other firms in the same and/or different countries in this region or around the world should be studied.

The second limitation of this research centers on the objectivity of the measures, both for GSCM practices and performance variables. Most firms were unwilling to allow the researcher to access their premises so as to observe some of the GSCM practices that they were implementing. Further, the measurement of environmental, operational and organizational performance variables was evaluated using perceptual data because most organizations were unwilling to disclose their objective performance data mostly because of fear of the information being leaked to competitors. Objective data would have given the best picture of the hypothesized relationships between variables. Future research should aim at benefitting from objective data in order to increase the validity of the results obtained.

Further, survey research design does not allow for the isolation of the effect of other variables that have the potential to affect the performance of the firm. Improved environmental, operational and organizational performance results from many sources. This study did not make an attempt to control for other sources of improved performance. Future studies should benefit from experimental research design which allows the researcher to control for important variables which have a relationship with performance of the firm. This would ensure that the effect in environmental, operational and organizational performance is only attributed to implementation of GSCM practices and not as a result of a change in any other variables.

The population of interest which comprised all ISO 14001 manufacturing firms in East Africa was widely geographically dispersed. This fact made the task of collecting the data very difficult. One of the direct effects of this was that the number of firms that eventually responded was considered rather small necessitating the use of PLS-SEM analysis which works well for small samples and with fewer assumptions. As more organizations obtain formal environmental management accreditation, future research should consider the use of covariance-based SEM analysis which works well for large samples and produces much more valid results.

6.7 Suggestions for Future Research

This study employed survey based, cross-sectional research design. The firms that were surveyed are considered early adopters of GSCM practices since most were certified recently. As these and more organizations become more mature adopters of GSCM practices, future research should employ longitudinal research design to evaluate the change in the implementation of GSCM practices and causal relationships in supply chains. This is especially crucial given that an argument has been advanced that it takes long for the effects of implementing GSCM practices to be observed in organizational performance.

The environmental, operational and organizational performance measures were assessed using perceptual data, since the response rate would be higher than if objective data was requested. This was necessitated by the fact that the population size was small and geographically dispersed. Although, past research has determined that managerial assessments are consistent with objective internal performance (Slater & Narver, 1994;

Pearce, Robbins & Robinson, 1987; Dess & Robinson, 1984) and with external secondary data (Venkatraman & Ramanujam, 1986), future research can focus on actual and more objective data on environmental, operational and organizational performance.

Future research should also seek to generalize the findings beyond the context of East African manufacturing firms by empirically testing the model in this study in other contexts (that is, countries, industries, cultures and supply chain entities). A large sample would also allow comparisons among sectors, which was not possible in this study since the sample size was relatively smaller and some sectors were under represented.

This study focused on the environmental and economic dimensions only. Firms should also take into account social justice in the pursuit of economic development. This brings into focus the necessity to strike a balance between economy, environment and benefit to society (Chien & Shi, 2007). Future researchers should therefore focus on the relationship between sustainability as a whole (economic, environmental and social) and organizational performance.

In comparing the results of this study with those of Lee et al. (2012), differences were noted concerning the effect of relational efficiency on the relationship between GSCM practices and organizational performance. These differences may be due to a number of reasons. One of the reasons may be because some partners in the supply chain are not honest with the trust and credibility accorded to them. Secondly, it could be that the mediating effect of relational efficiency on the relationship between GSCM practices and organizational performance may be long-term. Another reason comes from the difference in the sample used. This study used East African manufacturers while Lee et al. (2012)

study focused on Korean manufacturers. Further research is therefore necessary to reconcile these differences. It is may also be necessary to confirm the findings using a larger sample.

6.8 Summary

This chapter looked at the summary, conclusions and implications of the findings of this study. It began by presenting a summary of the findings followed by conclusions. The chapter then discussed the contributions of the study to knowledge, theory, policy and practice. It ended by pointing out the limitations of the study and providing suggestions for future research.

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APPENDICES

Appendix I: Operationalization of Green Supply Chain Management Practices

a) Green Procurement Practices (Min, & Galle, 1997, 2001; Rao & Holt, 2005; Vachon, 2007; Zhu et al. 2008a; Zhu et al. 2008b; Testa & Irlado, 2010; Diabat & Govindan, 2011; El-Tayeb et al., 2011; Khisa, 2011; Laosirihongthong et al.,2013; Mittra & Datta, 2013)

