

2016

## The impact of the dimensions of green supply chain management practices on corporate performance

Hassan Younis  
*University of Wollongong in Dubai*

Follow this and additional works at: <https://ro.uow.edu.au/theses>

### University of Wollongong

#### Copyright Warning

You may print or download ONE copy of this document for the purpose of your own research or study. The University does not authorise you to copy, communicate or otherwise make available electronically to any other person any copyright material contained on this site.

You are reminded of the following: This work is copyright. Apart from any use permitted under the Copyright Act 1968, no part of this work may be reproduced by any process, nor may any other exclusive right be exercised, without the permission of the author. Copyright owners are entitled to take legal action against persons who infringe their copyright. A reproduction of material that is protected by copyright may be a copyright infringement. A court may impose penalties and award damages in relation to offences and infringements relating to copyright material.

Higher penalties may apply, and higher damages may be awarded, for offences and infringements involving the conversion of material into digital or electronic form.

Unless otherwise indicated, the views expressed in this thesis are those of the author and do not necessarily represent the views of the University of Wollongong.

### Recommended Citation

Younis, Hassan, The impact of the dimensions of green supply chain management practices on corporate performance, Doctor of Business Administration thesis, Faculty of Business, University of Wollongong in Dubai, University of Wollongong, 2016. <https://ro.uow.edu.au/theses/4845>



**Faculty of Business**

The Impact of the Dimensions of Green Supply Chain Management Practices on  
Corporate Performance

**Hassan Younis**

**"This thesis is submitted in partial fulfilment of the requirements for the  
Degree of  
Doctorate of Business Administration  
University of Wollongong"**

**October 2016**

## **THESIS CERTIFICATION**

### **Certification**

I, Hassan Younis, declare that this thesis, submitted in partial fulfilment of the requirements for the award of Doctorate of Business Administration, in the faculty of business, University of Wollongong in Dubai, is wholly my own work unless otherwise referenced or acknowledged. The document has not been submitted for qualifications at any other academic institution.

Hassan Younis

09/ 10/ 2016

## ABSTRACT

Global warming, carbon emissions and the depletion of natural resources have heralded significant changes in the way organizations produce and deliver products and services. Within this context the greening of supply chains has gained the attention of practitioners in many countries. In some countries, for example, carbon taxation has been introduced as a mandatory requirement. However, the implementation of green supply chain management practices and the impact of these practices on corporate performance are still in a nascent stage.

The United Arab Emirates (UAE) faces many challenges including increased energy consumption, the depletion of natural resources and the generation of significant waste and Green House Gas (GHG) emissions. Indeed, the UAE's total GHG emissions increased by 100 million tCO<sub>2</sub>e between 2007 and 2012 (MoEW, 2015). In addition electricity consumption, which depends mainly on fossil fuel for its generation, has increased at a rate of 8% annually during the same period. Business organizations, through their operational activities, are responsible for a large proportion of these environmental challenges. For example, GHG emissions from the manufacturing sector in the UAE accounted for 16.7% of total GHG emissions in 2012. It was also found that 53.3% of the plastic bags produced annually in the UAE were non-biodegradable (MoEW, 2015). These issues indicate the need to investigate green supply chain implementation across UAE organizations in order to gain a deeper understanding of the impact of implementing green supply chain management practices on corporate performance.

Consequently, the aim of this research was to explore green supply chain management (GSCM) practices and their relationship to corporate performance (CP). The major research objective was to answer the question: *What is the impact of implementing green supply chain management practices on corporate performance?* The research specifically examines the impact of implementing a set of green supply chain management practices; including eco-design, green purchasing, environmental cooperation and reverse logistics, on different dimensions of corporate performance. This includes environmental, operational, economic and social outcomes. The methodology used in this research is mainly deductive in nature, however, following a survey employed to collect quantitative data from ISO 14001 certified and none certified manufacturing firms in the UAE, a qualitative phase was introduced to

enhance the quantitative results. Thus, a sequential mixed methods approach was introduced by following the quantitative phase with a qualitative research phase that involved collecting interview data from a selected sample of those firms that responded to the quantitative survey. This phase was designed to gain a deeper understanding of why the quantitative study found that some green practices failed to have an impact on some of the corporate performance dimensions.

While the research presents mixed outcomes, some green supply chain practices were found to have no impact on any performance dimensions such as eco-design, while other practices had an impact on a single dimension, for example, environmental cooperation which was found to have a positive impact on operational performance but not on any other performance dimensions. Similarly reverse logistics was found to only impact the social performance of the firm, while green purchasing was found to be a key green supply chain practice because it can improve both operational and economic performance.

This study adds to the body of knowledge by identifying barriers to the implementation of a number of green supply chain practices. For example; this study identifies barriers to implementation of a number of green supply chain practices while highlighting the value of a mixed methods approach in green supply chain research. It contributes to business practice by presenting a stakeholder understanding of the relationship between the implementation of different green supply chain practices and corporate performance, including the level of adoption that may identify the most appropriate GSCM practices needed to reach the optimum performance level. A series of recommendations are also provided for firms interested in improving their footprint and their environmental performance while implementing green supply chain practices.

## **DEDICATION**

To my father, Ali Suleiman Younis, in loving memory.

## **ACKNOWLEDGEMENTS**

I'm extremely thankful to many people who have provided me with encouragement, advice and support throughout my thesis research.

I would like to extend sincere thanks to my supervisor, Dr. Balan Sundarakani for his support and guidance during all the years of my study in the DBA program. I'm also indebted for Professor Barry O'Mahony whose support and mentorship with such intellect, vision and purpose enabled me to achieve this work. Many thanks for Dr. Prakash Vel, who also helped me during the initial stages of this thesis write-up.

I would like also to acknowledge the help of Madina Akhmedova and Veronika Loessl from the Postgraduate Research Office as they were always there to assist with all admin related matters and facilitate communication among all parties involved in this thesis.

My wholehearted thanks go to my mother for her love and support during my life and for teaching me to stand up for what I believe and to fight for what is valuable. How could I thank her enough?

I also would like to express my heartfelt gratefulness for my lovely wife for her unwavering encouragement and unconditional support during my six years journey and for bearing the responsibility towards the home and the kids patiently and uncomplainingly. Her confidence in me was always a source of motivation and enthusiasm to accomplish this work.

## TABLE OF CONTENTS

THESIS CERTIFICATION.....	i
ABSTRACT.....	ii
DEDICATION.....	iv
ACKNOWLEDGEMENTS.....	v
TABLE OF CONTENTS.....	vi
LIST OF FIGURES .....	xi
LIST OF TABLES.....	xii
1 INTRODUCTION .....	1
1.1 Background.....	1
1.2 Definition of Green Supply Chain .....	1
1.3 Sustainability.....	3
1.4 Green Supply Chain Management (GSCM) Practices.....	4
1.5 Effects of Green Supply Chain Practices on Corporate Performance .....	5
1.6 Research questions.....	6
1.7 Organization of the dissertation.....	6
2 LITERATURE REVIEW .....	8
2.1 Grounded theories in GSCM .....	8
2.1.1 Stakeholder theory .....	8
2.1.2 Institutional theory .....	9
2.1.3 Resource based theory .....	10
2.2 Drivers of GSCM.....	11
2.3 GSCM and Corporate performance .....	12
2.3.1 GSCM and Corporate Performance: No relationship .....	13
2.3.2 GSCM and Corporate Performance: Negative Relationship .....	15
2.5.3 GSCM and Corporate Performance: Positive Relationship.....	16
2.4 ISO 14001 Environment Management System.....	28
2.5 GSCM in the United Arab Emirates .....	29
2.6 Green supply chain initiatives adoption.....	30
2.7 Research Gaps.....	31
3 CONCEPTUAL FRAMEWORK AND HYPOTHESES DEVELOPMENT .....	33
3.1 Theoretical model .....	33
3.2 Discussion of independent variables selected for the theoretical model .....	34



3.2.1	Eco-design.....	35
3.2.2	Green purchasing .....	37
3.2.3	Environmental cooperation .....	39
3.2.4	Reverse logistics .....	40
3.3	Discussion of the dependent variables selected for the theoretical model.....	42
3.3.1	Environmental performance.....	43
3.3.2	Operational performance .....	43
3.3.3	Economic performance .....	44
3.3.4	Social performance .....	45
3.3.5	Control variables .....	45
3.4	Summary of all variables definitions selected in the model .....	46
3.5	Summary of Hypotheses .....	47
3.5.1	GSCM Practices and Environmental Performance.....	47
3.5.2	GSCM Practices and Operational Performance.....	47
3.5.3	GSCM Practices and Economic Performance .....	48
3.5.4	GSCM Practices and Social Performance.....	48
4	RESEARCH METHODOLOGY.....	50
4.1	Measurement.....	51
4.2	Scale.....	53
4.3	Survey instrument .....	53
4.3.1	Manufacturing industries in UAE.....	54
4.3.2	Dun & Bradstreet (D&B).....	55
5	HYPOTHESES TESTING AND RESULTS .....	56
5.1	The population and sample size.....	56
5.2	Details of the instrument, survey and analysis of the results .....	56
5.3	Examination of outliers and missing data .....	57
5.4	Non response bias .....	59
5.5	Descriptive Statistics.....	59
5.5.1	Independent variables (IV) .....	60
5.5.2	Dependent variables (DV) .....	60
5.6	Demographic characteristics .....	61
5.6.1	Participants' position in the organization .....	61
5.6.2	Location of responding firms in UAE .....	62

5.6.3	Size of firms .....	63
5.6.4	Number of years in business .....	64
5.6.5	Legal status and ownership .....	65
5.6.6	EMS Certification .....	66
5.7	Validity and reliability analysis .....	66
5.8	Factor analysis .....	68
5.8.1	Sample size .....	68
5.8.2	Foundational rationale .....	69
5.8.3	Eco-Design (ED).....	69
5.8.4	Green purchasing (GP) .....	72
5.8.5	Environmental cooperation (EC) .....	75
5.8.6	Reverse Logistics (RL) .....	78
5.8.7	Environmental performance (EP) .....	81
5.8.8	Operational performance (OP).....	84
5.8.9	Economic performance (EcP) .....	87
5.8.10	Social performance (SP) .....	91
5.9	Multiple regression analysis .....	94
5.9.1	Sample size consideration.....	94
5.9.2	Assessing multicollinearity .....	94
5.9.3	Assumptions for multiple regression analysis .....	95
5.9.4	Regression results and output for Environmental Performance (EP) .....	95
5.9.5	Regression results and output for operational performance (OP).....	98
5.9.6	Regression results and output for economic performance .....	101
5.9.7	Regression results and output for social performance .....	104
5.10	Hypothesis testing.....	108
5.10.1	Independent variables regression results .....	108
6	SEQUENTIAL QUALITATIVE RESEARCH.....	119
6.1	Introduction.....	119
6.2	Adoption of sequential qualitative approach .....	120
6.3	Sample Selection for interviews .....	121
6.4	Qualitative Data Analysis Process .....	123
6.4.1	Process related issues .....	124
6.4.2	Environment Management System (EMS) related issues.....	126

6.4.3	Cost related issues.....	127
6.4.4	Marketing related issues .....	127
6.4.5	Time related issues.....	128
7	DISCUSSION.....	129
8	LIMITATIONS, CONCLUSION AND FURTHER RESEARCH .....	137
8.1	Limitations .....	137
8.2	Further research .....	137
8.3	Recommendations.....	138
	REFERENCES .....	140

## List of abbreviations

Abbreviation	Description
GSCM	Green supply chain management
CP	Corporate Performance
ED	Eco Design
GP	Green Purchasing
EC	Environmental Cooperation
RL	Reverse Logistics
EP	Environmental Performance
OP	Operational Performance
EcP	Economic Performance
SP	Social Performance
EMS	Environment Management System
D&B	Dun & Bradstreet
IV	Independent Variable
DV	Dependent Variable
CV	Control Variable
UAE	United Arab Emirates
ANOVA	Analysis of Variance
SD	Standard Deviation
MNC	Multi National Cooperation
CFA	Confirmatory Factor Analysis
MSA	Measure of Sample Adequacy
KMO	Kaiser-Meyer-Olkin
TVA	Total Variance Explained
MRA	Multiple Regression Analysis
VIF	Variance Inflation Factor

## LIST OF FIGURES

Figure 1: GSCM Practices .....	4
Figure 2: GSCM-Performance Impact.....	28
Figure 3: Theoretical Model .....	33
Figure 4: Performance Model, adopted Elkington (1998).....	43
Figure 5: The theoretical model with hypotheses .....	49
Figure 6: Participants' position.....	62
Figure 7: Location of firms in UAE.....	63
Figure 8: Size of organizations .....	64
Figure 9: Number of years in business .....	65
Figure 10: Organizations types .....	66
Figure 11: EMS Certification.....	66
Figure 12: EP Histogram .....	96
Figure 13: EP Scatterplot.....	97
Figure 14: EP Normal P-P Plot.....	98
Figure 15: OP Histogram.....	99
Figure 16: OP Scatterplot.....	100
Figure 17: OP Normal P-P Plot .....	101
Figure 18 : EcP Histogram.....	102
Figure 19 : EcP Scatterplot .....	103
Figure 20: EcP Normal P-P Plot .....	104
Figure 21: SP Histogram.....	105
Figure 22: SP Scatterplot .....	106
Figure 23: SP Normal P-P Plot.....	107
Figure 24 : GSCM practices and corporate dimension results .....	117

## LIST OF TABLES

Table 1: GSCM definition in the extant literature .....	3
Table 2: Summary of sample articles on GSCM .....	27
Table 3: Conceptual construct definitions .....	46
Table 4: Measurement items .....	52
Table 5: Descriptive Statistics .....	58
Table 6: ANOVA .....	59
Table 7 : IVs descriptive statistics .....	60
Table 8: DVs descriptive statistics.....	61
Table 9: Variables Cronbach's $\alpha$ .....	67
Table 10: Questionnaire Cronbach's $\alpha$ .....	67
Table 11: ED items correlation .....	69
Table 12: ED Anti-image Matrices.....	69
Table 13: ED KMO and Barlett's Test .....	70
Table 14: ED items total variance explained .....	70
Table 15 : ED items factor loadings .....	71
Table 16: ED items communalities.....	71
Table 17: GP items correlations.....	72
Table 18: GP items Anti-image matrices.....	72
Table 19: GP KMO and Barlett's test.....	73
Table 20: GP items total variance explained .....	73
Table 21: GP factor loadings .....	74
Table 22: GP communalities.....	74
Table 23: GP items total variance explained .....	74
Table 24: EC items correlations.....	75
Table 25: EC items Anti-image matrices.....	76
Table 26: EC KMO and Barlett's test.....	76
Table 27: EC total variance explained .....	77
Table 28 : EC factor loadings .....	77
Table 29: EC communalities.....	77
Table 30: EC total variance explained .....	78
Table 31: RL correlations .....	79

Table 32: RL anti-image matrices.....	79
Table 33: RL KMO .....	80
Table 34: RL total variance explained .....	80
Table 35: RL factor loadings .....	80
Table 36: RL Communalities.....	81
Table 37: EP correlations.....	81
Table 38: EP anti-image matrices .....	82
Table 39: EP KMO .....	82
Table 40: EP total variance explained .....	83
Table 41: EP Components Matrix.....	83
Table 42: EP Communalities .....	84
Table 43: EP Total Variance 2.....	84
Table 44: OP items correlations.....	85
Table 45: OP Anti-image Matrices .....	85
Table 46: OP KMO.....	86
Table 47: OP Total variance explained.....	86
Table 48: OP component Matrix.....	87
Table 49: OP Communalities.....	87
Table 50: EcP Correlations .....	88
Table 51: EcP Anti-image matrices .....	88
Table 52: EcP KMO.....	89
Table 53: EcP Total variance.....	89
Table 54: EcP Component Matrix .....	90
Table 55: EcP Communalities .....	90
Table 56: EcP Total variance explained .....	90
Table 57: SP items correlations .....	91
Table 58: SP Anti-image matrices .....	91
Table 59: SP KMO.....	92
Table 60: SP Total variance.....	92
Table 61: SP Components matrix .....	93
Table 62: SP Communalities .....	93
Table 63: IV Multicollinearity .....	94
Table 64: Collinearity Diagnostics .....	95

Table 65: EP Model summary .....	97
Table 66: OP Model summary .....	100
Table 67: EcP Model Summary .....	103
Table 68: SP Model summary.....	106
Table 69 : EP Model summary .....	108
Table 70: EP Coefficients .....	109
Table 71: Environmental performance hypotheses.....	109
Table 72: OP Model summary .....	110
Table 73: OP Coefficients.....	111
Table 74: Operational performance hypotheses .....	111
Table 75: EcP Model summary.....	112
Table 76: EcP Coefficients .....	113
Table 77: Economic Performance hypotheses .....	113
Table 78: SP Model summary.....	114
Table 79: SP Coefficients .....	115
Table 80: Social Performance hypotheses .....	115
Table 81: Control variables impact.....	116
Table 82: Characteristics of firms and interviewees.....	122
Table 83: Summary of the interview questions .....	123
Table 84: Summary of firms answers to the 12 interview questions .....	124



# **1 INTRODUCTION**

This chapter illustrates the background of the topic and summarizes the different definitions of green supply chain management from various academic and industry perspectives. Subsequently the commonality between sustainability and green supply chain is discussed and differentiated. Finally, the chapter elaborates on the various green supply chain management dimensions, and their relationship with corporate performance and deriving the research question from thereof.

## **1.1 Background**

The integration of environmental actions and organizational performance has gained increasing attention over recent decades. Climate change, the depletion of natural resources and environmental pollution are the main drivers behind international efforts to greening not only organizations but also entire supply chains (Lee *et al.*, 2012). Organizations are required to balance between compliance with legislation and remaining focused on stockholders' objectives. Investigating how businesses can achieve these goals while satisfying stakeholders' different interests is reported to be potentially of great value (Ayuso *et al.*, 2014; Freeman, 2002; Russo & Fouts, 1997).

## **1.2 Definition of Green Supply Chain**

Prior to embarking on this research it is important to define what constitutes a green supply chain. This section presents a number of definitions found within the literature. A useful definition of green supply chain is captured by Hervani (2005, p.334) who states that a "green supply chain is a concept that combines green procurement, environmental management of manufacturing materials, environmental circulation, marketing, and reverse logistics". According to Sarkis (2003, p.399) it is further defined as "a combination of the activities that encompasses product design, all stages of manufacturing and distribution and all aspects of reverse logistics, and emphasized the latter's importance". Sundarakani *et al.* (2010, p.43) add another dimension asserting that "green supply chain management can be defined as the integration of environmental thinking into supply chain management, including product

design, supplier selection and material sourcing, manufacturing processes, product packaging, delivery of the product to consumers, and end-of-life management of the product after its use”.

These definitions build on earlier work by Beamon (1999, p.332) who defines a green supply chain as "the extension of the traditional supply chain to include activities that aim at minimizing environmental impacts of a product throughout its entire cycle, such as green design, resource saving, harmful material reduction and product recycle and reuse".

Later, Kumar and Putnam (2008, p.305) have proposed that the end-to-end supply chain process which was called “cradle to grave” in the early eighties, is now called “cradle to cradle”, which means that the product has to be returned back to the origin (the manufacturer) to be reused or properly disposed of. Srivastava (2007) on the other hand, believes that green supply chain management practices need to be integrated across the whole supply chain including acquisition of raw material, product design, manufacturing processes, finished product delivery and finally the management of the disposal of the product after its useful life. Table 1 summarizes the definitions of GSCM in the current literature (Adopted from Luthra *et al.* (2014)).

Table 1: GSCM definition in the extant literature

S.No	Definition	Author/s
1	GSCM is as the practice of monitoring and improving environmental performance in the supply chain	Godfrey (1998)
2	Environmental/GSCM consists of the purchasing function's involvement in activities that include reduction, recycling, reuse and the substitution of materials	Narasimhan and Carter (1998)
3	GSCM is the set of SCM policies held, actions taken and relationships formed in response to concerns related to the natural environment with regard to the design, acquisition, production, distribution, use, re-use and disposal of the firm's goods and services	Zsidisin and Siferd (2001)
4	GSCM is the summation of Green Purchasing, Green Manufacturing/Materials Management, Green Distribution/ Marketing and Reverse Logistics	Hervani <i>et al.</i> (2005)
5	GSCM covers all phases of the product's life cycle from design, production and distribution phases to the use of products by the end users and its disposal at the end of the product's life cycle	Zhu and Sarkis (2006)
6	GSCM is adding "green" component to SCM, including green operations, Green Design, Green Manufacturing, Reverse Logistics and Waste Management	Srivastava (2007)
7	GSCM is as an approach for improving performance of the processes and products according to the requirements of the environmental regulations	Hsu and Hu (2008)
8	GSCM is as a managerial approach that seeks to minimize a product or service's environmental and social impacts or footprint	Rettab and Ben Brik (2008)
9	GSCM (the integration of both environmental and SCM) is a proven way to reduce a company's impact on the environment while improving business performance	Torielli <i>et al.</i> (2011)

Based on the above definitions it can be clearly observed that greening must span the entire supply chain throughout all stages and therefore it can be reasonably claimed that a green supply chain is a supply chain that produces a degradable product using minimum resources while generating minimal waste (Younis *et al.*, 2016).

### 1.3 Sustainability

Inevitably the term "Sustainability" and "Green Supply Chain" have been considered hand in hand within the literature and both have become "buzzwords" within the contemporary business environment (Carter and Easton, 2011). Sustainability, in general, is the endurance

of systems and processes, however in the business world sustainability used to refer to the environmental, economic and social actions of organizations. Nevertheless, scholars such as Elkington (1994) claim that a sustainable supply chain encompassing environmental and social activities must not harm the economic performance of the firm. Later, Elkington (1998) introduced his triple bottom line concept of sustainability, theorizing that sustainability is the intersection of the environmental, social and economic performance of the firm.

Sustainability is a strategic, transparent integration and achievement of organization's social, environmental and economic goals in coordination with other supply chain members (Carter and Easton, 2011). Green supply chain management as a whole includes sustainability and the operational component, hence looking at 360 degree performance improvement on both chain and firm levels.

#### **1.4 Green Supply Chain Management (GSCM) Practices**

Although there are many green initiatives organizations can adopt, the four practices below have been found to be the most dominant practices adopted by most organizations and form an integral part of any certification for GSCM implementation such as ISO 14001. These four practices can be adopted by any member within the supply chain either on the upstream or downstream side of the chain; Section 3.2 elaborates upon each of these four practices. Figure 1 below displays the conceived model for frequently adopted GSCM practices by many firms.



Figure 1: GSCM Practices

## **1.5 Effects of Green Supply Chain Practices on Corporate Performance**

The impact of implementing green supply chain management practices on corporate performance has been the focus of researchers, academics and practitioners. There are three schools of thought in this regard; first, those who believe that implementing green supply chain management practices can be a burden on the organization and that this entails huge upfront investments for which returns might not be realized in the short-term (Zhu *et al.*, 2007; Rothenberg *et al.*, 2001). Members of this school include Friedman (1962) and Jaffe *et al.* (1996). Other researchers go beyond that and argue that implementing green supply chain management practices might in fact lead to negative economic performance, for example, Sarkis (2004) argues that implementing green supply chain management practices leads to an increase in operational costs, increased costs of procuring environmentally friendly items and materials and increased training costs.

Members of the second school such as Fogler and Nutt (1975); Freedman and Jaggi (1982); Wiseman (1982) and Rockness *et al.* (1986) who argue that there is no relationship between environmental and economic performance. However, other researchers from this school, such as Walley (1994), believe that implementing green supply chain management practices is nothing but a trade-off between economic and environmental performance.

Those of the third school argue that there is a positive relationship between implementing green supply chain practices and corporate performance and that organizations may reap many benefits from such implementation such as reducing operational costs (Orlitzky *et al.*, 2003), enhancing the corporate image (Porter, 1991), increasing customer satisfaction (Kleindorfer *et al.*, 2005), improving employee job satisfaction (Jun *et al.*, 2006) and creating more market opportunities (Diabat *et al.*, 2013). The aim of this research is to explore the relationship of related factors between the implementation of green supply chain practices and corporate performance and to identify the impact of these factors on corporate performance.

## **1.6 Research questions**

The contrasting views discussed above show that there is a lack of agreement between scholars and researchers in the field on whether implementing green supply chain management practices improves or weakens corporate performance. As a result, the overall research question this study poses is: *What is the impact of implementing green supply chain management practices on corporate performance?* In detail, the study aims to establish which dimension/s of corporate performance is/are mostly impacted by certain GSCM practice/s and therefore to provide some recommendations on the appropriate GSCM practices that businesses need to implement in order to drive the respective dimension of corporate performance to the required target levels.

While Chapter two provides additional context to the study, it also further highlights the research gap that this study addresses by presenting the relevant previous studies that have investigated this issue emphasizing how these have had varying results.

## **1.7 Organization of the dissertation**

The dissertation is organized into eight chapters. Chapter one provides background on green supply chain management, highlights the main green practices adopted in the research and discusses how they relate to corporate performance. In Chapter two, a thorough literature review including grounded theories in green supply chain management is presented. The second half of Chapter two reflects on the drivers of green supply chain and highlights the research gaps. Chapter three elaborates on the conceptual framework and hypotheses development with a discussion of the independent and dependent variables selected in the conceptual model for this study. In Chapter four, the research methodology is presented including the sample selected, the measurement items employed and the scales adopted for the survey. Chapter five presents the results of the hypothesis testing. In Chapter six, the qualitative research is discussed. This is presented in a separate chapter because it was an initially unanticipated, additional research phase that was specifically conducted to clarify a number of the key findings of the quantitative study. In Chapter seven, the overall findings of the thesis are discussed and linked to the theories presented earlier in the review of the literature.

In Chapter eight of the dissertation the researcher presents the conclusion, some specific insights and provide recommendations for further researches.

## **2 LITERATURE REVIEW**

To provide context to the literature review and to set the stage for the subsequent discussion, a brief elaboration of the theories guiding this research are discussed below.

### **2.1 Grounded theories in GSCM**

Carter and Easton (2011) in their review of literature in supply chain found that 87% of the articles published during the period 1991-2000 did not use any sort of theoretical framework. However, during the following 10 years of study approximately 33% of the articles published within the area of green and sustainable supply chain included some theoretical foundation. While many theories were employed to help explain the impact of implementing green supply chain practices on corporate performance, three key theories have been found to be the main theoretical pillars within the extant green literature namely; stakeholder theory (Freeman, 1984), institutional theory (DiMaggio and Powell, 1983) and resource-based theory (Wernerfelt, 1984). Each of these theories is discussed below.

#### **2.1.1 Stakeholder theory**

One of the early works in the field of corporate performance and possibly the most prominent and well-known theory of business management, was coined by Freeman as stakeholder theory (1984, p.43), in which he claims that "Any organization performs to benefit and satisfy its stakeholders including: government, investors, political groups, customers, suppliers, communities, trade associations and employees". Resultantly, businesses these days adopt GSCM practices to respond to various pressures from different stakeholder groups including employees, shareholders, environment conscious bodies and government organizations who also influence decision making in these organizations (Frooman and Murrell, 2005).

Lately, in his updated stakeholder theory, Freeman (2004) posited that organizations need to go beyond maximizing shareholders wealth to address the interest of its stakeholder groups and individuals who might affect or be affected by the organization's purpose and existence. Those stakeholders are viewed as the potential beneficiaries or the bearers of any risk that the organization might undergo (Post *et al.*, 2002). In line with that, Freeman concludes that



beneficiaries should be changed from stockholders to stakeholders and should be given effective decision making authority on a par with the firm's executives (Stieb, 2009). Further the author argues that "each of these stakeholder groups has the right not to be treated as a means to some end and therefore must participate in determining the future direction of the firm in which they have a stake" (Freeman, 2002, p. 39).

Ayuso *et al.* (2012) supports this view asserting that stakeholder theory is very much connected with corporate social responsibility and can help analyze the relationship between the organization and society and may provide direction to the firm's managers. In summary, and as claimed by Key (1999), Freeman attempted to explain the relationship of the firm to its external environment and its behavior within this environment. The author documented the key players and relationships involved and sought to empower both groups and individuals involved.

### 2.1.2 Institutional theory

DiMaggio and Powell (1983), presented institutional theory in the early 1980s, claiming that firms attempt to adapt to the surrounding environment by adhering to legitimacy rules and regulations from one side and through seeking social fitness from another side. These authors also claim that a firm's behaviour may be driven by a strong social force motivating the organization to go in a certain direction. Such a force can be any form of social driver including; culture, law, or regulations. However, Zhu and Sarkis (2007) found that the implementation of green supply chain management practices is not always motivated by efficiency but rather that businesses endeavour to achieve social legitimacy and business sustainability.

Government regulations can be one of the main institutional factors that drive businesses to implement green supply chain practices. That is why within some regions, such as Europe and the USA, where environmental rules are strict; businesses adopt GSCM practices more frequently than businesses in other regions where they still lack stringent environmental legislation. Such adaptation might be costly especially if firms opt for cutting edge technologies to minimize environmental impacts (Groenewegen and Vergragt, 1991).

Researchers have used institutional theory in different research areas such as total quality management, quality cycles and business continuity planning (Lin and Sheu, 2012). Lin and Sheu (2012) claim that institutional drivers can be internal to help improve operational performance such as exploiting ISO 9000, or external such as pressures to implement TQM in order to seek legitimacy. Institutional theory can help explain whether such endeavour for social fitness is externally or internally driven and consequently will lead to performance improvement or not.

### 2.1.3 Resource based theory

The third theory presents the resource-based view of the firm and links the firm's success with the better utilization of its internal assets. This includes both tangible, such as financial reserves, and physical assets, and intangible assets such as reputation, employee skills and knowledge and corporate culture. Wernerfelt (1984) challenged the earlier belief that the firm's success is only determined by its external environment and argued that the competitive advantage of any firm is embedded within its inimitable assets. The firm needs to properly and effectively manage its capabilities to upscale its performance and outperform its competitors. From a tangible assets perspective, Russo (1996) claims that a firm can outperform its competitor's environmental performance if the deployment of new physical assets enhance internal processes in the use of resources and waste reduction.

However, the link between the firm's external environment and its internal assets remained unclear until Barney's (1986) early work which was later supported by Conner's (1991) study which made it clear that a firm's resources cannot be evaluated in isolation. Rather their importance is determined in the interaction with market conditions and the most valuable resources are those that enable the firm to exploit market opportunities and avoid market and competitor threats. Later, Hunt (2000) claimed that resources can be tangible and intangible entities available to the firm to enable the production of a value-adding product for the targeted market. He also identifies seven key types of resources; physical, legal, human, financial, relational, informational and organizational.

While the above studies highlight several approaches that can influence firms to green the supply chain, the pressure exerted on businesses to clean their operations and reduce their carbon footprints may lead them to react differently (Eltayeb *et al.*, 2010). For example, some may adopt compliance based strategies such as pollution abatement and short term “end-of-pipe” approaches, while others may react proactively and reengineer their operations to reduce material consumption and prevent pollution (Hart, 1995). It is only with the latter strategy that firms are likely to achieve a competitive advantage and reap benefits from the implementation of GSCM practices (Laosirihongthong *et al.*, 2013).

Nevertheless, the theoretical lenses reviewed above, namely stakeholder theory, institutional theory and resource-based theory; provide the theoretical basis for this research. In the following sections the drivers of GSCM are discussed, the extant literature relating to the application of different GSCM practices to different dimensions of corporate performance are also presented, discussed and summarized.

## **2.2 Drivers of GSCM**

In order to set the context for this research it is important to determine the drivers of green supply chain management. Consequently, the section below highlights the main drivers motivating businesses to implement green practices.

Firms may pursue different strategies when it comes to the adoption of green supply chain practices in response to tougher environmental statutes to comply with legislation. Mutingi (2013) recognized this in his work when he developed a taxonomic framework that can be used to formulate strategies for green supply chain initiatives. The approach categorized green supply chain strategies into four types; compliance-based, eco-efficient, innovation-centered and closed-loop. However, it is not only legislation that drives businesses to go green and implement environmental management systems (EMS), there are other factors that also motivate businesses to improve their environmental records and enhance their competitiveness in the marketplace. For example, Lo (2014) claims that drivers to go green can be either external such as: legislation, customers and competitors, or internal which include: senior management support, firm reputation and cost reduction. These findings echoed a previous study conducted by Walker *et al.* (2008) who sought to identify the drivers

and the barriers to implementing environmental supply chain management practices within the public and private sectors in the UK. Using interviews with seven different private and public sector organizations, the authors found that both drivers and barriers can be either internal or external. Internal drivers include: value champions and cost reduction, whereas external drivers include: regulations, customers, competitors and society.

Adopting a similar qualitative approach, Mollenkott *et al.* (2010), examined the relationship among green, lean and global supply chain strategies including their convergence and divergence. The findings of the study revealed that four major factors motivate businesses to adopt some combination of green, lean and global supply chain including: cost reductions, customer demands, ISO 9000 and ISO 14001 certification and risk management.

In a quantitative vein, Lee (2008) explored the drivers for implementing green supply chain initiatives within small and medium-sized suppliers. Analysing the data obtained through a survey questionnaire presented to 142 SME suppliers in South Korea, Lee concluded that buyers play a key role in facilitating SME suppliers to get involved in green supply chain initiatives. He also found that government's involvement and support was linked with a greater willingness of SME suppliers to get involved in green supply chain initiatives. Moreover, Lee found that the participation of SME suppliers in green supply chain initiatives was directly related to their readiness, including; internal available resources and organizational capabilities.

In concluding this section of the literature review, therefore, it is fair to say that businesses are driven by internal and external pressures to green their operations but the question is how do these actions impact their corporate performance? This is discussed in the next section.

### **2.3 GSCM and Corporate performance**

The literature on the GSCM and corporate performance began to appear in academic journals and social science books in the early nineties when the Harvard Business guru, Michael Porter, sparked a debate by claiming that corporate environmental improvements lead to financial improvements in the long term, Porter also introduced the concept of "Innovation

offsets" and claimed that GSCM can be a vehicle for creating competitive advantages for the firm (Porter, 1991).

A recent study on the sustainable supply chain by Carter and Easton (2011), which intended to provide a systematic review of the evolution of supply chain management over a period of 20 years, found that environmental aspects of supply chain have been a key focus of scholarly researchers. The authors reviewed 80 articles and contrasted them in terms of: subject, inferential, moderation, methodology, analysis, context, and theory used. The authors found that a large focus was placed on the consumer product industry with 55% of the articles heavily relying on descriptive statistics and 10% that included moderating variables. Just less than 4% employed any format of conceptual theory building.

It would appear that the inconsistency in the extant literature stems from the mixed results reported on the impact of GSCM practices on corporate performance outcomes. The disparity in research findings highlights the need for additional research to address this gap. More specifically, while some studies found no relationship, other studies revealed either a positive or a negative relationship. The sections below discuss the studies that have reported no relationship, a negative relationship and a positive relationship in more detail.

### 2.3.1 GSCM and Corporate Performance: No relationship

Evidence of no relationship between the impact of green supply chain management and firm performance can be found in the work of Lee *et al.* (2012). Their study aimed to explore the direct and indirect paths of related factors between the implementation of GSCM practices and the firm's performance. Using responses from a survey questionnaire completed by 223 SMEs in the electronic industry in Korea, the authors could find that no direct relationship; however, an indirect relationship was found to exist between GSCM practices and organizational performance mediated by operational and relational efficiency. The strength of the study is supported by a good sample size (i.e. 223) and a 100% response rate, but the measurement of the dependent variable, namely; business performance, might be inconclusive as it ignored the operational element. In particular, the impact of the independent variables (GSCM practices) on the effectiveness and efficiency of the products

and processes within the organization was targeted not tested. Moreover, the study focused on one industry within one country that is the electronics industry in Korea and this may impact the external validity and limits the generalizability of its findings.

Benito and Benito (2004), reported similar results. In their study sought to empirically analyse the relationship between environmental proactivity and business performance using quantitative data gathered through survey questionnaire of 186 industrial companies in Spain. Using multiple regression analysis, the authors couldn't find any relationship between environmental proactivity and financial performance. Whilst the study had a high response rate to the questionnaire (i.e. 43%), the authors relied on subjective measures (the respondents perceptions) to measure the dependent variable (business performance). More concrete results would have been obtained if some objective financial measures were employed such as return on investments (ROI), return on sales (ROS) and return on equity (ROE).

Using the same dependent variable employed by Benito and Benito (2004), Watson *et al.* (2004), compared 10 pairs of firms (EMS adopters and non-EMS adopters) in different industries in the US with an objective to propose and test a framework that quantifies EMS improvements to determine their impact on financial performance. The authors found no significant difference in the financial performance between EMS adopters versus non-adopters.

Adopting a similar approach in terms of the population targeted, Link and Naveh (2005), surveyed forty ISO 14001 certified organizations in Israel to determine if the environmental management standard ISO 14001 helps organizations reduce the negative impact their business activities may have on the environment and, as a result, improve their business performance. The study revealed that there are significant differences among ISO 14001 certified organizations in the way they run their environmental operations, and no relationship was found between environmental and business performance. Apart from the small sample size used in the study (i.e. 40) which might impact the generalizability of the findings, it can be claimed that the study had a good response rate to the survey (i.e. 52%). In addition the authors cross-checked the information received from the survey with Dun and Bradstreet data and used three years financials to support the validity of the findings.

To summarize this section of the literature review, it would appear that a performance dimension is missing from previous studies. That is operational performance. As a result this study will include operational performance as an important outcome and to be assessed along with other performance outcomes such as financial performance which both Benito & Benito (2004) and Watson *et al.* (2004) included in their studies.

### 2.3.2 GSCM and Corporate Performance: Negative Relationship

The second wave of literature documented negative relationships between GSCM practices implementation and the different dimensions of corporate performance. Examples of negative relationships include the work of Richey *et al.* (2005). Their study employed a survey questionnaire to collect data from 118 respondents to examine the effect of reverse logistics programs on reverse logistics performance in the automobile aftermarket industry in the US. The findings revealed that internal innovation impacts performance negatively as it seems too costly. Although the study used valid and reliable measures, the shortcomings of this study are threefold; firstly, the sample size is relatively small (i.e. 118) compared to the large population, secondly, it was limited to one industry and finally it relied on self-reported data even for the performance measures. If more objective measures either accounting based (such as return on investment or return on asset), or market based (such as share price) were employed, more generalizable results would have been obtained.

Another example of a negative relationship was reported by Montabon *et al.* (2007). The authors used content analysis of 45 corporate reports to empirically examine the relationship between a set of different environment management practices (EMPs) and firm performance. The study found a negative relationship between EMPs and return on investment (ROI). The strengths of the study include; meeting most statistical assumptions for the canonical correlation analysis employed and clearly justifying the use of content analysis to tackle the subject matter. However, one can claim that generalizability is limited since the sample size is relatively small (e.g. 45) and below Hair *et al.* (2010) recommendation of 10 observations per variable (10 variables were included).

Furthermore, Large and Thomsen (2011) reported a negative relationship between green cooperation with suppliers and purchasing performance. The authors obtained quantitative data from 109 purchasing and supply managers in Germany using a survey questionnaire. The objective was to study the impact of different approaches (green assessment and green collaboration) on environmental performance improvement and to investigate the impact of environmental performance improvements on purchasing department outcomes. Although the researchers used multiple statistical tests (i.e. factor analysis, structural equation modelling, linear regression) to examine the relationship between a set of GSCM practices as independent variables and the environmental and purchasing performances as dependent variables, but, it can be claimed that the study suffers from one weakness namely, relying on self-reported data to measure performance outcomes instead of other objective measures say for example return on assets (ROA), return on equity (ROE) or reduction in material cost from purchasing outcomes perspective.

As will be discussed in the next chapter, this research adopts the same data gathering tool employed in the three studies above. However, it will be more conclusive in including more green supply chain practices as well as a 360 degree performance outcomes view. This will include eco-design, green purchasing, environmental cooperation and reverse logistics from green supply chain practices perspective. Performance outcomes include; environmental performance, operational performance, economic performance and social performance.

### 2.5.3 GSCM and Corporate Performance: Positive Relationship

Supporters of Porter's earlier claim on GSCM – Corporate performance having a positive relationship are many and their research provide evidence from numerous industries to show that different GSCM practices lead to a variety of positive relationships on performance outcomes. The following section highlights the main studies conducted in this field.

A recent study conducted by Diabat *et al.* (2013) to explore the relationship between green supply chain practice initiatives and performance outcomes used a survey questionnaire that included 50 participants from industry and academia. The study found that three main GSCM practices namely; eco-design, co-operation with customers and reverse logistics can



positively impact economic performance and can lead to better corporate performance. Similarly, Green *et al.* (2012) used a larger sample size of 159 managers in manufacturing industries in the US to examine and assess the impact of implementing GSCM practices on environmental, operational and organizational performance. Using structural equation modelling, the authors found positive relationships between different GSCM practices including: Internal environmental management, green purchasing, green information systems, cooperation with customers, investment recovery, eco design and different dimensions of corporate performance. Although a very low response rate of 8% was reported, the study was the first to introduce staged GSCM implementation.

Adopting a quantitative research methodology, Zhu and Sarkis (2004), surveyed 186 manufacturing firms in China to examine the relationship between GSCM practice and environmental and economic performance. The authors found that enterprises with higher levels of GSCM adoption have better environmental and positive economic performance.

These studies provide guidance for the current study and as a result this study will employ some of the green supply chain management practices adopted by Diabat *et al.* (2013) such as eco design, environmental cooperation and reverse logistics as well as some of the performance outcomes adopted by Green *et al.* (2012) namely, operational performance and environmental performance. Moreover, the economic performance included in Zhu and Sarkis (2004) study will also be added to the performance outcomes group in this study.