GP 1.	Provide design specification on environmental requirements to suppliers for purchased items.
GP 2.	Cooperate with suppliers in order to attain environmental objectives.
GP 3.	Evaluate second-tier supplier for environmentally friendly practices.
GP 4.	Require suppliers to take back packaging.
GP 5.	Eco-labeling of products.
GP 6.	Reduce use of paper during the purchasing process (e.g. ordering via email).
GP 7.	Purchasing equipment that is easy to repair.
GP 8.	Develop environmental awareness among employees in the procurement department.
GP 9.	Favor products which provide information about their environmental impact.
GP 10.	Require suppliers to reduce packaging to minimum required to protect supplied items.
GP 11.	Make purchases from suppliers who are compliant with legislation on the environment.
GP 12.	Purchase raw materials in bulk in order to minimize use of energy, labour, and packaging materials through bulk packaging.
GP 13.	Purchase products that are energy efficient or products which require less energy to manufacture.
GP 14.	Require that suppliers must possess EMS certification (e.g. ISO 14001, BS7750 or EMAS).
GP 15.	Purchase products with bio-degradable or recyclable packaging.
GP 16.	Develop a database with information on suppliers' environmental conduct.
GP 17.	Purchase energy saving equipment (e.g. machines or vehicles with higher capacity and are fuel efficient).
GP 18.	Purchase materials and parts with desirable green attributes such as recycled or reusable items.
GP 19.	Purchase materials and parts that do not contain environmentally harmful elements (e.g. lead, CFCs or plastic foam in packaging materials).
GP 20.	Disclose environmental or safety information of product content using green seals and indicators of relative environmental impact.
GP 21.	Audit suppliers to evaluate compliance with environmental requirements.
GP 22.	Hold environmental awareness seminars periodically where suppliers and contractors meet to share knowledge on clean production technologies.
GP 23.	Guide suppliers to set up their own programs for environmental management
GP 24.	Pressurize suppliers to take disciplinary action for environmental non-compliance by their employees and suppliers.
GP 25.	Develop long-term relationships with the suppliers through collaboration.
GP 26.	Working to control the environmental risk resulting from suppliers' operations.

b) **Environmentally Responsible Design Practices** (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).

ED 1.	Collaboration with suppliers during the design process to ensure integration of green issues.
ED 2.	Collaboration with customers during design process to ensure integration of green issues.
ED 3.	Design of products and processes in a way that ensures reduction or elimination of environmentally hazardous materials (such as lead, mercury, chromium, cadmium etc).
ED 4.	Design in a way that facilitates reuse of a product or part of it with or without minimal treatment of the used product.
ED 5.	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.
ED 6.	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.
ED 7.	Design that incorporates reduction of material use by a product.
ED 8.	Design that promotes use of renewable resources in accordance to their rates of replenishment.
ED 9.	Design that incorporates reduction of energy consumption by a product, in addition to promoting use of renewable sources of energy.
ED 10.	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.
ED 11.	Design products with biodegradable materials.
ED 12.	Design products that have longer useful life.
ED 13.	Design products with physical characteristics (lighter, alternative materials) or production processes that allow for a higher transport density of parts.

c) **Green Manufacturing Practices** (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 et al., 2008; Holt & Ghobadian, 2009; Paulraj, 2009).

GM 1.	Top management is totally committed to environmentally friendly manufacturing.
GM 2.	Reduce use of virgin raw materials by using recycled materials or reusing materials for product manufacturing.
GM 3.	Putting in place measures for recycling and reuse of waste water.
GM 4.	Putting in place measures to control leakages, emanating from damaged pipes, spillages, losses due to improper handling or faulty machinery.
GM 5.	Decreased consumption or total elimination of hazardous and toxic materials (e.g. changing to aqueous cleaners).
GM 6.	Separation of hazardous and non-hazardous waste.
GM 7.	Use of controls and filters for harmful discharges and emissions.
GM 8.	Reduce energy consumption by using alternative sources of energy (e.g. biogas, solar, wind etc).
GM 9.	Maintain an inventory of the firm's environmental impacts and identification of proper indicators of improvement (waste, emissions, effluent generation).

GM 10.	Use of standardized components and parts to facilitate reuse.
GM 11.	Risk-prevention systems to cover possible environmental accidents and emergencies.
GM 12.	Training employees in safer production and accident prevention.
GM 13.	Involve production workers in green manufacturing to increase their awareness on the implication of their actions on the natural environment.
GM 14.	Reward of environmentally positive behaviour among employees.
GM 15.	Integrate total quality environmental management (TQEM) into planning and operation processes.
GM 16.	Establishment and maintenance of proper procedures and actions for noncompliance with environmental policies.
GM 17.	Availing firm's environmental impact information to the public for open discussion.
GM 18.	Practice quality management to ensure products with fewer defects are produced, hence reducing the need to ship it back or reprocess it.
GM 19.	Reduction in energy consumption by switching off idle machines, lights after working hours, installation of translucent roofing and glass blocks.

d) Green Packaging Practices (Wu & Dunn, 1995; Tseng, 2009; Ninlawan et al., 2010; Laosirihongthong et al., 2013)

GPP 1.	Deliver product without using any packaging at all.
GPP 2.	Use life cycle assessment to evaluate environmental load of packaging during design.
GPP 3.	Reduce or downsize overall packaging of products.
GPP 4.	Cooperate with the vendor to standardize packaging.
GPP 5.	Package product in such a way that time and effort required to unpack is reduced.
GPP 6.	Ensure that the size, shape, and materials for packaging promote efficiency (e.g. space utilization) during storage and transportation of the product.
GPP 7.	Adopt systems that encourage returnable packaging methods.
GPP 8.	Use biodegradable material (e.g. bioplastics, bio-nano composites, etc) for packaging.
GPP 9.	Reduce the use of hazardous materials in packaging.
GPP 10.	Make sure that packaging material has recyclable contents or can be reused.
GPP 11.	Make a continuous effort to find new reusable materials for packaging.

e) Green Distribution Practices (Wu & Dunn, 1995; Rodrigue et al., 2006; Zhu et al., 2008a; Paulraj, 2009; Ninlawan et al., 2010).