In the same context, Liang and Chang (2008) surveyed 127 enterprises in China to investigate the potential influences of GSCM on the performances of SMEs. Using structural equation modelling, the authors found that performance of SMEs is positively associated with implementation of GSCM practices. Analogous results were also reported by Zailani *et al.* (2011) who used a solid theoretical background, including strategic choice theory and institutional theory, to develop their argument. The researchers adopted a survey tool to gather data from 132 ISO 14001 certified organizations in Malaysia and used structural equation modelling to examine the extent to which internal proactive environmental strategy and external institutional drivers motivate firms to adopt eco-designs that influence environmental performance. The findings squared with those of Zhu and Sarkis (2004) and

Liang and Change (2008). Furthermore they found that regulations and incentives positively impact environmental performance.

As a result this study will follow Zailani *et al.* (2011) theoretical lenses and adopt elements of institutional theory to help understand what businesses do to achieve social fitness as theorized by DiMaggio and Powell (1983). In addition, this study will not be limited to only SMEs nor it will be targeting ISO 14001 certified organization but shall cover different organizational sizes that are both ISO certified and noncertified, which is appropriate in the UAE which has seen significant growth in businesses of all sizes over the past two decades.

Earlier studies such as those of Vachon and Klassen (2006) and Melnyk *et al.* (2003) reported similar findings. For example Vachon and Klassen (2006), collected survey responses from 84 industrial plants in North America with an intention to extend the "collaborative paradigm" suggested in previous research beyond a supply chain's core operations and to examine whether supply chain integration (logistically and technically) can be an antecedent of GSCM. Using regression analysis, the authors found that there is strong positive link between technological integration and environmental cooperation with primary suppliers and major customers. They also found that there is a positive relationship between technological integration and environmental monitoring for primary suppliers and major customers.

Melnyk *et al.* (2003) on the other hand, used a fairly large sample size of 1222 managers in manufacturing firms in the US to evaluate the assumption that an Environmental Management System (EMS) is critical to a firm's ability to reduce waste and pollution while simultaneously improving overall performance. Using regression analysis, the authors found a significant positive relationship between the presence of certified and formal EMS and improved operational performance including reduction of waste in the design and selection process during the production stage as well as a reduction in lead times which all lead to reductions in costs. If there are any shortcomings to be flagged in this study, it would be around the relatively low response rate to the survey questionnaire which was only 10%. However, there were many attempts to enhance the validity of the provided information including meeting with executives from the firms surveyed, using special templates to test ambiguity and finally involving industry experts to refine the survey questionnaire before sending out.

Carrying out an analysis of 652 US manufacturing firms during 1987-1996, King and Lenox (2001), aimed to examine if environmental performance impacts the financial performance of the firm. They measured the environmental performance by the amount of emissions compared to the industry, whereas Tobin's q was used to measure the financial performance. Using least-squares regression analysis to examine the relationship between the two variables indicated that environmental performance is associated with financial performance and firms with lower emissions in their industries have higher financial performance.

Likewise, the work of Al-Tuwaijiri *et al.* (2004), led to similar results, in particular, the researchers found a positive relationship between environmental and economic performance. The authors analysed a cross-sectional sample of 198 US firms from Standard and Poors in an attempt to investigate the relations among economic performance, environmental performance, and environmental disclosure. Using Three-stage least squares regression, they found that environmental performance is positively related to environmental disclosure and economic performance.

The present study will target a similar population to that which was targeted by Melnyk *et al.* (2003) and King and Lenox (2001), since it is perceived that manufacturing is a major enemy to the environment and the main cause behind both the depletion of natural resources and pollution. In this way the results may offer some insight to businesses on how they can reduce the activities they engage in to improve their impact on the environment.

On the positive relationship between GSCM practices and environmental performance, a study by Kung *et al.* (2012) reported similar findings to those of Melnyk *et al.* (2003). The authors analysed responses of a survey questionnaire to 118 respondents in the manufacturing industry in Taiwan to investigate the relationship between green management and environmental performance. Using hierarchical regression analysis, positive relationships were found between green manufacturing, green packaging, the adoption of ISO 14001 and the attainment of environmental labels from one side and environmental performance from the other side. Additionally, the work of Cordano *et al.* (2010) on the green practices in the winery industry in the US reported similar results. Using survey questionnaires collected from 369 managers within the industry, the authors intended to examine whether the

development of rudimentary environmental management systems (EMS), increases the success of implementing solid waste recycling and energy conservation practices. The multiple regression analysis employed, confirmed that firms with more developed EMP achieve greater success in implementing energy conservation and recycling activities and consequently better environmental performance.

In a similar vein, the work of Russo (2007) supports the preceding findings. The author surveyed 242 facilities in the electronics industry to examine three models used to evaluate the mediation relationships between the external and internal practices of GSCM with respect to environmental, economic, and operational performance. Using regression analysis to test the relationship, the author found that early adopters of ISO 14001 have lower emissions compared with late adopters and the longer the facility operated under ISO 14001 the lower its emissions. The most concrete strengths of this study are the use of large sample size and conducting the research longitudinally over a period of 10 years, whereas the only limitation is that it was limited to one industry that is the electronic industry.

Covering a wider geographic area, Rao (2002), surveyed 52 manufacturing firms in the Philippines, Malaysia, Indonesia, Thailand and Singapore in order to determine to what extent greening of the supply chain is taking place in these countries and what impact GSCM initiatives might have on environmental, economic and competitiveness aspects of corporate performance. The results of the structural equation modelling confirmed the presence of a significant links between environmental initiatives and environmental performance, as well as important link between environmental performance and competitiveness and an important link between competitiveness and economic performance.

Using cluster analysis to examine whether different types of manufacturing enterprises on environmental-oriented supply chain cooperation (ESCC) exist in China, Zhu *et al.* (2010) sent a survey to 334 representatives from chemical/petrochemical industry, electronic industry, automobile industry and mechanical industries. The findings supported the claim that, within the industries examined; there are four types of manufacturing enterprises implementing ESCC practices. The study also aimed to determine if the Chinese manufacturer types varying in ESCC differ in their implementation of Circular Economy (CE) practices towards achieving the CE-targeted goals on improving both environmental

and economic performance. The results of the MANOVA test confirmed that both CE and CE targeted performance are positively associated with manufacturer types implementing ESCC practices at higher levels.

Correspondingly, Gonzalez *et al.* (2008), sought to analyse the existence of differences in the implementation of environmental practices between companies that possess some form of certified environmental management system (ISO 14001 or EMS) and those that do not have any such system in Spain. The researcher employed a survey questionnaire to capture data in one to one interviews with 157 executives in the automotive industry. Employing logistic regression to test the relationship, the author found that there is a significant relationship between the possession of certified EMS, organization size and demand on suppliers to implement environmental practices (i.e. environmental performance) which in turn indicates that implementation of GSCM represented by having EMS certification such as ISO 14001, directs the corporate environmental behaviour towards the surrounding stakeholders including its suppliers. Although the study was limited to one industry within one country, it can be considered as one of the genuine works in the field, as all statistical assumptions were met and the authors used valid and reliable measures to measure both variables in particular EMS as independent variable and corporate practices as a dependent variable.

The above studies show that environment management system (EMS) adoption such as ISO 14001 has an impact on corporate performance. As a result, this research will control for such impact by including EMS as a control variable when measuring the impact of GSCM practices on performance outcomes.

Building on their work in 2005 to examine the relationship between different environmental practices and corporate performance outcomes, Zhu and Sarkis (2008), extended their work and dispatched a survey to 341 manufacturing facilities in China, the objective was to examine the relationships between GSCM practices and environmental and economic performance, but incorporating three different moderating factors this time namely; market, regulatory, and competitive institutional pressures. Using hierarchical regression analysis to test the relationships, the authors obtained mixed results. For example, market and regulatory pressures were found to be the main drivers influencing organizations to have better environmental performance but mainly when they lead to adoption of eco-design and green purchasing practices. Another finding was that manufacturers facing regulatory pressures

tend to implement green purchasing and investment recovery practices. One surprising finding was that green purchasing lead to improved environmental performance but investment recovery lead to worse economic performance. Among the three types of pressures on businesses to adopt GSCM practices (market, regulatory and competitiveness), only competitiveness was found to lead to positive economic performance across a number of implemented GSCM practices. This is concurs with the earlier finding of Rivera (2002) on the proactivity behaviour of firms towards GSCM initiatives. In other words, it can be argued that only when the motivation comes from within the organization to go green, the economic performance will not be enhanced. Regulatory pressures always associated with high costs and imposed GSCM initiatives might require devoting additional resources that might be beyond the firm's financial capabilities.

Mixed results on the impact of GSCM practices on corporate performance were also reported by Eltayeb *et al.* (2011). The authors employed a survey questionnaire to capture data from 132 environment management representatives in manufacturing firms in Malaysia. The aim was to assess the actual environmental, economic and intangible outcomes resulting from the adoption of green supply chain initiatives namely; eco-design, reverse logistics and green purchasing. Running regression analysis to examine the relationship between the variables, the authors found that eco-design positively impacts all types of performance outcomes whereas reverse logistics was impacting only cost reduction outcomes. On the other hand, the two externally oriented green initiatives (green purchasing and reverse logistics) were found to have little impact on the internal performance of the firm. One can argue that the relatively good response rate to the survey questionnaire adopted for this research (i.e. 24%) might not help enhance the weak construct validity resulting from the reliance on self-reported data (i.e. respondents perceptions) which measured the economic performance of the firm, rather than obtaining more objective measures such as financial/accounting ratios or market based measures.

The above studies do however; demonstrate that internally oriented GSCM practices usually lead to improved performance outcomes compared with externally oriented GSCM. However, as noted earlier, the results of a number of previous studies have been inconsistent or disparate suggesting that the study context may have a bearing on the impact of GSCM

practices on corporate performance. This research will test if this claim holds true in the UAE context.

Evidently, Eltayeb *et al.* (2011) approach was adopted by Wagner (2005), who intended to examine the relationship between environmental and economic performance and the influence of corporate strategies with regard to sustainability and the environment. The authors adopted more reliable, objective measures to measure both constructs. In other words they used total emissions, water consumption and energy consumption to measure the environmental performance of the firm. On the economic side, return on employed capital, return on equity and return on sales were used to measure the economic performance. Using incomplete panel data on a set of 37 paper firms in Germany, Italy, the Netherlands and the UK, the authors regressed the variables using ordinary least square regression. The results revealed that in some sensitive industries such as the one targeted in this study, it is difficult to see a positive relationship between environmental and economic performance unless a more proactive environmental strategy is implemented such as pollution prevention systems. This finding matches with results obtained by Zhu and Sarkis (2008) discussed above. Conversely, the authors found that end of pipe strategies lead to little positive or even negative performance.

Another example on the employment of reliable measures for corporate performance can be found in the work of Menguc and Ozanne (2005), the authors' objective was to propose a higher order construct of natural environmental orientation (NEO) and to test the relationship between NEO and firm performance. Survey questionnaires were sent to 140 CEOs in manufacturing firms in Australia and the data obtained were analyzed using structural equation modelling. The findings were no different from the preceding supporters for GSCM implementation, more specifically; the authors found that the higher order construct of NEO is positively and significantly related to a firm's profit and market share. Similar findings were also recently reported by Bose and Pal (2012). These authors adopted an event study approach to analyse 104 announcements related to GSCM. They found that firms that adopted GSCM practices had a positive impact on shareholders' value.

While Menguc and Ozanne's (2005) study above triangulated the self-reported data with measureable dimensions of corporate performance, Eltayeb *et al.* (2011) relied on measurable

items only to assess performance improvement resulting from environmental initiatives. It can be claimed that Europe and Australia (where these studies were conducted) are more advanced than regions in the Middle East and access to corporate's information for research purposes is easier to obtain, however, this study will rely on self-reported data only.

Similarly, the work of Rao and Holt (2005), on the impact of GSCM practices on competitiveness and economic performance, led to similar findings. The authors analysed responses to a survey questionnaire of 52 environment management representatives (EMRs) /CEOs of ISO 14001 certified firms in Philippines, Malaysia, Thailand, Indonesia and Singapore. The goal was to identify potential linkages between green supply chain management as an initiative for environmental enhancement from one side and economic performance and competitiveness from another side amongst a sample of companies in South East Asia. The regression analysis between greening inbound, greening production and greening outbound as independent variables and economic performance and competitiveness as dependent variables revealed that the green inbound function of the supply chain as well as a green production stage leads to a green outbound stage. Moreover, the green supply chain, comprising all three phases, leads to significant values for competitiveness and economic performance. Apart from the relatively small sample size (52 firms), this study can be considered as one of the few studies that looked at the whole supply chain and examined the impact of GSCM on each stage within the supply chain.

Targeting a similar population that was researched by Rao and Holt (2005) with approximately the same sample size, Ann *et al.* (2006) surveyed 45 ISO 14001 certified firms in Malaysia aiming to investigate the impact of EMS certification on the performance of firms including economic and environmental aspects and perceived customer satisfaction. The regression analysis employed in that study was designed to test the relationship between EMS as an independent variable and the three performance outcomes as dependent variables. However, it was found that EMS did not help to improve the operational performance of the organization, in that it did not lead to quality improvement or reduction in costs and lead times. The good response rate to the survey (i.e. 29.8%) did not compensate for the limitation of the small sample size (i.e. 45) which in turn might question the generalizability of the findings. Nonetheless, the study provided new insights on the EMS impact on corporate



performance and affirmed the findings of earlier works in the field such as the studies discussed above.

Employing objective measures for corporate environmental and economic performance, Moneva and Ortas (2009), analysed 230 European companies, mainly their corporate environmental performance in 2004 and corporate financial performance in 2005, 2006 and 2007 with the aim of evaluating the significance of the link between corporate environmental and financial performance. The partial least squares model adopted to test the relationship revealed a positive, significant relationship between corporate environmental performance and corporate financial performance. Using three years' data for the CFP can be considered as a source of strength and maximizes the reliability of measurement used and consequently the generalizability of the findings.

Using the same corporate performance variables that King and Lenox (2001) used in their study, Nakao *et al.* (2007), empirically examined if environmental performance (EP) has any impact on financial performance (FP) by analysing five years' financial data from approximately 300 listed firms as well as results from Nikkei EM survey report. The measures of financial performance adopted were all objective including: company sales, growth rate, customer relevancy (advertising expense/sales), R&D expense/sales, debt dependence (financial leverage) and sales/assets ratio. Multiple linear regression analysis was selected to assess the relationship between the two main constructs (i.e. environmental performance and financial performance). Interestingly the results obtained answered the question raised twenty years earlier by McGuire *et al.* (1988) on the direction of the causality between EP and FP. It was found that the firm's environmental performance has a positive impact on its financial performance and vice versa. Additionally, it was revealed that this positive, two way interaction is not limited to top scoring companies but to all other firms covered by Nikkei EM Survey. The study can be applauded for using pooled cross-section and time series data (5 years) from one side and relying on more objective measures to measure financial performance from another side.

In a similar manner of objective measures for the corporate financial performance, and adopting King and Lenox (2001) approach in using Tobin's q as a measure for financial performance, Wahba (2008), intended to present an empirical evidence on the influence of

engaging in environmental responsibility on corporate market value. The author conducted an analysis of 156 ISO 14001 certified firms in Egypt across 19 industries for three years. Unsurprisingly, the findings supported the earlier argument of the proponents of the positivity in relationship between GSCM practices represented by EP and corporate performance measured by Tobin's q. Furthermore, it was found that firm's age and ownership have no significant impact on corporate market value. The only limitation noticed in this study is the use of ISO 14001 as a proxy for corporate environmental performance which might not be sufficient since some business may have EMS in place but not be ISO 14001 certified.

This research adopts some of the measures used in the above studies either from green supply chain practices or from the performance dimension point of view. However it will target a new geographical area that was not tackled before that is UAE.

Table 2 below highlights the ten most frequently cited relevant studies conducted in the GSCM field. It presents the article title, the author name and date of publication, the research methodology adopted, the statistical tool used, the variables employed, the measures used, the findings reported and the number of citations

As shown in table 2 a number of studies have been conducted using a variety of research techniques to gather data. The majority have used quantitative methods using surveys to gather data with varying sample sizes. Among the most recent of these was a survey using a questionnaire that was directed at manufacturing companies that had ISO 14001 certification (see Laorsirihongthong, 2013). Interestingly, even though all of the businesses surveyed were ISO 14001 certified, legislation and regulations were found to be key drivers of performance. Thus, in this case, external motivators appear to be more dominant drivers than internal standards. This may have implications for this research particularly in relation to surveying ISO 14001 certified businesses.

Table 2: Summary of sample articles on GSCM

Title	Author/s and Publication Date	Research methodology	Variables	Measures/dimensions	Statistical tool	Findings	No. of Citations
Corporate social and financial performance: a meta-analysis	Orlitzky <i>et al.</i> (2003)	Meta analysis of 52 quantitative studies	DV: Corporate Financial Performance IV: Corporate Social Performance	CFP: market based measures, accounting based measures and perceptual based measures CSP: disclosure, reputation indexes, social audits and corporation social responsibility values and attitudes	File drawer analysis	(1) across studies, CSP is positively correlated with CFP, (2) the relationship tends to be bidirectional and simultaneous, (3) reputation appears to be an important mediator of the relationship	1651
A resource-based perspective on corporate environmental performance and profitability	Russo and Fouts (1997)	243 sample firms from Franklin Research and Development Corporation (FRDC)	DV: Economic performance Moderator: Industry growth IV: Environmental performance Control variables: industry concentration, firm growth rate, firm size, advertising intensity, capital intensity and industry growth	EP: FRDC Rating EcP: ROA	Regression Analysis	Environmental performance and economic performance are positively linked moderated by industry growth	1406
The impact of environmental management on firm performance	Klassen and McLaughlin (1996)	Event study methodology for 22 firms	Environmental management and firm performance	Environmental management: product and operations technologies designed to minimize their environmental impact and strong EMS Firm performance: financial performance and market valuation of the firm	* ANCOVA * ANOVA * Regression analysis	* Significant positive stock returns following positive environmental event performance. * Larger market valuation with winning of an award. * Significant negative returns for environmental crises	821
Relationships between operational practices and performance among early adopters of green supply chain management practices in Chinese manufacturing enterprises	Zhu and Sarkis (2004)	Survey questionnaire to 186 manufacturing firms in China	IV: GSCM Practices Moderators: quality management and just-in-time DV: Organizational performance	GSCM: Internal environmental management, external GSCM, investment recovery and eco design Organizational performance: environmental performance, positive economic performance and negative economic performance	Factor analysis for variables internal consistency and validity Multivariate regression analysis to test the relationship	* Firms with higher levels of GSCM adoption have better environmental and positive economic performance *	638
The relations among environmental disclosure, environmental performance and economic performance: a simultaneous equations approach	Al-Tuwaijri <i>et al.</i> (2004)	Analysis of cross-sectional sample of 198 US firms from Standard & Poors	DVs: Economic performance, environmental performance and environmental disclosure Ivs: Unexpected earnings, growth opportunities, environmental exposure, environmental concern. Control variables: public visibility and firm size	Environmental concern is measured by: having environmental committee, number and frequency of environmental reports published and number of programs the firm participate in	Three-stage least squares regression	* There is positive relation between economic performance and environmental performance. * environmental performance is positively related to environmental disclosure.	349
Does it really pay to be green	King and Lenox (2001)	Analysis of 652 US manufacturing firms during 1987-1996	IV: Environmental performance DV: Financial performance Control variables: Company size, capital intensity, the annual growth, leverage, R&D intensity and stringency	IV: Relative emissions and industry emissions DV: Tobin's q	Least-squares regression analysis	* Environmental performance is associated with financial performance * Firms with lower emissions in their industries have higher financial performance	296
Greening the supply chain: new initiative in south east Asia	Rao (2002)	Survey questionnaire to 52 manufacturing firms in Philippine, Malaysia, Indonesia, Thailand and Singapore	Environmental initiatives and Performance	IV: Environment initiatives and green supply chain environmental management DV: Environmental performance, economic performance and competitiveness	Confirmatory and exploratory factor analysis to validate the constructs and structural equation modelling to validate the model proposed	* There is significant link between environmental initiatives and environmental performance * There is important link between environmental performance and competitiveness * There is important link between competitiveness and economic performance	277
The moderating effects of institutional pressures on emergent green supply chain practices and performance	Zhu and Sarkis (2007)	Survey questionnaire to 341 manufacturing facilities in China	Ivs: Green supply chain practices DVs: Performance Improvements Control variables: Institutional pressures	GSCMPs: Internal environmental management, green purchasing, Eco-design, cooperation with customers and investment recovery Performance improvements: environmental, positive economic and negative economic Institutional pressure: Market, regulatory and competition	Exploratory factor analysis for data reduction and hierarchical regression analysis to test the relationships	* Market and regulatory pressures will influence organizations to have better environmental performance * Manufacturers facing regulatory pressures tend to implement green purchasing and investment recovery practices, GP leads to improved environmental performance but IR leads to worse economic performance	222
An examination of corporate reporting, environmental management practices and firm performance	Montabon <i>et al.</i> (2007)	Content analysis of 45 corporate reports	Environment management practices and firm performance	EMPs: Recycling, proactive waste reduction, remanufacturing, environmental design, specific design targets and surveillance of market Firm performance: Product innovation, process innovation, ROI and sales growth	Canonical correlation	* All EMPs except specific design targets are positively associated with product and process innovation * EMPs had relatively weak relationship with sales growth and negative relationship with ROI * Overall the results are consistent with Porter and van der Linde argument for Innovation offsets	193
An analysis of the drivers affecting the implementation of green supply chain management	Diabat and Govindan (2011)	Case study of Indian company that produces aluminium products	Drivers of green supply chain management	Drivers: certification of suppliers' environmental management system, environmental collaboration with suppliers, collaboration between product designers and suppliers, government regulations and legislation, green design, ISO 14001 certification, collaboration with customers and reverse logistics	Interpretive structural modelling (ISM)	* certification of suppliers' EMS, environmental collaboration with suppliers, green design, ISO 14001 certification, integrating quality environmental management into planning and operation process, reusing and recycling materials and packaging, and environmental collaboration with customers found to have strong driving power and strong dependence power	171

To summarize, figure 2 displays the articles examined the GSCM and corporate performance and number of articles reported a positive, no relationship or negative relationship.

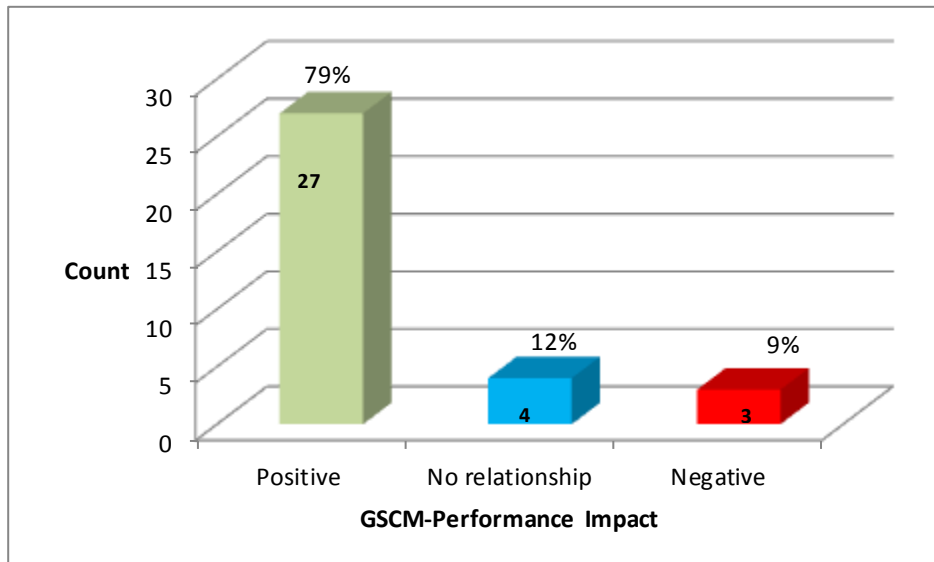


Figure 2: GSCM-Performance Impact

## 2.4 ISO 14001 Environment Management System

One of the commonly adopted measures for GSCM practices is ISO 14001. Some practitioners refer to it as the "green seal" which breaks environmental barriers for international trade.

ISO 14001 certified organizations are those firms that implement environment management system (EMS) and wish to have it certified to the ISO 14001 standard which was introduced by the International Organization for Standardization (ISO) in 1996 (Bansal and Hunter, 2003). The ISO 14001 standards require organizations to develop an environmental policy with specific objectives, executing a program to achieve those objectives, measuring its efficacy, rectifying any problems and evaluating the system to improve its overall performance (Tibor and Feldman, 1996).

## 2.5 GSCM in the United Arab Emirates

Despite the fact that the study of GSCM in the UAE is minimal (Balasubramanian 2014) and (Elgayar *et al.* 2016), a report published by UAE Ministry of Environment and Water titled “UAE State of Green Economy” (2014), emphasizes that the country’s long term approach towards the green economy was launched and is built on three main pillars illustrated as follows;

1. Green Technology and Market Development

Improve low-carbon technology investments as well as eco-efficient production in order to enhance the country’s competitiveness and create new opportunities for export

2. Integrated Social and Spatial Development

Promote green life through green and smart cities that use country resources sustainably and develop local talent to take new positions created within the new green sector.

3. Clean Energy and Sustainable Use of Resources

Move into renewable energy by increasing power generation from renewable sources while at the same time reduce dependency on fossil fuel

Many green initiatives in different sectors and with various magnitudes were launched by the UAE, among them is the country’s well known “green vehicle”, MASDAR which aims to advance the clean energy industry in the UAE and around the world. Within the construction sector, Urban Planning Council launched “Istedama”, or “Pearl Rating” wherein contractors need to adhere to a set of green regulations for the design, construction and operation of buildings, villas and communities. Other initiatives within green include; introducing green service stations, improving in-house recycling and adopting efficient cooling systems.

The literature on GSCM within the UAE context is meagre, with an exception of the construction sector wherein few recent studies were published such as Elgayar *et al.* (2016) aimed to study the progress of green systems use in the UAE construction industry. A second example within the same sector is Balasubramanian (2014) study on the enablers of green supply chain in the UAE construction industry.

## **2.6 Green supply chain initiatives adoption**

The selection of GSCM practices to adopt differs between organizations and may depend on the industry type in some cases and on the firm's position in the supply chain in other cases. To elaborate, Eltayeb and Zailani (2009) investigated the adoption of green supply chain initiatives in Malaysia. They sent a survey questionnaire to 132 ISO 14001 certified manufacturing organizations. The analysis of variance (ANOVA) employed to test the difference among three GSCM practices found that eco-design is the most highly adopted green supply chain initiative followed by green purchasing, whereas reverse logistics was found to be the least adopted GSCM initiative.

Likewise, the work of Lo (2014) reported similar results, the author sought to investigate the effect of the firm's position (upstream, midstream, downstream) in the supply chain on the type of GSCM practices it may adopt to improve its performance. Using case studies of 12 firms in the high-tech industry in Taiwan, the author concluded that firms located downstream of the supply chain focus more on the practices of green design, green purchase and internal environmental management. Firms in the midstream were found to focus more on practices of green manufacturing and green logistics

From this review of literature it can be concluded that the existing literature has an apparent anomaly in terms of the green practices adopted, the performance measures used, the corporate performance dimensions studied and consequently the results reported.

The specific aim of the research presented in this thesis is to select the most commonly adopted green supply chain practices (as depicted in figure 1 above) namely; eco-design, green purchasing, environmental cooperation and reverse logistics. The research then adopts a quadruple approach for corporate performance by adding a fourth dimension to the sustainability triple bottom line, thus measuring the impact on the environmental, operational, economic and social performance of the firm.

## **2.7 Research Gaps**

The literature review demonstrates that many studies have examined the relationship between implementing different sets of green supply chain management practices and different dimensions of corporate performance. A substantial amount of research has been dedicated to assessing the green supply chain in terms of economic considerations and from the point of view of recycling (Sarkis, 1998; Rao and Holt, 2005). However, an overall perspective of green supply chain best practices implementation with respect to corporate performance is lacking and it is missing from the theoretical and practical literature. Moreover, no study considered the impact of implementing the four main GSCM practices (eco-design, green purchasing, environmental cooperation and reverse logistics) on corporate performance environmentally, economically, operationally and socially. In addition, none of the earlier studies has investigated the implementation of these practices on businesses performance in this Middle Eastern region.

This research is an attempt to fill these gaps and provide new insights on how organizations can satisfy the green needs of their stakeholders, as theorized by Freeman (1984) while at the same time improving the overall performance. The general aim of this study is to investigate the impact of implementing green supply chain management practices on corporate performance within a UAE context. More specifically, it explores how the four main green supply chain management practices identified above namely; eco-design, green purchasing, environmental cooperation and reverse logistics impact corporate performance from environmental, operational, economic and social points of view.

As a result, this thesis contributes to industry practice by increasing our understanding of which dimensions of GSCM practices have a positive or direct impact on performance as well as how those positive impacts can best be accomplished within an organisation. The research methods employed also provide guidance for researchers who seek to gain a deeper understanding of the drivers of organisational performance. That is, a mixed methodology can provide a richer, more holistic view of where the investment in GSCM practices can provide a return on investment and how that return on investment might best be realised. From a theoretical stance, the research has also confirmed that the internal and external environment, along with organisational culture and the local context (in this case local

regulation and business practices in the United Arab Emirates), has an impact on how GSCM practices are implemented and how this impacts corporate performance.



### 3 CONCEPTUAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

#### 3.1 Theoretical model

Based on the preceding literature, it can be argued that there is some debate on whether implementing GSCM practices leads to improving or weakening corporate performance. Certainly, there is a lack of consensus on the impact of GSCM on corporate performance (Laosirihongthong *et al.*, 2013). Zhu *et al.* (2012) argue that such conflicting results may create a barrier for organizations planning to adopt GSCM practices. Hence this research aims to address this gap by investigating the impact of the four dimensions of GSCM practices implementation on corporate performance from a 360 degree perspective. Figure 3 below illustrates the theoretical model guiding this research and this model is further developed in Figure 5 in section 3.3 where the study hypotheses are added.

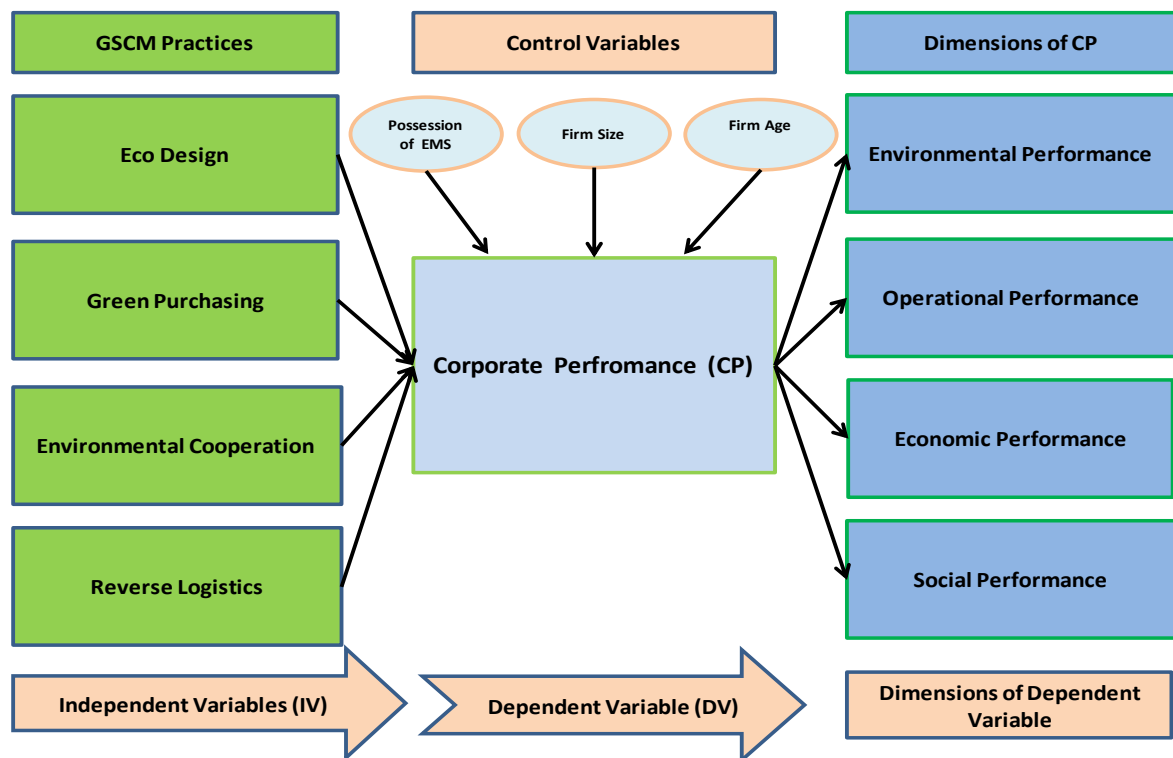


Figure 3: Theoretical Model

The model is informed by the three theories discussed earlier. To clarify, both operational and economic dimensions were drawn from the resource based theory as businesses strive to utilize their inimitable assets effectively and efficiently which will be translated into higher quality of their products, reduction in lead time and improvements in financial returns. Similarly, stakeholder theory hypothesizes that firms endeavour to satisfy all stakeholders which, in turn, justifies the consideration of the economic dimension to meet shareholders expectations. The end users who also need to be satisfied as per stakeholder theory are demanding environmentally friendly products and thus the operational dimension is taken into consideration and employed in the model.

Institutional theory on the other hand, posits that firms always seek to adapt to the surrounding environment by adhering to government regulations and related rules, and therefore they will continuously need to measure their environmental and social performance which are both considered in the proposed model.

The left side of the model exhibited in Figure 3 shows the four independent variables namely; eco-design, green purchasing, environmental cooperation and reverse logistics employed in this research. The dependent variable which is corporate performance is shown with its four dimensions on the right side. The three control variables that may affect the dependent variable: environment management system (EMS) certification, firm size and age are displayed in the upper middle of the model.

### **3.2 Discussion of independent variables selected for the theoretical model**

Green supply chain practices are those initiatives that any organization adopts to comply with environmental legislation, reduce its operations' negative impact on the environment and improve its performance. This research will focus on those green supply chain initiatives that have been widely adopted and discussed in the extant literature which include; green purchasing, eco-design, environmental cooperation and reverse logistics. The above four practices will become the independent variables for the theoretical model to be investigated. The below sections elaborate on each one of them more broadly and how it has been employed by other scholars in the field.

### 3.2.1 Eco-design

This research adopts the definition developed by Johansson (2002) for eco-design, which defines eco-design as the actions taken during the product development stage targeted towards minimizing a product's environmental impact during its whole life cycle starting from acquiring raw materials for manufacturing, the use of the product and finally the disposal of the product without compromising other essential product criteria such as performance and cost.

Eco-design is an important green supply chain initiative because at this stage every aspect of the product is determined including the type of raw material to be used, the energy consumed and the waste generated. It can be argued that product design touches each stage in the supply chain when it comes to environmental impact, starting with production all the way through to consumption and finally disposal. Therefore it is of significant importance to integrate environmental aspects in the product design from the early stages (Eltayeb, 2009).

Indeed, it is the product attributes and basic materials that determine how much energy the product needs to function and what wastes it may generate and accordingly how it can be disposed of. Taking the above into consideration, one can claim that eco-design plays an integral role in any sustainable development effort especially when it comes to manufacturing industries. This in turn entails close collaboration among supply chain members to ensure that a product's life and afterlife are taken into account from early stages.

Among the studies of relevance, Eltayeb and Zailani's (2009) work, which surveyed 132 ISO 14001 certified organizations in Malaysia to investigate the adoption of green supply chain initiatives, found that eco-design is the most frequently adopted green supply chain initiative followed by green purchasing and reverse logistics respectively.

Eco-design as a GSCM initiative was employed by many researchers in different studies including: Zailani *et al.* (2011) who intended to examine its impact on the environmental performance of the firm. Lee *et al.* (2012), also included eco-design on the list of GSCM

practices to examine their impact on the firm's performance. However, Laosirihongthong *et al.* (2013) went deeper and investigated the impact of product related eco-design practices and packaging related eco-design practices on environmental, economic and intangible performances.

Perotti *et al.* (2012) used semi structured interviews with executives from 13 third party logistics (3PL) providers in Italy to find how eco-design along with other GSCM practices can affect the corporate performance. Similarly, Diabat *et al.* (2013), explored the relationship between a set of GSCM practices (including eco-design) and different performance outcomes. Eltayeb and Zailani (2009), ran a survey to ISO 14001 organizations in Malaysia to rank the adoption of different GSCM practices and eco-design was one of four GSCM practices selected for this study. In this work eco-design was found to be the number one adopted GSCM initiative. Zhu *et al.* (2006) as well as Zhu and Sarkis (2004), used eco-design in addition to other GSCM practices in their studies to assess their impact on different corporate performance dimensions. Zhu and Sarkis (2005) included eco-design in their survey to companies in three industrial sectors in China and were able to establish the drivers behind GSCM practices implementation.

Furthermore, Deutz *et al.* (2013) recent work focused on eco-design practices in the UK manufacturing industry, the author examined the environmental factors designers consider during the product design stage in the selected companies. Additionally, Zhu and Sarkis (2007); Eltayeb *et al.* (2011) and Zhu *et al.* (2012) all included eco-design (along with other GSCM practices) in their studies that attempted to test its relationship with different performance outcomes.

Based on the discussion above, it is therefore proposed that:

- *There is a positive relationship between implementation of Eco Design practices and the corporate environmental performance.*
- *There is a positive relationship between implementation of Eco Design practices and the corporate operational performance.*
- *There is a positive relationship between implementation of Eco Design practices and the corporate economic performance.*

- *There is a positive relationship between implementation of Eco Design practices and the corporate social performance.*

### 3.2.2 Green purchasing

Green purchasing can be defined as an environmental purchasing initiative that aims to ensure purchased products and materials meet with environmental objectives set by the purchasing firm such as reducing sources of waste, encouraging recycling, reuse and substitution of materials (Carter *et al.*, 1998; Min and Galle, 2001; Zsidisin and Siferd, 2001). Green purchasing is receiving significant attention worldwide and businesses have become keener to evaluate their suppliers' environmental performance before taking any procurement decision (Zhu and Sarkis, 2006). Some authors go beyond that to consider evaluating second-tier suppliers' environmental performance as well. For example Walton *et al.* (1998), ranked second-tier suppliers environmental performance as the second important evaluation criteria when it comes to evaluating supplier's environmental performance. Furthermore, Green *et al.* (1998), found that implementing green purchasing practices within firms in the UK can help companies achieve "environmental excellence". Within the same context, Schlegelmilch *et al.* (1996) found that environmental consciousness has a positive impact on pro- environmental purchasing behaviour.

Large organizations such as Ford, General Motors, Xerox and International Business Machines consider green purchasing as a key element in their environmental management systems, as such they enforce their suppliers to develop environmental strategies that encompass green purchasing and consequently obtain ISO 14001 certification as a green label for their environmental responsibility (Eltayeb *et al.*, 2010). Green purchasing has been used in different studies tackling the impact of GSCM practices on corporate performance, for example, Zhu *et al.* (2010), used green purchasing as an independent variable along with other variables to measure its impact on the firm's economic and environmental performance. Furthermore, Eltayeb *et al.* (2010), selected green purchasing as the only dependent variables against a couple of independent variables measuring corporate performance including social responsibility and expected business benefits. Liang and Chang (2008) also employed green purchasing along with green production and

green marketing to examine their impact on profit goals, sales goals and return on investment (ROI).

More recently, Diabat *et al.* (2013) and Laosirihongthong *et al.* (2013) used green purchasing along with other green supply chain initiatives to examine their impact on a set of corporate performance outcomes including environmental, economic and intangible performance. Green *et al.* (2012) who examined the impact of green purchasing together with internal environmental management, green information systems, cooperation with customers, investment recovery and eco design, on different dimensions of corporate performance. This included environmental, operational, economic and organizational performance. Green purchasing was also one of the GSCM practices adopted by Zhu *et al.* (2006) along with, eco-design, reverse logistics and cooperation with customers to examine their impact on economic, operational and environmental performance. Zhu and Sarkis (2005) also incorporated a set of GSCM practices including green purchasing in analysis of variance (ANOVA) test to compare drivers and practices of GSCM in three typical sectors in China namely, the automobile industry within thermal power plants and the electrical/electronic industry.

Based on the discussion above, it is therefore proposed that:

- *There is a positive relationship between the implementation of Green Purchasing practices and corporate environmental performance.*
- *There is a positive relationship between the implementation of Green Purchasing practices and corporate operational performance.*
- *There is a positive relationship between the implementation of Green Purchasing practices and corporate economic performance.*
- *There is a positive relationship between the implementation of Green Purchasing practices and corporate social performance.*

### 3.2.3 Environmental cooperation

Adopting green supply chain practices requires internal and external cooperation among different stakeholders. For example, in the manufacturing industry, cooperation to achieve environmental objectives needs to exist between the organizations' different departments, such as; purchasing, marketing, production and human resources. Similarly, external cooperation between different stakeholders within the supply chain including the raw material supplier, the manufacturer, the logistics provider, and the customer needs to take place in order to introduce an ecologically responsible design for a product that is safe and easy to recycle (Gonzalez, 2008). It is possible to achieve sustainable growth when there is cooperation and trust-based relationships among the supply chain members. Moreover, both internal and external cooperation entails "buy in", commitment and support from the senior management within each organization to deliver on the environmental goals and objectives.

Environmental cooperation has been used as a GSCM initiative in several studies but generally in one of two forms. That is either upstream with the suppliers or downstream with customers. In this research, cooperation with suppliers or customers will be referred to as environmental cooperation. Examples on extant studies that employed environmental cooperation include the work of Lee *et al.* (2012), who examined the impact of environmental cooperation on different performance dimensions within electronic firms in Korea. In the same way, Perotti *et al.* (2012), used environmental cooperation along with other GSCM initiatives to examine how the adoption of GSC practices by 3PLs in Italy can affect company performance. Using collaboration with suppliers and collaboration with customers in addition to other GSCM initiatives, Diabat *et al.* (2013) also examined their impact on different corporate performance measures.

Equally, environmental collaboration with suppliers was on Azevedo *et al.* (2011) list, who intended to investigate the relationships between green practices of supply chain management and supply chain performance in the context of the automotive industry in Portugal. Other examples of environmental cooperation include Ford Motors. The company offers seminars and training sessions for its suppliers to assist them achieve their goals for environmental excellence (Rao, 2002).

In terms of cooperation with customers, Green *et al.* (2012); Zhu *et al.* (2006) and Zhu and Sarkis (2007) all examined the impact of a set of other GSCM practices on different corporate performance outcomes.

The example of studies indicated above demonstrates that environmental cooperation is a key practice in any green supply chain initiative, since it brings all parties together to ensure they all play on the same wave length to achieve a common goal. That is maximizing the efficiency and effectiveness of the supply chain as a whole. This research will define environmental cooperation as: the activities that take place between reduced supply chain members for eco-design, cleaner production, green packaging, use of less energy, use during the transportation of materials and goods, and working together on mutual environmental responsibilities and objectives.

Based on the discussion above, it is therefore proposed that:

- *There is a positive relationship between the implementation of Environmental Cooperation practices and corporate environmental performance.*
- *There is a positive relationship between the implementation of Environmental Cooperation practices and corporate operational performance.*
- *There is a positive relationship between the implementation of Environmental Cooperation practices and corporate economic performance.*
- *There is a positive relationship between the implementation of Environmental Cooperation practices and corporate social performance.*

#### 3.2.4 Reverse logistics

This research adopts the definition proposed by Carter and Ellram (1998, p.86) that defines reverse logistics as “the return or take back of products and materials from the point of consumption to the forward supply chain for the purpose of recycling, reuse, remanufacture, repair, refurbishing or safe disposal of the products and materials”. Like other green supply chain initiatives, reverse logistics plays a key role in enhancing the



organization's operational efficiency, improving its competitiveness and reduce system wide costs. Reverse logistics is one of the most commonly used GSCM practices in the extant literature. For example, Perotti *et al.* (2012), included reverse logistics along with other GSCM initiatives in their study of some logistics providers in Italy to assess the adoption level of such initiatives and their potential impact on different corporate performance dimensions. Likewise Diabat *et al.* (2013), employed the Fuzzy TOPSIS Method to explore how reverse logistics, along with other GSCM initiatives can lead to improved corporate performance. In the same way, reverse logistics was among three GSCM practices that Eltayeb and Zailani (2009) intended to rank in terms of adoption levels in Malaysia.

From a performance measurement perspective, reverse logistics was one of the GSCM initiatives that Hervani *et al.* (2005) looked at, aiming to propose a model for a performance measurement system. Moreover, Azevedo *et al.* (2011), considered reverse logistics in their analysis of five case studies in Portuguese automotive industry to examine its relationship with supply chain performance. Similarly, Eltayeb *et al.* (2011), assessed the actual environmental, economic and intangible outcomes resulting from the adoption of different GSCM practices including reverse logistics.

The different studies presented above, confirm the importance of reverse logistics as a GSCM initiative either on a firm level or on a supply chain level. This is because it acts as a commitment from the respective chain members to the customers and to other stakeholder groups that the product that is introduced /sold will be returned back to be processed, repaired or properly disposed of in a way that is environment friendly. Based on the above, the following hypotheses are proposed below:

- *There is a positive relationship between the implementation of Reverse Logistics practices and corporate environmental performance.*
- *There is a positive relationship between the implementation of Reverse Logistics practices and corporate operational performance.*
- *There is a positive relationship between the implementation of Reverse Logistics practices and corporate economic performance.*

- *There is a positive relationship between the implementation of Reverse Logistics practices and corporate social performance.*

### **3.3 Discussion of the dependent variables selected for the theoretical model**

Corporate performance is the other side of the GSCM-Performance equation and was considered as a dependent variable in most of the studies that examined its relationship with GSCM. GSCM initiatives might lead to tangible benefits such as cost reduction (Orlitzky *et al.*, 2003; Melnyk *et al.*, 2003; Eltayeb *et al.*, 2011), improved quality (Melnik *et al.*, 2003), waste reduction (Azevedo *et al.*, 2011), reduction of lead times (Melnik *et al.*, 2003), improved profitability (Darnall *et al.*, 2008; Menguc and Ozanne, 2005), positive stock returns (Klassen and McLaughlin, 1996; Menguc and Ozanne, 2005) and energy conservation (Cordano *et al.*, 2010). GSCM practices may also lead to intangible benefits including: enhanced competitiveness (Rao, 2002; Rao and Holt, 2005), increased shareholder value (Bose and Pal, 2012), increased customer satisfaction (Azevedo *et al.*, 2011), improved job satisfaction (Jun *et al.*, 2006), enhanced efficiency (Azevedo *et al.*, 2011) and new market opportunities (Diabat *et al.*, 2013; Walley and Whitehead, 1994).

As discussed earlier, Elkington (1998) introduced the concept of the "triple bottom line" claiming that sustainability is nothing but the intersection of economic, environmental and social performance. However this research seeks to add another dimension; that is, operational performance so the impact of GSCM practices is measured from a 360 degree perspective. Consequently, 360 degree corporate performance is the impact resulting from implementing GSCM practices on four different aspects of corporate performance namely environmental, such as, waste reduction and resource savings, operational, such as, enhanced efficiency and improved quality, economic such as improved profitability and positive stock returns and social such as, improved job satisfaction and increased customer satisfaction. The section below elaborates more on each of these dimensions while figure 4 below portrays how they are interrelated.

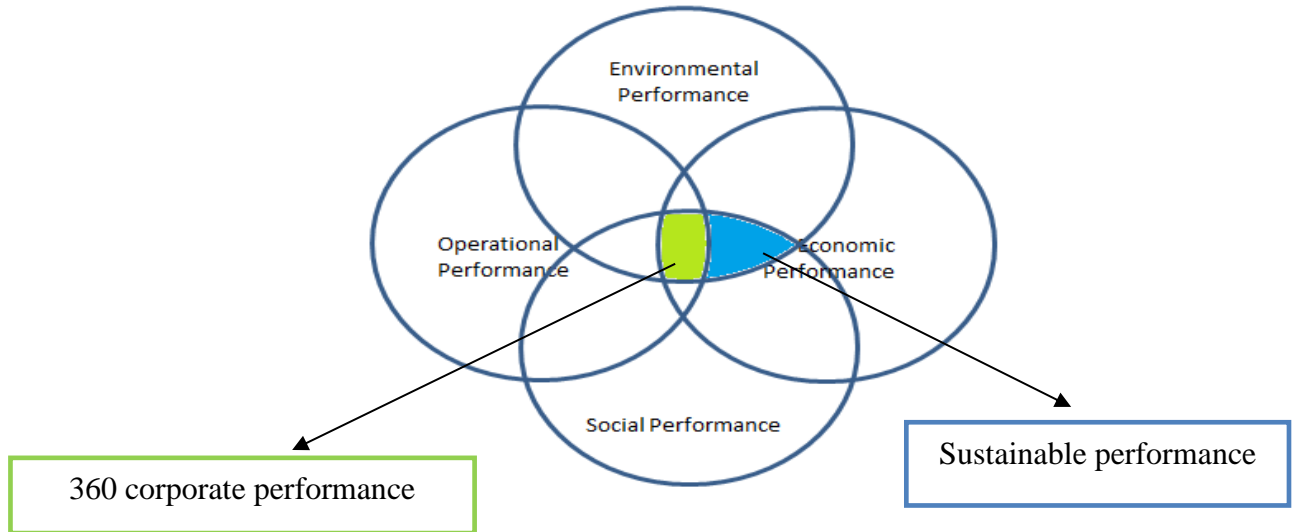


Figure 4: Performance Model, adopted Elkington (1998)

### 3.3.1 Environmental performance

This research adopts a modified version of the definition developed by Zhu *et al.* (2008), thus environmental performance refers to: The ability of the organization to reduce air emissions, effluent waste, decrease consumption of hazardous and toxic material as well as frequency of environmental accidents.

Based on the model displayed in figure 2 above, the improvement in environmental performance resulting from the implementation of GSCM practices can be expressed in the equation below:

$$Y_1 = \beta_0 + (\beta_1 * ED) + (\beta_2 * GP) + (\beta_3 * EC) + (\beta_4 * RL)$$

Where  $Y_1$  is the environmental performance,  $\beta_0$  is the constant term,  $\beta_1$  is ED coefficient,  $\beta_2$  is GP coefficient,  $\beta_3$  is EC coefficient and  $\beta_4$  is RL coefficient.

### 3.3.2 Operational performance

This research employs a modified version of Melnyk *et al.* (2003) and Zhu *et al.*'s (2008) definition for operational performance where operational performance refers to the organization's capabilities to more efficiently to produce and deliver products to customers

with improved quality and reduced lead times which ultimately lead to improving its position in the marketplace and increasing its chances in selling its products into international markets.

Based on the model displayed in figure 2 above, the improvement in operational performance resulting from the implementation of GSCM practices can be expressed in the equation below:

$$Y_2 = \beta_0 + (\beta_1 * ED) + (\beta_2 * GP) + (\beta_3 * EC) + (\beta_4 * RL)$$

Where  $Y_2$  is operational performance,  $\beta_0$  is the constant term,  $\beta_1$  is ED coefficient,  $\beta_2$  is GP coefficient,  $\beta_3$  is EC coefficient and  $\beta_4$  is RL coefficient.

### 3.3.3 Economic performance

This research adopts an extended version of Green and Inman (2005) and Zhu *et al.*'s (2005) definition for economic performance. Hence, economic performance is defined as financial and marketing performance improvements resulting from implementing green supply chain management practices that enhances the firm's position compared to the industry average. The financial improvement encompasses decreased costs for material purchasing, decreased costs for energy consumption, decreased cost for waste discharge and decreased costs for environmental accidents. The marketing based improvements include: increased average return on sales, increased average profit and profit growth and increased average market share growth. Based on the model displayed in figure 2, the improvement in economic performance resulting from the implementation of GSCM practices can be expressed in the equation below:

$$Y_3 = \beta_0 + (\beta_1 * ED) + (\beta_2 * GP) + (\beta_3 * EC) + (\beta_4 * RL)$$

Where  $Y_3$  is economic performance,  $\beta_0$  is the constant term,  $\beta_1$  is ED coefficient,  $\beta_2$  is GP coefficient,  $\beta_3$  is EC coefficient and  $\beta_4$  is RL coefficient.

### 3.3.4 Social performance

Wood (1991, p.693) defines social performance as "a business organization's configuration of principles of social responsibility, processes of social responsiveness, and policies, programs and observable outcomes as they relate to the firm's societal relationships. This research adopts measures for social performance from different sources which are discussed in the research methodology section.

Based on the model displayed in figure 2 above, the improvement in the social performance resulting from the implementation of GSCM practices can be expressed in the equation below:

$$Y_4 = \beta_0 + (\beta_1 * ED) + (\beta_2 * GP) + (\beta_3 * EC) + (\beta_4 * RL)$$

Where  $Y_4$  is the social performance,  $\beta_0$  is the constant term,  $\beta_1$  is ED coefficient,  $\beta_2$  is GP coefficient,  $\beta_3$  is EC coefficient and  $\beta_4$  is RL coefficient.

### 3.3.5 Control variables

To maximize the robustness and reliability of the results, the model considers three control variables. These are possession of environment management system (EMS) certification, firm size and firm age. These three variables were selected because earlier studies found a significant effect of these variables on the dependent variables employed in this study. For example, some researchers argue that ISO 14001 certification might fit large organizations better and this, in turn, justifies the use of firm size (Naveh and Marcus, 2004) to control for such effects. On the other hand Ann *et al.* (2006) found that certification to ISO 14001 might have an impact on the economic performance of the firm. Moreover, Bowen (2002) claims that larger firms might be in a better position to devote more resources for green initiatives and thus this research uses firm size to control any effects on the dependent variables. Some of these variables were used by Eltayeb, *et al.*, 2010; King and Lenox, 2001 and Russo, 2009.

### 3.4 Summary of all variables definitions selected in the model

Table 3 lists the main constructs employed in the research and their definitions.

Table 3: Conceptual construct definitions

Construct	Definition	Source
Eco Design	The actions taken the during product development stage targeted towards minimizing a product's environmental impact during its whole life cycle starting from acquiring raw material to manufacturing, use and finally to its final disposal without compromising other essential product criteria such as performance and cost.	Johansson (2002)
Green Purchasing	An environmental purchasing initiative that aims to ensure purchased products and material meet with environmental objectives set by the purchasing firm such as reducing sources of waste, encouraging recycling, reuse and substitution of materials.	Carter <i>et al.</i> (1998); Min and Galle, (2001); Zsidisin and Siferd, (2001)
Environmental Cooperation	the activities that take place between the supply chain members for eco-design, cleaner production, green packaging, use of less energy during transportation of materials and goods, and working together on mutual environmental responsibilities and objectives.	Green <i>et al.</i> (2012); Zhu <i>et al.</i> (2006) and Azevedo <i>et al.</i> (2011)
Reverse Logistics	The return or take back of products and materials from the point of consumption to the forward supply chain for the purpose of recycling, reuse, remanufacture, repair, refurbishing or safe disposal of products and materials.	Carter and Ellram (1998)
Environmental Performance	The ability of the organization to reduce air emissions, effluent waste, and solid wastes and the ability to decrease consumption of hazardous and toxic material and decreased frequency for environmental accidents.	Zhu <i>et al.</i> (2008)
Operational Performance	The organization's capabilities to more efficiently produce and deliver products to customers with improved quality and reduced lead times which ultimately lead to improving its position in the market place and increasing its chances of selling its products into international markets.	Melnyk <i>et al.</i> (2003) and Zhu <i>et al.</i> (2008)
Economic Performance	The financial and marketing performance improvements resulting from implementing green supply chain management practices that enhance the firm's position compared to the industry average.	Green and Inman (2005) and Zhu <i>et al.</i> (2005)
Social Performance	A business organization's configuration of principles of social responsibility, processes of social responsiveness, and policies, programs and observable outcomes as they relate to the firm's societal relationships.	Wood (1991)

### **3.5 Summary of Hypotheses**

Based on the model displayed in figure 3 in page 31, this research summarizes the hypotheses to be tested in this research in the below 16 hypotheses.

#### **3.5.1 GSCM Practices and Environmental Performance**

Hypothesis 1a: There is a positive relationship between Eco Design practices and corporate environmental performance

Hypothesis 1b: There is a positive relationship between the implementation of Green Purchasing practices and corporate environmental performance

Hypothesis 1c: There is a positive relationship between the implementation of Environmental Cooperation practices and corporate environmental performance

Hypothesis 1d: There is a positive relationship between the implementation of Reverse Logistics practices and corporate environmental performance

#### **3.5.2 GSCM Practices and Operational Performance**

Hypothesis 2a: There is a positive relationship between the implementation of Eco Design practices and corporate operational performance

Hypothesis 2b: There is a positive relationship between the implementation of Green Purchasing practices and corporate operational performance

Hypothesis 2c: There is a positive relationship between the implementation of Environmental Cooperation practices and corporate operational performance

Hypothesis 2d: There is a positive relationship between the implementation of Reverse Logistics practices and corporate operational performance

### 3.5.3 GSCM Practices and Economic Performance

Hypothesis 3a: There is a positive relationship between the implementation of Eco Design practices and corporate economic performance

Hypothesis 3b: There is a positive relationship between the implementation of Green Purchasing practices and corporate economic performance

Hypothesis 3c: There is a positive relationship between the implementation of Environmental Cooperation practices and corporate economic performance

Hypothesis 3d: There is a positive relationship between the implementation of Reverse Logistics practices and corporate economic performance

### 3.5.4 GSCM Practices and Social Performance

Hypothesis 4a: There is a positive relationship between the implementation of Eco Design practices and corporate social performance

Hypothesis 4b: There is a positive relationship between the implementation of Green Purchasing practices and corporate social performance

Hypothesis 4c: There is a positive relationship between the implementation of Environmental Cooperation practices and corporate social performance

Hypothesis 4d: There is a positive relationship between the implementation of Reverse Logistics practices and corporate social performance

Figure 5 displays the model with all of the hypotheses discussed above included.



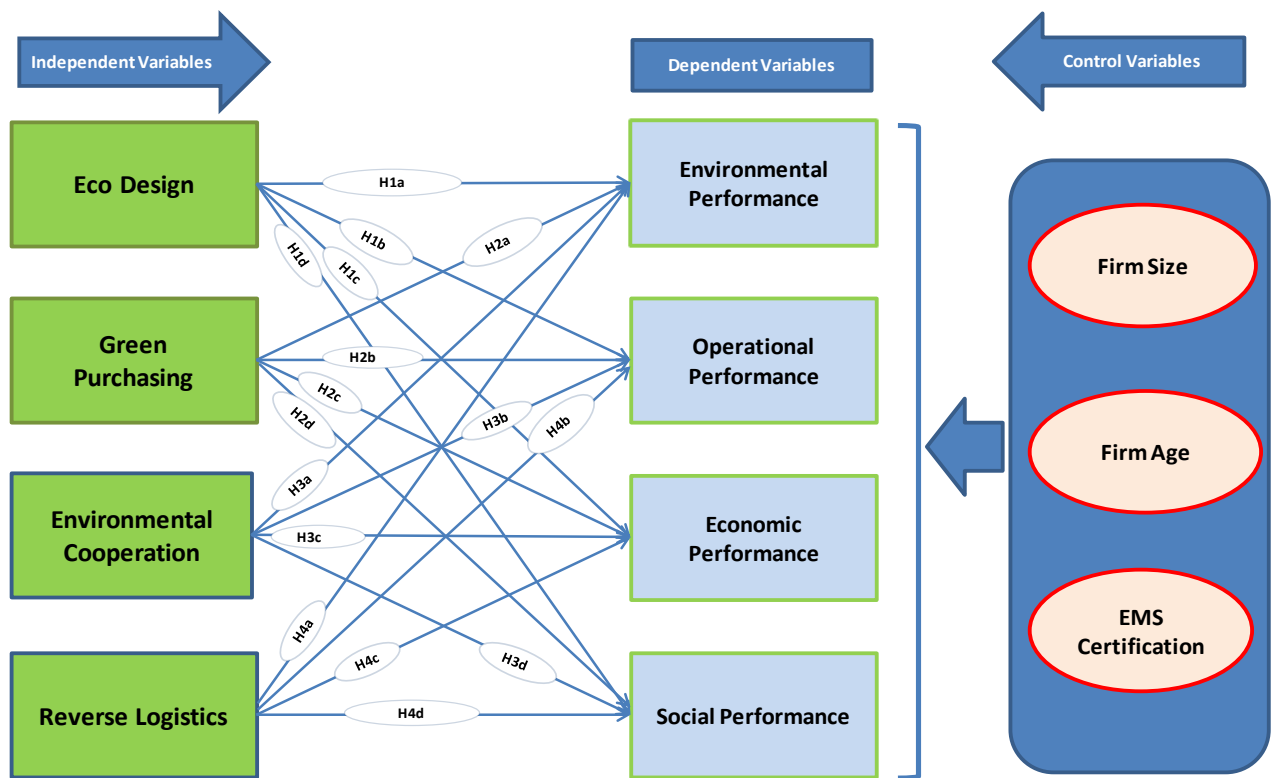


Figure 5: The theoretical model with hypotheses

## 4 RESEARCH METHODOLOGY

Given the deductive nature of the study which suggests a model with a causal relationship between green supply chain practices and corporate performance that requires validation using empirical data, a quantitative approach is adopted in this study in the first instance using information gathered through a survey questionnaire to obtain categorical data needed for the statistical testing. The researcher then sought to gain deeper understanding on some outcomes; consequently, a qualitative approach was employed to gather additional information using interviews with a selected sample from those firms that responded to the questionnaire. As per Creswell (2003) the mixed method approach is a methodology in which the researcher builds the knowledge of the subject topic on practical grounds where the data is collected simultaneously or sequentially to understand and analyse the research problem.

Quantitative approach has been adopted by many researchers in the field including: Lee *et al.* (2012) who examined the direct and indirect factors between GSCM implementation and business performance using a quantitative approach. Similarly, Laosirihongthong *et al.* (2013) quantitatively, explored the adoption of proactive and reactive green practices and their impact on the tangible and intangible performance dimensions of the firm. The work of Diabat *et al.* (2013) was also based on a quantitative approach where the research team surveyed 50 experts from industry and academia to examine the relationship between GSCM practices and performance outcomes. Using a similar methodology, Liang and Chang (2008) and Zhu and Sarkis (2004), examined the influence of GSCM practices on different performance dimensions within SMEs and manufacturing firms in China respectively.

Furthermore, Darnall *et al.* (2008) and Melnyk *et al.* (2003), adopted a quantitative approach employing a survey questionnaire to solicit information from US based manufacturing firms that can help identify the relationship between EMS certification and GSCM practices and their impact on the overall corporate performance.

## 4.1 Measurement

Vogt (2007, p.78) defines measurement as "an observation expressed as a number to make it possible to link concepts and the empirical world". Given the amount of research previously conducted in this area, existing measures were used to operationalize the constructs. For example eco-design was measured using four items adopted from Zsidisin and Hendrick, (1998) and Carter *et al.* (1998). Green purchasing was measured using five items adopted from Zsidisin and Hendrick (1998) and Walton *et al.* (1998). For environmental cooperation, the research used eight measures adopted from three different sources: Zsidisin and Hendrick, 1998; Walton *et al.* 1998 and Vachon and Klassen, 2006. Reverse logistics was measured using three items adopted from Rao, 2007.

The measurement of the independent variables was also facilitated by items adopted from different sources as explained hereafter. Environmental performance measured using five items adopted from Zhu *et al.* (2005) and operational performance was measured using five items adopted from Melnyk *et al.* (2003). Economic performance was measured using four items adopted from Zhu *et al.* (2005) and three items adopted from Green and Inman (2005). Finally, the social performance variable was measured using five items: three items are adopted from Rao (2002), one item adopted from Homburg and Stock (2004) and Zhu *et al.* (2008), and the last item is adopted from Cordano *et al.* (2010). Table 4 below summarizes the measurement items adopted for each construct and their sources

Table 4: Measurement items

Variable	Measurement item	Source
Eco-Design	Design of products for reduced consumption of material/energy	Zsidisin and Hendrick, 1998; Carter et al., 1998
	Design of products for reuse, recycle, recovery of material, component parts	
	Design of products to avoid or reduce use of hazardous products	
	Design of processes for minimization of waste	
Green purchasing	Provide design specification to suppliers that include environmental requirements for purchased items	Zsidisin and Hendrick, 1998; Walton et al., 1998
	Environmental audit for suppliers' internal management	
	Second-tier supplier environmentally friendly practice evaluation	
	Suppliers are selected using environmental criteria	
	Require suppliers to use environmental packaging (degradable and non-hazardous)	
Environmental Cooperation	Cooperation with suppliers and customers for eco-design	Zsidisin and Hendrick, 1998; Walton et al., 1998
	Cooperation with suppliers and customers for cleaner production	
	Cooperation with suppliers and customers for green packaging	
	Cooperation with supplies and customers for using less energy during product transportation	
	Developing a mutual understanding of responsibilities regarding environmental performance	Vachon and Klassen, 2006
	Working together to reduce environmental impact of our activities	
	Conducting joint planning to anticipate and resolve environmental-related problems	
	Making joint decisions with other supply chain members about ways to reduce overall environmental impact of our products	
Reverse Logistics	Use of remanufacturing	Rao,P., 2007
	Recovery of the company's end-of-life products	
	Taking back packaging	
Environmental performance	Reduced air emission	Zhu et al., 2005
	Reduced waste water	
	Reduced solid wastes	
	Decreased consumption for hazardous/harmful/toxic materials	
	Decreased frequency for environmental accidents	
	Improve a company's environmental situation	
Economic performance	Decreased cost for materials purchasing	
	Decreased cost for energy consumption	
	Decreased fee for waste treatment and discharge	
	Decreased fine for environmental accidents	
	Average return on sales and investment over the past three years	Green and Inman, 2005
	Average profit and profit growth over the past three years	
	Average market share growth over the past three years	
Social Performance	Improved corporate image	Rao,P., 2002
	Social comittment	
	Preserve environment	
	Enhanced employee job satisfaction	Homburg and Stock (2004), Zhou et al. (2008)
	Enhanced health and safety of employees.	Cordano et al., 2010
Operational Performance	Significantly reduced lead times	Melnyk et al., 2003
	Significantly improved product quality	
	Significantly improved its position in the market place	
	Helped the company design/develop better products	
	Implementing green practices helps in redusing all types of wastes	
	Improved its chances in successfully selling its products in international markets	

## **4.2 Scale**

The questionnaire adopted for this research required responses that can be quantified and consequently statistically tested using a statistical software package. A five point Likert-Scale was adopted since it has a middle neutral point which is 3 and this in turn gives the respondent an opportunity to select an answer at either side of the midpoint. Taking a statistical point of view, the answers of the respondents should show a normal distribution around a good portion of answers in the middle and a five point scale with 3 in the middle offers this distribution.

In addition the questionnaire adopted the criteria mentioned below for section 2 of the survey which solicits information on the GSCM practices implemented by the firms surveyed: ?

- 1: Not considering
- 2: Planning to consider
- 3: Considering it currently
- 4: Initiating implementation
- 5: Currently implementing

For section 3, which is was designed to measure the impact of GSCM practices implementation on corporate performance, the research adopted the criteria mentioned below:

- 1: Not at all
- 2: A little bit
- 3: To some degree
- 4: Relatively significant
- 5: Highly significant

A copy of the survey questionnaire is presented in appendix B.

## **4.3 Survey instrument**

Vogt (2007, p.77) defines sampling as "the process that involves selecting a small group from a larger group and studying the small group (the sample) in order to learn about the

large group (the population). Sampling is of two main types; probability sampling and non-probability sampling. The latter is used when the researcher doesn't know the probability of selecting any case or element from the population. On the other hand, probability sampling is when the researcher knows the probability of selecting any object from the population (Vogt, 2007).

There are four main types of probability sampling; random sampling at which any member in the population has an equal chance to be selected in the sample; stratified sampling takes place when groups are selected within the population and then random sampling is performed within each group; systematic sampling is used when every *n*th member from a list of population is selected for inclusion in the sample. Finally, cluster sampling is used when randomly sampling clusters of the population one time or more then performing random sampling (Vogt, 2007).

The population for this study consisted of all ISO 14001 certified and non-certified manufacturing firms in UAE. The manufacturing industry was selected because it is one of the biggest sources of emissions and resource depletion Zhu and Sarkis (2004). Many researchers have targeted the manufacturing industry in their studies such as Green *et al.* (2012) with similar dependent and independent variables. Zhu *et al.* (2006) also examined the impact of GSCM practices on different performance outcomes of manufacturing firms in China. Rao (2002) also examined to what extent greening supply chain takes place within 52 manufacturing firms in four Asian countries namely the Philippines, Indonesia, Thailand and Singapore.

#### 4.3.1 Manufacturing industries in UAE

Manufacturing industries in the UAE spread throughout the seven emirates that form the United Arab Emirates namely; Abu Dhabi, Dubai, Sharjah, Ajman Umm al-Qaiwain, Ras al-Khaimah and Fujairah. Each of the emirates has a chamber of commerce and industry department which looks after all commercial activities and grants the required licensing for the firm to conduct its business. In addition, there are international organizations that can

provide information on businesses including risk management information, financial information and supply management information.

#### 4.3.2 Dun & Bradstreet (D&B)

Dun and Bradstreet was established in the United States in 1841. The company is considered to be one of the leading business information providers in the world. They have more than 200 million business records in their database. The South Asia and Middle East office is located in Dubai, looking after 71 countries in the region and offering services to various government departments, financial institutions, multinational companies and leading banks. (D&B, 2014).

An initial communication with D&B in Dubai was made to enquire about the availability of list of all manufacturing firms in the UAE. The company confirmed that it maintains a list of 6,500 entries and can provide all required information including, addresses, phone numbers, contact people and email addresses. Since it is difficult to send a survey to the whole population it was decided to adopt a non-probability convenience sampling approach. Therefore a defined criterion was adopted targeting medium and large-sized enterprises with 50 employees or more to participate in the survey, since it is assumed that they have sufficient resources to implement green supply chain management practices.

## **5 HYPOTHESES TESTING AND RESULTS**

### **5.1 The population and sample size**

As discussed earlier, it was decided to send the survey to firms with 50 employees and above to ensure that small firms classified under manufacturing, such as tailor shops for example are excluded. Dun and Bradstreet provided a list of 1,840 manufacturing firms in the UAE that have more than fifty employees. This included firms in all seven emirates. On contacting the respondents for a survey, 971 were available and willing to participate in the survey.

### **5.2 Details of the instrument, survey and analysis of the results**

As noted earlier, the survey questionnaire had three sections in addition to the introduction which briefed the reader on the purpose of the survey. The first section of the survey aimed to collect pertinent information on the characteristics of the respondents and their organizations including their titles, the organizations scope of business, legal status, number of years in business, size and possession of Environmental Management System (EMS).

The second section elaborated on the GSCM initiatives adopted by the organization covering the four main GSCM practices introduced including, eco-design, green purchasing, environmental cooperation and reverse logistics. The third section solicited information on the impact of such GSCM initiatives on corporate environmental, economic, operational and social performance.

Once the survey instrument was ready to send out to respondents, phone calls were made to the firms selected to confirm their willingness in participating in the survey. The survey was sent via an online survey tool (survey monkey) to the environmental management representative (EMR) within each firm. An online survey tool was employed because it is more convenient and cost effective and the responses can be easily exported to the data analysis application for statistical testing (i.e. SPSS). The survey was sent in two waves



with a two week gap between each wave. The survey was closed 42 days (6 weeks) after its commencement date.

The first wave of the questionnaire was sent on October 1<sup>st</sup> 2014 while the second wave sent after 2 weeks i.e. on 15<sup>th</sup> October 2014. Four reminders were sent to encourage participation one every week with the first wave closed at the end of week 6 that is November 12<sup>th</sup> 2014. 143 responses were received with almost 15% response rate, falling within the common range for self-administered questionnaires as reported by Ilieva *et al.* (2002) and within the average response rate for surveys in the region. For example, a study by Ben Brik *et al.* (2011) reported only 13% response rate.

Upon reviewing the responses, however, only 117 responses were found to be complete which could be used for the statistical testing.

### **5.3 Examination of outliers and missing data**

Table 5 below shows the minimum, maximum, mean, standard deviation and the number of missing entries for each measurement item. The table shows that there are 15 missing entries. To fix this, each missing entry was replaced with the corresponding mean. Since a 5 point scale was adopted, no outliers were detected.

Table 5: Descriptive Statistics

Var	N	Minimum	Maximum	Mean	Std. Deviation	Missing
ED1	117	1	5	3.69	1.348	0
ED2	117	1	5	3.68	1.437	0
ED3	117	1	5	3.62	1.419	0
ED4	117	1	5	4.06	1.139	0
GP1	117	1	5	3.28	1.332	0
GP2	117	1	5	2.58	1.328	0
GP3	117	1	5	2.48	1.317	0
GP4	117	1	5	2.52	1.317	0
GP5	117	1	5	2.64	1.392	0
EC1	117	1	5	2.89	1.401	0
EC2	116	1	5	3.15	1.327	1
EC3	116	1	5	2.78	1.326	1
EC4	117	1	5	2.68	1.243	0
EC5	116	1	5	2.97	1.426	1
EC6	115	1	5	2.38	1.274	2
EC7	116	1	5	2.45	1.281	1
EC8	115	1	5	2.90	1.252	2
RL1	114	1	5	2.84	1.509	3
RL2	116	1	5	3.01	1.524	1
RL3	116	1	5	2.58	1.415	1
EP1	117	1	5	3.79	1.032	0
EP2	117	1	5	3.76	1.006	0
EP3	117	1	5	3.67	.991	0
EP4	117	1	5	3.71	1.130	0
EP5	117	1	5	3.60	1.107	0
EP6	117	1	5	3.95	.964	0
OP1	117	1	5	3.43	1.093	0
OP2	117	1	5	2.83	1.154	0
OP3	117	1	5	3.37	1.022	0
OP4	117	1	5	3.77	1.037	0
OP5	116	1	5	3.53	1.099	1
OP6	117	1	5	3.55	1.063	0
EcP1	117	1	5	2.68	1.304	0
EcP2	117	1	5	3.29	1.145	0
EcP3	117	1	5	3.15	1.149	0
EcP4	117	1	5	3.57	1.045	0
EcP5	117	1	5	2.91	1.215	0
EcP6	116	1	5	2.87	1.262	1
EcP7	117	1	5	2.91	1.250	0
SP1	117	1	5	3.83	.985	0
SP2	117	1	5	3.81	1.017	0
SP3	117	2	5	4.09	.877	0
SP4	117	1	5	3.42	1.085	0
SP5	117	1	5	3.80	1.028	0
<b>Total</b>						<b>15</b>

## 5.4 Non response bias

The responses were categorized as responding to the first call or to the follow up call. Of the responses 33 were categorized as early responses (28%) and 84 responses were categorized as late responses (72%). A comparison of the means of some demographic and independent variables for the two groups was conducted using one-way ANOVA (Rogelberg and Stanton, 2007). Table 6 below shows no statistically significant difference between early and late wave groups and therefore non-response bias was not an issue.

Table 6: ANOVA

ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.043	1	2.043	8.663	.004
(EMS) Within Groups	26.880	114	.236		
Total	28.922	115			
Between Groups	6.154	1	6.154	4.591	.034
Size Within Groups	154.154	115	1.340		
Total	160.308	116			
Between Groups	9.744	1	9.744	4.472	.037
ED2 Within Groups	250.581	115	2.179		
Total	260.325	116			
Between Groups	8.376	1	8.376	3.930	.050
ED3 Within Groups	245.077	115	2.131		
Total	253.453	116			
Between Groups	17.082	1	17.082	7.447	.007
RL3 Within Groups	261.495	114	2.294		
Total	278.578	115			

## 5.5 Descriptive Statistics

The section below elaborates on the descriptive statistics of each variable including minimum, maximum, mean and standard deviation.

### 5.5.1 Independent variables (IV)

Table 7 below shows the means for the four constructs. With respect to the practices, it is clear that on average, the eco design construct is considered the strongest practice (Mean= 3.76, SD=1.34), followed by reverse logistics (Mean=2.81, SD=1.47), followed by the environmental cooperation construct (Mean=2.77, SD=1.31). The weakest practices are identified as green purchasing (Mean=2.7, SD=1.38). The suggestion therefore is that, UAE manufacturers pay a lot of attention to the eco design of their products as well as to reverse logistics and product take back, which is driven primarily by close cooperation between the supply chain members on environment related matters. In contrast, there is less attention paid to green purchasing indicating that auditing suppliers for environmental commitment and selecting them based on environmental criteria are not considered as much of priority compared to other practices.

Table 7 : IVs descriptive statistics

Variable	No of measurement items	Minimum	Maximum	Mean	Std. Deviation
Eco-Design	4	1	5	3.76	1.34
Green Purchasing	5	1	5	2.70	1.38
Environmental Cooperation	8	1	5	2.77	1.31
Reverse Logistics	3	1	5	2.81	1.47

### 5.5.2 Dependent variables (DV)

Table 8 below shows the means for each DV construct. In terms of performance constructs, all four constructs show relatively high levels of attainment with the exception of economic performance which, on an average, was slightly weaker than the other three constructs (Mean=2.65,SD=1.19). Social performance was found to be the strongest construct (Mean=3.79, SD= 1.0) followed by environmental performance (Mean=3.75, SD=1.04) and finally operational performance (Mean=3.41, SD=1.08). One possible explanation might be that some UAE manufacturers have developed a positive image of their products and organizations in the minds of their customers, employees and suppliers,

while at the same time reducing the negative impact of their activities on the environment and improving the quality of their products and delivery lead times.

Table 8: DVs descriptive statistics

Variable	No of items	Minimum	Maximum	Mean	Std. Deviation
Environmental Performance	6	1	5	3.75	1.04
Operational Performance	6	1	5	3.41	1.08
Economic Performance	7	1	5	2.64	1.19
Social Performance	5	1	5	3.79	1.00

## 5.6 Demographic characteristics

The below section highlights the demographic characteristics of the companies involved in the survey and the responding individuals that represented these companies in the study

### 5.6.1 Participants' position in the organization

Figure 5 below shows that almost 82% of the respondents were from middle management positions, while around 9% are held top position. The rest were in supervisory and non-managerial level positions. This makes it evident that the information provided was from people who have knowledge of and experience with GSCM practices within their organizations this was supported by the quality of the information provided either through the survey or during the qualitative interviews that took place at later stage

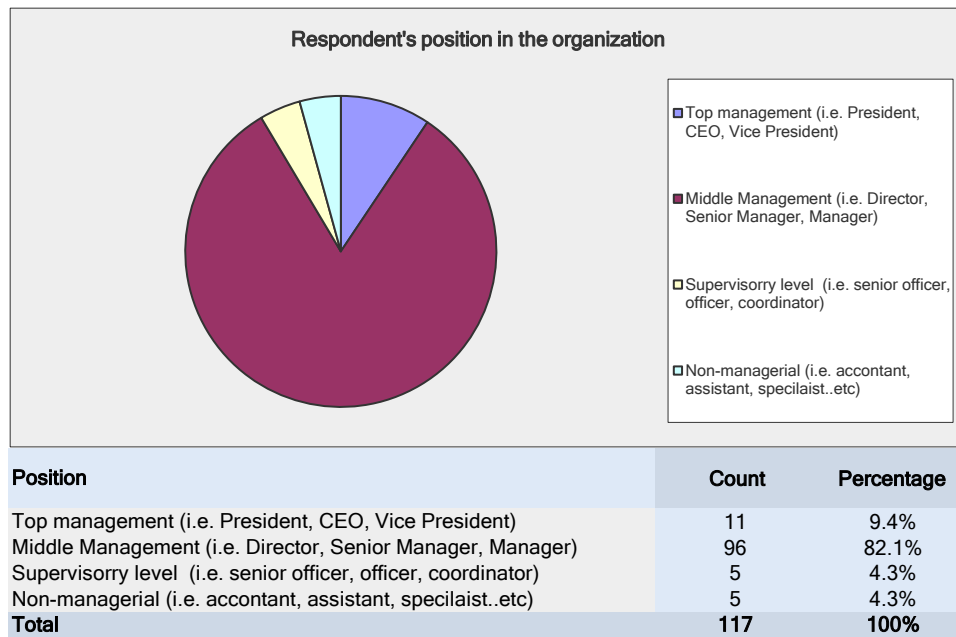


Figure 6: Participants' position

#### 5.6.2 Location of responding firms in UAE

Figure 6 below shows that almost 50% of the firms are based in Dubai, 25% in Abu Dhabi, 15% in Sharjah and the rest are in the remaining emirates. This is generally consistent with the spread of business activity within the UAE as a whole.

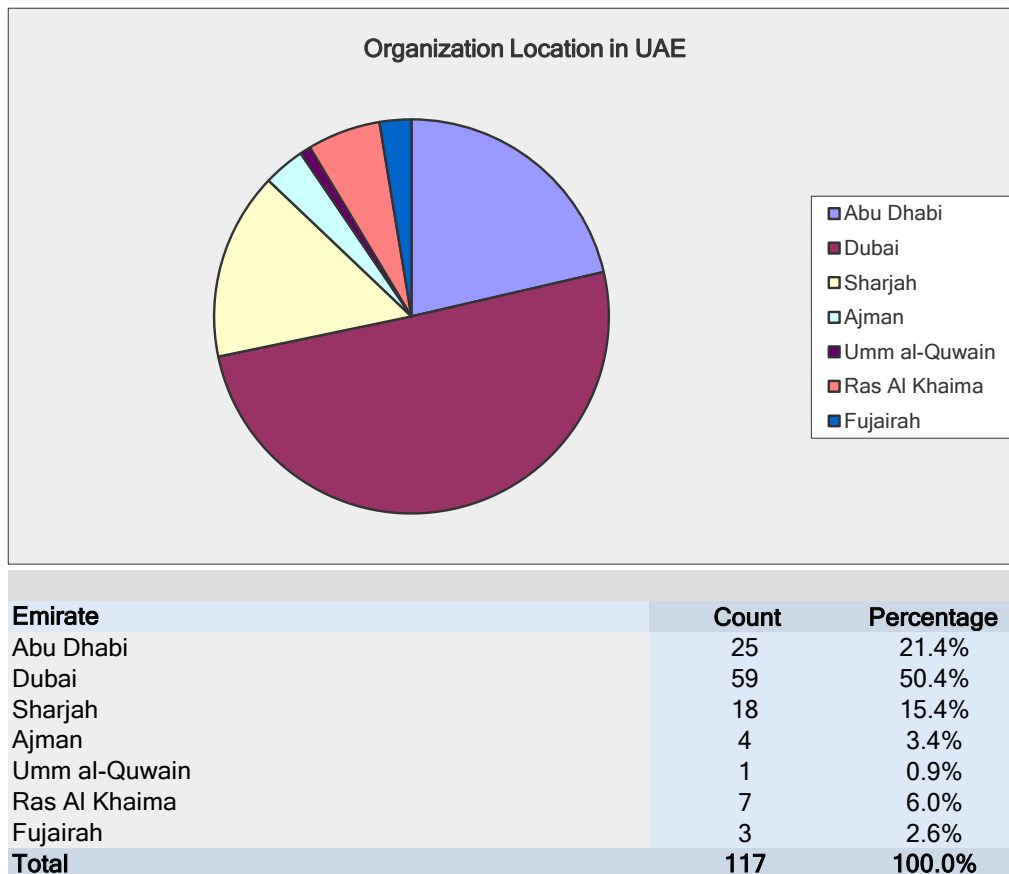


Figure 7: Location of firms in UAE

### 5.6.3 Size of firms

Figure 7 below shows that organizations included in the survey fall into three main categories in terms of size; small (51-100) employees, medium (101-300) employees and large (301- 5000) employees with only 2 organizations having more than 5000 employees.