GD 1.	Distribute products together, rather than in smaller batches to ensure full vehicle loads for efficiency.
GD 2.	Employ transport modes that use less energy or use energy more efficiently.
GD 3.	Employ transport modes that generate less air and noise pollution (e.g. rail, water as opposed to road and air).
GD 4.	Use a good information system and innovative management to ensure more efficient loading, scheduling and routing.
GD 5.	Deliver products directly to the user site.

GD 6.	Employ transport modes that use alternative fuel (e.g. electricity, ethanol, biodiesel, hydrogen etc).
GD 7.	Locate near customers to reduce resources consumed in getting the product to them.
GD 8.	Use logistics firms that abide to environmentally friendly principles or have EMS certification (e.g. ISO 14001, BS7750, EMAS), in case transport is outsourced.
GD 9.	Usage of warehousing facilities that have been certified as environmentally efficient.
GD 10.	Proper maintenance programmes of vehicles to keep them in safe and efficient working condition.
GD 11.	Sale of vehicles that have reached their end of useful life rather than leave them to fill the parking yard.

f) Reverse Logistics Practices (Wu & Dunn, 1995; Florida & Atlas, 1997; Toffel, 2004; Vachon, 2007; Ninlawan et al., 2010).

RL 1.	Spread awareness among customers on the firm's product or packaging return or take-back policy.
RL 2.	Install collection points for used products and packaging for reuse and recycling.
RL 3.	Employ individuals or firms to collect waste generated by the firm's products.
RL 4.	Maintain a database on the quantities and value of material and end of life products or packaging collected from consumers.
RL 5.	Safe disposal of unrecyclable or unreusable waste (especially hazardous waste).
RL 6.	Offer special incentives to those who return packaging materials.
RL 7.	Giving bonuses to employees who collect sizeable amounts recyclable materials (e.g. broken bottles in case of soft drinks or beer companies).
RL 8.	Provide appropriate advice to customers on the environmental aspects of handling, use, and disposal of the firm's products.
RL 9.	Return used products and packaging to suppliers for reuse or recycling.
RL 10.	Remind customers not to purchase the firm's products unless it is absolutely necessary.
RL 11.	Consolidate freight in case where used material and packaging is to be shipped back to the firm.
RL 12.	Put in place systems to monitor reverse flows of materials.
RL 13.	Work to ensure proper product use by customers.

Appendix II: Operationalization of Relational Efficiency

a) Trust (Doney & Cannon, 1997; Fisher, et al., 1997; Zacharia et al., 2009)

RT 1.	Increased appreciation for our collaboration partners.
RT 2.	Increased respect for the skills and capabilities of our collaboration partners.
RT 3.	Increased overall respect for our collaboration partners.
RT 4.	Improved level of honesty.
RT 5.	More open sharing of information with our partners.
RT 6.	Enhanced commitment to work together in the future.
RT 7.	Enhanced feeling of partnership and solidarity among us.

b) Credibility (Gundlach, Achrol & Mentzer, 1995; Siguaw, Simpson & Baker, 1998)

RC 1.	Increased level of frankness by our supply chain partners in dealing with us.
RC 2.	Increased reliability of promises made by our supply chain partners.
RC 3.	Increased knowledge of our supply chain partners regarding their role in the supply chain.
RC 4.	Our supply chain partners have no problems answering our questions regarding green supply chain management issues.
RC 5.	Our supply chain partners disclose confidential information about industry/market conditions, competitors, and channel partners.
RC 6.	Our supply chain partners promised resources and support (e.g., market research and help in decision making).

c) Relationship Effectiveness (Ruekert &Walker 1987; Fisher et al., 1997)

RE 1.	The relationship with our supply chain partners is productive as far as adoption of environmentally friendly practices are concerned.
RE 2.	Time and effort spent developing and maintaining these relationships are worthwhile.
RE 3.	Overall, we are satisfied with the relationship with our supply chain partners.

Appendix III: Operationalization of Environmental, Operational and Organizational Performance

a) Environmental Performance

1. Environmental Impact Reduction (Zhu et al., 2008a; Shi et al., 2012)

EIR 1.	Green house gas emissions (e.g. carbon dioxide, nitrous oxide, methane, hydro fluorocarbons, sulphur hexafluoride, per fluorocarbons, etc)
EIR 2.	Water Use Ratio (WUR)
EIR 3.	Discharge of wastewater (in cubic meters)
EIR 4.	Solid waste (e.g. packaging waste, scrap, etc)
EIR 5.	Use of hazardous materials
EIR 6.	Frequency of environmental accidents

2. Environmental Cost Saving (Zhu et al., 2008a; Shi et al., 2012)

ECS 1.	Savings due to purchase of environmentally friendly raw materials
ECS 2.	Investment in environmental technology
ECS 3.	Savings due to material recovery (by reusing or recycling materials)
ECS 4.	Savings due to recycling of waste water
ECS 5.	Savings due transporting in bulk rather than in small quantities.
ECS 6.	Energy cost savings
ECS 7.	Fines/penalties for flouting environmental regulations

b) Operational Performance

1. Quality (Ketchen Jr et al., 2008; Slack, Chambers & Johnston,2007)

OQ 1.	Products scrapped
OQ 2.	Products reworked
OQ 3.	Products returned by consumers
OQ 4.	Number of complaints during warranty period