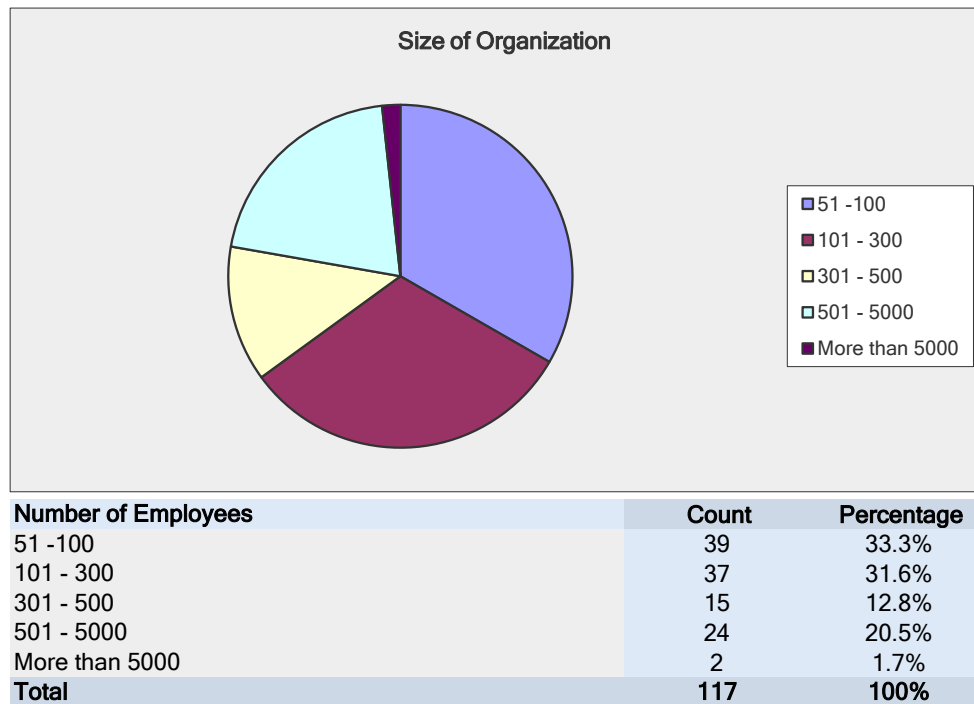


Figure 8: Size of organizations

#### 5.6.4 Number of years in business

Figure 8 below shows that almost 75% of the organizations surveyed have been in business for more than 10 years and therefore capable of assessing the GSCM practices and their related impact on performance within the organization over time since many of these are long term oriented. This denotes a sizable representation of the organizations that have been involved in green supply chain practices and supports the validity and reliability of the findings.



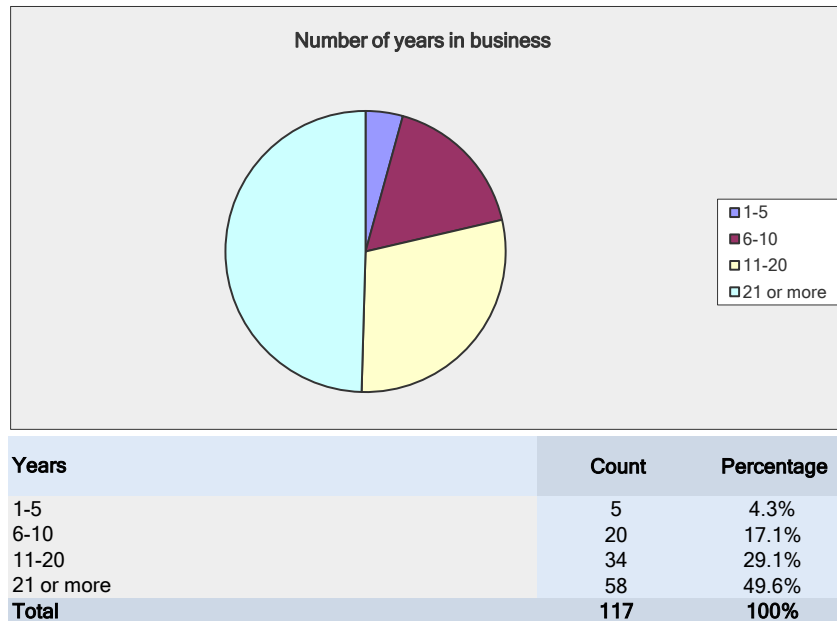


Figure 9: Number of years in business

#### 5.6.5 Legal status and ownership

Figure 9 below shows that 85% of the organizations surveyed are privately owned, 7.7% MNCs and the rest are government and semi-government. This implies that the private sector in UAE which plays a key role in green supply chain practices is well represented in the study. It was also confirmed by Dun and Bradstreet (2014) that 95% of the ISO 14001 certified organizations in UAE are from the private sector.

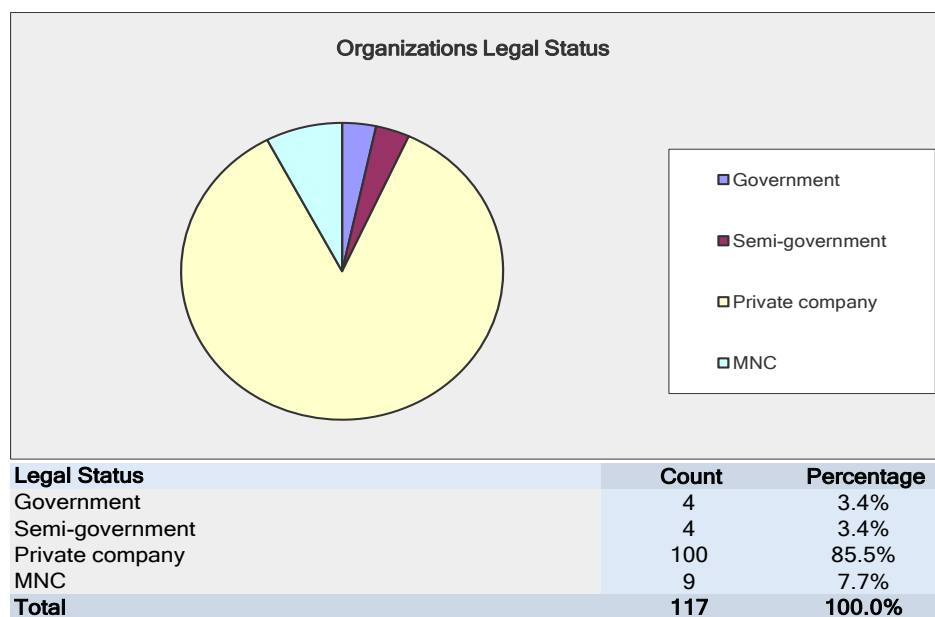


Figure 10: Organizations types

#### 5.6.6 EMS Certification

Figure 10 shows that almost 48% of the firms surveyed are EMS certified and this, in turn, confirms that the GSCM information provided is from the firms that implemented some sorts of GSCM practices and therefore can be deemed reliable.

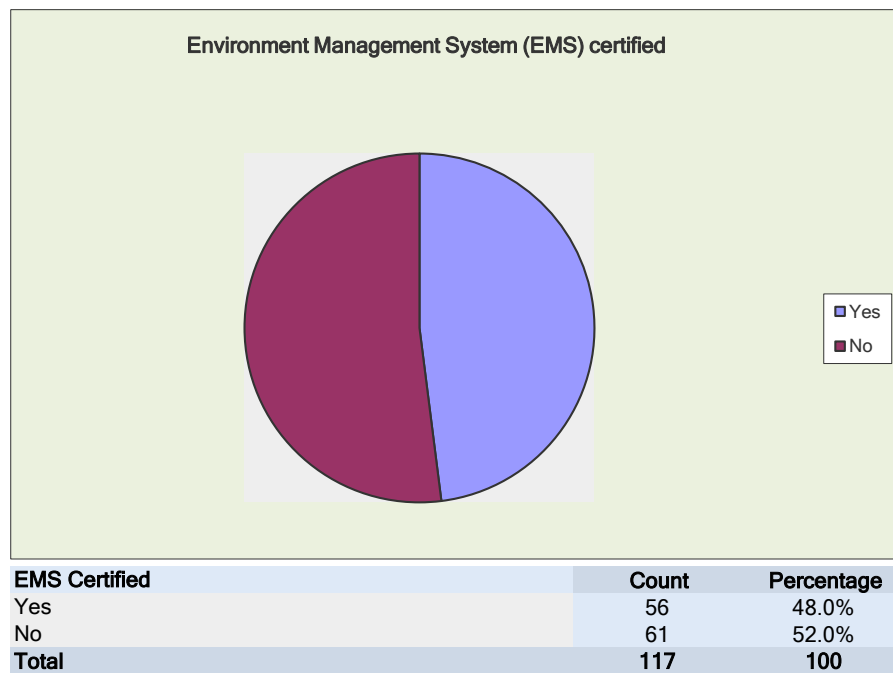


Figure 11: EMS Certification

### 5.7 Validity and reliability analysis

Content validity is a tool usually employed to ensure that the measures used are quantifying the concepts that are supposed to be tested (Sekaran, 2003). For content validity, the survey was shared with individual industry experts to get their feedback and revise accordingly in case of any issues arising. A pre-test of the survey was also conducted with a number of selected companies for the purpose of testing the understanding of the instrument and making any relevant changes. As discussed earlier and to examine non-response bias, the survey was sent in two waves and the test for the non-

response bias was conducted using Armstrong and Overton's (1977) approach to ensure no difference existed between early and late responses.

In order to measure the reliability of the measurements and to verify the internal consistency of the constructs, Cronbach's alpha was used as displayed in table 9. The results indicate that all the values are above 0.7 and this confirms that the constructs are acceptable (Cronbach, 1951).

Table 9: Variables Cronbach's  $\alpha$

Variable	Number of items	Cronbach's alpha
Eco-Design	4	.826
Green Purchasing	5	.832
Environmental Cooperation	8	.888
Reverse Logistics	3	.710
Environmental Performance	6	.860
Operational Performance	6	.890
Economic Performance	7	.921
Social Performance	5	.891

Table 10: Questionnaire Cronbach's  $\alpha$

Cronbach's Alpha	Number of items
0.954	44

In addition Cronbach's  $\alpha$  was measured for the whole questionnaire and found to be above 0.7 which in turn ensures the internal consistency and validity of the constructs employed.

## 5.8 Factor analysis

Hair *et al.* (2010) define factor analysis as "an interdependent technique whose purpose is to define the underlying structure among the variables in the analysis". Factor analysis can be used for data reduction or data summarization. In data reduction, the aim is to reduce the number of variables to ease the application of the multivariate technique. On the other hand, in data summarization, the researcher defines a new small set of factors that represent the original variables. This research used factor analysis for data summarization to ensure that items of each variable loads significantly on that variables by examining multicollinearity, the factor loadings and the commonality among the items.

Since this research is related to theory testing and therefore it would be appropriate to use a confirmatory factor analysis (CFA) to examine constructs validity and to confirm the fit of the hypothesized factor structure against the obtained data. As per Hair *et al.* (2010), in addition to adequate sample size which should be 100 or larger and observations must be equal or more than 10 times the number of variables, three main items need to be checked and confirmed before proceeding with factor analysis: first, strong foundational rationale supporting the existence of a structure; second, an existence of sufficient correlation among the variables supported by Barlett's test of sphericity with sigma value less than 0.05; and finally, Measure of Sampling Adequacy (MSA) with values for each variable exceeding 0.5 and if not to be deleted one at a time (p.105). After carrying out the factor analysis, total variance explained needs to be examined as well as factor loadings and communalities which all must be within the acceptable range as per Nunnally and Vernstein (1994).

### 5.8.1 Sample size

Since the sample size was 117 which is larger than 100, it can be claimed that the sample size condition for running the factor analysis is met here. As far as the number of observations is concerned, the study has eight main variables and therefore the number of observations is more than 10 times the number of variables, consequently the second assumption of variables/observations ration is met.

## 5.8.2 Foundational rationale

Since the research is of confirmatory nature with theory testing approach, most of the measurement items were developed as per table 4 above and therefore the existence of strong foundational rationale are confirmed.

## 5.8.3 Eco-Design (ED)

### 5.8.3.1 Correlation among the items of the variable

Visual inspection of table 11 reveals that a greater degree of correlations among Eco-Design items exist, where all greater than 0.30.

Table 11: ED items correlation

Correlations				
	ED1	ED2	ED3	ED4
ED1	1.000			
ED2	.540**	1.000		
ED3	.510**	.534**	1.000	
ED4	.601**	.575**	.542**	1.000

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

To confirm the practical and statistical significance of the correlation among ED items, anti-image correlation matrix was conducted and the results are displayed in table 12.

Table 12: ED Anti-image Matrices

Anti-image Matrices					
		ED1	ED2	ED3	ED4
Anti-image Correlation	ED1	.808 <sup>a</sup>			
	ED2	-.228	.817 <sup>a</sup>		
	ED3	-.197	-.264	.834 <sup>a</sup>	
	ED4	-.354	-.285	-.242	.788 <sup>a</sup>

a. Measures of Sampling Adequacy(MSA)

As per Hair *et al.* (2010), anti- image correlation matrix is the negative value of the partial correlation and larger values are indicative of matrix that is not suitable for factor analysis. Table 12 shows that most anti-image correlations have low values (less than 0.3) and therefore there is significant correlation suited to proceed with factor analysis. All MSA values are also above the threshold of 0.5 and therefore acceptable. Bartlett's Test of sphericity was also conducted as an additional measure to confirm the statistical significance of the correlation among the variables. As shown in 13 below, the probability associated with the Bartlett Test is less than 0.001, which satisfies this requirement. In addition, the overall MSA for the set of variables included in the analysis was 0.811, which exceeds the minimum requirement of 0.50 for overall MSA.

Table 13: ED KMO and Barlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.811
Bartlett's Test of Sphericity	Approx. Chi-Square	163.940
	df	6
	Sig.	.000

#### 5.8.3.2 Deriving Factors and Assessing Overall Fit

As shown in table 14 below the total variance explained by 4 components is 66.2% which exceeds the minimum value of 60% recommended by Hair *et al.* (2010).

Table 14: ED items total variance explained

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.652	66.298	66.298	2.652	66.298	66.298
2	.502	12.559	78.857			
3	.454	11.361	90.218			
4	.391	9.782	100.000			

Extraction Method: Principal Component Analysis.

### 5.8.3.3 Examining factor loadings and communalities

Designed to minimize variable complexity by maximizing variation between variable loadings, Varimax rotation method was used. Table 15 shows the factor loadings, it can be seen that all factor loadings are above 0.7 and therefore significant as recommended by Hair *et al.* (2010)

Table 15 : ED items factor loadings

Component Matrix <sup>a</sup>	
	Component
	1
ED1	.815
ED2	.813
ED3	.790
ED4	.839
Extraction Method: Principal Component Analysis.	
a. 1 components extracted.	

Table 16 shows the communalities for the variables which reflect the common variance in the data structure. It can be claimed that the communality for each variables is within the threshold limit of 0.5 as highlighted in yellow.

Table 16: ED items communalities

Communalities		
	Initial	Extraction
ED1	1.000	.663
ED2	1.000	.662
ED3	1.000	.623
ED4	1.000	.704
Extraction Method: Principal Component Analysis.		

Based on the above it can be claimed that all ED variable items are loading significantly on ED as a factor and therefore it can be claimed that there is a reasonable fit of the factor to the data collected.

## 5.8.4 Green purchasing (GP)

### 5.8.4.1 Correlation among the items of the variable

Visual inspection of table 17 below reveals that there is substantial number of correlations all greater than 0.30.

Table 17: GP items correlations

Correlations					
	GP1	GP2	GP3	GP4	GP5
GP1	1.000				
GP2	.524**	1.000			
GP3	.424**	.625**	1.000		
GP4	.454**	.532**	.621**	1.000	
GP5	.434**	.437**	.443**	.434**	1.000

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

To confirm the practical and statistical significance of the correlation among GP items, anti-image correlation matrix was run and is displayed in table 18 which also shows Measures of Sampling Adequacy (MSA).

Table 18: GP items Anti-image matrices

Anti-image Matrices						
		GP1	GP2	GP3	GP4	GP5
Anti-image Correlation	GP1	.829 <sup>a</sup>	-.335	-.019	-.104	-.248
	GP2	-.335	.806 <sup>a</sup>	-.384	-.175	-.068
	GP3	-.019	-.384	.784 <sup>a</sup>	-.411	-.141
	GP4	-.104	-.175	-.411	.831 <sup>a</sup>	-.103
	GP5	-.248	-.068	-.141	-.103	.881 <sup>a</sup>

a. Measures of Sampling Adequacy(MSA)

As it can be seen from the anti-image matrices they are all significant and are below 0.3. MSA for all items is also significant and above 0.5. Barlett's Test of sphericity was also conducted as an additional measure to confirm the statistical significance of the correlation among the variables. As shown in table 19, the probability associated with the Bartlett Test



is less than 0.001, which satisfies this requirement. In addition, the overall MSA for the set of variables included in the analysis was 0.819, which exceeds the minimum requirement of 0.50 for overall MSA.

Table 19: GP KMO and Bartlett's test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.819
Bartlett's Test of Sphericity	Approx. Chi-Square	213.989
	df	10
	Sig.	.000

#### 5.8.4.2 Deriving Factors and Assessing Overall Fit

As shown in table 20 the total variance explained by 5 components is 60% which can be deemed sufficient.

Table 20: GP items total variance explained

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.010	60.200	60.200	3.010	60.200	60.200
2	.700	13.999	74.199			
3	.576	11.527	85.726			
4	.405	8.106	93.832			
5	.308	6.168	100.000			

Extraction Method: Principal Component Analysis.

#### 5.8.4.3 Examining factor loadings and communalities

Table 21 shows the factor loadings. It can be seen that all factor loadings are above 0.7 except item 5, therefore will look at the communality if below 0.5, then the item will be deleted.

Table 21: GP factor loadings

Component Matrix <sup>a</sup>	
	Component
	1
GP1	.737
GP2	.835
GP3	.830
GP4	.794
GP5	.671
Extraction Method: Principal Component Analysis.	
a. 1 components extracted.	

Table 22 shows that the commonality for item 5 is less than 0.5 and therefore it is deleted and the factor analysis is conducted again and results are displayed in table 23.

Table 22: GP communalities

Communalities		
	Initial	Extraction
GP1	1.000	.543
GP2	1.000	.697
GP3	1.000	.688
GP4	1.000	.631
GP5	1.000	.450
Extraction Method: Principal Component Analysis.		

Table 23: GP items total variance explained

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.657	66.419	66.419	2.657	66.419	66.419
2	.625	15.624	82.043			
3	.407	10.187	92.229			
4	.311	7.771	100.000			

It is evident that the cumulative variance explained has improved from 60 to 66% and therefore 4 components can explain the variable better than 5 items. 66% exceeds the minimum value of 60% recommended by Hair *et al.* (2010) and therefore can be deemed

sufficient to proceed. Since all GP items were significantly loaded on GP variable, it can be claimed that there is a reasonable fit of the factor to the data collected and analysed.

### 5.8.5 Environmental cooperation (EC)

#### 5.8.5.1 Correlation among the items of the variable

Visual inspection of table 24 reveals that there is significant correlations among the variables all greater than 0.30.

Table 24: EC items correlations

Correlations								
	EC1	EC2	EC3	EC4	EC5	EC6	EC7	EC8
EC1	1.000							
EC2	.606**	1.000						
EC3	.610**	.527**	1.000					
EC4	.400**	.492**	.506**	1.000				
EC5	.468**	.492**	.388**	.396**	1.000			
EC6	.351**	.389**	.461**	.550**	.370**	1.000		
EC7	.372**	.457**	.351**	.440**	.375**	.749**	1.000	
EC8	.431**	.497**	.439**	.542**	.453**	.570**	.612**	1.000
**. Correlation is significant at the 0.01 level (2-tailed).								

To confirm the practical and statistical significance of the correlation among EC items, an anti-image correlation matrix was run and is displayed in table 25 which also shows Measures of Sampling Adequacy (MSA).

Table 25: EC items Anti-image matrices

Anti-image Matrices									
		EC1	EC2	EC3	EC4	EC5	EC6	EC7	EC8
Anti-image Correlation	EC1	.857 <sup>a</sup>							
	EC2	-.304	.894 <sup>a</sup>						
	EC3	-.369	-.179	.873 <sup>a</sup>					
	EC4	.039	-.171	-.157	.896 <sup>a</sup>				
	EC5	-.177	-.169	-.015	-.059	.944 <sup>a</sup>			
	EC6	.083	.090	-.193	-.288	-.059	.813 <sup>a</sup>		
	EC7	-.091	-.165	.134	.090	-.047	-.531	.815 <sup>a</sup>	
	EC8	-.065	-.116	-.086	-.213	-.117	-.148	-.241	.926 <sup>a</sup>

a. Measures of Sampling Adequacy(MSA)

As it can be seen the anti-image matrices are all significant and 0.3 and MSA for all items is also significant and 0.5.

Barlett Test of sphericity was also conducted as an additional measure to confirm the statistical significance of the correlation among the variables. As shown in table 26, the probability associated with the Bartlett Test is less than 0.001, which satisfies this requirement. In addition, the overall MSA for the set of variables included in the analysis was 0.874, which exceeds the minimum requirement of 0.50 for overall MSA.

Table 26: EC KMO and Barlett's test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.874
Bartlett's Test of Sphericity	Approx. Chi-Square	445.434
	df	28
	Sig.	.000

#### 5.8.5.2 Deriving Factors and Assessing Overall Fit

As shown in table 27 the total variance explained by 5 components is 56%.

Table 27: EC total variance explained

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.486	56.081	56.081	4.486	56.081	56.081
2	.944	11.796	67.877			
3	.634	7.922	75.799			
4	.556	6.950	82.749			
5	.434	5.429	88.178			
6	.382	4.779	92.957			
7	.330	4.130	97.087			
8	.233	2.913	100.000			

Extraction Method: Principal Component Analysis.

#### 5.8.5.3 Examining factor loadings and communalities

Table 28 shows the factor loadings and the communalities. It can be seen that all factor loadings are above 0.7 except for item 5, the communalities in table 29 are above 0.5 except item 5 also therefore it is deleted and the factor analysis was run again.

Table 28 : EC factor loadings

Component Matrix <sup>a</sup>	
	Component
	1
EC1	.727
EC2	.784
EC3	.747
EC4	.734
EC5	.677
EC6	.769
EC7	.743
EC8	.803

Extraction Method: Principal Component Analysis.  
a. 1 components extracted.

Table 29: EC communalities

Communalities		
	Initial	Extraction
EC1	1.000	.529
EC2	1.000	.614
EC3	1.000	.558
EC4	1.000	.538
EC5	1.000	.459
EC6	1.000	.592
EC7	1.000	.553
EC8	1.000	.644
Extraction Method: Principal		

Table 30: EC total variance explained

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.090	58.426	58.426	4.090	58.426	58.426
2	.927	13.241	71.667			
3	.587	8.387	80.053			
4	.449	6.410	86.464			
5	.382	5.462	91.926			
6	.331	4.734	96.660			
7	.234	3.340	100.000			

Table 30 shows that the total variance explained has improved from 56% to 58% although it is slightly less than 60% it can be considered satisfactory as per Hair *et al.* (2010). Since all EC items were significantly loaded on EC variable, it can be claimed that there is a reasonable fit of the factor to the data collected.

#### 5.8.6 Reverse Logistics (RL)

##### 5.8.6.1 Correlation among the items of the variable

Visual inspection of table 31 reveals that there is substantial number of correlations among the variables all greater than 0.3 at 0.01 significant levels.

Table 31: RL correlations

Correlations			
	RL1	RL2	RL3
RL1	1.000		
RL2	.565**	1.000	
RL3	.353**	.385**	1.000

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

To confirm the practical and statistical significance of the correlation among RL items, an anti-image correlation matrix was run and is displayed in table 32 below which also shows Measures of Sampling Adequacy (MSA).

Table 32: RL anti-image matrices

Anti-image Matrices				
		RL1	RL2	RL3
Anti-image Correlation	RL1	.618 <sup>a</sup>	-.501	-.181
	RL2	-.501	.609 <sup>a</sup>	-.247
	RL3	-.181	-.247	.755 <sup>a</sup>

a. Measures of Sampling Adequacy(MSA)

As it can be seen the anti-image matrices are all significant and below 0.3 and MSA for all items is also significant and above 0.5.

Bartlett Test of sphericity was also conducted as an additional measure to confirm the statistical significance of the correlation among the variables. As shown in table 33, the probability associated with the Bartlett test is less than 0.001, which satisfies this requirement. In addition, the overall MSA for the set of variables included in the analysis was 0.642, which exceeds the minimum requirement of 0.5 for overall MSA.

Table 33: RL KMO

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.642
Bartlett's Test of Sphericity	Approx. Chi-Square	68.776
	df	3
	Sig.	.000

#### 5.8.6.2 Deriving Factors and Assessing Overall Fit

As shown in table 34 the total variance explained by 3 components is 63.18% which exceeds the minimum value of 60% recommended by Hair *et al.* (2010).

Table 34: RL total variance explained

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.896	63.187	63.187	1.896	63.187	63.187
2	.679	22.636	85.823			
3	.425	14.177	100.000			

Extraction Method: Principal Component Analysis.

#### 5.8.6.3 Examining factor loadings and communalities

Table 35 and table 36 show the factor loadings and the communalities. As can be seen all factor loadings are above .7 and communalities are above 0.5 and therefore significant (Hair, 2010, pp.117).

Table 35: RL factor loadings

Component Matrix <sup>a</sup>	
	Component
	1
RL1	.827
RL2	.843
RL3	.709

Extraction Method: Principal Component Analysis.  
a. 1 components extracted.



Table 36: RL Communalities

Communalities		
	Initial	Extraction
RL1	1.000	.683
RL2	1.000	.710
RL3	1.000	.502

Extraction Method: Principal Component Analysis.

Since all RL items were significantly loaded on the RL variable, it can be claimed that there is a reasonable fit of the factor to the data collected.

#### 5.8.7 Environmental performance (EP)

##### 5.8.7.1 Correlation among the items of the variable

Visual inspection of table 37 reveals that there is substantial correlation among the variables all are greater than 0.3.

Table 37: EP correlations

Correlations						
	EP1	EP2	EP3	EP4	EP5	EP6
EP1	1.000					
EP2	.596**	1.000				
EP3	.451**	.566**	1.000			
EP4	.333**	.528**	.540**	1.000		
EP5	.372**	.466**	.440**	.661**	1.000	
EP6	.420**	.472**	.476**	.623**	.681**	1.000

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

To confirm the practical and statistical significance of the correlation among EP items, an anti-image correlation matrix was run and is displayed in table 38 which also shows Measures of Sampling Adequacy (MSA).

Table 38: EP anti-image matrices

Anti-image Matrices							
		EP1	EP2	EP3	EP4	EP5	EP6
Anti-image Correlation	EP1	.843 <sup>a</sup>	-.396	-.156	-.004	-.023	-.084
	EP2	-.396	.847 <sup>a</sup>	-.247	-.125	-.096	-.095
	EP3	-.156	-.247	.884 <sup>a</sup>	-.250	-.001	-.046
	EP4	-.004	-.125	-.250	.858 <sup>a</sup>	-.342	-.241
	EP5	-.023	-.096	-.001	-.342	.825 <sup>a</sup>	-.426
	EP6	-.084	-.095	-.046	-.241	-.426	.849 <sup>a</sup>
a. Measures of Sampling Adequacy(MSA)							

As it can be seen that the anti-image matrices are all significant and below 0.3. MSA for all items is also significant and above 0.5.

Bartlett's Test of sphericity was also conducted as an additional measure to confirm the statistical significance of the correlation among the variables. As shown in table 39, the probability associated with the Bartlett Test is less than 0.001, which satisfies this requirement. In addition, the overall MSA for the set of variables included in the analysis was 0.85, which exceeds the minimum requirement of 0.5 for overall MSA.

Table 39: EP KMO

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.850
Bartlett's Test of Sphericity	Approx. Chi-Square	301.535
	df	15
	Sig.	.000

#### 5.8.7.2 Deriving Factors and Assessing Overall Fit

As shown in table 40 total variance explained by 3 components is 59.155%.

Table 40: EP total variance explained

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.549	59.155	59.155	3.549	59.155	59.155
2	.848	14.132	73.287			
3	.563	9.384	82.671			
4	.384	6.392	89.063			
5	.351	5.844	94.907			
6	.306	5.093	100.000			

Extraction Method: Principal Component Analysis.

### 5.8.7.3 Examining factor loadings and communalities

Table 41 and 42 show the factor loadings and the communalities, as it can be seen all factor loadings are above 0.7 except for the first item whose commonality is also less than .5 and therefore the item will be deleted.

Table 41: EP Components Matrix

Component Matrix <sup>a</sup>	
	Component
	1
EP1	.682
EP2	.786
EP3	.724
EP4	.819
EP5	.795
EP6	.799

Extraction Method: Principal Component Analysis.  
a. 1 components extracted.

Table 42: EP Communalities

Communalities		
	Initial	Extraction
EP1	1.000	.465
EP2	1.000	.618
EP3	1.000	.525
EP4	1.000	.671
EP5	1.000	.632
EP6	1.000	.638

Extraction Method: Principal Component Analysis.

After deleting component 1, the factor analysis is conducted again and displayed in table 43.

Table 43: EP Total Variance 2

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.167	63.332	63.332	3.167	63.332	63.332
2	.711	14.221	77.553			
3	.462	9.247	86.800			
4	.354	7.087	93.887			
5	.306	6.113	100.000			

Extraction Method: Principal Component Analysis.

As can be seen, the cumulative variance explained has improved from 59% to 63% and therefore 5 components can explain the variable better than 6 components. 63% exceeds the minimum value of 60% recommended by Hair *et al.* (2010). Since all EP items were significantly loaded on EP variable, it can be claimed that there is a reasonable fit of the factor to the data collected.

### 5.8.8 Operational performance (OP)

#### 5.8.8.1 Correlation among the items of the variable

Visual inspection of table 44 reveals that there is a significant correlation among OP item variables all greater than 0.30.

Table 44: OP items correlations

Correlations						
	OP1	OP2	OP3	OP4	OP5	OP6
OP1	1.000					
OP2	.651**	1.000				
OP3	.643**	.592**	1.000			
OP4	.586**	.505**	.620**	1.000		
OP5	.454**	.423**	.402**	.571**	1.000	
OP6	.576**	.515**	.520**	.660**	.776**	1.000

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

To confirm the practical and statistical significance of the correlation among OP items, an anti-image correlation matrix was conducted and the results are displayed in table 45 which also show Measures of Sampling Adequacy (MSA).

Table 45: OP Anti-image Matrices

Anti-image Matrices							
		OP1	OP2	OP3	OP4	OP5	OP6
Anti-image Correlation	OP1	.876 <sup>a</sup>	-.363	-.256	-.166	.026	-.164
	OP2	-.363	.881 <sup>a</sup>	-.254	.006	-.077	-.079
	OP3	-.256	-.254	.859 <sup>a</sup>	-.344	.107	-.071
	OP4	-.166	.006	-.344	.889 <sup>a</sup>	-.152	-.247
	OP5	.026	-.077	.107	-.152	.782 <sup>a</sup>	-.605
	OP6	-.164	-.079	-.071	-.247	-.605	.807 <sup>a</sup>

a. Measures of Sampling Adequacy(MSA)

As it can be seen the anti-image matrices are all significant and below 0.3 and MSA for all items is also significant and above 0.5. Bartlett's Test of sphericity was also conducted as an additional measure to confirm the statistical significance of the correlation among the variables. As shown in table 46 below, the probability associated with the Bartlett test is less than 0.001, which satisfies this requirement. In addition, the overall MSA for the set of variables included in the analysis was 0.848, which exceeds the minimum requirement of 0.5 for overall MSA.

Table 46: OP KMO

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.848
Bartlett's Test of Sphericity	Approx. Chi-Square	395.855
	df	15
	Sig.	.000

#### 5.8.8.2 Deriving Factors and Assessing Overall Fit

As shown in table 47 the total variance explained by 6 components is 64.7% which exceeds the minimum value of 60% recommended by Hair *et al.* (2010).

Table 47: OP Total variance explained

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.882	64.702	64.702	3.882	64.702	64.702
2	.812	13.536	78.239			
3	.474	7.904	86.143			
4	.329	5.487	91.630			
5	.291	4.849	96.479			
6	.211	3.521	100.000			

Extraction Method: Principal Component Analysis.

#### 5.8.8.3 Examining factor loadings and communalities

Table 48 and 49 show the factor loadings and the communalities.

Table 48: OP component Matrix

Component Matrix <sup>a</sup>	
	Component
	1
OP1	.824
OP2	.776
OP3	.788
OP4	.837
OP5	.746
OP6	.850

Extraction Method: Principal Component Analysis.  
a. 1 components extracted.

Table 49: OP Communalities

Communalities		
	Initial	Extraction
OP1	1.000	.680
OP2	1.000	.602
OP3	1.000	.622
OP4	1.000	.700
OP5	1.000	.557
OP6	1.000	.722

Extraction Method: Principal Component Analysis.

As it can be seen in table 48 all standardized loadings are greater than 0.7. Communalities are also acceptable and greater than 0.5 (Nunnally and Vernstein, 1994). Based on the above it can be claimed that all items are significantly loading on the OP variable and there is a reasonable fit of the factor to the data collected.

### 5.8.9 Economic performance (EcP)

#### 5.8.9.1 Correlation among the items of the variable

Visual inspection of table 50 reveals that there is significant correlation among EcP item variables all greater than 0.3.

Table 50: EcP Correlations

Correlations							
	EcP1	EcP2	EcP3	EcP4	EcP5	EcP6	EcP7
EcP1	1.000						
EcP2	.683**	1.000					
EcP3	.626**	.718**	1.000				
EcP4	.317**	.459**	.445**	1.000			
EcP5	.712**	.586**	.596**	.491**	1.000		
EcP6	.716**	.646**	.670**	.480**	.865**	1.000	
EcP7	.673**	.602**	.660**	.471**	.818**	.843**	1.000

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

To confirm the practical and statistical significance of the correlation among EP items, an anti-image correlation matrix was run and displayed in table 51 which also shows Measures of Sampling Adequacy (MSA).

Table 51: EcP Anti-image matrices

Anti-image Matrices								
		EcP1	EcP2	EcP3	EcP4	EcP5	EcP6	EcP7
Anti-image Correlation	EcP1	.920 <sup>a</sup>	-.345	-.111	.169	-.176	-.176	-.079
	EcP2	-.345	.883 <sup>a</sup>	-.401	-.184	-.009	-.057	.048
	EcP3	-.111	-.401	.908 <sup>a</sup>	-.088	.080	-.086	-.231
	EcP4	.169	-.184	-.088	.925 <sup>a</sup>	-.166	-.028	-.074
	EcP5	-.176	-.009	.080	-.166	.885 <sup>a</sup>	-.506	-.256
	EcP6	-.176	-.057	-.086	-.028	-.506	.878 <sup>a</sup>	-.375
	EcP7	-.079	.048	-.231	-.074	-.256	-.375	.915 <sup>a</sup>

a. Measures of Sampling Adequacy(MSA)

As it can be seen that anti-image matrices are all significant and below 0.3 and MSA for all items is also significant and above 0.5.

Bartlett's Test of sphericity was also conducted as an additional measure to confirm the statistical significance of the correlation among the variables. As shown in table 52, the probability associated with the Bartlett Test is less than 0.001, which satisfies this requirement. In addition, the overall MSA for the set of variables included in the analysis was 0.899, which exceeds the minimum requirement of 0.5 for overall MSA.



Table 52: EcP KMO

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.899
Bartlett's Test of Sphericity	Approx. Chi-Square	656.236
	df	21
	Sig.	.000

#### 5.8.9.2 Deriving Factors and Assessing Overall Fit

As shown in table 53 the total variance explained by 6 components is 64.7% which exceeds the minimum value of 60% recommended by Hair *et al.* (2010).

Table 53: EcP Total variance

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.881	69.726	69.726	4.881	69.726	69.726
2	.699	9.982	79.708			
3	.571	8.162	87.871			
4	.330	4.719	92.590			
5	.231	3.297	95.887			
6	.170	2.426	98.313			
7	.118	1.687	100.000			

Extraction Method: Principal Component Analysis.

#### 5.8.9.3 Examining factor loadings and communalities

Table 54 and 55 show the factor loadings and the communalities.

Table 54: EcP Component Matrix

Component Matrixa	
	Component
	1
EcP1	.867
EcP2	.816
EcP3	.825
EcP5	.894
EcP6	.922
EcP7	.897

Table 55: EcP Communalities

Communalities		
	Initial	Extraction
EcP1	1.000	.721
EcP2	1.000	.666
EcP3	1.000	.677
EcP4	1.000	.381
EcP5	1.000	.798
EcP6	1.000	.841
EcP7	1.000	.799

Extraction Method: Principal Component Analysis.

As highlighted in yellow above in both tables, item 4 is below the suggested value of loading (0.7) and below the suggested value of commonality (0.5) and therefore must be deleted. Table 56 shows that the total variance explained has improved after deleting item 4 from 69.7% to 75% and thus 6 components can explain the factor better than 7.75% also exceeds the minimum value of 60% recommended by Hair *et al.* (2010).

Table 56: EcP Total variance explained

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.553	75.880	75.880	4.553	75.880	75.880
2	.571	9.523	85.403			
3	.340	5.661	91.064			
4	.247	4.118	95.183			
5	.170	2.839	98.022			
6	.119	1.978	100.000			

Based on the above it can be claimed that all items are significantly loading on the EcP variable and there is a reasonable fit of the factor to the data collected.

#### 5.8.10 Social performance (SP)

##### 5.8.10.1 Correlation among the items of the variable

Visual inspection of table 57 reveals that there is substantial number of correlations among the variables and all are greater than 0.3.

Table 57: SP items correlations

Correlations					
	SP1	SP2	SP3	SP4	SP5
SP1	1.000				
SP2	.813**	1.000			
SP3	.602**	.610**	1.000		
SP4	.681**	.674**	.449**	1.000	
SP5	.659**	.683**	.649**	.723**	1.000

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

To confirm the practical and statistical significance of the correlation among SP items, an anti-image correlation matrix was run and displayed in table 58 which also shows Measures of Sampling Adequacy (MSA).

Table 58: SP Anti-image matrices

Anti-image Matrices						
		SP1	SP2	SP3	SP4	SP5
Anti-image Correlation	SP1	.795 <sup>a</sup>	-.595	-.228	-.201	.028
	SP2	-.595	.814 <sup>a</sup>	-.083	-.143	-.172
	SP3	-.228	-.083	.777 <sup>a</sup>	.256	-.460
	SP4	-.201	-.143	.256	.770 <sup>a</sup>	-.559
	SP5	.028	-.172	-.460	-.559	.761 <sup>a</sup>

a. Measures of Sampling Adequacy(MSA)

As it can be seen the anti-image matrices are all significant and below 0.3 and MSA for all items is also significant and above 0.5.

Bartlett's Test of sphericity was also conducted as an additional measure to confirm the statistical significance of the correlation among the variables. As shown in table 59, the probability associated with the Bartlett test is less than 0.001, which satisfies this requirement. In addition, the overall MSA for the set of variables included in the analysis was 0.784, which exceeds the minimum requirement of 0.5 for overall MSA.

Table 59: SP KMO

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.784
Bartlett's Test of Sphericity	Approx. Chi-Square	363.306
	df	10
	Sig.	.000

#### 5.8.10.2 Deriving Factors and Assessing Overall Fit

As shown in table 60 the total variance explained by 6 components is 69.94% which exceeds the minimum value of 60% recommended by Hair *et al.* (2010).

Table 60: SP Total variance

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.497	69.942	69.942	3.497	69.942	69.942
2	.620	12.402	82.343			
3	.489	9.785	92.128			
4	.215	4.307	96.435			
5	.178	3.565	100.000			

Extraction Method: Principal Component Analysis.

#### 5.8.10.1 Examining factor loadings and communalities

Table 61 and 62 show the factor loadings and communalities, respectively.

Table 61: SP Components matrix

Component Matrix <sup>a</sup>	
	Component
	1
SP1	.868
SP2	.881
SP3	.738
SP4	.810
SP5	.875
Extraction Method: Principal Component Analysis.	
a. 1 components extracted.	

Table 62: SP Communalities

Communalities		
	Initial	Extraction
SP1	1.000	.754
SP2	1.000	.776
SP3	1.000	.545
SP4	1.000	.656
SP5	1.000	.766
Extraction Method: Principal Component Analysis.		

As it can be seen in table 61 all standardized loadings are greater than 0.7. Communalities are also acceptable and greater than 0.5 (Nunnally and Vernstein, 1994) as shown in table 62. Based on the above it can be claimed that all items are significantly loading on the SP variable and there is a reasonable fit of the factor to the data collected.

To summarize, the measurement items for the 8 variables namely; eco-design, green purchasing, environmental cooperation, reverse logistics, environmental performance, operational performance, economic performance and social performance have met the assumptions of the factor analysis in terms of existence of foundational rationale, existence of sufficient correlation among the variables, accepted values for measure of sample adequacy, sufficient total variance explained and finally acceptable range for the values of both factor loading and communalities as per Nunnally and Vernstein (1994).

## 5.9 Multiple regression analysis

Predicting the impact of the independent variables on the dependent variables entails the employment of statistical techniques not only to explain and predict but also for the researcher to validate the proposed model. Multiple regressions analysis (MRA) is used to test the relationship between independent and dependent variables because it analyses the relationship between a single dependent variable (each dimension of corporate performance at a time) and several independent variables (GSCM practices).

### 5.9.1 Sample size consideration

Like other statistical techniques, MRA requires a minimum sample size. The minimum acceptable ratio of observations to variable is 5:1 Hair *et al.* (2010), however the preferred ratio is 15:1. Since there are 117 observations and eight variables in this study, the sample size falls within the preferred ratio (i.e. 14.6:1).

### 5.9.2 Assessing multicollinearity

As per Hair *et al.* (2010), the ideal situation is to have some collinearity between the independent variables and the dependent variable but little correlation among the independent variables themselves. The correlation matrix between the independent variables displayed in table 63 indicates that there is no tolerance value higher than the cut-off point of 0.9 (Hair *et al.*, 2010) and therefore there is no collinearity among the independent variables.

Table 63: IV Multicollinearity

Coefficients										
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics		
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF	
1	(Constant)	.000	.086		.000	1.000	-.170	.170		
	ED	.183	.103	.183	1.778	.078	-.021	.387	.703	1.423
	GP	.130	.133	.130	.972	.333	-.134	.393	.419	2.387
	EC	.156	.148	.156	1.055	.294	-.137	.450	.338	2.960
	RL	.030	.114	.030	.262	.794	-.196	.256	.571	1.751

Additionally, to test for multicollinearity we look at the variance proportions for each IV which must be high in one dimension and low in other dimensions. As highlighted in yellow in the collinearity diagnostics table, it can be confirmed that there is no multicollinearity.

Table 64: Collinearity Diagnostics

Collinearity Diagnostics								
Model	Dimension	Eigenvalue	Condition Index	Variance Proportions				
				(Constant)	ED	GP	EC	RL
1	1	2.592	1.000	.00	.05	.04	.04	.05
	2	1.000	1.610	1.00	.00	.00	.00	.00
	3	.649	1.998	.00	.56	.16	.07	.08
	4	.549	2.173	.00	.35	.10	.01	.60
	5	.210	3.517	.00	.03	.69	.88	.27

### 5.9.3 Assumptions for multiple regression analysis

There are four main assumptions that may affect the statistical procedure which need to be tested for when running the multiple regression analysis. These are:

- 1) Linearity of the phenomenon measured
- 2) Constant variance of the error terms
- 3) Independence of the error terms
- 4) Normality of the error term distribution

### 5.9.4 Regression results and output for Environmental Performance (EP)

#### 5.9.4.1 Testing of assumptions

- 5.9.4.1.1 Linearity: the bell shaped curve of the residual plots in the histogram in figure 12 indicates that the relationship between the independent variables and the dependent variable is linear therefore the assumption of linearity is met.

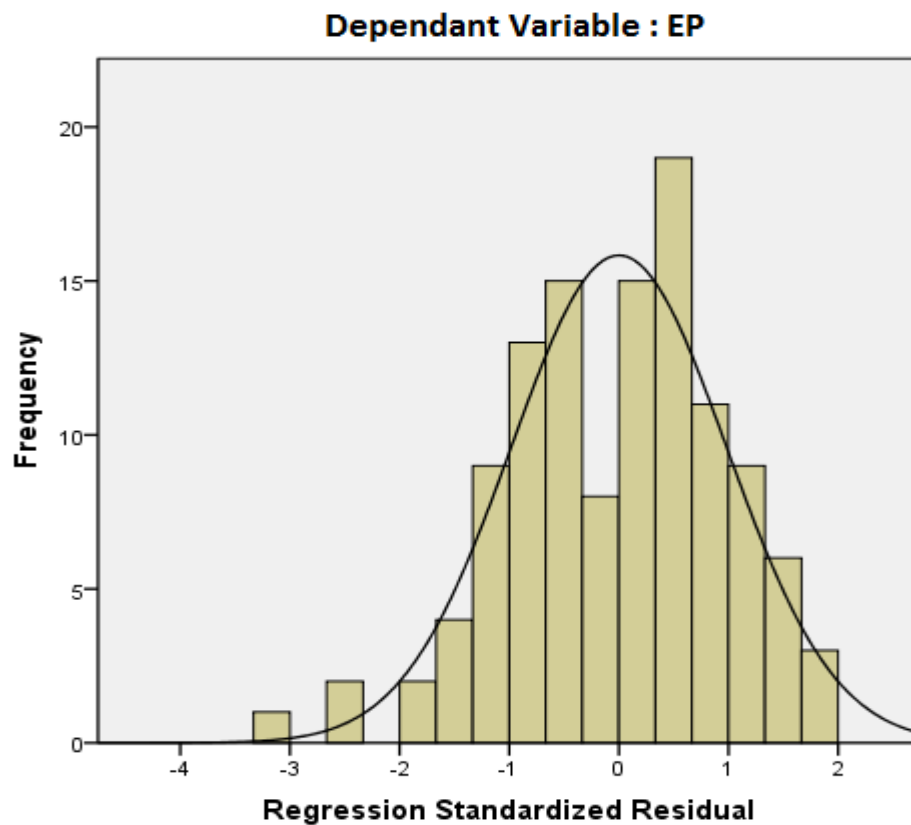


Figure 12: EP Histogram

5.9.4.1.2 Constant variance of error terms (heteroscedasticity): As displayed in the scatterplot in figure 13, it can be seen that the pattern is neither triangle nor diamond shaped but consistent and therefore the variance of the error terms is constant and no heteroscedasticity is present.



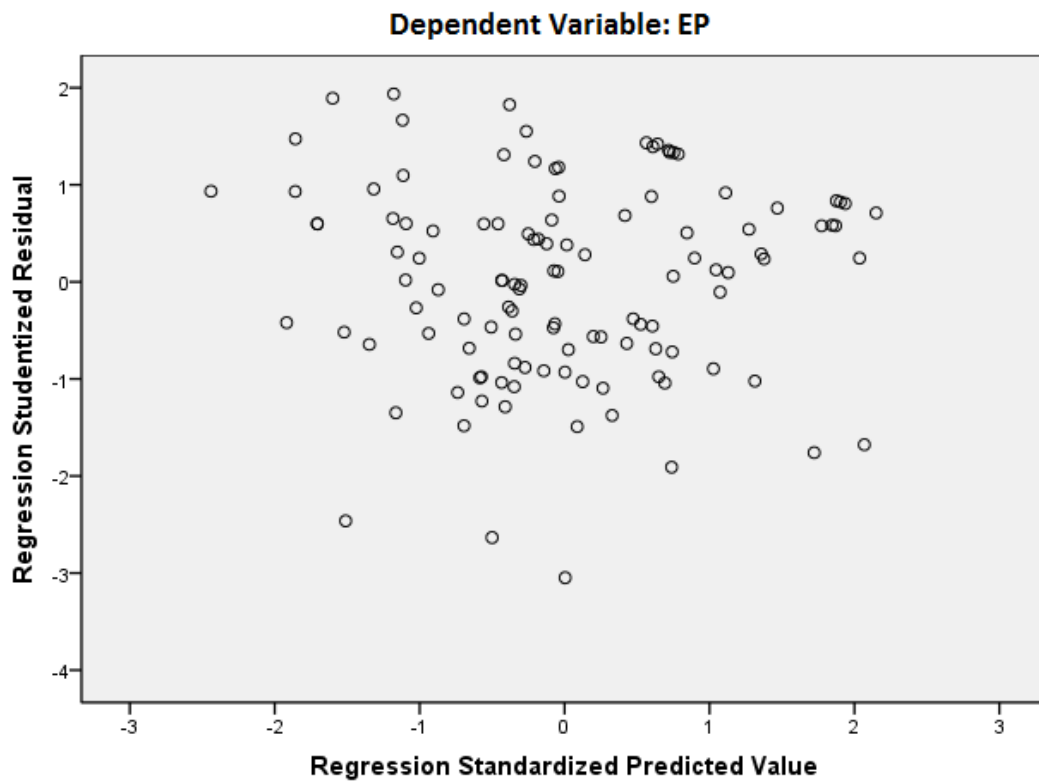


Figure 13: EP Scatterplot

5.9.4.1.3 Independence of the error terms: For the error terms to be independent, the Durbin Watson value needs to be above 1.0 (Hair *et al.*, 2010). The Durbin Watson value as displayed in table 65 is 1.77 which is greater than 1.0 and therefore this assumption is met.

Table 65: EP Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.409	.167	.137	.92874252	.167	5.621	4	112	.000	1.777

5.9.4.1.4 Normality of the error term distribution: As can be seen in figure 14, all the points are clustered around the line and therefore the normality assumption is met.

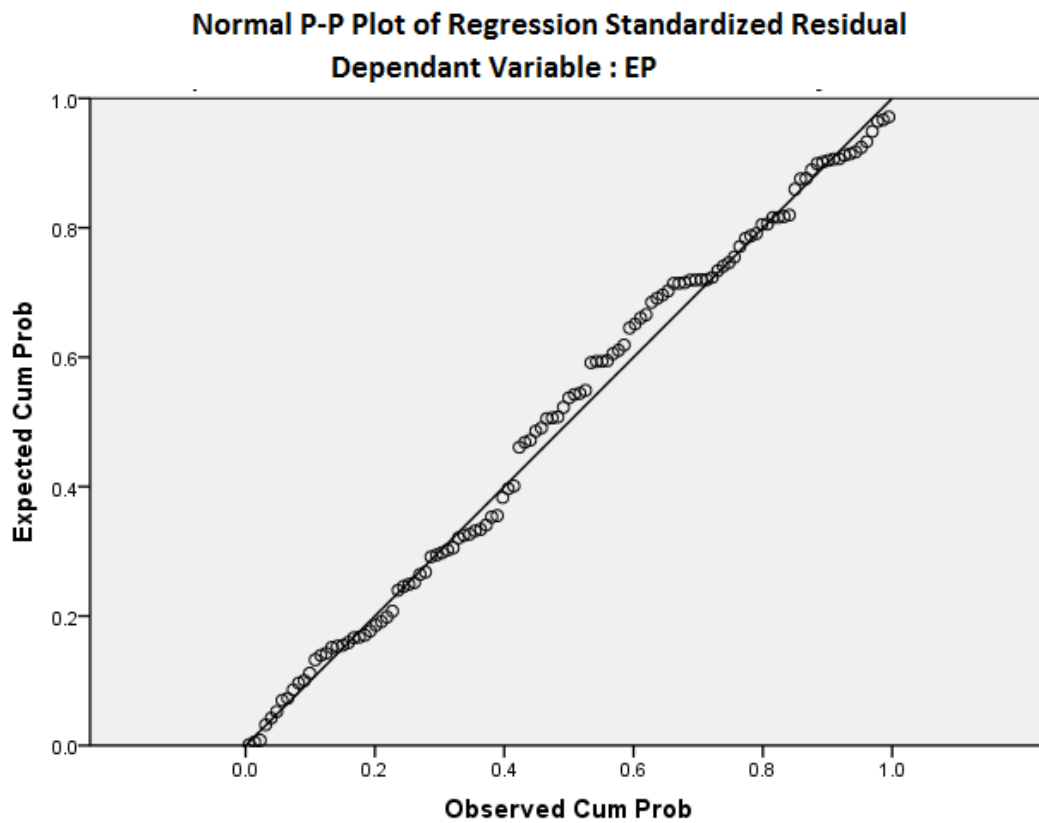


Figure 14: EP Normal P-P Plot

## 5.9.5 Regression results and output for operational performance (OP)

### 5.9.5.1 Testing of assumptions

5.9.5.1.1 Linearity of the phenomenon measured: the bell shaped curve of the residual plots in the histogram in figure 15 indicates that the relationship between the independent variables and the dependent variable is linear therefore the assumption of linearity is met.

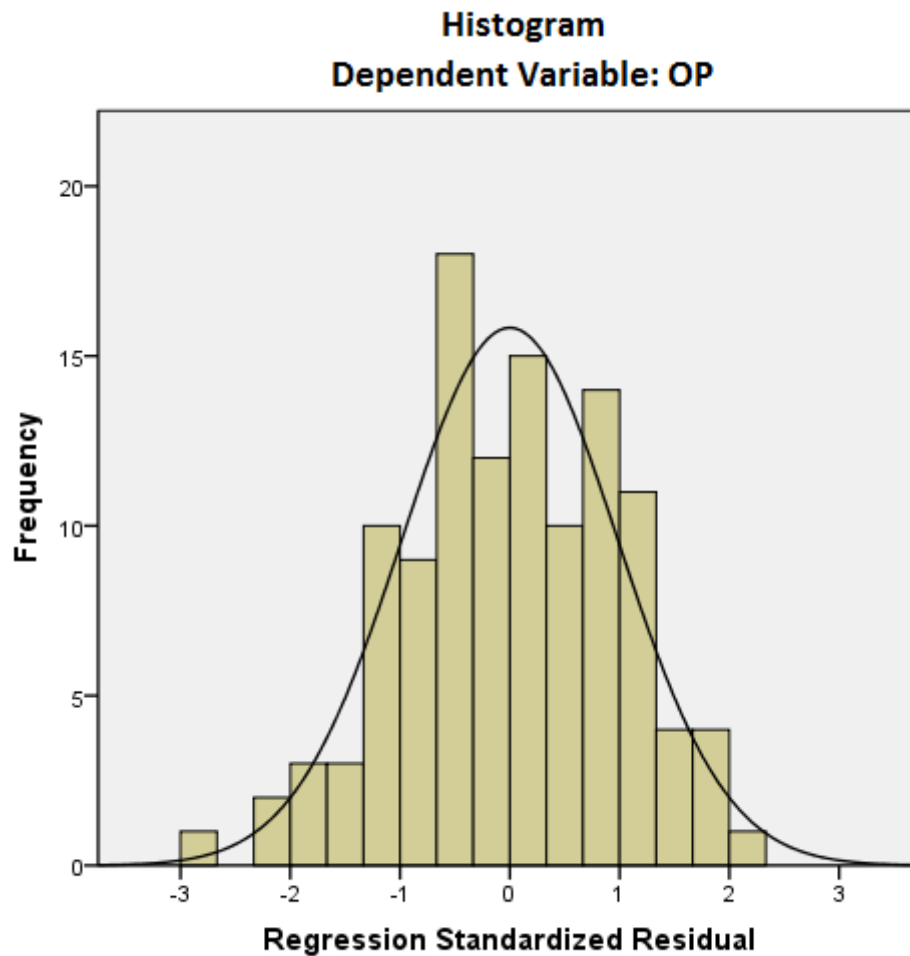


Figure 15: OP Histogram

5.9.5.1.2 Constant variance of the error terms: As displayed in the scatterplot in figure 16, it can be seen that the pattern is neither triangular nor diamond shaped but consistent and therefore the variance of the error terms is constant and no heteroscedasticity is present.

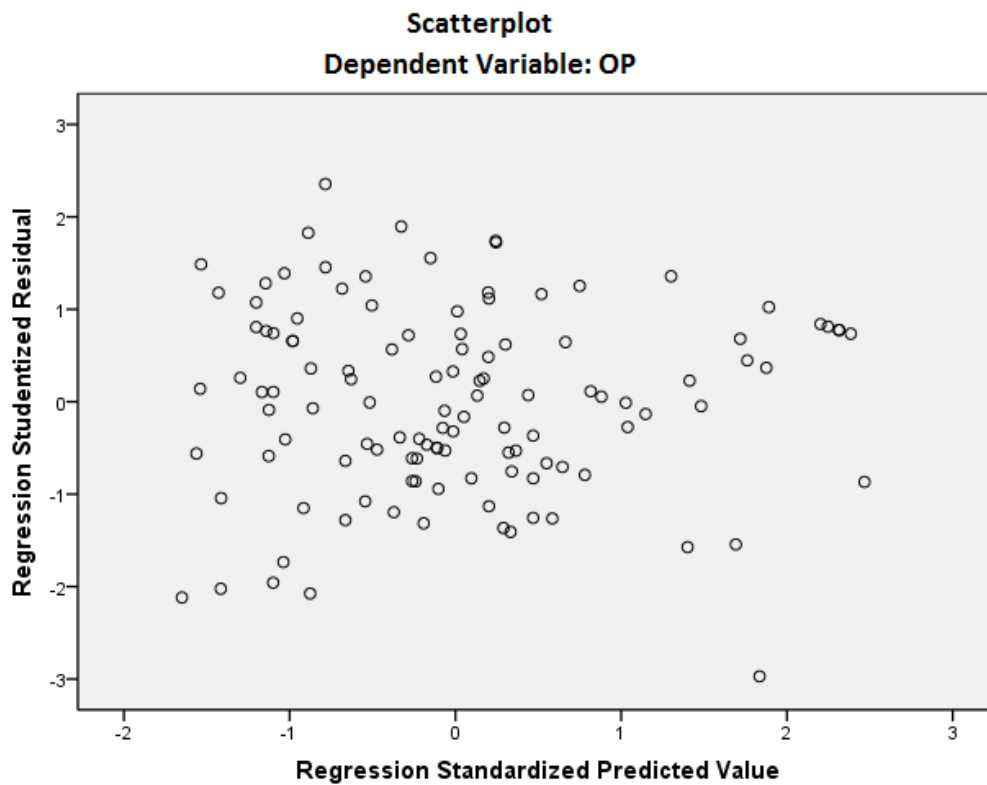


Figure 16: OP Scatterplot

5.9.5.1.3 Independence of the error terms: The value for Durbin Watson is greater than 1.0 as displayed in table 66 and therefore this assumption is met.

Table 66: OP Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.499	.249	.222	.88198571	.249	9.280	4	112	.000	1.998

5.9.5.1.4 Normality of the error term distribution: As it can be clearly seen in figure 17, all the points are clustered around the line and therefore the normality assumption is met.

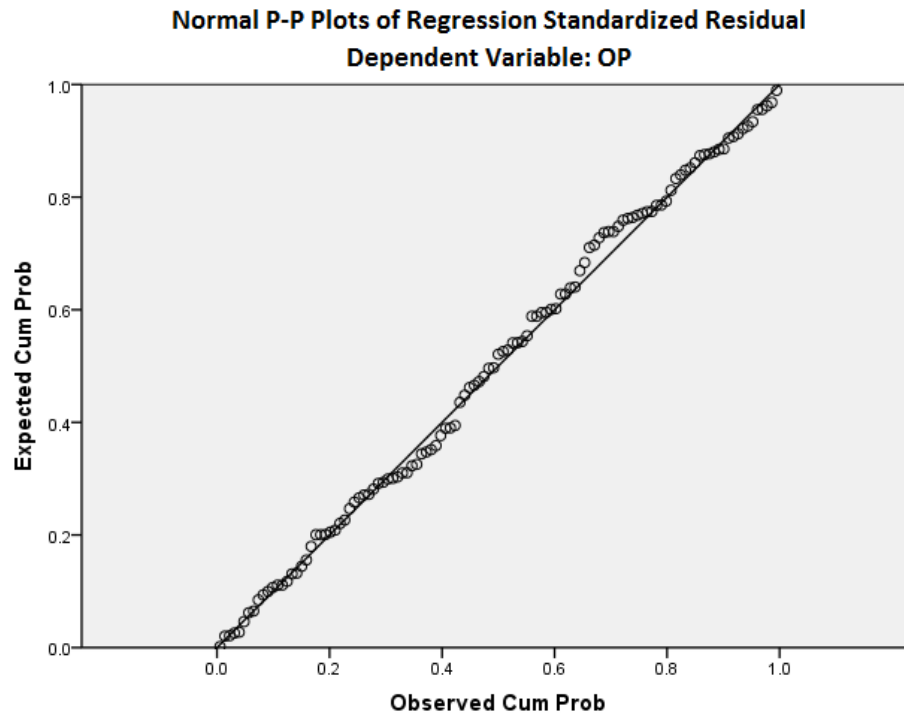


Figure 17: OP Normal P-P Plot

## 5.9.6 Regression results and output for economic performance

### 5.9.6.1 Testing of assumptions

5.9.6.1.1 Linearity of the phenomenon measured: the bell shaped curve of the residual plots in the histogram in figure 18 indicates that the relationship between the independent variables and the dependent variable is linear therefore the assumption of linearity is met.

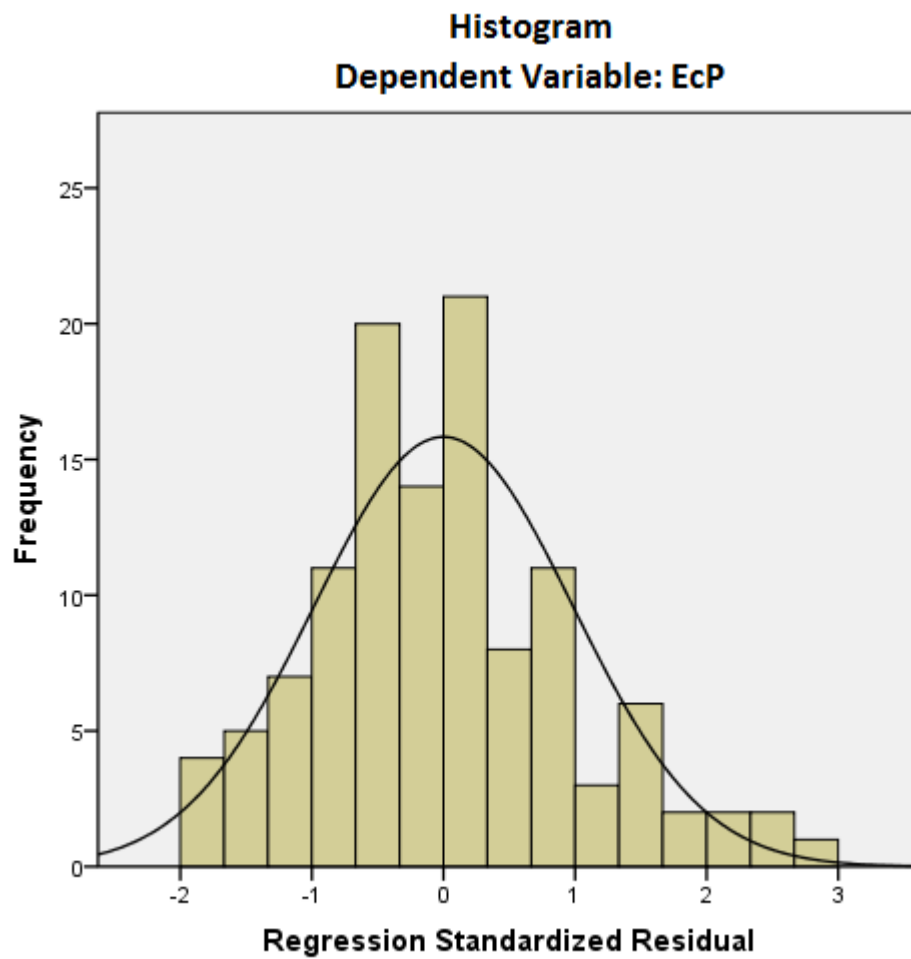


Figure 18 : EcP Histogram

5.9.6.1.2 Constant variance of the error terms: As displayed in the scatterplot in figure 19, it can be seen that the pattern is neither triangle nor diamond shaped but consistent and therefore the variance of the error terms is constant and no heteroscedasticity is present.

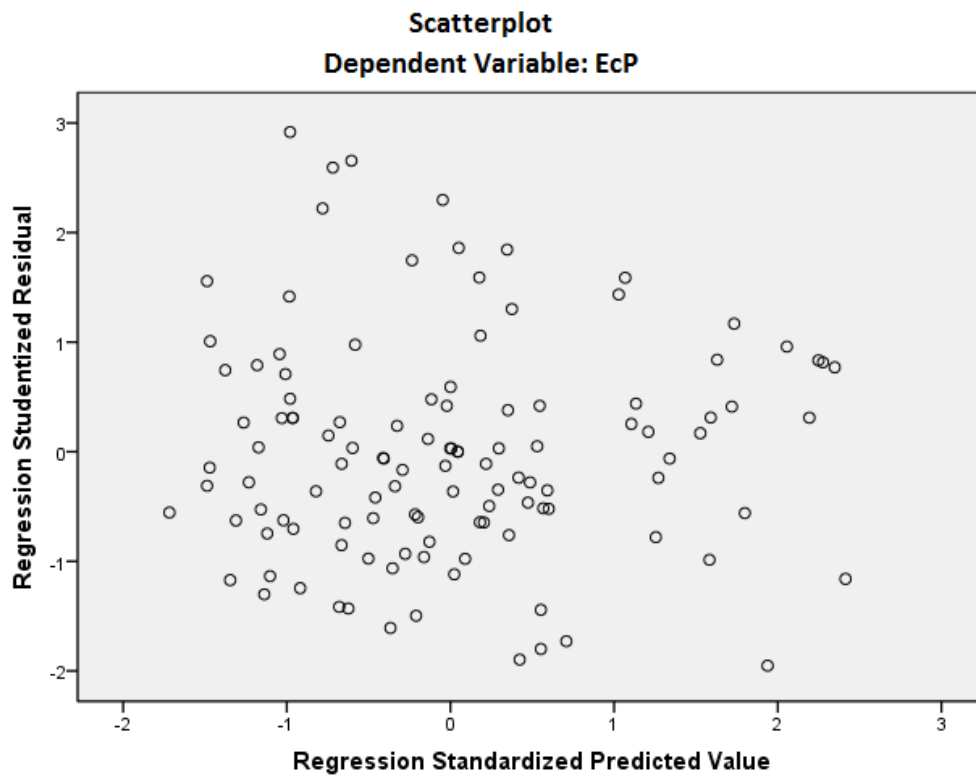


Figure 19 : EcP Scatterplot

5.9.6.2 Independence of the error terms: The Durbin Watson value as shown in table 67 below is greater than 1.0 and therefore this assumption is met.

Table 67: EcP Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.539	.291	.265	.85713521	.291	11.473	4	112	.000	1.805

5.9.6.2.1 Normality of the error term distribution: As it can be clearly seen in figure 19, all the points are clustered around the line and therefore the normality assumption is met.

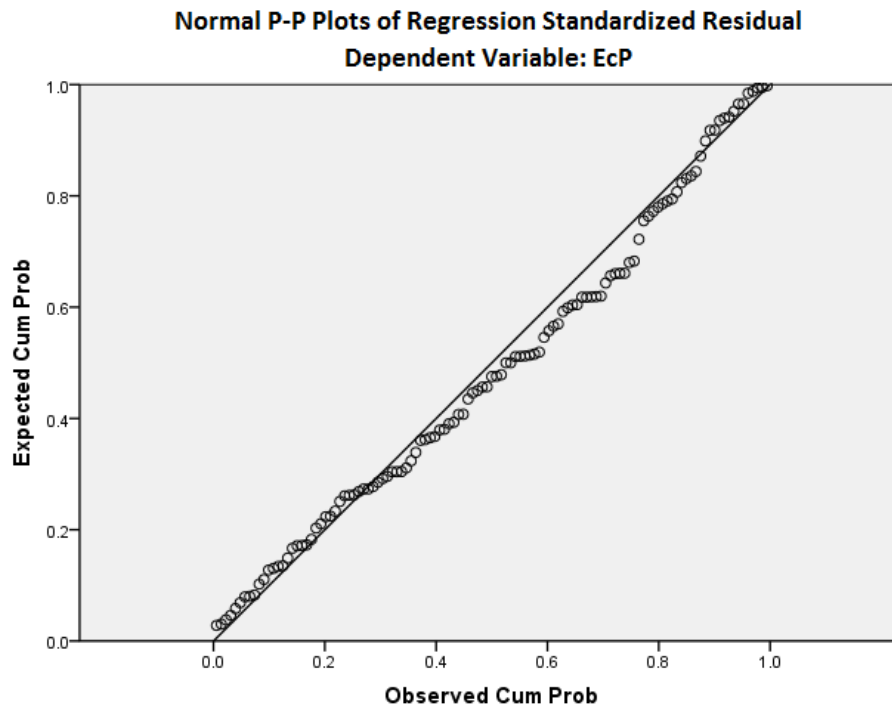


Figure 20: EcP Normal P-P Plot

## 5.9.7 Regression results and output for social performance

### 5.9.7.1 Testing of assumptions

5.9.7.1.1 Linearity of the phenomenon measured: the bell shaped curve of the residual plots in the histogram in figure 21 indicates that the relationship between the independent variables and the dependent variable is linear and therefore the assumption of linearity is met.



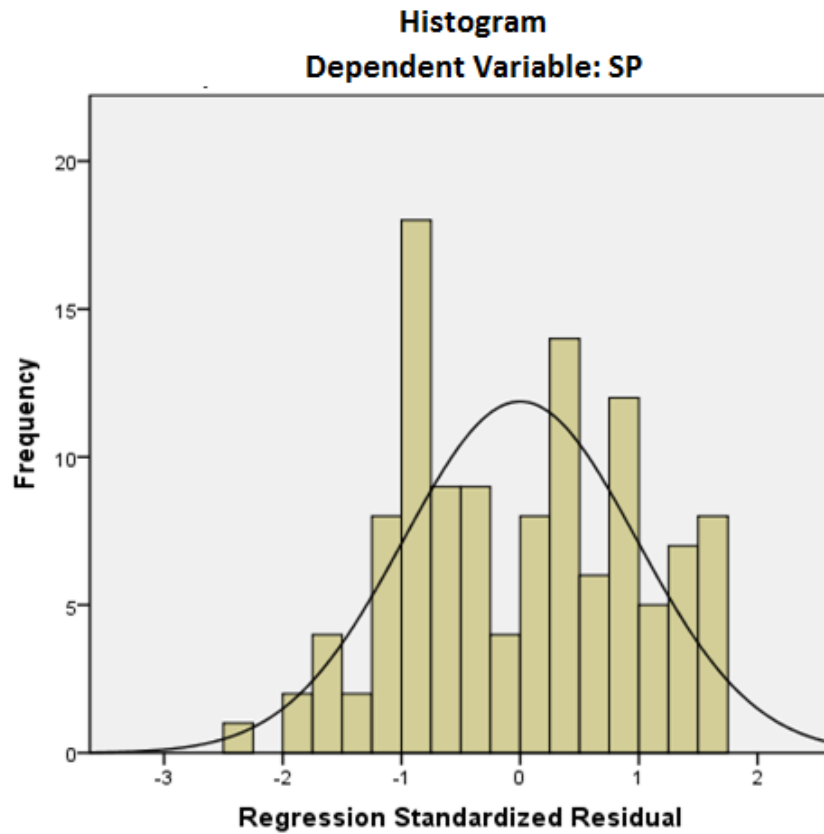


Figure 21: SP Histogram

5.9.7.1.2 Constant variance of the error terms: As displayed in the scatterplot in figure 22, it can be seen that the pattern is neither triangular nor diamond shaped but consistent and therefore the variance of the error terms is constant and no heteroscedasticity is present.

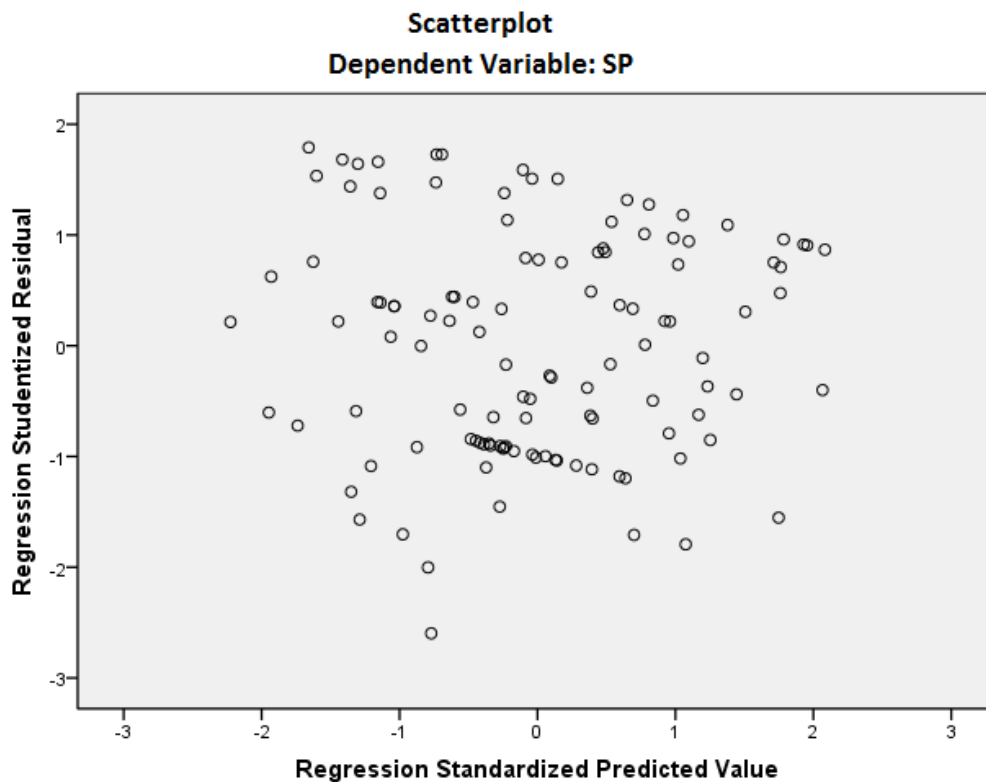


Figure 22: SP Scatterplot

5.9.7.2 Independence of the error terms: The Durbin Watson value as shown in table 68 is greater than cut-off point of 1.0 and therefore this assumption is met.

Table 68: SP Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.299	.089	.057	.97124815	.089	2.742	4	112	.032	1.923

5.9.7.2.1 Normality of the error term distribution: As it can be clearly seen in figure 23, all the points are clustered around the line and therefore the normality assumption is met.

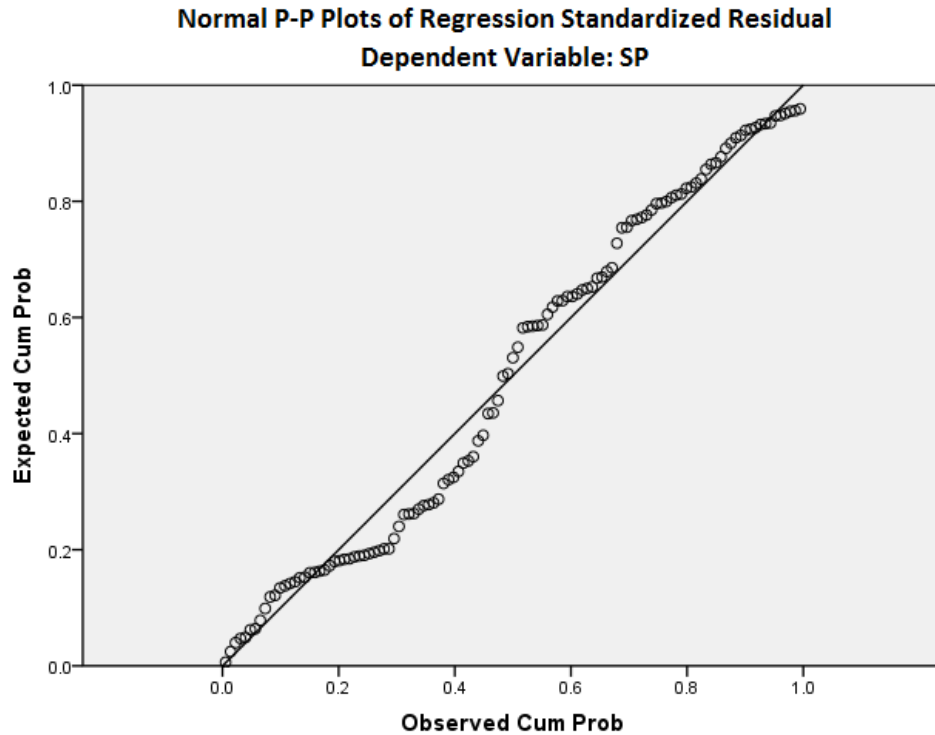


Figure 23: SP Normal P-P Plot

In summary, all assumptions of multiple regression analysis have been met including; existence of some collinearity between the independent variables and the dependent variables, existence of correlation among the independent variables themselves, linearity of the phenomenon measured, constant variance of the error terms, independence of the error terms and normality of the error terms distribution. It is now claimed that the outcome can proceed with the multiple regression analysis.

## 5.10 Hypothesis testing

To test the impact of the independent variables (ED, GP, EC, RL) on each dependent variable (EP, OP, EcP, SP) while controlling for the three control variables (firm size, firm age and EMS certification), hierarchical multiple regression is adopted entering the control variables as independent variables at block one and entering the independent variables in block two.

### 5.10.1 Independent variables regression results

5.10.1.1 Environmental performance dimension (EP): After controlling the effect of the three control variables, the model explains an additional 8.4% of the variability in the environmental performance as shown in table 69. The Sig F change is less than 0.05 and therefore the addition of the four independent variables (ED,GP,EC,RL) is statistically significant in predicting the dependent variable i.e. EP.

Table 69 : EP Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.387	.150	.127	.93435053	.150	6.624	3	113	.000	1.959
2	.484	.234	.185	.90293545	.084	3.000	4	109	.022	

To assess the contribution of each independent variable to the model we look at model 2 in the coefficients table 73. As it can be seen none of the four independent variables contribute significantly to the model when the effects of other variables have been removed.

Table 70: EP Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.606	.339		-1.787	.077		
	FirmSize	.196	.079	.231	2.483	.014	.870	1.149
	FirmAge	-.026	.102	-.023	-.259	.796	.915	1.093
	EMSC	.528	.179	.265	2.953	.004	.937	1.067
2	(Constant)	-.582	.329		-1.768	.080		
	FirmSize	.163	.078	.191	2.086	.039	.837	1.195
	FirmAge	.022	.101	.020	.219	.827	.870	1.150
	EMSC	.306	.189	.153	1.619	.108	.786	1.273
	FED	.139	.102	.139	1.352	.179	.669	1.494
	FGP	.038	.134	.038	.283	.778	.390	2.563
	FEC	.175	.145	.175	1.211	.228	.335	2.983
	FRL	.031	.112	.031	.272	.786	.558	1.791

Significant at \* $\alpha = 0.05$  and \*\* $\alpha = 0.10$

Table 70 above shows the values for the t statistic for the four independent variables are all more than 0.05, therefore not significant as highlighted, which in turn means that they can't help in predicting the dependent variable.

To summarize, table 71 shows the status of EP hypotheses

Table 71: Environmental performance hypotheses

Research Hypothesis		$\beta$	Status
1a	ED > EP	.139	Not supported
1b	GP > EP	.038	Not supported
1c	EC > EP	.175	Not supported
1d	RL > EP	.031	Not supported

5.10.1.2 Operational performance dimension (OP): After controlling the effect of the three control variables, the model explains an additional 18.8% of the variability in the environmental performance as shown in table 72. The Sig F change is less than 0.05 and therefore the addition of the four independent variables (ED,GP,EC,RL) has statistically significant contribution in predicting the dependent variable i.e. OP.

Table 72: OP Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.299	.089	.065	.96681120	.089	3.700	3	113	.014	
2	.526	.277	.231	.87707162	.188	7.077	4	109	.000	2.032

To assess the contribution of each independent variable to the model we look at model 2 in the coefficients table below. As can be seen only GP and EC contribute significantly to the model when the effects of other variables have been removed.

Table 73: OP Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.553	.351		-1.577	.118		
	FirmSize	.129	.082	.152	1.581	.117	.870	1.149
	FirmAge	.017	.106	.015	.164	.870	.915	1.093
	EMSC	.435	.185	.218	2.352	.020	.937	1.067
2	(Constant)	-.529	.320		-1.652	.101		
	FirmSize	.078	.076	.092	1.031	.305	.837	1.195
	FirmAge	.084	.098	.074	.849	.398	.870	1.150
	EMSC	.174	.183	.087	.950	.344	.786	1.273
	FED	-.110	.100	-.110	-1.108	.270	.669	1.494
	FGP	.219	.130	.219**	1.682	.095	.390	2.563
	FEC	.270	.141	.27**	1.923	.057	.335	2.983
	FRL	.078	.109	.078	.716	.475	.558	1.791

Significant at \* $\alpha = 0.05$  and \*\* $\alpha = 0.10$

Table 73 above shows that the t-statistic value for only two independent variables (GP and EC) is more than 0.05, therefore significant as highlighted, which in turn means that they help in predicting the dependent variable. The t-statistic value for ED and RL is greater than 0.05, therefore nonsignificant and in turn can't help in predicting the dependent variable

To summarize, table 74 shows the status of the hypotheses relating GSCMP and OP

Table 74: Operational performance hypotheses

Research Hypothesis		$\beta$	Status
2a	ED > OP	-.110	Not supported
2b	GP > OP	.219**	Supported
2c	EC > OP	.27**	Supported
2d	RL > OP	.078	Not supported

Based on table 74 above, the corporate operational performance improvement equation with respect to green purchasing and environmental cooperation can be presented as:

$$Y(OP) = -0.553 + .219 GP + .27 EC$$

5.10.1.3 Economic performance dimension (EcP): After controlling the effect of the three control variables, the model explains an additional 20.9% of the variability in the environmental performance as shown in table 75. The Sig F change is less than 0.05 and therefore the addition of the four independent variables (ED,GP,EC,RL) has statistically significant contribution in predicting the dependent variable i.e. EcP.

Table 75: EcP Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.329	.109	.085	.95663863	.109	4.585	3	113	.005	
2	.563	.318	.274	.85225011	.209	8.344	4	109	.000	1.899

To assess the contribution of each independent variable to the model we look at model 2 in the coefficients table 76. As can be seen only GP contribute significantly to the model when the effects of other variables have been removed. None of the other IVs have a significant impact on the EcP.



Table 76: EcP Coefficients

Coefficients								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.409	.347		-1.180	.241		
	FirmSize	.137	.081	.162	1.696	.093	.870	1.149
	FirmAge	-.044	.105	-.039	-.419	.676	.915	1.093
	EMSC	.513	.183	.257	2.805	.006	.937	1.067
2	(Constant)	-.388	.311		-1.248	.215		
	FirmSize	.079	.074	.092	1.068	.288	.837	1.195
	FirmAge	.030	.096	.027	.313	.755	.870	1.150
	EMSC	.241	.178	.121	1.356	.178	.786	1.273
	FED	-.156	.097	-.156	-1.615	.109	.669	1.494
	FGP	.328	.127	.328	2.592	.011	.390	2.563
	FEC	.211	.137	.211	1.545	.125	.335	2.983
	FRL	.069	.106	.069	.652	.516	.558	1.791

Significant at \* $\alpha = 0.05$  and \*\* $\alpha = 0.10$

Table 76 above shows that the t-statistic value for only one independent variable (GP) is less than 0.05, therefore it is significant as highlighted, which in turn means that it helps in predicting the dependent variable. The t-statistic value for ED, EC and RL is greater than 0.05, therefore these are not significant and in turn can't help in predicting the dependent variable.