2. Cost (Maani, Putterill & Sluti, 1994; Slack, Chambers & Johnston,2007)

OC 1.	Inventory levels reduction
OC 2.	Improved capacity utilization
OC 3.	Cost per operation hour
OC 4	Variance against budget

3. Speed (Tersine & Hummingbird, 1995; Slack, Chambers & Johnston,2007)

OS 1.	Design time
OS 2.	Cycle time
OS 3.	Machine set-up time
OS 4.	Through-put time
OS 5.	Order lead time

4. Flexibility (Suarez, Cusumano & Fine, 1996; Slack, Chambers & Johnston,2007)

OF 1.	Increased number of product categories
OF 2.	Ability of the firm to increase production should an increase in demand arise and vice versa
OF 3.	Ability to introduce new products in case of demand
OF 4.	Ability of firm to vary delivery time to meet demand

c) Organizational Performance

1. Financial Performance (Green & Inman, 2005; Richard et al., 2009)

FP 1.	Cash Flow
FP 2.	Profit after tax
FP 3.	Return on Sales
FP 4.	Return on Investment
FP 5.	Ability to Fund Business Growth from Profits
FP 6.	Return on Shareholders' Equity

2. Market Performance (Green & Inman, 2005; Richard et al., 2009)

MAP 1.	Market share growth
MAP 2.	Sales volume growth (in units)
MAP 3.	Sales growth (in shillings)

Appendix IV: Operationalization of Institutional Pressures for GSCM Implementation

1. Coercive Pressures	
CP 1.	Domestic environmental regulations
CP 2.	Government environmental policy (e.g. NEMA, WRMA)
CP 3.	International environmental agreements (e.g. Kyoto Agreement, The Climate Change Treaty, The Montreal Protocol, etc)
2. Mimetic Pressures	
MP 1.	Local competitors
MP 2.	National competitors
MP 3.	Regional competitors (neighboring countries)
MP 4.	Global competitors
3. Normative Pressures	
NP 1.	Household consumers
NP 2.	Commercial buyers
NP 3.	Environmental groups or organizations
NP 4.	Community groups or organizations
NP 5	Labor unions
NP 6.	Trade associations
NP 7.	Shareholders
NP 8.	Management employees
NP 9.	Non-management employees
NP 10.	Suppliers of goods and services
NP 11.	Banks and other lenders
NP 12.	Other groups or organizations

Appendix V: Questionnaire

SECTION A: FIRM CHARACTERISTICS

1. Name of the organization______________________________________

2. What is the ownership status of your firm?

Ownership status	Code
Fully locally owned	1
Fully foreign owned	2
Joint locally and foreign owned	3
Other (please specify)	4

3. In which manufacturing sub-sector does your firm operate in?

Manufacturing Subsector	Code
Building, Construction & Mining	1
Chemical & Allied	2
Electrical & Electronics	3
Food Beverages & Tobacco	4
Leather & Footwear	5
Metal & Allied	6
Motor Vehicle & Accessories	7
Paper & Board.	8
Pharmaceutical & Medical Equipment	9
Plastics & Rubber	10
Timber, Wood Products & Furniture	11
Textiles & Apparels	12
Consultancy & Industrial Services	13
SME Focal Point	14
Others (Specify)	

4. How long has your firm been in existence? ______________________________Years.

5. What is the size of the staff of your company (full time employees)? ______________

6. What is the scope of the market that is served by your firm?

Scope of the market	Code
Local	1
Global	4

7. How long ago did you receive ISO 14001 certification? ______________________________

8. Were you in the organization when your firm received ISO 14001 certification?

Present	Code
Yes	1
No	2

9. (a) Does your firm have an environmental management department?

Has EMD	Code	Instructions
Yes	1	Go to Q9b
No	2	Go to Q10

(b) How many employees are working under this department?

No. of Employees in EMD	Code
Less than 5 employees	1
5-10 employees	2
More than 10 employees	3

10. Is your firm registered with any environmental management body?

Registered	Code	Instructions
Yes	1	Go to Q11
No	2	Go to Q11

11. Does your firm have an environmental management policy?

Has EMP	Code
Yes	1
No	2

12. How often do you have inter-departmental meetings where you discuss environmental issues in a year? (tick one)

Frequency of Meetings	Code
0	1
1-2 times	2
3-4 times	3
5 or more times	4

13. (a) Does your firm have a budget for research and development specifically related to environmental management issues?

Has Budget	Code	Instructions
Yes	1	Go to Q13b
No	2	Go to Q14

(b) If yes, what is the approximate amount of total budget for research and development allocated to environmental management issues in a year?

Research Budget (ksh)	Code
Less than Ksh. 50,000	1
Ksh. 50,001- Ksh. 100,000	2
Ksh. 100,001- Ksh.150,000	3
Above Ksh. 150,000	4

SECTION B: INSTITUTIONAL PRESSURES FOR GREEN SUPPLY CHAIN PRACTICES ADOPTION

14. Using the scale below, indicate the extent to which the following institutional pressures have influenced your firm to implement green supply chain management practices (e.g. seek ISO 14001 certification).