To summarize, table 77 shows the status of the hypotheses relating GSCM practices and EcP

Table 77: Economic performance hypotheses

Research Hypothesis		$\beta$	Status
3a	ED > EcP	-.156	Not supported
3b	GP > EcP	.328*	Supported
3c	EC > EcP	.211	Not supported
3d	RL > EcP	.069	Not supported

Based on table 77, the corporate economic performance improvement equation with respect to green purchasing can be presented as:

$$Y(EcP) = -0.388 + .328 GP$$

5.10.1.4 Social performance dimension (SP): After controlling the effect of the three control variables, the model explains an additional 4.0% of the variability in environmental performance as shown in table 78. The Sig F change is greater than 0.05 and therefore the addition of the four independent variables (ED,GP,EC,RL) has no statistically significant contribution in predicting the dependent variable i.e. SP.

Table 78: SP Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.422	.178	.156	.91858434	.178	8.158	3	113	.000	
2	.467	.218	.168	.91214357	.040	1.400	4	109	.239	2.122

To assess the contribution of each independent variable to the model we look at model 2 in the coefficients table 79. As can be seen only RL contributes significantly to the model when the effects of other variables have been removed. None of the other IVs have significant impact on the SP.

Table 79: SP Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.555	.333		-1.665	.099		
	FirmSize	.221	.078	.260	2.841	.005	.870	1.149
	FirmAge	-.066	.100	-.058	-.656	.513	.915	1.093
	EMSC	.574	.176	.288	3.266	.001	.937	1.067
2	(Constant)	-.488	.333		-1.466	.145		
	FirmSize	.213	.079	.251	2.710	.008	.837	1.195
	FirmAge	-.076	.102	-.067	-.740	.461	.870	1.150
	EMSC	.536	.191	.269*	2.811	.006	.786	1.273
	FED	.012	.104	.012	.120	.905	.669	1.494
	FGP	-.051	.136	-.051	-.375	.709	.390	2.563
	FEC	.011	.146	.011	.072	.943	.335	2.983
	FRL	.208	.113	.208**	1.835	.069	.558	1.791

Significant at \* $\alpha = 0.05$  and \*\* $\alpha = 0.10$

Table 79 above shows that the t-statistic value for only one independent variable (RL) is less than 0.10, therefore significant as highlighted, which in turn means that it helps in predicting the dependent variable. The t-statistics value for ED, EC and RL is greater than 0.05, and therefore these are not significant and in turn can't help in predicting the dependent variable.

To summarize, table 80 shows the status of the hypotheses relating GSCM practices and SP.

Table 80: Social performance hypotheses

Research Hypothesis		$\beta$	Status
4a	ED > SP	.012	Not supported
4b	GP > SP	-.051	Not supported
4c	EC > SP	.011	Not supported
4d	RL > SP	.208**	Supported

Based on table 80, the corporate social performance improvement equation with respect to reverse logistics can be presented as  $Y(SP) = -0.488 + .208 LR$

#### 5.10.1.5 Control variables

The impact of each of the three control variables on each performance dimension is summarized in table 81.

Table 81: Control variables impact

Control Variable	Performance Dimension	$\beta$	Significance
Firm size	Environmental Performance	0.231*	Significant
	Operational Performance	0.092	Nonsignificant
	Economic Performance	0.162**	Significant
	Social Performance	0.26**	Significant
Firm age	Environmental Performance	-0.023	Nonsignificant
	Operational Performance	0.074	Nonsignificant
	Economic Performance	-0.039	Nonsignificant
	Social Performance	-0.058	Nonsignificant
EMSC	Environmental Performance	0.265*	Significant
	Operational Performance	0.087*	Significant
	Economic Performance	0.257*	Significant
	Social Performance	0.29*	Significant

The overall corporate performance improvement can be expressed as the summation of operational performance, economic performance and social performance and can be expressed as:

Corporate performance = operational performance + economic performance + social performance. This is captured in the following equation:

$$CP = (-0.553 + 0.219 GP + 0.27 EC) + (-0.388 + 0.328 GP) + (-0.488 + 0.208 LR)$$

$$CP = -1.429 + 0.547GP + 0.27EC + 0.208RL$$

Figure 24 summarizes the significant relationships between GSCM practices and the four performance dimensions.

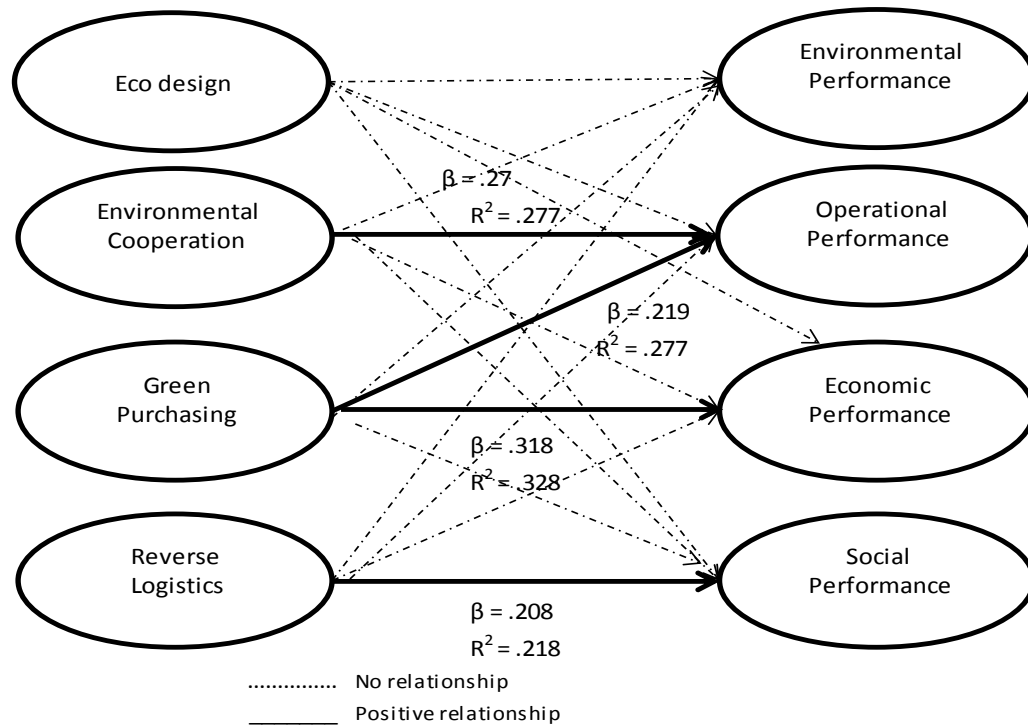


Figure 24 : GSCM practices and corporate dimension results

Figure 24 clearly shows that both environmental cooperation and reverse logistics impact one dimension each. Explicitly, environmental cooperation impacts operational performance and reverse logistics impacts social performance. However none of both practices impact any other dimensions. As far as green purchasing is concerned, the research found that it impacts operational and economic performance but failed to impact neither environmental nor social performance. The confounding results were related to the eco-design, which failed to impact any of corporate performance dimensions. In short, 75% of the hypotheses were unsupported. These findings are inconsistent with the findings from earlier studies, for example, Green *et al.* (2012) found that eco-design and environmental cooperation are positively linked to environmental performance. Similarly, Zailani *et al.* (2011) found that eco-design positively impacts environmental performance. Furthermore, Kung *et al.* (2012) found a positive relationship between green initiatives such as green manufacturing and environmental performance. Additionally Eltayeb *et al.* (2011) reported that there is strong relationship between eco-design and three dimensions of corporate performance, which are; environmental performance, economic performance and social performance. Zhu and Sarkis (2007) also found that green purchasing leads to

improved environmental performance while Rao (2002) found that there is a significant link between green initiatives and environmental performance.

Consequently, the researcher determined to gain a deeper understanding of why some GSCM practices adopted in this research, such as eco-design, failed to impact any performance dimension while other GSCM practices had an impact on one or two dimensions but not all dimensions. It was felt that the expertise, knowledge and perceptions of the respondents involved in this study were important in order to explain why these unexpected results were reported. To this end, the researcher employed an additional phases of qualitative research to assist in gaining a better understanding of why GSCM practices implemented didn't have an impact on corporate performance dimensions within the firms involved in this study.

## 6 SEQUENTIAL QUALITATIVE RESEARCH

### 6.1 Introduction

Broadly, qualitative research assists researchers to understand “how” and “why” people, and in this case firms, behave in certain ways (Crotty, 1998; Myers, 2011). While this information can be solicited in a variety of ways, one meaningful way to gain these insights is to engage directly with key stakeholders or their representatives using qualitative research methods (Michello *et al.*, 1995). Qualitative research can take many forms and examples include action research, grounded theory, case studies, content analyses and research interviews (Cresswell, 2006). Indeed, Myers (2011) claims that interviews are the most common technique for qualitative data gathering as they help the researcher to understand the broader context of the phenomenon by talking to key respondents to determine the motivations and actions that lead them to behave in certain ways.

For this reason, many researchers have adopted qualitative research methods in management research studies. Early examples include the work of Koplin *et al.* (2007) who intended to develop an approach that integrates social and environmental standards into supply policy and supply management at the Volkswagen AG plant. These authors employed an action research methodology to collect data by using workshops and survey questionnaires. Additionally, Kumar *et al.* (2012) used a case study approach to provide a sample framework to show how companies can implement changes in their organizations and then track the benefits of those changes. Additionally, these authors focussed on two organizations for deeper observation and comparison namely Coca-Cola and Apple Inc. The research concluded that Apple is still at a nascent stage in terms of green practices whereas Coca-Cola is taking pro-active measures in these directions.

A qualitative methodology was also adopted by Koh *et al.* (2012) in their research but within a different geographical context. The authors used multiple case studies as a research method among selected Taiwan IT industries to develop a model outlining the antecedents for a successful embeddedness of environmental directives; including waste electrical and electronic equipment (WEEE) and restriction. Moreover, Diabat and

Govindan (2011) sought to identify and rank the drivers that affect the implementation of green supply chain and to determine the interactions among the identified drivers by adopting a qualitative approach, in his case by using case study of an Indian company that produces aluminium products.

Adopting qualitative approach but with different data gathering tools, Walker *et al.* (2008) engaged in an exploratory approach using interviews with seven different private and public sector organizations in the UK. Their aim was to identify the drivers and the barriers to implementing environmental supply chain management practices within the public and private sectors. Finally, Perotti *et al.* (2012) aimed to examine how the adoption of green supply chain practices by third part logistics (3PLs) companies in Italy could affect company performance. In their research the researchers used 15 case studies and collected data using semi structured interviews. This technique allowed them to uncover that there was a limited level of adoption of green supply chain management practices among these Italian firms.

## **6.2 Adoption of sequential qualitative approach**

Since some of the findings within this study were found to be inconsistent with earlier studies, the researcher was perplexed as to why this might be the case. Consequently, the researcher decided to triangulate the quantitative approach with additional data gathered using an exploratory qualitative method. It was felt that by collecting further information using in-depth, semi structured interviews with environment management representatives (EMR) within a selected sample from the population targeted in the quantitative phase of the study the research findings could be more meaningfully explained. This is in keeping with Kelle's (2006, p.309) observation that "adopting mixed method design can help identify unobserved heterogeneity in quantitative data as well as previously unknown explaining variables and misspecified models". In other words, results from qualitative research can help explain incomprehensible statistical results (Kelle, 2006).

The researcher selected semi-structured interviews as the most appropriate method because "interviews allow us to gather rich data from people in various roles and situations" (Myers 2011, p.121). Interviews are defined as "a process in which a researcher and participant



engage in a conversation focused on questions related to a research study” which was exactly what the researcher in this study sought to achieve (DeMarrais, 2004, p. 55). The next section elaborates on the sample selection process.

### **6.3 Sample Selection for interviews**

As discussed earlier, there are two common types of sampling which are probability sampling and nonprobability sampling. In his study, the researcher decided to adopt a nonprobability sampling technique because the objective was to “discover, understand, and gain insight and therefore select a sample from which the most can be learned” (Merriam and Merriam, 2009, p.77). Consequently, the researcher selected a convenience sample from those that responded to the initial quantitative survey as they could provide answers that could help to explain why some hypotheses were not supported. Over 140 respondents had completed the quantitative survey questionnaire in the first phase of the research (with 117 useable surveys); however, only 32 had indicated they were prepared to be contacted again and had provided their contact details. All 32 were contacted by telephone to seek their support to take part in an interview and 20 were either on leave, had left their organizations or declined to be interviewed citing time constraints. Out of the twelve remaining respondents, only eight respondents eventually committed to be interviewed. Of these eight all were in a position to provide specific insights into the current state of play within their organisations and were thus deemed as industry experts because their views were appropriate to augment and validate the findings of the quantitative survey.

Table 82 highlights some characteristics of the firms and the participants targeted for the interview

Table 82: Characteristics of firms and interviewees

S.No.	Company	Activity	ISO 14001 Certified	Interviewee designation
1	A	Glass Reinforced Plastic Pipes and Fittings	Yes	Production Engineer, Technical Manager
2	B	Tiles Manufactory	Yes	Production Manager
3	C	Manufactory of Thermally Preinsulated Piping Systems	Yes	Production Incharge, Q&A Manager
4	D	Pharmaceutical Manufacturing	Yes	Purchasing Manager
5	E	Manufacturer of Building Materials for the Construction Field	Yes	General Manager
6	F	Furniture Manufactory	No	Procurement Manager
7	G	Manufactory of Pipes	Yes	Production Manager
8	H	Production and Supply of Ready Mix Concrete	Yes	Operations Manager, HSE Manager

Among the eight case organisations that were selected, only case number 6 (company F), representing the large scale furniture manufacturing industry was a noncertified company. The remaining seven organisations were certified with ISO 14001 certification as part of their business activities. These interviews were performed in April, 2016 in the UAE. As depicted here, the interviewees were from managerial and senior managerial positions within the organisation and had worked within the industry for a minimum of 5 years. As a result, they had a complete understanding of the company vision and mission strategies. The objective of the interviews was to present those findings of the quantitative study to these environmental management representatives and to gain their views on those results that were found to be confounding. A series of interview questions and probes was developed to assist this process and table 83 summarizes the twelve questions that were discussed during the interview. Appendix C contains the complete transcripts of these eight interviews.

Table 83: Summary of the interview questions

S.No.	Question
1	Why you think eco design practices such as; design of products for reduced consumption, design of products for reuse, recycle, and design of products to reduce use of hazardous material didn't impact corporate environmental performance i.e. helped in reducing air emissions, waste water, solid wastes, consumption of hazardous materials, frequency of environmental accidents and improves the company's overall situation?
2	Why you think eco design practices such as; design of products for reduced consumption, design of products for reuse, recycle, and design of products to reduce use of hazardous material didn't impact corporate economic performance i.e. decreased cost for materials, energy consumption, water discharge and treatment, improves return on sales, average profit and average market share?
3	Why you think eco design practices such as; design of products for reduced consumption, design of products for reuse, recycle, and design of products to reduce use of hazardous material didn't impact corporate operational performance i.e. reduced lead times, improved product quality, helped design better product, sell in international market, improve market position?
4	Why you think eco design practices such as; design of products for reduced consumption, design of products for reuse, recycle, and design of products to reduce use of hazardous material didn't impact corporate social performance i.e. Improve corporate image, social commitment, enhance employee job satisfaction and health and safety?
5	Why you think environmental cooperation practices such as cooperation with suppliers and customers for eco-design products, cleaner production and working together to reduce environmental impact of activities didn't impact corporate environmental performance i.e. helped in reducing air emissions, waste water, solid wastes, consumption of hazardous materials, frequency of environmental accidents and improves the company's overall situation?
6	Why you think environmental cooperation practices such as cooperation with suppliers and customers for eco-design products, cleaner production and working together to reduce environmental impact of activities didn't impact corporate economic performance i.e. decreased cost for materials, energy consumption, water discharge and treatment, improves return on sales, average profit and average market share?
7	Why you think environmental cooperation practices such as cooperation with suppliers and customers for eco-design products, cleaner production and working together to reduce environmental impact of activities didn't impact corporate social performance i.e. Improve corporate image, social commitment, enhance employee job satisfaction and health and safety?
8	Why you think green purchasing practices such as environmental audit for suppliers, second-tier supplier environmentally friendly practice evaluation, selecting suppliers using environmental criteria and require suppliers to use environmental packaging didn't impact corporate environmental performance i.e. helped in reducing air emissions, waste water, solid wastes, consumption of hazardous materials, frequency of environmental accidents and improves the company's overall situation?
9	Why you think green purchasing practices such as environmental audit for suppliers, second-tier supplier environmentally friendly practice evaluation, selecting suppliers using environmental criteria and require suppliers to use environmental packaging didn't impact corporate social performance Improve corporate image, social commitment, enhance employee job satisfaction and health and safety?
10	Why do you think reverse logistics practices such as use of remanufacturing, recovery of the company's end-of-life products and taking back packaging didn't impact corporate environmental performance i.e. helped in reducing air emissions, waste water, solid wastes, consumption of hazardous materials, frequency of environmental accidents and improves the company's overall situation?
11	Why do you think reverse logistics practices such as use of remanufacturing, recovery of the company's end-of-life products and taking back packaging didn't impact corporate operational performance i.e. reduced lead times, improved product quality, helped design better product, sell in international market, improve market position?
12	Why do you think reverse logistics practices such as use of remanufacturing, recovery of the company's end-of-life products and taking back packaging didn't impact corporate social performance i.e. Improve corporate image, social commitment, enhance employee job satisfaction and health and safety?

## 6.4 Qualitative Data Analysis Process

The interviews varied in length but on average were just over thirty minutes. In total eleven respondents took part in the interviews because in three cases two informants from the same organization participated in the interview discussion. The interviews were transcribed, and coded and categorized with an intention to allow for themes to emerge systemically (Schram, 2006). The analysis of qualitative data gathered through interviews is an important step in drawing out the topics and themes that can explain and answer the research questions. It is simply a “process of making sense of data” (Merriam and Merriam, 2009, p.193). However, when dealing with a large body of data it is important to first ensure that respondents have answered all of the 12 questions presented at interview. To this end a fixed grid (Table 84) was developed where, in the left column the firms that

took part in the interviews are represented using codes from A to H, and in the top row the 12 questions are represented. The answers to each of the questions are then contained in the cells underneath.

Table 84: Summary of firms answers to the 12 interview questions

Firm	ED > EP	ED > OP	ED > EcP	ED > SP	EC > EP	EC > EcP	EC > SP	GP > EP	GP > SP	RL > EP	RL > OP	RL > EcP
A	Don't apply as their product is not recoverable	Don't apply as their product is not recoverable	Extra cost incurred	Disagree	No idea	Difficult to compete as green product is costly	Issues in measurement	No EMRs to look after green initiatives	Lack of aw areness	Don't apply as their product is not recoverable	Don't apply as their product is not recoverable	Don't apply as their product is not recoverable
B	Issues in implementation	Issues in measurement	Mismatch between customers wants and green products	No advertising of green initiatives	Not correctly adhering to EMS requirements	It takes time	No advertising of green initiatives	GP needs to be coupled with other green initiatives	No advertising of green initiatives	Indirect impact	Recycled are lower quality	Additional costs incurred
C	Indirect impact	No EMRs to look after green initiatives	Extra cost incurred	Issues in measurement	No EMRs to look after green initiatives	Product cost increased	Lack of aw areness	No idea	No idea	Disagree	Issues in measurement	Extra cost incurred
D	Lack of management support	It takes time	It takes time	No advertising of green initiatives	No idea	No idea	No idea	No idea	Lack of HSE policy	Issues in implementation	It takes time	It takes time
E	Don't apply on them	Don't apply on them	Don't apply on them	Don't apply on them	Recycling generate emissions	Extra cost incurred	Lack of aw areness	Disagree	Lack of aw areness	Issues in implementation	Issues in implementation	Issues in implementation
F	It takes time	It takes time	Extra cost incurred	Disagree	It takes time	Extra cost incurred	No advertising of green initiatives	No EMRs to look after green initiatives	Issues in implementation	Issues in implementation	No Idea	Extra cost incurred
G	Issues in implementation	Disagree	Product cost increased	Lack of aw areness	No idea	No idea	Lack of aw areness	Issues in implementation	Lack of aw areness	Disagree	No Idea	Extra cost incurred
H	Disagree	Disagree	Product cost increased	Disagree	Takes time	Extra cost incurred	Takes time	Don't apply as there in monopoly in the supply	Indirect effect	Don't apply as their product is not recoverable	Don't apply as their product is not recoverable	Don't apply as their product is not recoverable

Generally speaking, and as can be seen from table 84, respondents' explanations for the reasons for the lack of a relationship between some green supply chain management practices and some dimensions of corporate performance revolve around five main themes. These are; (i) process related issues, (ii) EMS related issues, (iii) cost related issues, (iv) marketing related issues and (v) time related issues. The next section elaborates further on the detail provided by respondents, along with some key quotes that capture their perceptions.

#### 6.4.1 Process related issues

There was general agreement among the respondents that implementing green supply chain management practices needs to be properly performed by organizations to ensure they achieve the projected results. Improper implementation might lead to inefficiencies that hamper any improvement in corporate performance. For example when the general

manager of company E, which specializes in the manufacture of building materials such as bricks, was asked why green supply chain management practices sometimes fail to improve corporate environmental performance he stated that:

....Firms need to have the knowhow in using the recycled product in manufacturing again. For example, we have made a system to reduce the emissions because we have kept a blower sucking the dust and pumping inside the wall, running down the sediment. We are collecting 90% of the dust generated and entering it again into production which not all firms in this industry are good at...(General Manager, company E).

Other respondents felt that issues in measurement might be the reason for the lack of relationship between green supply chain management practices and corporate performance. This claim was supported by many respondents including the quality and assurance (Q&A) manager of company C who noted that:

... There are no agreed upon measures to gauge how well your corporate performance has improved after implementing green supply chain management practices as all existing measures are subjective.... (Q&A Manager, company C).

Furthermore, some informants claimed that although recycling is implemented to reduce resource depletion and green processes, sometimes recycling in itself generates emissions. This claim was made by the general manager of company E who gave an example of damaged building concrete that they sometimes grind and reuse in the concrete mix for bricks. This grinding process generates CO<sub>2</sub> emissions and this, in turn impacts, corporate environmental performance. Similarly, the production manager of company B asserted that the quality of a recycled product is usually lower than a product from raw material and this may explain why green supply chain practices sometimes fail to improve corporate operational performance.

Another significant factor to enable some green supply chain practices to improve corporate environmental performance is coupling individual practice with other green practices. In other words, some green supply chain practices need to be implemented together with other green supply chain practices. For example, the production manager of company B advised that:

In some cases green purchasing alone may not impact your corporate environmental performance unless it is coupled with other green supply chain practice such as eco-design for example ... (Production Manager, company B).

#### 6.4.2 Environment Management System (EMS) related issues

Having a dedicated resource within the organization to ensure adherence to environment management system rules and regulations and to oversee any implementation of green supply chain practices is crucial for the success of any green initiative. The absence of such a resource can be a strong reason for green supply chain practices failing to improve corporate performance—as claimed by many respondents in this study. For example, the procurement manager for firm F stated:

... Companies should appoint a resource to manage green related matters who should be taking care of green things and who should train all other persons in the company on how green practices must be deployed and then only things can improve... (Procurement Manager, company F).

One respondent pointed out that non-adherence to EMS requirements while implementing green supply chain practices might lead to green practices not improving corporate performance. The informant specifically noted that:

...Some companies take EMS certifications for the sake of certification and really don't want to make EMS practical, whatever is the EMS requirement, if you are not following, if you are not doing it, whatever your set goal you won't achieve it. Every year we have some EMS targets. These targets are written on paper and then executed by the team ... (Production Manager, company B).

By the same token, the absence of health, safety and environmental (HSE) policy within the organization may obstruct any corporate social improvement as claimed by the purchasing manager of company D. He also confirmed that for green supply chain management practices to improve employee health and safety within the pharmaceutical industry there must be a HSE policy in place.

#### 6.4.3 Cost related issues

Adopting green supply chain management practices may improve corporate economic performance such as reducing the product cost, improving sales and enhancing return on investment. However, some respondents claimed that this might be true in the long term but not in the short term. To elaborate, the HSE manager of company H advised that:

... Adding the microsilica to normal concrete to make it green concrete increases its cost as well as the controlling costs since it is a harmful material and needs to be dealt with carefully. Microsilica fumes are one of the finest dust materials and if it gets into the lungs it's over... (HSE Manager, company H).

Additionally, the purchasing manager of company H which specializes in pharmaceutical products confirmed that their costs increased when they implemented reverse logistics practices. In particular they had to involve a third party to properly dispose of their medical waste which is an additional cost for their organization to become environmentally responsible.

#### 6.4.4 Marketing related issues

Marketing green initiatives internally within the firm and externally to the public community is crucial to boost corporate social performance. For example, the purchasing manager for company D stated that failure to market green initiatives within the firm will lead to losing the management support needed to successfully implement green supply chain practices and consequently reap the benefits. Similarly, firms need to advertise any green related efforts to the wider community to get rewarded. Many respondents linked the failure of green practices to improving corporate performance with a lack of awareness. For example, the production manager of company B stated that:

You have to be publicizing yourself, what you are doing in favour of society. If this message did not go to the society, how will people know what you are doing for the environment ... (Production Manager, company B).

He also added that they had implemented an environmental cooperation initiative called “green boundary” in his firm. For example, his company worked with Abu Dhabi Municipality to have trees planted around their three square kilometre manufacturing facility in order to offset the carbon dioxide emitted during production with oxygen generated by 1,500 trees planted around the facility. For some reason, neither the Municipality nor his organization announced this initiative to the public and therefore no change on his firm’s corporate image has taken place.

#### 6.4.5 Time related issues

Benefits of implementing green supply chain practices may not materialize in the short term but may be accomplished in the long term. Different similar claims were made by firms representatives interviewed, including the production manager of company B, the purchasing manager of company D, the procurement manager of company F and the HSE manager of company H. They all confirmed that corporate performance will not improve overnight as a result of green practice implementation but requires some time to achieve payback.

This chapter has attempted to unearth the reasons behind the lack of a relationship between some green supply chain management practices and certain dimensions of corporate performance from the point view of the business organizations that were initially targeted in this study. It was found that five main issues can prevent green supply chain practices from impacting certain dimensions of corporate performance. These reasons are: process related issues, EMS related issues, cost related issues, marketing related issues and time related issues. The next chapter provides a discussion on the overall study integrating both quantitative and qualitative research phases to provide a more holistic account of the study outcomes.



## 7 DISCUSSION

Broadly, the conceptual framework of this study was adopted from stakeholder theory, institutional theory and resource based theory, each of which was included to help understand the effect of GSCM practices on different dimensions of corporate performance.

Four green supply chain management practices were found to be the most commonly adopted practices across businesses and thus selected for inclusion in the study. These were; eco design; green purchasing, environmental cooperation and reverse logistics. At the same time four dimensions of corporate performance that were found to be highly associated with green supply chain implementation and were previously assessed by several researchers in the field (although not collectively) were adopted for this research. These were: environmental performance, operational performance, economic performance and social performance. In addition, earlier studies found that three control variables were frequently associated with these dependent variables and therefore these were also employed in this study namely; firm size, firm age and possession of EMS certification.

The study initially embraced a quantitative approach using a survey questionnaires deployed to gather information from manufacturing businesses in the UAE with the resulting data used to test and validate the proposed hypotheses. However, the researcher decided to triangulate the quantitative approach with a qualitative phase using semi structured interviews with a sample selected from the original quantitative research population to gain a deeper understanding as to why some green supply chain management practices failed to impact certain corporate performance dimensions.

Consequently, and drawing on the institutional and stakeholder theories, the study found that half of the companies surveyed are EMS certified. However, these companies are motivated by different institutional drivers in their attempt to satisfy certain stakeholders. Nevertheless, such certification is associated with all dimensions of corporate performance. This association provides a good indication that firms in the UAE are going in the right direction because EMS implementation and certification form the basis for any green initiative to drive corporate performance. These findings were also echoed by Melnyk *et*

*al.* (2003) who found that there is a positive relationship between the presence of formal certified EMS and improved performance such as reduced costs (EcP), improved quality (OP), the reduction of waste in the design and equipment selection process (EP), and a reduction of lead times (OP). Additionally, Gonzalez *et al.* (2008) found that there is a significant relationship between the possession of certified EMS and demand on suppliers to implement environmental practices. As noted by Dun and Bradstreet UAE (2014), more than 4,000 firms are ISO 14001 certified in the UAE and more are in the certification stage. This, in turn, indicates that UAE firms have begun to realize the importance of being green conscious.

Before discussing the main hypotheses of the research, however, it is important to note that 75% of these hypotheses were not supported within the quantitative study, which means that the GSCM practices within UAE business organizations have a minor impact on their performance outcomes. One reason for this might be the lack of stringent legislation and regulation which were the main drivers for all types of tangible and intangible outcomes in other studies as has been recently evidenced by Laosirihongthong *et al.* (2013).

Although environmental performance showed high levels of attainment, as discussed in the descriptive statistics, and ranked second after social performance (Mean=3.75, SD=1.04), the study found that none of the independent variables has any significant impact on environmental performance. From a resource based view, and as claimed by Hart (1995), it may be that these firms adopted compliance-based strategies within these GSCM practices and not proactive strategies and thus couldn't positively impact environmental performance. Similar findings were also reported by Green *et al.* (2012) where these authors found no significant relationship between green purchasing and environmental performance. Furthermore, Simpson *et al.* (2007) reported that no significant relationship was found between environmental commitment and environmental performance. Moreover, Eltayeb *et al.* (2010) reported that green purchasing implementation needs to be stipulated and mandated by government regulation in order to be an effective tool for performance enhancements. This point is also sustained by the work of Zhu and Sarkis (2007), which proved that government regulations are the main driver influencing organizations to have better environmental performance. The explanation here might be that organizations in the UAE implement green supply chain management practices

without assessing which practices deliver the best outcome. For example, Lo (2014), claims that reverse logistics practices might deliver better performance outcomes than eco-design practices for firms downstream of the supply chain. It also differs from one industry to another. For example, green purchasing practices might lead to better performance outcomes than eco-design for firms in the textile manufacturing industry. In the qualitative phase of this study, for instance, when firms' Environment Management Representatives (EMRs) were asked why green supply chain management practices failed to improve corporate environmental performance, the answers varied. For example the production managers in both companies B and G, which, manufacture tiles and pipes, respectively, stated that eco-design practices, might not impact corporate environmental performance if the practices were not properly implemented. On the other hand, the purchasing manager of company D, which manufactures pharmaceuticals, advised that eco-design practices entail management support and commitment to lead to real performance improvements. Finally, the procurement manager of company F, which specializes in furniture manufacturing, opined that eco-design practices are long term initiatives and therefore the benefits require some time to be realized. This, in effect means that it can take some time for investments in GSCM to show a return.

When the interviewees were asked why environmental cooperation didn't impact corporate environmental performance, the respondents presented four main reasons. For example, the production manager of company B, which manufactures tiles, asserted that non-adherence to Environment Management System requirements might be a strong reason for this lack of relationship, while the Q&A manager in company C, which manufactures pre-insulated pipes, felt that the cause was rooted in the lack of assignment of a dedicated staff member to manage environment related matters within the firm. Additionally, both, the procurement manager in company F and the HSE manager in company H, which produces ready-mix concrete, claimed that environmental cooperation practices take time to improve environmental performance. One surprising reason for a lack of relationship between environmental cooperation and environmental performance was presented by the general manager of company E, whose firm is in the building materials manufacture business, was that recycling might generate some emissions and this in turn might hamper environmental performance improvements.

The reasons for the absence of a relationship between green purchasing and environmental performance as per the interviewees are similar to those of environmental cooperation. In other words, the technical manager of company A as well as the procurement manager of company F, both confirmed that the absence of a dedicated person monitoring the implementation of green purchasing practices and rectifying any issues during the implementation within the firm is the main reason for the lack of impact on corporate environmental performance. Similarly, the production manager of company B pointed out that green purchasing practices need to be coupled with other green practices in order to improve corporate environmental performance.

With regard to reverse logistics, the interviews found that there was consensus among the interviewees across all of the firms. For example, the purchasing manager of company D, the general manager of company E and the procurement manager of company E all confirmed that issues during implementation are the main reason for the lack of relationship between reverse logistics practices and corporate environmental performance

The study also found that green purchasing and environmental cooperation are positively related to operational performance ( $\beta=.219, .27$ , respectively). Such results are consistent with the resource based view. In other words, these firms tend to acquire and deploy innovative resources that proactively address environmental issues while working closely with their supply chain partners to prevent environmental accidents and improve product quality. These results conform to the results recently reported by Diabat *et al.* (2013) who found that environmental cooperation is one of the most important GSCM practices that can lead to better operational performance outcomes. These findings might be due to some recent regulations such as “Istedama”, “Pearl Rating” and “Green Building” initiatives launched by the UAE government aimed at motivating supply chain members to work more closely to deliver more sustainable products and projects.

Both eco-design and reverse logistics were found to have no impact on operational performance. This is curious because both practices were found to be the most highly adopted GSCM practices in the UAE. Nevertheless, in this study they failed to impact on operational performance. It is possible that this is because the level of implementation was not sufficient to lead to better outcomes (Zhu *et al.*, 2006). Similar findings were reported

by Deutz *et al.* (2013) who found that firms may not be effectively implementing eco-design due to the limited manner of functional requirements deployed and this may in turn, hamper any performance improvements. Similar reasons were coined by some interviewees. For example the production manager of company B said that if eco-design practices were not properly implemented, it may not lead to any operational benefits to the firm. Additionally, the Quality control and Assurance (QA) manager of company C claimed that, eco-design practices require a dedicated environmental management resource within the organization to monitor and manage its implementation which is not the case currently with most companies in the UAE.

With regards to reverse logistics, Richey *et al.* (2005) reported similar results. That is, the authors found that the implementation of reverse logistics procedures did not improve corporate operational performance. It may be that these firms implemented reverse logistics practices voluntarily and not due to legislation that holds them responsible for the recovery and proper disposal of their products after use. Consequently, the implementation may not have been deep enough to lead to any improvement in the operational dimension (Mitra and Datta, 2014). It can also be argued that reverse logistics and eco design require cooperation with other chain members in order for the benefits to be realized. However, the study didn't find a strong connection with cooperation because environmental cooperation was ranked third in terms of adoption by the firms that were surveyed. In addition, Eltayeb *et al.* (2011) found that externally oriented GSCM practices such as reverse logistics have little impact on the internal (operational) performance of the firm. The operation manager of company B, for example, stated that products from recycled materials are usually lower in quality than those from raw material and thus this might be the reason for the lack of improvement in corporate operational performance. By the same token, when the general manager of company E was asked why reverse logistics failed to have an impact on operational performance he stated that it may be connected with issues in implementation. He also provided an example advising that in one of their products that is, building bricks, the dust generated is collected and recycled back into the production process. However this process requires proper control and implementation which not all firms are good at.

In terms of economic performance, out of the four GSCM practices, only green purchasing was found to have a significant impact on economic performance ( $\beta=.318$ ). Surprisingly,

both variables have the lowest levels of adoption and attainment. In other words, green purchasing is the lowest GSCM practice in terms of implementation, and economic performance is the lowest in terms of attainment. One plausible explanation is that the improvement in the economic performance of UAE firms in the green context is mainly due to green purchasing practices. Green purchasing practices therefore are important for firms that have limited resources and want to realize short term economic benefits. This is in keeping Green *et al.* (2012), who found that green purchasing is positively linked to economic performance. Mitra and Datta (2014) reported similar results. These authors found that supplier collaboration is positively related to sustainable product design, which in turn, positively impacts economic performance. It could also be said that improvement in environmental performance can lead to improving economic performance as evidenced by Al-Tuwaijiri *et al.* (2004). Thus, it is feasible to have no impact of other practices except green purchasing on economic performance as none of the four green supply chain practices were found to impact environmental performance in this study as discussed above.

However, these results do present a challenge to the researcher, particularly since the research is set within the context of the UAE. The study didn't uncover any significant impact of other green practices on corporate economic performance. Within this context, it is possible that other practices within UAE firms might be long term oriented because they entail substantial initial investments such as pollution prevention systems and R and D in eco-design products and it can take time for returns to be realized. Green purchasing is less capital intensive as it is an externally oriented green supply chain initiative. This was found to be the case in Malaysia, for example, where Eltayeb *et al.* (2011) found that better economic performance is the main driver for Malaysian firms to adopt green purchasing practice and this is proposed to be the case within UAE firms as well based on the findings of this study. Within the qualitative research phase, for example, the production engineer and the technical manager of company A, which manufactures glass reinforced plastic pipes and fittings, stated that eco-design practices entail incurring extra costs to be properly implemented and such costs in turn, require some time to be recovered. The same claim was made by company F which manufactures furniture items. The procurement manager in that firm asserted that the three green supply chain practices; eco design, environmental cooperation and reverse logistics, incur significant extra costs to implement and that is why

company economic performance does not improve in the short term. Those firms which are in the pharmaceutical industry, such as firm D, claimed that eco-design of both the product and the packaging, as well as reverse logistics, will not improve economic performance in the short term but this investment may be recovered in the long term. Finally, the interviewee representing company D, which produces and sells ready-mix concrete, claimed that eco-design practices increase the product costs and can also lead to additional costs when working with other chain members (environmental cooperation). For this reason he concluded that economic performance does not improve. Both, the operations manager and HSE manager of company D, also advised that adding the “micorsilica” to the mix to make “green concrete” is an additional cost they incur in order to make their product green.

The results of reverse logistics practices in this study were consistent with the institutional theory perspective. That is, the study found that reverse logistics had a significant impact on corporate social performance ( $\beta=.208$ ). In fact, reverse logistics was found to be the second most implemented green supply chain practice in the UAE after eco-design, while social performance had the highest attainment level. This relationship is not unique, however, because similar results were also found by Mitra and Datta (2014). These authors found that the recovery of packaging and products improves the corporate image. Drawing on institutional theory, therefore, it is rational to claim that the reported improvement in social performance was partially due to external drivers, that is image, but not linked with legislation or regulations, which are the major external drivers found in most previous studies. Instead, the main drivers of social performance found in this study were internal reverse logistics pressures and these findings echo Lin and Sheu’s (2012) conclusion that internally driven GSCM practices lead to performance improvements.

The research did not find any impact of other green supply chain management practices such as eco-design, environmental cooperation and green purchasing on corporate social performance. The interviews conducted revealed some interesting explanations for these results. For example, the production manager of company B as well as the procurement manager of company D, both shared that for eco-design to impact corporate social performance, the firm needs to advertise such initiatives internally within the firm and externally to the community so that the employees feel more satisfied working for an

environmentally conscious organization and the community become aware of the organization's green efforts. A similar explanation was provided by the production manager of company G who confirmed that lack of awareness is the main reason behind the failure of eco-design to impact corporate social performance. Finally, the Q and A manager in company C pointed out that there are no accurate measures to measure the impact of eco-design practices on corporate social performance.

During the interviews awareness was also uncovered as an issue in relation to environmental cooperation. For example, the production manager of company B commented that lack of awareness is the main reason for the failure of environmental cooperation to impact social performance. Furthermore, lack of awareness for environmental cooperation—social performance no relationship was the reason reported by the Q&A manager of company C, the general manager of company E and the production manager of company G.

A number of different reasons were reported by the interviewees in relation to green purchasing. For example, the procurement manager of company F could see no relationship between green purchasing and social performance. However, the purchasing manager of company D suggested that the lack of HSE policy might be the main reason why this relationship was not found in this study.



## **8 LIMITATIONS, CONCLUSION AND FURTHER RESEARCH**

### **8.1 Limitations**

There were some limitations in this study. For example, the study was limited to firms in the manufacturing sector; however, this sector was specifically selected because the manufacturing industry in any region accounts for a large proportion of the environmental impact and manufacturing is also responsible for the depletion of natural resources. The study was also limited to manufacturing industries in the UAE because the research purposefully intended to gain an understanding of green supply chain management practices among UAE businesses and sought to discover how these practices relate to different aspects of corporate performance. This was seen as significant in a rapidly growing economy and particular because the UAE is considered to be a role model for other gulf cooperation council (GCC) countries who seek to diversify their economies. The sample size was also lower than expected due to a low response rate; however, the data was enhanced by the addition of the qualitative research phase.

Additionally, the study did not differentiate between early and late adopters of green supply chain practices which was due to difficulties in capturing this information. Further research may provide additional insights into how the different dimensions of corporate performance impact over time and how the outcomes of implementing green practices are realized. Finally, having eight respondents only within the qualitative part might be another limitation, however, this was due to the few number of organizations that provided their contact details in the survey and were interested to be interviewed. Future studies may improve response rate in this region by offering a summary of the survey results to interested respondents or offering a financial incentive such as I Pads won through a draw at the close of the survey.

### **8.2 Further research**

Extending this study to other industrial sectors in the UAE may allow researchers to understand how the performance of other firms is impacted by the implementation of green supply chain management practices and how they cope with mounting environmental

issues either in the construction sector, transportation sector or other environmentally sensitive sectors.

As such, this study lays the foundation for future research in other sectors as well as other Gulf Cooperation Council (GCC) countries such as Saudi Arabia, where the manufacturing industry is growing significantly. Qatar has also witnessed unprecedented economic vitality in almost all sectors, including construction and aviation, and therefore looking at its firms' position on the environmental radar and the different green practices implemented in that country, would be valuable. Further studies might also investigate the impact of EMS certifications such as ISO 14001 on different corporate performance dimensions to assess whether such certification plays any role in improving their environmental performance as well as any links between GSCM practices.

### **8.3 Recommendations**

Based on the results of this research that is, both the quantitative and qualitative findings the following recommendations are presented for firms interested in improving their footprint and their environmental performance while implementing green supply chain practices:

**Recommendation one:** Ensure that senior management supports the initiative.

**Recommendation two:** Ensure agreed practices are properly implemented and monitored.

**Recommendation three:** Ensure that Environment Management System rules are followed and adhered to.

**Recommendation four:** Employ a dedicated project manager to manage the implementation process.

**Recommendation five:** Ensure objective measures are in place to measure the outcomes.

**Recommendation six:** Ensure that all green initiatives are advertised to the public.

Finally, it is worth noting that within this study, the use of three key theories—stakeholder theory, institutional and resource-based theory—to frame the research and to help improve our understanding of the findings, was valuable. It is also important to note that the insights discovered in this study would not have been found without supporting the quantitative methods with a qualitative research phase. As a result, it is suggested that quantitative research, supported by exploratory research techniques, such as in-depth interviewing, are still important when researching this topic—despite the fact that there are many existing and validated measures available to conduct quantitative studies in this area. The use of the mixed methods approach, which was initially unanticipated, proved to be crucial to understand why many of the hypotheses in this study were unsupported. Consequently, the study presents insights for researchers proposing to study green supply chain practices in the future. Thus, the study contributes to research as well to practice. Indeed, the research model and findings of this study were published in the peer reviewed Emerald Journal: *Competitiveness Review: An International Business Journal* earlier this year (See Younis, Sundarakani and Vel, 2016 in the list of references). For this reason the citation Younis et al. (2016) has been occasionally used within the thesis.

## REFERENCES

- Al-Tuwaijri, S., Christensen, T. and Hughes, K. (2004) "The relations among environmental disclosures environmental performance, and economic performance: a simultaneous equations approach", *Accounting Organizations and Society*, Vol. 29, Iss. 5, pp. 447-471.
- Anbumozhi, V. and Kanada, Y. (2005), Greening the production and supply chains in Asia: is there a role for voluntarily initiatives? *IGES Kansai Research Center Discussion Paper*, KRC 2005. No. 6E.
- Ann, G., Zailani, S. and Wahid, N. (2006) "A study on the impact of environmental management system (EMS) certification towards firms" performance in Malaysia", *Management of Environmental Quality: An International Journal*, Vol. 17 Iss: 1, pp.73 - 93.
- APO (2004), *Eco-product Directory*, Asian Productivity Organization, Tokyo.
- Armstrong, J. & Overton, T. (1977) "Estimating Nonresponse Bias in Mail Surveys", *Journal of Marketing Research*, 3, pp. 396-??
- Ayuso, S, Rodríguez, M, García-Castro, R, and Ariño, M (2014) "Maximizing Stakeholders' Interests: An Empirical Analysis of the Stakeholder Approach to Corporate Governance", *Business & Society*, 53, 3, pp. 414-439, Business Source Complete, EBSCOhost, viewed 17 January 2016.
- Azevedo, S., Carvalho, H. and Machado, V. (2011) "The influence of green practices on supply chain performance: A case study approach", *Transportation Research Part E-Logistics and Transportation Review*, Vol. 47, No. 6, pp. 850-871.
- Azorin, J., Cortes, E., Gamero, M. and Tari, J. (2009) "Green management and financial performance: a literature review", *Management Decision*, Vol. 47, No. 7, pp. 1080-1100.
- Balasubramanian, S. (2012) "A Hierarchical Framework of Barriers to Green Supply Chain Management in the Construction Sector", *Journal of Sustainable Development*, Vol. 5, No. 10, pp. 15-27.
- Balasubramanian, S 2014, A Structural Analysis Of Green Supply Chain Management Enablers In The UAE Construction Sector, n.p.: Research Online, Research Online, EBSCOhost, viewed 26 September 2016.
- Banerjee, S., Iyer, E. and Kashyap, R. (2003) "Corporate environmentalism: antecedents and influence of industry type", *Journal of Marketing*, Vol. 67, pp. 106-122.

Bansal, P. and Hunter, T. (2003) "Strategic explanations for the early adoption of ISO 14001", *Journal of Business Ethics*, Vol. 46, pp. 289-299.

Barney, J. (1986) "Strategic factor markets: Expectations, luck and business strategy", *Management Science*, Iss. 32, pp. 1231-1241.

Beamon, A. (1999) "Designing the green supply chain" *Logistics Information Management*", Vol. 12, No. 4, pp. 330-353.

Ben Brik, A, Rettab, B, & Mellahi, K 2011, 'Market Orientation, Corporate Social Responsibility, and Business Performance', *Journal Of Business Ethics*, 99, 3, pp. 307-324, Health Business Elite, EBSCOhost, viewed 26 September 2016.

Benito, J. and Benito, O. (2005) "Environmental proactivity and business performance: an empirical analysis", *Omega-International Journal of Management Science*, Vol. 33, Iss. 1, pp. 1-15.

Bose, I. and Pal, R. (2011) "Do green supply chain management initiatives impact stock prices of firms?", *Decision Support Systems*, Vol. 52, pp. 624-634.

Carter, C. and Easton, P. (2011) "Sustainable supply chain management: evolution and future directions", *International Journal of Physical Distribution and Logistics Management*, Vol. 41, Iss. 1, pp.46-62.

Carter, C. and Ellram, L. (1998) "Reverse logistics: a review of the literature and framework for future investigation", *Journal of Business Logistics*, Vol. 19, pp. 85-102.

Chen, C. (2005) "Incorporating green purchasing into the frame of ISO 14000", *Journal of cleaner production*, Vol. 13, pp. 927-933.

Christmann, P. and Taylor, G. (2001) "Globalization and the environment: determinants of firm self-regulation in China", *Journal of International Business Studies*, Vol. 32, No.3, pp. 439–458.

Conner, K. (1991) "A historical comparison of resource-based theory and five schools of thought within industrial organization economics: Do we have a new theory of the firm?", *Journal of Management*, Iss. 17, No.1, pp. 121-154.

Cordano, M., Marshall, R. and Silverman, M. (2010) "How do Small and Medium Enterprises Go "Green"? A Study of Environmental Management Programs in the US Wine Industry", *Journal of Business Ethics*, Vol. 92, No. 3, pp. 463-478.

Creswell, JW 2003, *Research Design: Qualitative, Quantitative, And Mixed Methods Approaches* / John W. Creswell, n.p.: Thousand Oaks, Calif. : Sage Publications, c2003., UOW Catalogue, EBSCOhost, viewed 23 September 2016.

Creswell, J. W (2006) *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*, Sage Publications, Thousand Oaks, CA.

Cronbach, L.J. (1951) "Coefficient alpha and the internal structure of tests", *Psychometrika*, Vol. 16, pp. 297-334.

Crotty, M.(1998) *The Foundations of Social Research: Meaning and Perspective in the Research Process*, SAGE Publications, Thousand Oaks, CA.

Darnall, N., Jolley, G. and Handfield, R. (2006) "Environmental Management Systems and Green Supply Chain Management: Complements for Sustainability?", *Business Strategy and the Environment*, Vol. 18, pp. 30-45.

Darnall, N., Jolley, J., and Handfield, R. (2008) "Environmental management systems and green supply chain management: complements for sustainability?", *Business Strategy and the Environment*, Vol. 17, No. 1, pp. 30-45.

Davis, E. and Kay, J. (1990) "Assessing corporate performance", *Business Strategy Review*, Vol. 1, Issue 1, pp. 1-16.

De Giovanni, P. and Esposito Vinzi, V. (2012) "Covariance versus component-based estimations of performance in green supply chain management", *International Journal of Production Economics*, Vol. 135 No. 2, pp. 907-916.

DeMarrais , K. (2004) *Qualitative interview studies: Learning through experience*. In K. deMarrais & S. D. Lapan (Eds.), *Foundations for research* (pp. 51-68). Mahwah, NJ : Erlbaum .

Deutz, P., McGuire, M., and Neighbour, G. (2013) "Eco-design practice in the context of a structured design process: an interdisciplinary empirical study of UK manufacturers", *Journal of Cleaner Production*, Vol. 39, pp.117-128.

Diabat, A. and Govindan, K. (2011), “An analysis of the drivers affecting the implementation of green supply chain management”, *Resource, Conservation and Recycling*, Vol. 55, pp. 659-667.

Diabat, A., Khodaverdi, R. and Olfat, L. (2013) “An exploration of green supply chain practices and performance in an automotive industry”, *International Journal of Advanced Manufacturing Technology*, Vol. 68, pp. 949-961.

DiMaggio, P. and Powell, W. (1983) “The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields”, *American Sociological Review*, Vol. 48, Iss. 2, pp. 147-160.

Donnelly, K., Furnell, Z., Traeger, S., Okrasinski, T. and Holman, S. (2006) “Eco-design implemented through a product-based environmental management system”, *Journal of Cleaner Production*, Vol. 14, pp. 1357-1367.

Dun and Bradstreet, *company profile* available from: <http://www.dnbsame.com/company/in-the-region>, (5 May 2014).

Elgayar, A, Beheiry, S, Jabbar, A, & Al Ansari, H 2016, 'A benchmarking approach to the progress of green materials and systems' use in the UAE construction industry', *World Journal Of Science, Technology & Sustainable Development*, 13, 4, p. 315, Publisher Provided Full Text Searching File, EBSCOhost, viewed 26 September 2016.

Elkington, J. (1994) “Towards the sustainable corporation: win-win-win business strategies for sustainable development”, *California Management Review*, Vol. 36, No. 2, pp. 90-100

Eltayeb, T. and Zailani, S. (2009) “Going green through green supply chain initiatives towards environmental sustainability”, *Operations and Supply Chain Management*, Vol. 2, No.2, pp.93-110.

Eltayeb, T., Zailani, S. and Jayaraman, K. (2010) “The examination on the drivers for green purchasing adoption among EMS 14001 certified companies in Malaysia”, *Journal of Manufacturing Technology Management*, Vol. 21, Iss. 2, pp. 206 - 225.

Eltayeb, T., Zailani, S., and Ramayah, T. (2011) “Green supply chain initiatives among certified companies in Malaysia and environmental sustainability: Investigating the outcomes”, *Resources Conservation and Recycling*, Vol. 55, Iss. 5, pp. 495-506.

Fogler, H. and Nutt, F. (1975) “A note on social responsibility and stock valuation”, *Academy of Management Journal*, Vol. 18, pp. 155-160.

Freedman, M., and Jaggi, B. (1982) "The SEC's pollution disclosure requirements –Are they meaningful?", *California Management Review*, Vol. 24, No. 2, pp. 60-67.

Freeman, R. E.(1984) *Strategic Management: A Stakeholder Approach*. Pittman, Marshfield, MA.

Freeman, R. E. (2002), Stakeholder Theory of the Modern Corporation', in T. Donaldson and P. Werhane (eds.), *Ethical Issues in Business: A Philosophical Approach*, 7th Edition, Prentice Hall, Englewood Cliffs, NJ, pp. 38–48.

Friedman, M. (1962) *Capitalism and Freedom*, University of Chicago Press, Chicago, IL.

Friend, G. (2009) *The Truth about Green Business*, 1st edition. New Jersey: Pearson Education.

Frooman, J., and Murrell, A. J. (2005) "Stakeholder influence strategies: The roles of structural and demographic determinants", *Business and Society*, Iss. 44, pp. 3–31.

Geffen, C. and Rothenberg, S. (2000) "Suppliers and environmental innovation: the automotive paint process", *The international Journal of Operations and Production Management*, Vol. 20, No. 2, pp. 166-186.

Godfrey, R. (1998) "Ethical purchasing: developing the supply chain beyond the environmental", in Russel, T. (Ed.), *Greener Purchasing: Opportunities and Innovations*, Greenleaf Publishing, Sheffield, pp. 244-251.

Gonzalez, J. (2008) "The effect of manufacturing proactivity on environmental management: an exploratory analysis", *International Journal of Production Research*, Vol.46, No. 24, pp. 7010-38.

Gonzalez, P., Sarkis, J. and Di'az, B. (2008) "Environmental management system certification and its influence on corporate practices Evidence from the automotive industry", *International Journal of Operations and Production Management*, Vol. 28, No.11, pp. 1021-1041.

Green, K, Morton, B, & New, S 1998, 'Green purchasing and supply policies do they improve companies' environmental performance', *Supply Chain Management*, 3, 2, p. 89, Supplemental Index, EBSCOhost, viewed 18 September 2016.



Green, K. and Inman, R. (2005) "Using a just-in-time selling strategy to strengthen supply chain linkages", *International Journal of Production Research*, Vol. 43, No 16, pp. 3437- 3453.

Green, K., Zelbst, P., Meacham, J. and Bhadauria, V. (2012) "Green supply chain management practices: impact on performance", *Supply Chain Management: An International Journal*, Vol. 17 Iss. 3, pp. 290 - 305.

Hair, J., Black, W., Babin, B. and Anderson, R. (2010) *Multivariate Data Analysis* (Global Edition, 7th Edition), Upper Saddle River, NJ, Pearson Education, Inc.

Hart, S. (1995) "A natural resource-based view of the firm", *Academy of Management Review*, Iss. 20, pp. 986-1014.

Hervani, A., Helms, M. and Sarkis, J. (2005) "Performance measurement for green supply chain management", *Benchmarking: An International Journal*, Vol. 12, Iss. 4, pp. 330 - 353.

Homburg, C. and Stock, R. (2004) "The Link Between Salespeople's Job Satisfaction and Customer Satisfaction in a Business-to-Business Context: A Dyadic Analysis", *Journal Of The Academy Of Marketing Science*, 32, 2, p. 144-158.

Hsu, C.W. and Hu, A.H. (2008) "Green supply chain management in the electronic industry", *International Journal of Science and Technology*, Vol. 5 No. 2, pp. 205-216.

Huang, Y.C., Wu, Y.-C. and Rahman, S. (2012) "The task environment, resource commitment and reverse logistics performance: evidence from the Taiwanese high-tech sector", *Production Planning and Control*, Vol. 23 No. 10/11, pp. 851-863.

Hunt, S. & Davis, D. (2012) "Grounding Supply Chain Management in Resource-Advantage Theory: In Defense of a Resource-Based View of the Firm", *Journal Of Supply Chain Management*, Iss.48, No. 2, pp. 14-20.

Jack, E., Powers, T. and Skinner, L. (2010) "Reverse logistics capabilities: antecedents and cost savings", *International Journal of Physical Distribution and Logistics Management*, Vol. 40, Iss. 3, pp.228 - 246.

Jaffe, A., Peterson, S., Portney, P. and Stavins, R. (1995) "Environmental regulation and the competitiveness of US manufacturing: what does the evidence tell us?", *Journal of Economic Literature*, Vol. 33 No. 1, pp. 132-63.

- Jabbour, R., and Bheiry, S. (2011) "Studying the Barriers to Sustainable Construction Practices in the UAE." *Proceedings of the International Symposium on Sustainability and the Environment "ISSE'11"*. Sharjah, American University of Sharjah, p. 4.
- Johansson G, 2002 "Success Factors for Integration of Eco-design in Product Development: A Review of State of the Art", *Environmental Management and Health*, 13 (1), pp.98-107.
- Jun, M., Cai, S. and Shin, H. (2006) "TQM practice in maquiladora: antecedents of employee satisfaction and loyalty", *Journal of Operations Management*, Vol. 24, No. 6, pp. 791-812.
- Kelle, U. (2006) "Combining qualitative and quantitative methods in research practice: purposes and advantage", *Qualitative Research In Psychology*, 3, 4, pp. 293-311.
- Key, S. (1999) "Toward a new theory of the firm: a critique of stakeholder theory", *Management Decision*, 37, 3/4, p. 317.
- King, A. and Lenox, M. (2001) "Does It Really Pay to Be Green? An Empirical Study of Firm Environmental and Financial Performance", *Journal of Industrial Ecology*, Vol. 5, No. 1, pp. 105-116.
- Klassen, R. and McLaughlin, C. (1996) "The impact of environmental management on firm performance", *Management Science*, Vol. 42, Iss. 8, pp. 1199-1214.
- Kleindorfer, P., Singhal, K. and van Wassenhove, L. (2005) "Sustainable operations management", *Production & Operations Management*, Vol. 14, pp. 482-492.
- Kumar, S. and Putnam, V. (2008) "Cradle to cradle: reverse logistics strategies and opportunities across three industries", *International Journal of Production Economics*, Vol. 15, No. 2, pp. 305-315.
- Kung, F., Huang, C., and Cheng, C. (2012) "Assessing the green value chain to improve environmental performance: Evidence from Taiwan's manufacturing industry", *International Journal of Development Issues*, Vol. 11, Iss. 2, pp. 111-128.
- Laosirihongthong, T., Adebajo, D. and Tan, K. (2013) "Green supply chain management practices and performance", *Industrial Management and Data Systems*, Vol. 113, Iss. 8, pp. 1088-1109.

Large, R. and Thomsen, C. (2011) “Drivers of green supply management performance: Evidence from Germany”, *Journal of Purchasing and Supply Management*, Vol. 17, No.3, pp. 176-184.

Lee, S., Kim, S. and Choi, D. (2012) “Green supply chain management and organizational performance”, *Industrial Management and Data Systems*, Vol. 112, Iss. 8, pp.1148 - 1180.

Liang, S. and Chang, W. (2008) “An Empirical Study on Relationship between Green Supply Chain Management and SME Performance in China”, *Call of Paper Proceedings of 2008 International Conference on Management Science and Engineering*, pp. 611-618.

Lin, B., Jones, C.A. and Hsieh, C. (2001) “Environmental practices and assessment: a process perspective”, *Industrial Management and Data Systems*, Vol. 101, No. 2, pp. 71-79.

Lin, C. and Ho, Y. (2010), “The influence of environmental uncertainty on corporate green behaviour: an empirical study with small and medium –size enterprises”, *Social behaviour and personality*, Vol. 38, No. 5, pp. 691-696.

Lin, R. & Sheu, C. (2012) “Why Do Firms Adopt/Implement Green Practices?—An Institutional Theory Perspective”, *Procedia - Social And Behavioral Sciences*, Iss. 57, pp. 533-540.

Link, S. and Naveh, E. (2006) “Standardization and discretion: Does the environmental standard ISO 14001 lead to performance benefits?”, *IEEE Transactions on Engineering Management*, Vol. 53, No.4, pp. 508-519.

Ilieva, J, Baron, S, & Healey, N 2002, “Online surveys in marketing research: pros and cons”, *International Journal Of Market Research*, 44, 3, pp. 361-376, Business Source Complete, EBSCOhost, viewed 23 September 2016.

Lo, S. (2014), "Effects of supply chain position on the motivation and practices of firms going green", *International Journal of Operations & Production Management*, Vol.34, No. 1, pp. 93-114.

Linton, J. and Jayaraman, V. (2005) “A conceptual framework for product life extension”, *International Journal of Production Research*, Vol. 43, No. 9, pp. 1807-1829.

Luthra S., Garg, D. and Haleem, A. (2014) “Green supply chain management: Implementation and performance – a literature review and some issues”, *Journal of Advances in Management Research*, Vol. 11 Iss: 1, pp. 20 – 46.

Malhotra, N. and Briks, D. (2006) *Marketing research: an applied approach*, Harlow, England, Prentice Hall.

McGuire, J. and Sungrenand Schneeweis, T. (1998) "Corporate Social Responsibility and Firm Performance", *Acad. Management J.*, 31, pp. 854-872.

Melnyk, S., Sroufe, R. and Calantone, R. (2003) "Assessing the impact of environmental management systems on corporate and environmental performance", *Journal of Operations Management*, Vol. 21, No. 3, pp. 329-351.

Menguc, B. and Ozanne, L. (2005) "Challenges of the "green imperative": a natural resource-based approach to the environmental orientation-business performance relationship", *Journal of Business Research*, Vol. 58, Iss. 4, pp. 430-438.

Miles, M. and Covin, J. (2000), "Environmental marketing: a source of reputational, competitive and financial advantage", *Journal of Business Ethics*, Vol. 23 No. 3, pp. 299-311.

Minichiello, V, Aroni, R, Timewell, E & Alexander, L (1995) *In-depth Interviewing: Principles, Techniques, Analysis 2nd edition*, Melbourne, Longman.

Merriam, S, & Merriam, S. (2009) *Qualitative Research: A Guide To Design And Implementation*, n.p., San Francisco, Jossey-Bass, UOW Catalogue, EBSCOhost, viewed 6 May 2016.

Minichiello, V, Aroni, R, Timewell, E & Alexander, L (1995) *In-depth Interviewing: Principles, Techniques, Analysis 2nd edition*, Melbourne, Longman.

Min, H. and Galle, W.P. (2001) "Green purchasing practices of US firms", *International Journal of Production and Operations Management*, Vol. 21, Iss.9, pp. 1222-1238.

Mita, S. and Datta, P. (2014) "Adoption of green supply chain management practices and their impact on performance: an exploratory study of Indian manufacturing firms", *International Journal of Production Research*, Vol. 52, No. 7, pp. 2085-2107.

Moneva, J. and Ortas, E. (2010) "Corporate environmental and financial performance: a multivariate approach", *Industrial Management and Data Systems*, Vol. 110, No. 2, pp. 193-210.

Montabon, F., Sroufe, R. and Narasimhan, R. (2007) "An examination of corporate reporting, environmental management practices and firm performance", *Journal of Operations Management*, Vol. 25, Iss. 5, pp. 998-1014.

Myers, M. (2011) *Qualitative Research in Business and Management*, SAGE, New Delhi.

Nakao, Y., Amano, A., Matsumura, K., Genba, K. and Nakano, M. (2007) "Relationship between environmental performance and financial performance: an empirical analysis of Japanese corporations", *Business Strategy and the Environment*, Vol. 16, No. 2, pp. 106-118.

Narasimhan, R. and Carter, J.R. (1998) "Environmental supply chain management", *Research Monograph*, The Center for Advanced Purchasing Studies, Arizona State University, Tempe, AZ, available at: [www.capsresearch.org](http://www.capsresearch.org) (accessed January 11, 2011).

Naveh, E. and Marcus, A. (2004) "What does ISO 9000 quality assurance standard lead to performance improvement", *IEEE Transactions on Engineering Management*, Vol. 51, No. 3, pp. 352-363.

Nunnally, J.C. and Bernstein, I.H., (1994) Elements of statistical description and estimation. *Psychometric Theory*, 3rd Edition (Edited by: Nunnally JC, Bernstein IH).

Olugu, E., Wong, K. and Shaharoun, A. (2011) "Development of key performance measures for the automobile green supply chain", *Resources Conservation and Recycling*, Vol.55, No. 6, pp. 567-579.

Orlitzky, M., Schmidt, F. and Rynes, S. (2003) "Corporate social and financial performance: A meta-analysis", *Organization Studies*, Vol. 24, No. 3, pp.403-441.

Perotti, S., Zorzini, M., Cagno, E. and Micheli, G. (2012) "Green supply chain practices and company performance: the case of 3PLs in Italy", *International Journal of Physical Distribution and Logistics Management*, Vol. 42, Iss. 7, pp. 640 - 672.

Porter, M. (1991) "AMERICA GREEN STRATEGY", *Scientific American*, Vol. 264, pp. 168-168.

Post, J. E., Preston, L. E., and Sachs, S. (2002) "Managing the extended enterprise: The new stakeholder view", *California Management Review*, Iss. 45, No.1, pp. 6–28.

Rettab, B. and Ben B. (2008), "Green supply chain in Dubai. Dubai", *Dubai Chamber..?* Available at: [www.dubaichamber.com/wp-content/uploads/2009/07/GREEN-SUPPLY-CHAIN-IN-DUBAI.pdf](http://www.dubaichamber.com/wp-content/uploads/2009/07/GREEN-SUPPLY-CHAIN-IN-DUBAI.pdf)/ (Accessed April 12, 2012).

Rao, P. (2002) "Greening the supply chain: a new initiative in South East Asia", *International Journal of Operations Production Management*, Vol. 22, No.6, pp. 632–655.

Rao, P. (2007) "Greening of the Supply Chain: An Empirical Study for SMES in the Philippine Context", *Journal of Asia Business Studies*, Vol. 1, No. 2, pp. 55-66.

Rao, P. and Holt, D. (2005) "Do green supply chains lead to competitiveness and economic performance?" , *International Journal of Operations and Production Management*, Vol. 25, Iss. 9, pp. 898-916.

Richey, R., Chen, H., Genchev, S., and Daughert, P. (2005), "Developing effective reverse logistics programs" *Industrial Marketing Management*, Vol. 34, No. 8, pp. 830-840.

Rivera, J. (2002) "Assessing a voluntary environmental initiative in the developing world: the Costa Rican Certification of Sustainable Tourism", *Policy Sciences*, Vol. 35 No. 4, pp. 333-360.

Rockness, J., Schalter, P., and Rockness, H. (1986) "Hazardous waste disposal, corporate disclosure, and financial performance in the chemical industry in M. Neimark (Ed)", *Advances in public interest accounting*, Vol. 1, pp.167-191.

Rogelberg, S. and Stanton, J. (2007) "Introduction: Understanding and Dealing With Organizational Survey Nonresponse", *Organizational Research Methods*, vol. 10, no. 2, pp. 195-209.

Rogers, D. and Lambke, R. (1999), *Going backwards: Reverse logistics trends and practices*, Pittsburg PA: Reverse Logistics Executive Council Press.

Roller, M., & Lavrakas, P. (2015) *Applied Qualitative Research Design : A Total Quality Framework Approach*, n.p.: New York : The Guilford Press.

Rothenberg, S., Pil, F. and Maxwell, J. (2001) "Lean, green, and the quest for environmental performance", *Production and Operations Management*, Vol. 10 No. 3, pp. 228-43.

Russo, M. and Fouts, P. (1997) "A resource-based perspective on corporate environmental performance and profitability", *Academy of Management Journal*, Vol. 40, No.3, pp. 534-559.

Russo, M. (2009) "Explaining the Impact of ISO 14001 on Emission Performance: a Dynamic Capabilities Perspective on Process and Learning", *Business Strategy and the Environment*, Vol. 18, No. 5, pp. 307-319.

Sarkis, J. (2003) "A strategic decision framework for green supply chain management", *Journal of Cleaner Production*, Vol. 11, Iss.4, p. 397-409.

Sarkis, J. (1998) "Evaluating environmentally conscious business practices", *European Journal of Operational Research*, Vol. 107, No. 1, pp. 159-174.

Sarkis, J., Helms, M., and Hervani, A. (2010) "Reverse Logistics and Social Sustainability", *Corporate Social Responsibility and Environmental Management*, Vol. 17, Iss. 6, pp. 337-354.

Schlegelmilch, B, Bohlen, G, & Diamantopoulos, A 1996, 'The link between green purchasing decisions and measures of environmental consciousness', *European Journal Of Marketing*, 30, 5, p. 35, Business Source Complete, EBSCOhost, viewed 18 September 2016.

Schram, T, & Schram, T. (2006) *Conceptualizing And Proposing Qualitative Research*, n.p.: Upper Saddle River, N.J. , Pearson Merrill Prentice Hall, UOW Catalogue, EBSCOhost, viewed 6 May 2016.

Sekaran, U. (2003), *Research Methods for Business: A Skill Building Approach*, Wiley, Singapore.

Simpson, D., Power, D., and Samson, D., (2007) "Greening the automotive supply chain: a relationship perspective", *International Journal of Operations and Production Management*, 27 (1), pp. 28-48.

Srivastava, S. (2007) "Green supply-chain management: A state-of the-art literature review", *International Journal of Management Reviews*, Vol. 9, Iss. 1, pp. 53-80.

Stapleton, P., Glove, M., and Davis, S. (2001) *Environmental Management Systems: An Implementation Guide For Small And Medium Sized Organizations*, 2<sup>nd</sup>edn. NSF International: Ann Arbor, MI.

Stead, E., and Stead, G. (1995) "An empirical investigation of sustainability strategy implementation in industrial organizations", *Research in corporate social performance and policy*, supplement, Vol. 1, pp. 43-66.

Stieb, J., (2009) "Assessing Freeman's Stakeholder Theory", *Journal Of Business Ethics*, 87, 3, pp. 401-414.

Sundarakani, B., Souza R., Goh M., Wagner, S., and Manikandan, S. (2010) "Modeling carbon footprints across the supply chain", *International Journal of Production Economics*, Vol. 128, Iss.1, pp. 43-50.

Testa, F. and Iraldo, F. (2010) "Shadows and lights of GSCM: determinants and effects of these practices based on a multinational study", *Journal of Cleaner Production*, Vol. 18, No. 11, pp. 953-962.

Theyel, G. (2001) "Customer and supplier relation for environmental performance", *Greener Management International*, Vol. 35, pp. 61-69.

Tibor, T. and Feldman, I. (1996) *ISO 14000: A guide to the New Environmental Management Standards*, Irwin Professional, Burr Ridge, IL.

Torielli, R., Abrahams, R., Smillie, R. and Voigt, R. (2011) "Using lean methodologies for economically and environmentally sustainable foundries", *China Foundry*, Vol. 8 No. 1, pp. 74-88.

Mary, S. (2013, December 31). Abu Dhabi To Build Green Road To Dubai. *Gulf Business*. Available from [gulfbusiness.com](http://gulfbusiness.com). [27 February 2016].

UAE Ministry of Environment and Water, (2015), *UAE state of green economy*. Available from <http://www.moew.gov.ae>. [27 February 2016].

Vachon, S. and Klassen, R. (2006) "Extending green practices across the supply chain: The impact of upstream and downstream integration", *International Journal of Operations and Production Management*, Vol. 26, Iss. 7, pp. 795 - 821.

Van Hoek, R. (1999) "From reversed logistics to green supply chains", *Supply Chain Management*, Vol. 4, pp. 129-135.



Vogt, W. (2007), *Quantitative Research Methods for Professionals*, Pearson Education Inc. Boston, MA.

Wagner, M. (2005) "How to reconcile environmental and economic performance to improve corporate sustainability: corporate environmental strategies in the European paper industry", *Journal of Environmental Management*, Vol. 76, No. 2, pp. 105-118.

Wahba, H. (2008) "Does the market value corporate environmental responsibility? An empirical examination", *Corporate Social Responsibility and Environmental Management*, Vol. 15, No. 2, pp. 89-99.

Walker, H., Di Sisto, L. and McBain, D. (2008), "Drivers and barriers to environmental supply chain management practices: Lessons from the public and private sectors", *Journal of Purchasing and Supply Management*, Vol. 14, pp.69-85

Walley, N. and Whitehead, B. (1994) "ITS NOT EASY BEING GREEN", *Harvard Business Review*, Vol. 72, pp. 46-46.

Walton, S., Handfield R., and Melnyk, S. (1998) "The green supply chain: integrating suppliers into environmental management process", *International Journal of Purchasing and Material Management*, Vol. 2, pp.11.

Watson, K., Klingenberg, B., Polito, T. and Geurts, T. (2004) "Impact of environmental management system implementation on financial performance: A comparison of two corporate strategies", *Management of Environmental Quality: An International Journal*, Vol. 15 Iss. 6, pp. 622 - 628.

Wiseman, J. (1982) "An evaluation of environmental disclosures made in corporate annual reports", *Accounting, Organization and Society*, Vol. 7, pp. 53-63.

Wood, D. (1991) "Corporate social performance revisited", *Academy of Management Review*, Vol. 16, pp. 691-718.

Younis, H., Sundarakani, B. and Vel, P. (2016) "The impact of implementing green supply chain management practices on corporate performance", *Competitiveness Review: An International Business Journal* , Vol. 26 Issue: 3, pp 216-245

Zailani, S., Eltayeb, T., Hsu, C. and Tan, K. (2012) "The impact of external institutional drivers and internal strategy on environmental performance", *International Journal of Operations and Production Management*, Vol. 32, Iss. 6, pp. 721 - 745.

Zhu, Q. and Sarkis J. (2006) "An inter-sectoral comparison of green supply chain management in China: Drivers and practices", *Journal of Cleaner Production*, Vol.14, No.5, pp. 472-486.

Zhu, Q. and Sarkis, J. (2004) "Relationships between operational practices and performance among early adopters of green supply chain management practices in Chinese manufacturing enterprises", *Journal of Operations Management*, Vol. 22, No. 3, pp. 265-289.

Zhu, Q. and Sarkis, J. (2004) "Relationship between operational practices and performance among early adopters of green supply chain management practices in Chinese manufacturing enterprises", *Operational Management*, Vol. 22 No. 3, pp.265-289.

Zhu, Q. and Sarkis, J. (2006) "An inter-sectoral comparison of green supply chain management in China: drivers and practices", *Journal of Cleaner Production*, Vol. 14 No. 5, pp.472-86.

Zhu, Q. and Sarkis, J. (2007) "The moderating effects of institutional pressures on emergent green supply chain practices and performance", *International Journal of Production Research*, Vol. 45, Iss. 18, pp. 4333-4355.

Zhu, Q., Geng, Y. and Lai, K. (2010) "Circular economy practices among Chinese manufacturers varying in environmental-oriented supply chain cooperation and the performance implications", *Journal of Environmental Management*, Vol. 91, Iss. 6, pp. 1324-1331.

Zhu, Q., Sarkis, J. and Lai, K. (2007) "Initiatives and outcomes of green supply chain management implementation by Chinese manufacturers", *Journal of Environmental Management*, Vol. 85, pp. 179-189.

Zhu, Q., Sarkis, J. and Lai, K. (2008) "Confirmation of a measurement model for green supply chain management practices implementation", *International Journal of Production Economics*, Vol. 111 No.2, pp. 261-73

Zhu, Q., Sarkis, J. and Lai, K. (2012) "Green supply chain management innovation diffusion and its relationship to organizational improvement: An ecological modernization perspective", *Journal of Engineering and Technology Management*, Vol. 29, No. 1, pp. 168-185.

Zsidisin, G. & Hendrick, T (1998) "Purchasing's involvement in environmental issues: a multi-country perspective", *Industrial Management & Data Systems*, 98, 7/8, p. 313.

Zsidisin, G. and Siferd, S. (2001) "Environmental purchasing: a framework for theory development", *European Journal of Purchasing and Supply Management*, Vol. 7, No. 1, pp. 61-73.

## APPENDIX A PARTICIPANT INFORMATION SHEET FOR ENVIRONMENT MANAGEMENT REPRESENTATIVES

**TITLE:** The impact of implementing green supply chain management practices on corporate performance

### PURPOSE OF THE RESEARCH

This is an invitation to participate in a study conducted by researchers at the University of Wollongong in Dubai for a doctorate thesis. The purpose of the research is to investigate the impact of implementing a set of green supply chain management practices namely, eco-design, green purchasing, environmental cooperation and reverse logistics on a corporate performance environmentally, operationally, economically and socially.

### INVESTIGATORS

Dr Balan Sundarakani	Dr. Prakash Vel	Hassan Younis
Principal Investigator	Second Investigator	Co-investigator (student)
<a href="mailto:balansundarakani@uowdubai.ac.ae">balansundarakani@uowdubai.ac.ae</a>	<a href="mailto:prakashvel@uowdubai.ac.ae">prakashvel@uowdubai.ac.ae</a>	<a href="mailto:hasy479@uowmail.edu.au">hasy479@uowmail.edu.au</a>
+9714 3672466	+971 4 3672433	+971556167722

### METHOD AND DEMANDS ON PARTICIPANTS

If you choose to be included, you will be asked to participate in an online survey that takes no more than 7 minutes to be completed. The survey is of three sections. Section one gathers information about you and your organization asking you to select among some given answers. Typical questions include: Where is the main office of your organization? What is the legal status of your organization? What type of environment management systems your organization has?

Section two aims to understand your organization's implementation and involvement in green supply chain management practices using a five point scale. Typical questions include: does your organization consider design of products for reduced of material/energy. Does your organization select suppliers using environmental criteria? Does your organization cooperate with customers for product take -back?

Section three aims at assessing the impact of implementing green supply chain management practices on your corporate performance using a five point scale. Typical questions include: To what extent you believe that implementing green supply chain management practices reduces solid wastes? To what extent you believe that implementing green supply chain management practices improves product quality? To what extent you believe implementing green supply chain management practices improves average profit? At the end of the survey you are given the option to get a summary of the results by providing your personal particulars

## **POSSIBLE RISKS, INCONVENIENCES AND DISCOMFORTS**

Apart from the 7 minutes of your time for completing the survey, we can foresee no risks for you. Your involvement in the study is voluntary and you may withdraw your participation from the study at any time and withdraw any data that you have provided to that point. The decision not to participate, or to withdraw from the study, will not affect any current or future relationship with the University of Wollongong.

## **ETHICS REVIEW AND COMPLAINTS**

This study has been reviewed by the Social Sciences Human Research Ethics Committee of the University of Wollongong. If you have any concerns or complaints regarding the way this research has been conducted you can contact the UOW Ethics Officer on (02) 4221 3386 or email [rsoethics@uow.edu.au](mailto:rsoethics@uow.edu.au).

Thank you for your interest in this study.

## APPENDIX B SURVEY QUESTIONNAIRE

### **The impact of implementing green supply chain management practices on corporate performance**

#### **Section 1: General Information**

This section aims to understand more about you and your organization

- 1 Where is the main office of your organization in UAE  
Abu Dhabi  
Dubai  
Sharjah  
Ajman  
Umm Al-Quwain  
Ras Al Khaima  
Fujairah
- 2 What is your current position level?  
Top management (i.e. President, CEO, Vice President)  
Middle Management (i.e. Director, Senior Manager, Manager)  
Supervisory level (i.e. senior officer, officer, coordinator)  
Non- managerial (i.e. accountant, assistant, specialist..etc)  
Other (Please specify)
- 3 Which of the following describes the legal status of your organization?  
Government  
Semi government  
Private company  
Branch of a multinational corporation  
Other (Please specify)
- 4 In which industry/s your organization operate  
Oil & Gas field  
Construction  
Real Estate  
Healthcare  
Manufacturing  
Agriculture  
Logistics  
Retail  
Other (Please specify)
- 5 How long your organization has been in the business mentioned above (in years)  
1-5  
6-10  
11-20  
More than 21
- 6 Is your organization an Environment Management System (EMS) certified?  
Yes  
No
- 7 What EMS certification your organization has?  
ISO 14001  
British Standard 7750  
European Union Eco Management and Audit Scheme (EMAS)  
Others (please specify)
- 8 Since when your organization has been EMS certified  
Less than a year  
1-2 Years  
3-5 Years

- More than 5 Years
- 9 How many employees does your company have?
- Less than 50
- 51-100
- 101-300
- 3001-500
- 5001-5000
- More than 5000

## Section 2: Involvement and Implementation of Green Practices

This section aims to understand the extent to which the below green practices have been implemented by your company

On a five points scale where 1 = not considering, 2 = planning to consider, 3 = considering it currently, 4 = initiating implementation and 5-currently implementing, please rate your organization's approach towards the following

- 10 Design of products for reduced consumption of material/energy
- 11 Design of products for reuse, recycle, recovery of material and component parts
- 12 Design of products to avoid or reduce use of hazardous materials
- 13 Design of processes for minimization of waste
- 14 Provide design specification to suppliers that include environmental requirements for purchased items
- 15 Environmental audit for suppliers' internal management
- 16 Evaluation of second-tier suppliers on environmentally friendly practices
- 17 Suppliers are selected using environmental criteria
- 18 Require suppliers to use environmental packaging (degradable and non-- hazardous)
- 19 Cooperation with suppliers and/or customers for Eco design
- 20 Cooperation with suppliers and/or customers for cleaner production
- 21 Cooperation with suppliers and/or customers for green packaging
- 22 Cooperation with supplies and/or customers for using less energy during product Transportation
- 23 Cooperation with customers for product tack-back
- 24 Conducting joint planning with other supply chain members to anticipate and resolve environmental related problems
- 25 Making joint decisions with other supply chain members about ways to reduce overall impact of our products
- 26 Developing a mutual understanding of responsibilities regarding environmental performance
- 27 Use of remanufacturing of obsolete products
- 28 Recovery of the company's end-of-life products
- 29 Taking back packaging

### **Section 3: Assessment of green practices impact on corporate performance**

On a five point scale where 1 = not at all, 2 = a little bit, 3 = to some degree, 4 = relatively significant and 5= highly significant, how you assess the impact of GSCM practices implementation on the below 4 dimensions of performance in your organization ; Environmental, operational, economic and social

#### **The impact of Green Practices on the Environmental Performance of the firm**

- 30 Implementing green supply chain management practices reduces air emissions
- 31 Implementing green practices reduces waste water
- 32 Implementing green practices reduces solid wastes
- 33 Implementing green practices decreases consumption for hazardous/harmful/toxic materials
- 34 Implementing green practices decreases frequency for environmental accidents
- 35 Implementing green practices Improves my company's environmental position
- 36 Implementing green practices improves products quality

#### **The impact of Green Practices on the Operational Performance of the firm**

- 37 Implementing green practices reduces lead times
- 38 Implementing green practices helps the company develop/design better products
- 39 Implementing green practices helps in reducing all types of wastes
- 40 Implementing green practices improves the company chances of successfully selling its products in international markets
- 41 Implementing green practices helps the company improve its position in the market place

#### **The impact of Green Practices on the Economic Performance of the firm**

- 42 Implementing green practices decreases cost of purchasing materials
- 43 Implementing green practices decreases cost of energy consumption
- 44 Implementing green practices decreases cost incurred on waste treatment and discharge
- 45 Implementing green practices decreases penalty associated with environmental accidents
- 46 Implementing green practices enhances average return on sales and investment
- 47 Implementing green practices improves the average profit
- 48 Implementing green practices improves the average market share of the organization

#### **The impact of Green Practices on the Social Performance of the firm**

- 49 Implementing green practices improves the corporate image
- 50 Implementing green practices improves the social commitment of the organization
- 51 Implementing green practices preserves the environment
- 52 Implementing green practices enhances employee's job satisfaction
- 53 Implementing green practices enhances health and safety of employees

## APPENDIX C INTERVIEWS TRANSCRIPTS

### COMPANY A

Hassan:	Hello Mr. Ali
Ali:	Mr. Hamid will join us also.
Hassan:	Yes, please.
Ali:	Better to repeat whatever you use it for Mr. Hamid also.
Hassan:	Okay. My name is Hassan Younis. I'm doing a research. The title of the research is The Impact of Implementing Green Supply Chain Management Practices on Corporate Performance. There are four practices and four dimensions of corporate performance. We wanted to see if a company or a manufacturing factory, like your factory, implemented those practices, how these practices will impact the corporate performance. We sent a survey like a year ago to 1,500 companies including your factory.
Hamid:	1,500 companies?
Hassan:	1,500 companies across UAE. In Abu Dhabi, Dubai, Sharjah, Ajman and the rest of all emirates and they responded back. One of those companies was your factory. My supervisor selected a couple of those companies to follow up and to seek their opinion on the impact of those practices on corporate performance.
Ali:	This research is under what agency?
Hassan:	I'm going to give you now the information sheet. We said there are four main practices. The first one is eco design.
Ali:	No, no, no. Who's the authority to give this entire research?
Hassan:	The entire research is under the university, the University of Wollongong in Dubai.
Hamid:	Okay.
Ali:	Who?
Hassan:	The University of Wollongong in Dubai.
Hamid:	An Australian university.
Hassan:	An Australian university based in Dubai.
Ali:	I see.
Hassan:	I'm doing a thesis. I'm doing a DBA thesis.
Ali:	It's for you personally?
Hassan:	It's for me, but sponsored by the University of Wollongong in Dubai. The results of the research will be published. It might be shared with companies in UAE or across the globe. The purpose of the research is to motivate companies to implement green practices. Today everything is going green.
Ali:	Finally it is your research?
Hassan:	It's my research, sponsored by my organization. We wanted to go to the market, to the factories, to the manufacturing industry to get this information to help us understand how those companies operate when it comes to green practices.
Ali:	What's your position inside the university?
Hassan:	Yes I'm a researcher doing a DBA. I'm doing my degree; I'm doing my DBA at the University of Wollongong in Dubai. You might remember we sent this survey in December 2014. We received your responses but we feel that we need to get more information because the responses somehow were a bit surprising. For example, when we say implementing eco design practices, we believe that it should impact the company positively. For example, you design a product to reduce the consumption of water, consumption of electricity, of power.