[1] Not at all [2] Small extent [3] Moderate extent [4] Great extent [5] Very great extent

	Institutional Pressures					
1.	Domestic environmental regulations	1	2	3	4	5
2.	Government environmental policy (e.g. NEMA, WRMA)	1	2	3	4	5
3.	International environmental agreements (e.g. Kyoto Agreement, The Climate Change Treaty, The Montreal Protocol, etc)	1	2	3	4	5
4.	Local competitors	1	2	3	4	5
5.	National competitors	1	2	3	4	5
6.	Regional competitors (neighboring countries)	1	2	3	4	5
7.	Global competitors	1	2	3	4	5
8.	Household consumers	1	2	3	4	5
9.	Commercial buyers	1	2	3	4	5
10.	Environmental groups or organizations	1	2	3	4	5
11.	Community groups or organizations	1	2	3	4	5
12.	Labor unions	1	2	3	4	5
13.	Trade associations	1	2	3	4	5
14.	Shareholders	1	2	3	4	5
15.	Management employees	1	2	3	4	5
16.	Non-management employees	1	2	3	4	5
17.	Suppliers of goods and services	1	2	3	4	5
18.	Banks and other lenders	1	2	3	4	5
19.	Other groups or organizations (please specify)	1	2	3	4	5

SECTION C: GREEN SUPPLY CHAIN MANAGEMENT PRACTICES

15. Using the scale below, indicate the extent to which your firm has implemented the green procurement practices shown below.

[1] Not at all [2] Small extent [3] Moderate extent [4] Great extent [5] Very great extent

	Green Procurement Practices					
1.	Provide design specification on environmental requirements to suppliers for purchased items.	1	2	3	4	5
2.	Cooperate with suppliers in order to attain environmental objectives.	1	2	3	4	5
3.	Evaluate second-tier supplier for environmentally friendly practices.	1	2	3	4	5
4.	Require suppliers to take back packaging.	1	2	3	4	5
5.	Eco-labeling of products.	1	2	3	4	5
6.	Reduce use of paper during the purchasing process (e.g. ordering via email).	1	2	3	4	5
7.	Purchasing equipment that is easy to repair.	1	2	3	4	5
8.	Develop environmental awareness among employees in the procurement department.	1	2	3	4	5
9.	Favor products which provide information about their environmental impact.	1	2	3	4	5

10.	Require suppliers to reduce packaging to minimum required to protect supplied items.	1	2	3	4	5
11.	Make purchases from suppliers who are compliant with legislation on the environment.	1	2	3	4	5
12.	Purchase raw materials in bulk in order to minimize use of energy, labour, and packaging materials through bulk packaging.	1	2	3	4	5
13.	Purchase products that are energy efficient or products which require less energy to manufacture.	1	2	3	4	5
14.	Require that suppliers must possess EMS certification (e.g. ISO 14001, BS7750 or EMAS).	1	2	3	4	5
15.	Purchase products with bio-degradable or recyclable packaging.	1	2	3	4	5
16.	Develop a database with information on suppliers' environmental conduct.	1	2	3	4	5
17.	Purchase energy saving equipment (e.g. machines or vehicles with higher capacity and are fuel efficient).	1	2	3	4	5
18.	Purchase materials and parts with desirable green attributes such as recycled or reusable items.	1	2	3	4	5
19.	Purchase materials and parts that do not contain environmentally harmful elements (e.g. lead, CFCs or plastic foam in packaging materials).	1	2	3	4	5
20.	Disclose environmental or safety information of product content using green seals and indicators of relative environmental impact.	1	2	3	4	5
21.	Audit suppliers to evaluate compliance with environmental requirements.	1	2	3	4	5
22.	Hold environmental awareness seminars periodically where suppliers and contractors meet to share knowledge on clean production technologies.	1	2	3	4	5
23.	Guide suppliers to set up their own programs for environmental management	1	2	3	4	5
24.	Pressurize suppliers to take disciplinary action for environmental non-compliance by their employees and suppliers.	1	2	3	4	5
25.	Develop long-term relationships with the suppliers through collaboration.	1	2	3	4	5
26.	Working to control the environmental risk resulting from suppliers' operations.	1	2	3	4	5

16. Using the scale below, Indicate the extent to which your firm has implemented the environmentally responsible design practices shown below.

[1] Not at all [2] Small extent [3] Moderate extent [4] Great extent [5] Very great extent

	Environmentally Responsible Design Practices					
1.	Collaboration with suppliers during the design process to ensure integration of green issues.	1	2	3	4	5
2.	Collaboration with customers during design process to ensure integration of green issues.	1	2	3	4	5
3.	Design of products and processes in a way that ensures reduction or elimination of environmentally hazardous materials (such as lead,	1	2	3	4	5

	mercury, chromium, cadmium etc).					
4.	Design in a way that facilitates reuse of a product or part of it with or without minimal treatment of the used product.	1	2	3	4	5
5.	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.	1	2	3	4	5
6.	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.	1	2	3	4	5
7.	Design that incorporates reduction of material use by a product.	1	2	3	4	5
8.	Design that promotes use of renewable resources.	1	2	3	4	5
9.	Design that incorporates reduction of energy consumption by a product, in addition to promoting use of renewable sources of energy.	1	2	3	4	5
10.	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.	1	2	3	4	5
11.	Design products with biodegradable materials.	1	2	3	4	5
12.	Design products that have longer useful life.	1	2	3	4	5
13.	Design products with physical characteristics (lighter, alternative materials) or production processes that allow for a higher transport density of parts.	1	2	3	4	5

17. Using the scale below, Indicate the extent to which your firm has implemented the green manufacturing practices shown below.

[1] Not at all [2] Small extent [3] Moderate extent [4] Great extent [5] Very great extent

	Green Manufacturing Practices					
1.	Top management is totally committed to environmentally friendly manufacturing.	1	2	3	4	5
2.	Reduce use of virgin raw materials by using recycled materials or reusing materials for product manufacturing.	1	2	3	4	5
3.	Putting in place measures for recycling and reuse of waste water.	1	2	3	4	5
4.	Putting in place measures to control leakages, emanating from damaged pipes, spillages, losses due to improper handling or faulty machinery	1	2	3	4	5
5.	Decreased consumption or total elimination of hazardous and toxic materials (e.g. changing to aqueous cleaners).	1	2	3	4	5
6.	Separation of hazardous and non-hazardous waste.	1	2	3	4	5
7.	Use of controls and filters for harmful discharges and emissions.	1	2	3	4	5
8.	Reduce energy consumption by using alternative sources of energy (e.g. biogas, solar, wind etc).	1	2	3	4	5
9.	Maintain an inventory of the firm's environmental impacts and identification of proper indicators of improvement (waste, emissions, effluent generation)	1	2	3	4	5
10.	Use of standardized components and parts to facilitate reuse	1	2	3	4	5
11.	Risk-prevention systems to cover possible environmental accidents and emergencies	1	2	3	4	5

12.	Training employees in safer production and accident prevention	1	2	3	4	5
13.	Involve production workers in green manufacturing to increase their awareness on the implication of their actions on the natural environment.	1	2	3	4	5
14.	Reward of environmentally positive behaviour among employees.	1	2	3	4	5
15.	Integrate total quality environmental management (TQEM) into planning and operation processes.	1	2	3	4	5
16.	Establishment and maintenance of proper procedures and actions for noncompliance with environmental policies.	1	2	3	4	5
17.	Availing firm's environmental impact information to the public for open discussion.	1	2	3	4	5
18.	Practice quality management to ensure products with fewer defects are produced, hence reducing the need to ship it back or reprocess it.	1	2	3	4	5
19.	Reduction in energy consumption by switching off idle machines, lights after working hours, installation of translucent roofing and glass blocks.	1	2	3	4	5

18. Using the scale below, Indicate the extent to which your firm has implemented the green packaging practices shown below.

[1] Not at all [2] Small extent [3] Moderate extent [4] Great extent [5] Very great extent

	Green Packaging Practices					
1.	Deliver product without using any packaging at all.	1	2	3	4	5
2.	Use life cycle assessment to evaluate environmental load of packaging during design.	1	2	3	4	5
3.	Reduce or downsize overall packaging of products.	1	2	3	4	5
4.	Cooperate with the vendor to standardize packaging	1	2	3	4	5
5.	Package product in such a way that time and effort required to unpack is reduced.	1	2	3	4	5
6.	Ensure that the size, shape, and materials for packaging promote efficiency (e.g. space utilization) during storage and transportation of the product.	1	2	3	4	5
7.	Adopt systems that encourage returnable packaging methods.	1	2	3	4	5
8.	Use biodegradable material (e.g. bioplastics, bio-nano composites, etc) for packaging.	1	2	3	4	5
9.	Reduce the use of hazardous materials in packaging	1	2	3	4	5
10.	Make sure that packaging material has recyclable contents or can be reused.	1	2	3	4	5
11.	Make a continuous effort to find new reusable materials for packaging.	1	2	3	4	5

19. Using the scale below, Indicate the extent to which your firm has implemented the green distribution practices shown below.

[1] Not at all [2] Small extent [3] Moderate extent [4] Great extent [5] Very great extent

	Green Distribution Practices					
1.	Distribute products together, rather than in smaller batches to ensure full vehicle loads for efficiency.	1	2	3	4	5

2.	Employ transport modes that use less energy or use energy more efficiently.	1	2	3	4	5
3.	Employ transport modes that generate less air and noise pollution (e.g. rail, water as opposed to road and air).	1	2	3	4	5
4.	Use a good information system and innovative management to ensure more efficient loading, scheduling and routing.	1	2	3	4	5
5.	Deliver products directly to the user site.	1	2	3	4	5
6.	Employ transport modes that use alternative fuel (e.g. electricity, ethanol, biodiesel, hydrogen etc).	1	2	3	4	5
7.	Locate near customers to reduce resources consumed in getting the product to them.	1	2	3	4	5
8.	Use logistics firms that abide to environmentally friendly principles or have EMS certification (e.g. ISO 14001, BS7750, EMAS), in case transport is outsourced	1	2	3	4	5
9.	Usage of warehousing facilities that have been certified as environmentally efficient.	1	2	3	4	5
10.	Proper maintenance programmes of vehicles to keep them in safe and efficient working condition.	1	2	3	4	5
11.	Sale of vehicles that have reached their end of useful life rather than leave them to fill the parking yard.	1	2	3	4	5

20. Using the scale below, Indicate the extent to which your firm has implemented the reverse logistics practices shown below.

[1] Not at all [2] Small extent [3] Moderate extent [4] Great extent [5] Very great extent

	Reverse Logistics Practices					
1.	Spread awareness among customers on the firm's product or packaging return or take-back policy.	1	2	3	4	5
2.	Install collection points for used products and packaging for reuse and recycling.	1	2	3	4	5
3.	Employ individuals or firms to collect waste generated by the firm's products.	1	2	3	4	5
4.	Maintain a database on the quantities and value of material and end of life products or packaging collected from consumers.	1	2	3	4	5
5.	Safe disposal of unrecyclable or unreusable waste (especially hazardous waste).	1	2	3	4	5
6.	Offer special incentives to those who return packaging materials.	1	2	3	4	5
7.	Giving bonuses to employees who collect sizeable amounts recyclable materials (e.g. broken bottles in case of soft drinks or beer companies)	1	2	3	4	5
8.	Provide appropriate advice to customers on the environmental aspects of handling, use, and disposal of the firm's products.	1	2	3	4	5
9.	Return used products and packaging to suppliers for reuse or recycling.	1	2	3	4	5
10.	Remind customers not to purchase the firm's products unless it is absolutely necessary.	1	2	3	4	5
11.	Consolidate freight in case where used material and packaging is to be shipped back to the firm.	1	2	3	4	5
12.	Put in place systems to monitor reverse flows of materials.	1	2	3	4	5

13.	Work to ensure proper product use by customers.	1	2	3	4	5

SECTION D: RELATIONAL EFFICIENCY

21. Using the scale below, Indicate the extent to which your organization experienced the relational outcomes below as a result of collaborating with partners in the supply chain (suppliers and customers) on environmental issues.

[1] Not at all [2] Small extent [3] Moderate extent [4] Great extent [5] Very great extent

1.	Increased appreciation for our collaboration partners.	1	2	3	4	5
2.	Increased respect for the skills and capabilities of our collaboration partners.	1	2	3	4	5
3.	Increased overall respect for our collaboration partners.	1	2	3	4	5
4.	Improved level of honesty.	1	2	3	4	5
5.	More open sharing of information with our partners.	1	2	3	4	5
6.	Enhanced commitment to work together in the future.	1	2	3	4	5
7.	Enhanced feeling of partnership and solidarity among us.	1	2	3	4	5
8.	Increased level of frankness by our supply chain partners in dealing with us.	1	2	3	4	5
9.	Increased reliability of promises made by our supply chain partners.	1	2	3	4	5
10.	Increased knowledge of our supply chain partners regarding their role in the supply chain	1	2	3	4	5
11.	Our supply chain partners have no problems answering our questions regarding green supply chain management issues.	1	2	3	4	5
12.	Our supply chain partners disclose confidential information about industry/market conditions, competitors, and channel partners.	1	2	3	4	5
13.	Our supply chain partners promised resources and support (e.g., market research and help in decision making)	1	2	3	4	5
14.	The relationship with our supply chain partners is productive as far as adoption environmentally friendly practices are concerned.	1	2	3	4	5
15.	Time and effort spent developing and maintaining these relationships are worthwhile.	1	2	3	4	5
16.	Overall, we are satisfied with the relationship with our supply chain partners.	1	2	3	4	5

SECTION E: ENVIRONMENTAL PERFORMANCE

22. Using the scale below, Indicate the percentage reduction in the negative environmental outcomes below that your organization has experienced since you were ISO 14001 certified.

Environmental impact reduction	0-10%	11- 20%	21- 30%	31- 40%	Over 40%
Green house gas emissions (e.g. carbon dioxide, nitrous oxide, methane, hydro fluorocarbons, sulphur hexafluoride, per fluorocarbons, etc)	1	2	3	4	5
Water Use Ratio (WUR)	1	2	3	4	5
Discharge of wastewater (in cubic meters)	1	2	3	4	5
Solid waste (e.g. packaging waste, scrap, etc)	1	2	3	4	5
Use of hazardous materials	1	2	3	4	5
Frequency of environmental accidents	1	2	3	4	5

23. Using the scale below, Indicate the percentage decrease in cost of the activities/items below that your organization has experienced since you were ISO 14001 certified.

Environmental cost saving	0-10%	11- 20%	21- 30%	31- 40%	Over 40%
Savings due to purchase of environmentally friendly raw materials	1	2	3	4	5
Investment in environmental technology	1	2	3	4	5
Savings due to material recovery (by reusing or recycling materials)	1	2	3	4	5
Savings due to recycling of waste water	1	2	3	4	5
Savings due transportation of products in bulk rather than distributing them in small quantities.	1	2	3	4	5
Energy cost savings	1	2	3	4	5
Fines/penalties for flouting environmental regulations	1	2	3	4	5

SECTION F: OPERATIONAL PERFORMANCE

24. Indicate the percentage reduction in the following quality indicators since you were ISO 14001 certified.

Quality measures	0-10%	11- 20%	21- 30%	31- 40%	Over 40%
Products scrapped	1	2	3	4	5
Products reworked	1	2	3	4	5
Products returned by consumers	1	2	3	4	5
Number of complaints during	1	2	3	4	5

warranty period					

25. Indicate the percentage reduction in the following cost indicators that your firm has experienced since receiving ISO 14001 certification.

Cost measures	**0-10%**	**11- 20%**	**21- 30%**	**31- 40%**	**Over 40%**
Inventory levels reduction	1	2	3	4	5
Improved capacity utilization	1	2	3	4	5
Cost per operation hour	1	2	3	4	5
Variance against budget	1	2	3	4	5

26. Indicate the percentage reduction in the following times that your firm experienced since you were ISO 14001 certified.

Speed measures	**0-10%**	**11- 20%**	**21- 30%**	**31- 40%**	**Over 40%**
Design time	1	2	3	4	5
Cycle time	1	2	3	4	5
Machine set-up time	1	2	3	4	5
Through-put time	1	2	3	4	5
Order lead time	1	2	3	4	5

27. Indicate the extent to which the following flexibility measures have been enhanced since your firm received ISO 14001 certification.

[1] Not at all [2] Small extent [3] Moderate extent [4] Great extent [5] Very great extent

Flexibility measures					
Increased number of product categories	1	2	3	4	5
Ability of the firm to increase production should an increase in demand arise and vice versa	1	2	3	4	5
Ability to introduce new products in case of demand	1	2	3	4	5
Ability of firm to vary delivery time to meet demand	1	2	3	4	5

SECTION G: ORGANIZATIONAL PERFORMANCE

28. Indicate the percentage increase in the following financial performance measures that your firm has experienced since receiving ISO 14001 certification.

Financial Performance measures	**0-10%**	**11- 20%**	**21- 30%**	**31- 40%**	**Over 40%**
Cash Flow	1	2	3	4	5
Profit after tax	1	2	3	4	5
Return on Sales	1	2	3	4	5
Return on Investment	1	2	3	4	5
Ability to Fund Business	1	2	3	4	5

Growth from Profits					
Return on Shareholders' Equity	1	2	3	4	5

29. Indicate the percentage increase in the following market performance measures that your firm has experienced since receiving ISO 14001 certification.

Market Performance measures	**0-10%**	**11- 20%**	**21- 30%**	**31- 40%**	**Over 40%**
Market share	1	2	3	4	5
Sales volume (in units)	1	2	3	4	5
Sales (in $)	1	2	3	4	5

THANK YOU VERY MUCH FOR YOUR COOPERATION

Appendix VI: Sample Size Selection Guidelines

Minimum sample size required	Maximum number of arrows pointing at a latent variable in the model
52	2
59	3
65	4
70	5
75	6
80	7
84	8
88	9
91	10

Source: Wong, K. K. K. (2013). Partial least squares structural equation modeling (PLS-SEM) techniques using SmartPLS. *Marketing Bulletin*, *24*(1), pp 5. Based on guidelines given by Marcoulides, G. A., & Saunders, C. (2006, June). Editor's Comments – PLS: A Silver Bullet? *MIS Quarterly*, *30*(2), iii-ix.

Appendix VII: Authority Letter from National Commission for Science, Technology and Innovation

NACOSTI

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471, 2241349, 310571, 2219420
Fax: +254-20-318245, 318249
Email: secretary@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No.

Date:

16th September, 2014

NACOSTI/P/14/3744/3059

Stephen Ochieng' Odock
University of Nairobi
P.O. Box 30197-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Green Supply Chain Management practices and performance of ISO 14001 Certified Manufacturing Firms in Kenya,"*** I am pleased to inform you that you have been authorized to undertake research in **all Counties** for a period ending **30th November, 2014.**

You are advised to report to **the Directors of selected manufacturing firms, the County Commissioners and the County Directors of Education, all Counties** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

DR. S. K LANGAT, OGW
FOR: SECRETARY/CEO

Copy to:

The Directors
Selected Manufacturing Firms.

The County Commissioners
The County Directors of Education
All Counties.

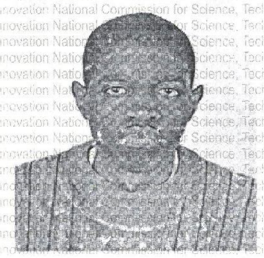
National Commission for Science, Technology and Innovation is ISO 9001: 2008 Certified

THIS IS TO CERTIFY THAT:
MR. STEPHEN OCHIENG ODOCK
of UNIVERSITY OF NAIROBI, 0-100
NAIROBI,has been permitted to conduct
research in*All Counties County*

on the topic: *GREEN SUPPLY CHAIN MANAGEMENT PRACTICES AND PERFORMANCE OF ISO 14001 CERTIFIED MANUFACTURING FIRMS IN KENYA*

for the period ending:
30th November,2014

Permit No : NACOSTI/P/14/3744/3059
Date Of Issue : 16th September,2014
Fee Recieved :Ksh 2,000



....
Applicant's Signature

for ....
Secretary
National Commission for Science, Technology & Innovation

Appendix VIII: University of Nairobi Letter of Authorization to Conduct Research