	Design of products for reuse, design of products for easy recycling. From day one, you design a product to be recycled again. Design a product to avoid and reduce the use of hazardous products and materials. You try to minimize the use of hazardous material within your product. Again, to minimize the waste of other things. How this should impact the corporate environmental performance? We feel it should impact it positively. Corporate environmental performance means reducing air emissions. When you design environment friendly products, which is an eco-design product, the air emission should be reduced. The waste water should be reduced. The consumption of hazardous materials should be reduced. The frequency of environmental accidents should be reduced, but in fact, our study so far has found it did not impact. We did not find this relationship.
Ali:	Why?
Hassan:	That's why we said we'll come back to you, we'll seek your opinion to see what do you think?
Ali:	About the strange answer you collected before, about the strange ... You said that something is not in the line here.
Hassan:	That's what I'm saying. Those practices, eco design ...
Ali:	It's normally whatever ... You said it's in the one side, one right, one side.
Hassan:	Yeah.
Ali:	How come in opposite direction?
Hassan:	This is what we wanted to find out. We feel that implementing eco design practices should improve the corporate performance. From your point of view, why do you think that implementing these practices did not positively impact the corporate environmental the performance?
Ali:	It is. It's not. It is. Sure. Sure it will be in the positive, not negative.
Hassan:	So it should positively impact?
Ali:	Yes.
Hassan:	Okay, but the research didn't find this relationship. It didn't impact the corporate performance, as I said ...
Hamid:	One point I'll tell you
Hassan:	Thank you, just for the recording can you just introduce yourself?
Hamid:	Yeah, I'm Hamid, Technical Manager.
Hassan:	And you Mr. Ali ?
Ali:	Production Manager.
Hassan:	Production Manager, Abu Dhabi Pipe ...
Ali:	Factory.
Hassan:	... Factory. Yeah, please.
Hamid:	This product which is pipe is GRP not reusable.
Hassan:	The one that you are manufacturing?
Hamid:	Yeah.
Ali:	Especially in our case or in the general?
Hassan:	We're talking in your case.
Hamid:	Right.
Ali:	Okay.
Hamid:	There are two types of plastic, normal plastic such as the one in shopping bags or bottles and you have the second type which is thermostatic. Our product is manufactured from thermostatic plastic. So recycling is not possible in our product.
Hassan:	Yeah, this one.
Hamid:	... I can bring this bottle and make new ship after some time. After 10 years or after 15 years. Take this plastic shape and reuse it maybe to make a new shape. In our materials, there's

	thermoplastic. It cannot be reused after melting.
Hassan:	It cannot be reused?
Hamid:	Yeah. This is a problem. You cannot find our answers in that plastic environment.
Hassan:	I see, okay.
Hamid:	To reduce the ... for recycling, we don't have any solution ...
Hassan:	I see, okay.
Hassan:	That's why you feel it does not impact the environmental corporate performance?
Hamid:	Something like that, something like that.
Hassan:	How about the environmental economic performance?
Hamid:	Environmental economic performance.
Hassan:	Economic performance, which means economic performance, for example decreased cost for material purchasing, decreased energy function, decreased water discharge, decreased fine for environmental accidents and again improving return on sales for example. Improving average profits and improving average markets.
Hamid:	That should positive actually.
Hassan:	Again the research found that there is no positive relationship between these practices and the corporate economic performance. What do you think from your opinion?
Ali:	I don't know how you said that that research find. It depends on what you say it is.
Hassan:	Okay, very good.
Ali:	Our answer was positive. How is it come negative, as for the negative now?
Ali:	It surely said no?
Hassan:	Mr. Ali, what we do all this information, there is a computer system application called SPSS, so statistics. You put all these answers into the system and the system produce a graph for you. The graph show you there is positive, there is negative, there is positive, there is negative, but when it comes this particular practice which is eco design, it does not impact neither ... none of the four dimensions which is the environmental performance, the economic performance, the social performance and the operation performance. No any relationship found. There must be a story behind it. That's why we said we'll come back to you. We selected you and we wanted to take your opinion.
Ali:	Economically ...
Hassan:	Economic performance, as we said, it did not improve the average return, it did not improve ...
Hamid:	Since recycling is not in our product norm, the impact is not that much.
Hassan:	Okay, so you won't be able to reuse the product again?
Hamid:	To reuse, because of plastic industry.
Ali:	Somewhere also we're supposed to use it inside the concrete. They put it as filler inside the concrete. They crush the pipe ... Our product is pipe as you see. It's pipes.
Hassan:	Concrete and plastic or?
Ali:	It's only pipes. It's actually pipes.
Hassan:	Plastic pipes.
Ali:	Yes, plastic, but silica.
Hassan:	Silica? Makes the plastic and silica?
Ali:	Yes. This is not possible to ...
Hassan:	Reuse.
Ali:	... recycle or deposit.
Hassan:	Recycle. Okay.
Ali:	Some companies take this other pipe as a wastage, as a scrap, whatever and crash it and put it inside the concrete because there is no way to recycle it. Put it as filler set in a concrete block or in something like this. This is the only way to use this material in our case.

Hamid:	Yeah, that is the right way. Apart from that, there is no scaling or degradation of this product.
Hassan:	No scaling or degradation.
Hamid:	We are using this as the positive point in the life of that material. We give the life of the product like 60 years ...
Hassan:	6-0. Okay.
Hamid:	So we don't know, will be alive or not in 20 years but what we supplied in 1980, now still fresh.
Hassan:	They are ...
Hamid:	They're working. The life is 100 years. There is no scaling in this product. Steel, you have scaling in the product. What will happen when time goes, thickness will go down to about 90%, 80%, 70%, 60%, then it will come below 30%. So you have to change it. In our case there is no scale. The piping is the scrap. It should be laid from there but it is like a strap, like solid. They end up spending a lot of money for the plastic bags, for the biodegradable, but they cannot do it because these are different types of plastics.
Hassan:	My next question, you consider these factors when you manufacture these pipes, that it is ...
Hamid:	We consider. We consider.
Hassan:	... environment friendly.
Hamid:	We consider.
Hassan:	It can be again crushed as you mentioned. It can ... I don't know.
Hamid:	we're trying our best. We're trying our best.
Hassan:	You do have this? Okay.
Hamid:	We're trying our best.
Hassan:	Again the research interestingly finds that it did not again impact the operation performance. It did not for example improve the product quality. It did not help design better products. It did not help the company to send to international markets. It did not improve the market position of the organization. Interestingly again, the research find that for example you are considering some environmental aspects for your product but again, having for example noticed that ...
Hamid:	I got your point, nowadays if you are supplying to any country like Malaysia for example ...
Hassan:	Are you supplying to external parties?
Hamid:	Yeah, yeah.
Hassan:	You are exporting?
Hamid:	Supplying to Australia for example. Australia I know. First they'll ask you, "Where is your environmental ...
Hassan:	Aspects, yeah.
Hamid:	... aspects," and what you're doing with certain people. Somebody was here from Australia.
Ali:	Yeah, which one do you follow.
Hamid:	He was telling no. Forget about all this. First where is your environmental policy?
Hassan:	Very good.
Hamid:	In a point you are correct. In future maybe. People will ask us what is your record in corporate social responsibility, environmental decisions, but as of today, we did pretty much impact on these other officials. In future, nobody asks me, except one Australian. They tell, "What is your environmental policy?" Now people have started asking. Maybe 10% people will be asking, but yes, in future, we'll have to have a look into it.
Ali:	Now we answer a question like only belongs to our company.
Hassan:	Yes, of course.

Ali:	Because whatever you sell for this steel pipe, every four years you have to remove it and put new one. This wastage of course is against that, your research. What we said is our pipe, once you lay it out in the underground, up to 60 years is guaranteed. This is not ... Only this answer for our product. Our product.
Hassan:	Generally Mr. Hamid, what do you think is the reason why it does not impact the operation performance of the firm? For example, let's say that a firm, implement it all these green practices, eco design, environment friendly product. It can be reused, it can be redesigned, it can be re-manufactured, but again, it does not improve the company position in selling it's a product internationally for example, or improve the quality of a product for the lead time to the market. What do you think is the reason for that?
Hamid:	It will improve in future maybe, but as of now, since only 50% person of the ... Only the big clients are asking the environmental aspect of it. Small party, nobody is asking. We're supplying to Nigeria now, Kenya now. Nobody is asking me, "Are you having 14,000 or 18,000 in your shop?" No.
Hassan:	You believe people are still unaware about the importance of environment and that's why ...
Hamid:	I don't know. I don't know.
Hassan:	Okay. The final dimension is the social performance. Again, implementing of these eco design practices does not improve the social performance of the firm. The social performance is improving corporate image for example, improving the social commitment, enhancing the employee job satisfaction and health and safety
Hamid:	This is very important question you are asking now.
Hassan:	Yeah.
Hamid:	There is no any gauge to measure this.
Hassan:	There is no gauge to manage it. Okay.
Hamid:	Do we have any gauge? No. We don't have any gauge for that. If there is any meter, no.
Hassan:	Generally ...
Hamid:	We don't now actually do it frankly this way.
Hassan:	Generally employees when they are asked, when they want to join a new organization, would you like to join a company that is environmentally friendly or a company that's got money problems with the government? They would say, "No, please, I want to go with the environment friendly."
Hamid:	No, we have done a lot of changes for the environment to be frank. This product when you manufacture the product, fumes will come out. What do you call it? VOC? VOC, yeah. Volatile Organic Compound.
Hassan:	VOC, okay.
Hamid:	There is a meter to measure this VOC. Initially they measured the VOC in our plant and it was very high plants. Then environmental organizations raised an objection. "This is hazardous to your health and to the atmosphere also, the ozone layer also." If you see going all the way in in our factory, we made a system to sack this problem locally and go with the filter so that the filter will absorb all the content. The VOC content has been reduced by 70% now.
Hassan:	Very good, very good. Do you think that this improve your social image as a company or ...
Hamid:	It will definitely because when any clients come we tell them that, "See, we have designed a new system which will support the ozone and will support ... "
Ali:	Sometimes our neighbour more than three kilometres from here, they make a complaint that a bad smell coming from your side." Once we make this, they stop complaining.
Hassan:	They stop complaining. Okay.
Hamid:	This is meant for them, they may just improve.
Hassan:	Okay, so your image in front of them has improved? Okay.

Ali:	Not only image. Actually also all image as ...
Hassan:	Operationally?
Ali:	Yes, as production, as workers, and health-wise we are good people.
Hamid:	We are using monitors outside to show the VOC coming from our product. We show this to all our employees. Before it was very high. That's something everybody is happy about
Hassan:	Thank you very much. Good information,
Ali:	I'm afraid I have somebody waiting for me also to go. We have only 10 minutes if possible.
Hassan:	I'll try to squeeze it. I'll try to squeeze it.
Ali:	I'm sorry.
Hassan:	That's fine. All right, so we're done with the eco design. The second practice is we call it environmental cooperation. Environmental cooperation is cooperation with suppliers and customers to steer eco design products, cleaner production, green packaging, and using less energy during transportation, developing mutual understanding of responsibilities regarding environmental performance and working together to reduce environmental impact. Again, the research did find that this impacted the environmental performance of the firm and such practices fail to improve the environmental performance of the firm. We're done with eco design.
	Cooperation with customers or suppliers should hit the organization to improve its environmental position, but the study didn't find this. What do you think the reasons for that?
Hamid:	No, I don't think this true
Ali:	It is very strange.
Hassan:	Strange. That's why we came to hear from you. It must be positive. It should improve but it's not improving.
Hamid:	It has improved actually
Ali:	This filter system which we made outside has cost the factory more than two million.
Hamid:	Two million.
Ali:	It's huge only for one item for environment but actually it's okay.
Hamid:	We spend a lot of money.
Ali:	The image is coming good and also the customers are feeling better, the companies dealing with us.
Hassan:	Did it impact the economic performance of your firm; working with suppliers and customers. You had your suppliers, right?
Ali:	Yeah.
Hassan:	... and you have customers and you cooperate with them on environmental aspects. Again, does it impact the economic performance of the firm? Does your cost go down?
Hamid:	Nobody raised an issue.
Hassan:	Nobody raised an issue?
Hamid:	Nobody raised an issue because our main clients like Abu Dhabi Sewerage Company and Abu Dhabi Municipality. Nobody has raised it to this extent, but when they come for audit and we tell them we have a system they say ok.
Hassan:	Again, did that impact the social ...
Hamid:	There is no gauge to measure the social
Hassan:	Okay. It might be you improved, it might be ...
Hamid:	It might be that we improved. It might be ...
Hassan:	... but there is no way to gauge it or ...
Hamid:	Yeah, might be improved. You can find that.
Hassan:	All right. The last practice is again what we call the green practicing. Green practicing is for example providing design specifications to suppliers that include environmental requirements for

	purchased items, environmental audits of suppliers. You go and audit your suppliers to make sure that they are environmentally responsible. Again, auditing the second tier suppliers for friendly practice evaluation and again selecting suppliers using environmental criteria and require suppliers to use environmental packaging such as degradable ...
Hamid:	Not to that extent
Ali:	Supply of material?
Hassan:	Your suppliers. Yeah, you as suppliers.
Ali:	Chemicals and mechanicals. Chemicals already have their own system they have to follow before coming here. When we receive the material, we have to make all the cases through being sure that it's material according to our specification or not. I don't think that these affect any way.
Hamid:	No. Mechanically we're checking the properties and this and that, but we're not checking are they following the practices of [crosstalk 00:18:43] system. What I think they really need ...
Hassan:	Yeah, green practicing is working with your suppliers.
Hamid:	We are not auditing them
Hassan:	... for the green practice, okay.
Hassan:	Generally, those companies who audit their supplies and they audit their second tier suppliers and they implement these practices, we did not notice any improvement on their, again, environmental performance or operational performance or economic performance or social performance. What do you think from your point of view can be ...
Hamid:	It has to improve. It has to improve.
Hassan:	It has to improve.
Hamid:	When you talk about environment, companies are spending a lot of money. You need an engineer for environment; you need somebody to audit the content. Investment and environment are in a different proportion. The government want to say, "You have to invest some money also."
Hassan:	You're right. Yes, yes.
Hamid:	In a way, at a glance, you feel that your investment will increase when you have a better performance. Still in this country, the maturity does not come to that extent.
Hassan:	Not much when it comes to that.
Hamid:	Not much, yeah. Like Australia for example. If you're supplying a pipe, you're putting a packing, there are specs for that. They're looking at it also.
Hassan:	They provide the specs.
Hassan:	I see. Okay. All the things they're supplied, you are a supplier to ...
Hamid:	Exactly.
Hassan:	They're protecting you and they are requiring you to use ...
Hamid:	Yes.
Hassan:	Okay.
Hamid:	They're telling us, "No. You're supplying to this company? Okay,"
Ali:	Maybe not direct from the companies, from supplier or from the customer, maybe from the ... in the policy of the company.
Hamid:	No works were coming secondary in terms of the investigation.
Ali:	It's not related to the companies, it's related to that country.
Hamid:	Country, yeah. Company will go hand in hand with institution.
Ali:	No. Maybe inside the country some people talking.
Hamid:	Possible, possible.
Hassan:	The interesting part I think those practices when we send the survey, most of the companies they said, "Yes, we are implementing, we are implementing," but when it comes to impacting the performance, there's no impact. There is no impacting. All these practices fail to impact the

	different dimensions of the performance.
Hamid:	This is an issue.
Hassan:	Yeah. Any idea where in the UAE we are implementing these practices by the firms to improve the performance?
Hamid:	What I feel is I have never seen a company in our recycling. We put a full-time man for environment. Now you are looking for this, you also fall in the wrong range and you are in for the production, but you follow your own range. Still companies are not investing full-time percent for their environment anyway.
Hassan:	To take care of all environmental matters, okay.
Hamid:	One is the business climate nowadays and the second is companies promoting the full-time manpower. If you invest in a full time man for environment, of course he will do other things. This might be these easy user end. Nowadays getting investment in environmental engineers out of the MB is just ...
Hassan:	It's difficult to get environmental engineer. Okay.
Ali:	If these expenses do not come back again to the company, it means
Hassan:	UAE is different from other countries. Other countries, as you said, Australia, they implement practices. They feel there is a differential social dimension, economics dimension, operation dimension but it influence eco design and environmental cooperation. They fail to impact the corporate different dimensions. The last one I think is reverse logistics which is using of re-manufacturing. Recovery of companies, end of life products and taking back packaging. Again does not impact the corporate performance. It only impact the social performance.
	The reverse logistics which is taking the products back to be re-manufactured or reused, it only impacted the social performance but not the environmental performance, not the operational performance, not the economic performance. What do you think about economic performance? If you take some products back and reusing them again, the logic states it should improve, right? It should bring your cost down.
Hamid:	Again the problem came to the same issue. We cannot recycle product.
Hassan:	That's it.
Hamid:	But this is good for the plastic manufacturers such as bottles manufacturers or plastic sheets manufacturers.
Hassan:	Even again as I said, even those who are reusing them, they are not achieving any improvement on any ...
Hamid:	They have to
Hassan:	Yeah, 0%. Okay. Thank you very much gentlemen for your information. It's very much appreciated. I'm very pleased and privileged to have this conversation with you. The end result of this research will benefit you in general
Hamid:	You have taken a very good field about your research.
Hassan:	Yeah.
Hamid:	This is for graduate or for masters?
Hassan:	It is for PhD.
Hamid:	For PhD.
Hassan:	It's for DBA, Doctorate of Business Administration and I selected this because it is important. The ozone layer degradation. Now ...
Hamid:	You are MBA already or?
Hassan:	I have two masters degrees. One supply chain and one international business. This is my DBA project and ...
Ali:	You are from?
Hassan:	I'm from Jordan.
Ali:	Jordan.

Hamid:	Jordan. I see.
Hassan:	Thank you very much gentlemen ...
Hassan	Yes Mr. Hamid.
Hamid	The business climate. Now if you make a project in any other GCC country, in Saudi Arabia or even made in UAE, if there is no practice of environment in Saudi Arabia or any other country not Saudi Arabia only, and too much rigidity in UAE so UAE has to put more money to make that product. If there is no environmental issue in any other country, they will make a cheaper product so the cost of the product will be cheaper in a country where you don't have much restrictions.
Hassan	Very good. Agreed.
Hamid	Ultimately in GCC the competition is from country to country. If I make a pipe of hundred dirham somebody can make it for eighty dirhams. He'll get the benefit. It is a very important point that the region should come up with the environment, not in the country.
Hassan	Okay so you mean they should all play on the same wavelength?
Hamid	The competition will be apple to apple otherwise somebody is making in any other country. If I'm making UAE sort of high class. Everything is high class.
Ali	In the same country, different companies but the scale of the company is different. Big scale of company's scale, our factory, and the small factory. If our factory follow the procedure of the environment and paid two million as this, it will not feel too much but going through the environmental procedure, feeling better as you said economically, and socially but for the small-scale company it cannot make it. This cover same point that Hamid said some company it's possible to make the same product with hundred, some is possible to make it with fifty. How come? The big scale and overhead.
Ali	This is the point so if there is a lot of GCC is working in the same platform, it makes sense.
Hassan	They will work mean same direction.
Ali	Now what is happening UAE, they are in a very high class. High level accommodation, high level standard of living. Everything is high level, environment and [inaudible 00:02:05] Comparative costs to another country, if somebody is making product in Bahrain or Saudi Arabia or Oman, he's making a cheaper product so how to tackle that issue?
Hassan	How to compete you mean.
Ali	Yes.
Hassan	Okay. Very good. Again thank you very
Hassan	Yes Mr. Hamid.



## COMPANY B

Hassan:	Good morning Mr Manoj, Manoj is the Production Manager for B.
Manoj:	Yeah.
Hassan:	My name is Hassan Younis, I'm doing research on the impact of implementing green supply chain management practices on corporate performance. We sent a survey in December 2014 to all manufacturing industries in UAE, including your company, and you responded to that survey. You filled that survey in. We really appreciate that, and we thank you for that. We analysed the results, so we got the results from the survey, and we put this through an SPSS system, to analyse the results. We wanted to discuss, and take your opinion on these results.
Manoj:	Okay.
Hassan:	Mainly, the research was intended to find the impact of those four practices, which are eco-design. Eco-design is nothing by designing an environment friendly product.
Manoj:	Yes, yes.
Hassan:	Does it not consume too much water, too much power, and so on. It's easy to recycle, easy to reuse. Environmental cooperation, so you work with your supply chain members, your suppliers, customers on environmental goals, to reduce the impact.
Manoj:	Yes.
Hassan:	Green purchasing is you order from your suppliers based on environmental criteria. You make sure that they are ISO certified. You work with them on common goals. Reverse logistics, you take back the product to be redesigned, re-manufactured, or recycled.
Manoj:	Yes.
Hassan:	We wanted to find the impact of implementing these practices on corporate performance. Corporate performance is of four damages. Environmental performance, environmental procedures, reduction in air emissions, reduction in solid waste. Operational performance improvement on the product quality. Reduction in the lead time, and the processes. Economic performance, economic performance of the firm is increasing the sales, improving the profit, and so on. Social performance is improving the image of your organization, enhancing the employee job satisfaction, and improving health and safety of employees
Manoj:	Yes.
Hassan:	We wanted to find the impact of those on those. Let us start with the first one, which is eco-design. As we said, eco-design is designing an environment friendly product that does not consume water and electricity, and is easy to recycle. Now it is said, theoretically, eco-design should positively impact these, right? The research did not find any relationship between eco-design and environmental performance. You implemented eco-design practices ...
Manoj:	Yeah, we implemented this.
Hassan:	... but it did not reduce the carbon emissions, it did not reduce the solid waste. It did not reduce...
Manoj:	It will reduce.
Hassan:	It should reduce?
Manoj:	Yes, yes, it will reduce. See, our process, we are consuming water.
Hassan:	You are consuming water?
Manoj:	Yes.
Hassan:	What do you produce Mr Manoj?
Manoj:	We are producing vitrified tiles.

Hassan:	Tiles?
Manoj:	Yes.
Hassan:	What do you call it?
Manoj:	Vitrified tiles.
Hassan:	Vitrified tiles, okay.
Manoj:	Yes. Technical as well, and glazed porcelain.
Hassan:	Glazed?
Manoj:	Yes, technical porcelain, and glazed porcelain.
Hassan:	Glazed porcelain. Glazed means?
Manoj:	Means tiles, those have a glazed surface.
Hassan:	Glazed, which is like glossy.
Manoj:	Yeah, light glossy, matte, inject, and the normal polished one. These are the basic products of our company. We are implementing ...
Hassan:	You implement eco-design?
Manoj:	Yes, eco-design. How we are implementing I will tell you. We are using some water to clean the equipment in the lines, to clean the flooring. This water we are not sending outside, this water we are recycling and cleaning, and then we are using in the production again
Hassan:	Oh okay.
Manoj:	These practices, from day one, we are using here.
Hassan:	Now those companies who use eco-design, like you, but they did not feel any improvement in their environmental performance. Their product is environmentally friendly, but there is no reduction in the carbon emissions, there is no reduction in solid waste. What can be the reason for that?
Manoj:	It will depend on the product also.
Hassan:	It might depend on the product.
Manoj:	Yes. We are producing tiles, so some of the companies they cannot use their wastes in their own products.
Hassan:	Oh, okay, so it depends on the product.
Manoj:	Product also. We are using the ceramic raw materials and water for the recycling material. Water is what the waste is of the materials. This is usable again, and ...
Hassan:	In the product?
Manoj:	Yes. Automatically once you are using the waste material, or recycling materials, which is come through the process, this one is integrated into the production again so you can reduce your resources, you can reduce the carbon emission, you can reduce the losses of, you know? This kind of practice we have in the ceramic industries.
Hassan:	Your product can be recycled?
Manoj:	Yeah, or product ... We have two stages. Stage one stage, is the green stage.
Hassan:	The green stage?
Manoj:	Yes. One is the fired stage. Green and fired.
Hassan:	Green and ...?
Manoj:	Fired, fired.
Hassan:	Fired.
Manoj:	Yes. Green stage means before firing, but we are producing any tile broken, or any losses in the process it will go through our reprocessing, so you cannot say this is waste. This will recover again, this will be again recycled, and again reused in the process. Whatever the loss is after the kiln ...

Hassan:	Yeah, after the ...?
Manoj:	After the kiln, there is also one possibility, this material also we can make ... Our standard size 600 x 600, 300 x 300, 900 x 900.
Hassan:	ok
Manoj:	Yes, Or meter x meter. If something going wrong, let's say the edge is cracked, and it cannot go as a meter x meter rectangle size, or a square size, then what we have to do, we have a cutting plant here.
Hassan:	A cutting plant, okay.
Manoj:	This one we are cutting from the side, making the shorter size, and selling to the customer.
Hassan:	Very good, okay. Since you implemented this green design, you told me your environmental performance has improved.
Manoj:	Improved.
Hassan:	There is a reduction in the carbon emission.
Manoj:	Yes, yes. This is depend on this one, the carbon emission, and the water consumption, natural resources, that we are using. If you don't have such kind of practices, then you cannot implement all these parameters. You are consuming water, whatever your waste is, this you are not controlling. It means there is no tremendous advantage in your process.
Hassan:	Okay, it's about that control, not only you implement it, you need to control that?
Manoj:	Yes, otherwise you will lose resources, and then there is no change, there is no ...
Hassan:	Okay, so in summary those who implemented eco-design practices, but they did not have their environmental performance improve, they did not have proper control of that?
Manoj:	Control, and they have to find some root cause why we have this kind of wastage. Even they are not able to control this wastage, they have to go through the market, they have to make survey in the market. Whether this kind of product we can sell. Even this is not achieving the absolute numbers, absolute quality level, but we have the market. This we can, instead of throwing away as waste, someone can use.
Hassan:	Okay, very good.
Manoj:	In a word, someone's waste, some maybe useful for them. This kind of practice we have to find.
Hassan:	Okay. Environmental corporation, we said that you work with your suppliers, you work with your customers, you work with every chain members to reduce the impact of the environment.
Manoj:	Yeah, yeah, we always ...
Hassan:	To have a common goal. Do you cooperate with your suppliers and customers?
Manoj:	Yes, yes, we have EMS 14000 certification.
Hassan:	Ah, okay, very good.
Manoj:	We know what is our environmental responsibilities.
Hassan:	You know, okay very good.
Manoj:	How to interact with your customers. We always refer to our ... Those are the vendors who join with us, those are the customers with us. We are selling in Europe and Latin-America, and other big customers, so they know. Without knowing these things, they will not deal with us.
Hassan:	Okay, very good.
Manoj:	We have all these environmental process in our company. We have all trained staff here, from time to time we have the internal audit, as well as outside audit. We are holding all these environmental procedures.

Hassan:	Yes, so back to eco-design, we said eco-design should, again, improve the operational performance of the firm but in fact it did not improve. See there is a dotted line. What can be the reason? We say operational performance product, quality improvement ...
Manoj:	This will be, you know, this is something measurable, something subjective. If you have subjectable you will not find any correlation between these two. You should make this process measurable.
Hassan:	Measurable, okay.
Manoj:	Okay?
Hassan:	Very good.
Manoj:	Measurable means what you are producing, how much you are consuming, what is your wastage? What is your absolute wastage?
Hassan:	Very good, okay. You mean those would not ...
Manoj:	If you are not have this kind of control inside your factory, you cannot see any difference.
Hassan:	Okay, very good. How about economic performance? Again eco-design, you told me you are just exporting your product to Europe, right?
Manoj:	Yes, yes.
Hassan:	Again, Europe they have strict standards when it comes to green, right?
Manoj:	Yes.
Hassan:	They don't accept any product, it must be ...
Manoj:	We have the third party inspection program with us. This is not assigned by us, this is assigned by our customers.
Hassan:	Great.
Manoj:	We are not interpreting to whom you have to assign to whom you have to come out to inspect us, they are independent to come us. They can check our product, and if we are complying all their standards, as the customer ask, then they are only releasing.
Hassan:	Okay, so why eco-design will not improve the economic performance?
Manoj:	No, it will improve.
Hassan:	It should improve the economic performance?
Manoj:	A hundred percent it will.
Hassan:	In case of those companies who did not feel any improvement, what can be the reason for that?
Manoj:	The reason is this, first thing they have to maintain one system, what customer need and what we are doing. They have to make one comparison. The customer requirement, customer need is very important. Once you are running any factory, any manufacturing unit, the customer is the end-point. If the customer is not happy you cannot feel any difference, you cannot do anything. First thing you have to understand what the customer wants.
Hassan:	Ah-ha, okay very good.
Manoj:	Then you have to check yourself, what you are doing. If these two things are not matching, you cannot go through the process. You have to be very careful about what we are doing, and what the customer wants. These both needs should be met. Keeping in the mind, environment, resources, all these parameters. Whatever the impacts comes through your process, any factory, any manufacturing unit, have the impact to the environment.
Hassan:	Okay, very good. In your case, you implemented eco-design practices, did you feel improvement on your economic performance because sales increased?
Manoj:	Yes, because you know these people will not buy from us, because they first inspect us, they will see what we are doing, what is our procedure? They will check our process

	parameters. They will say our ISO certificates. They will say who is auditing? What records we are keeping? Finally, once you have this kind of system, people will see you as a good manufacturer, then your overall image will be improved.
Hassan:	Okay, so this is the fourth dimension. The design should improve social performance.
Manoj:	Sure.
Hassan:	If it did not improve, what can be the reason?
Manoj:	The reason is this, it means whatever you are doing, whatever we are doing here in the factory, if the impact was to the society, and we are not advertising, we are not publishing to the local people and media, people doesn't know what you are doing.
Hassan:	Okay, so marketing ...
Manoj:	You have to be publicizing yourself, what it is you are doing in favour of society. If this message not goes to the society, how people will know what you are doing to the ...
Hassan:	Very good, how about health and safety of the employees?
Manoj:	We have the standard ...
Hassan:	Your design, again, I mean your product is a green product, you don't use too much hazardous material.
Manoj:	Yes, actually if someone has to use hazardous material in this area, we have some feeling the risk level, this is something wrong, then we are using the PPE, we are giving the training to them. We are making this hazard level as minimum as possible
Hassan:	Okay. Now moving to the second practice, which is environmental cooperation. Again, environmental cooperation, you work with your supplier, your customers, and agree with them on environmental goals.
Manoj:	Yes, yes.
Hassan:	Environmental cooperation should improve the environmental performance, right?
Manoj:	Sure.
Hassan:	Should reduce the carbon emissions to produce ...
Manoj:	Yes, if you are really doing such kind of practices, it will help a lot.
Hassan:	Why, in this case, it's failed to improve environmental performance?
Manoj:	No, the people really don't want to make it practically, they are going through all the, whatever is the EMS requirement, if you are not following, if you are not doing it, whatever your set goal. Every year we have some EMS target. This target, if you are working on paper, it does not help practically. You have to go practically.
Hassan:	Ah, so implementation?
Manoj:	Yeah, implementation is very important.
Hassan:	It's not only just the certification, but ...
Manoj:	No, no, this is something wrong, this is the reason.
Hassan:	Okay. How about the environmental cooperation ...
Manoj:	Will improve operational performance also.
Hassan:	It will improve?
Manoj:	Yeah, hundred percent it will improve.
Hassan:	Not economic performance, why economic performance?
Manoj:	No, economic performance is ...
Hassan:	It is increasing sales, improving profit?
Manoj:	Maybe the longer time it will affect your overall business performance.
Hassan:	Ah, including economic performance?
Manoj:	Yes.
Hassan:	You need to give some time for economic performance to be realized?
Manoj:	Yes, yes.

Hassan:	I see.
Manoj:	You will not such a huge, tremendous difference in a short time, it will be ...
Hassan:	Very good, great. How about environmental cooperation and social performance? Again, there is no impact
Manoj:	Yeah, yeah, this is also something like that. You are not giving the message to the community.
Hassan:	Ah, okay.
Manoj:	You have to put some big boards in front of the factory so people can read it, what is the environment policy, what we are doing. You have to do some such type of practices, anyone coming to your gate, anyone coming to your factory. You have to start this practice from gate, from here, so people will understand what is our ...
Hassan:	Okay. The third practice is green purchasing.
Manoj:	Yes.
Hassan:	Green purchasing it improves operational performance, which is product quality.
Manoj:	Yes.
Hassan:	It improves economic performance, increase it.
Manoj:	Yes.
Hassan:	It did not improve the environmental performance.
Manoj:	It will improve. I will show you, in our company if you will see, I have in [inaudible 00:16:06] more and more factories, number of factories are more and more. You never see our factory only have the trees around the wall.
Hassan:	The what?
Manoj:	Trees.
Hassan:	Trees, okay.
Manoj:	Yes, you see our factory have trees.
Hassan:	Trees, ah trees, okay.
Manoj:	Yes.
Hassan:	You grow these trees, to increase the oxygen, and to increase the ...
Manoj:	Yes, yes, the carbon level.
Hassan:	Okay.
Manoj:	People can do here what we are doing this all, you know our boundaries, if you will see five kilometre far, we are the one who has this green boundary.
Hassan:	A green boundary, okay.
Manoj:	We insist that every year we have this much quota to plant trees to make this green environment grow and grow.
Hassan:	In this case, you mean those companies, they not only need to implement green purchasing, but they need to go beyond that, and think of ideas. Such as yourself, and planting these green ...
Manoj:	Yes, yes, and whatever water which we want to throw outside, the same water we are treating, and we're giving to the trees.
Hassan:	Okay, amazing, amazing.
Manoj:	Whatever our toilet and washrooms waste water, drainage water, we are supplying to our trees. This is very good practice.
Hassan:	Very good. Green purchases and social performance, again there is no relationship. Again, you work with your suppliers, but it did not improve social performance. What can be the reason for that?
Manoj:	See, this is again, this is not direct impact to the business. These kind of things only you can gain, or you can achieve about your advertisement.

Hassan:	Okay, you need to advertise, you need to send the message to the society.
Manoj:	Yes, message to the community, then only people can know what is your game, or what is your idea.
Hassan:	Now reverse logistics is the last practice, it only improves social performance. Reverse logistics we said taking back product to be recycled, taking back the packaging.
Manoj:	Yes, this is very important, this is very important.
Hassan:	To the community they get to realize about these practices.
Manoj:	Yes, yes.
Hassan:	When it comes to environmental performance, there is no relationship? There is no reduction on carbon emissions, there is no reduction in waste. What can be done?
Manoj:	This is ... You know, any wastage if you are taking, and you are bring back to your process, your are using. I think directly you cannot relate it, but if you will see there is a relation. This wastage also comes from other industry. This waste you are using as a raw material, because for them this is wastage, for us this is a raw material.
Hassan:	Raw material, okay.
Manoj:	It means whatever percentage you are using, let's say you are using five percent, it means five percent you are using wastage of someone, which is raw material to us. It means that you are not using five percent resources, you are reserving the resource for future.
Hassan:	Okay.
Manoj:	Direct impact will not be there, but if you correlate this thing ... If you will correlate, because I am now using 95 percent raw material, I am saving five percent resources for future, natural resources for future use. It means there is something we are doing, this is favourable. It means direct impact is not there. We are buying this wastage from someone else.
Hassan:	You're buying it?
Manoj:	Buying, or we are taking free of charge.
Hassan:	Sometimes, okay.
Manoj:	Sometimes free of charge also we are taking. How it will be correlated? It can be correlated annually, once the factory who is giving this material to us, if they have such kind of study, such kind of system, then they can show this one. That we are giving five percent of our wastage to this company.
Hassan:	Okay, so those firms who implemented reverse logistics practices, and did not get their environmental performance improved, is it because marginal improvement cannot be measured, or ...
Manoj:	It seems to be the people that are working under this EMS system. They have this kind of internal practices, then they will make this better, and they can study, they can find some
Hassan:	Okay, so they need to properly measure this?
Manoj:	Measure this.
Hassan:	Measure this, okay.
Manoj:	Again, this is subjective. If you have anything measurable, you can see that, subjective things you cannot see.
Hassan:	I see. How about, again, operational performance, there is no relationship. They didn't find any ...
Manoj:	No, no, this is also very important. This is also operational performance means ...
Hassan:	Product quality and ...
Manoj:	No, no, I will tell you, I will explain. If I am using five percent of waste, this waste is somehow I have X, Y, Z stages of process, and this material already passed through X stage, then I'm going to add Y stage. One stage I already bypass, one stage already I

	cross through.
Hassan:	Okay.
Manoj:	If you have ... You have to be recognized the process, you have to go through the process. This X raw material I am taking from this one, this is the wastage of someone, and this I will be add in my Y stage, not in X stage. Operation performance will be improved, because you are not doing one process. You already ...
Hassan:	Oh okay, reduced the return.
Manoj:	Yes, yes.
Hassan:	You reduced the return because one process is already ...
Manoj:	Yeah.
Hassan:	You're right, it should improve, but why it did not find this relationship?
Manoj:	This we have to go through the proper record. This we have to go through make one proper record, one proper data, then you will find all this correlates.
Hassan:	Let me ask you one question Mr Manoj, so product that came from a recycled material, and the product that came from raw material, in terms of quality, are they the same quality?
Manoj:	No, it may not be.
Hassan:	It may not be. Which one will be better quality, is it the one from the recycled, or the one ..
Manoj:	It depends what kind of product you are making.
Hassan:	Let's talk about the tiles, in your case.
Manoj:	Yes, yes.
Hassan:	You have two pieces of tiles ...
Manoj:	In tiles it will not harm anything.
Hassan:	Okay, so quality will remain the same, or the one will be ...
Manoj:	Yes, yes, if you have some certain percentage, means you cannot go varying the percentage. Let's say if I can use five percent waste, means five percent. If I'm using six percent, definitely it will harm.
Hassan:	Okay.
Manoj:	We have to go with the proper research and development, and proper product, unless it's the final quality will not be harmed, whatever the customer wants, this is standard parameters we have to follow.
Hassan:	Okay.
Manoj:	If we are not following, then we should not use a lot, we have to be minimizing our ...
Hassan:	You think that reverse logistics should improve the operational performance, should improve the product quality?
Manoj:	Sure.
Hassan:	In case there is no improvement, there might be something wrong with the implementation, or ...
Manoj:	They don't have the proper research, they don't have the proper development in the factory. They have to go through with their own data, own process. I'm not claiming to everyone, but some of the process you can do this one.
Hassan:	Okay. Now for those recycled materials that you bring back to production, do you need special equipment to treat them?
Manoj:	Yeah, yeah.
Hassan:	There must be some special equipment, you cannot use the same equipment to produce?
Manoj:	No, no. There maybe ...
Hassan:	This might be the reason for no improvement in economic performance, because you are incurring costs, right?



Manoj:	No, in the ...
Hassan:	Economic.
Manoj:	Any practice, loss and profit and the capital expenditure of recycling waste materials, these all how much things should be valued, should be checked through in proper financial, practical way. What will be the return pay back time, and what will be the ... Definitely it will be recovered.
Hassan:	There is always a cost for treating those recycled ... There is a cost?
Manoj:	Yeah, but it will be recovered.
Hassan:	It will be recovered, okay. Again, you said we are taking these products sometimes free of charge, free of cost, right? Sometimes you pay ...
Manoj:	Yeah, yeah. Payments ... we are not paying the cost of material, we are paying only the transport logistic charges.
Hassan:	Transport, so you're incurring cost to get those recycled materials back to the production.
Manoj:	Yes. Let's say our tiles, whatever the waste is, treatment plant, whatever the solid waste is coming, this we are consuming in our gypsum plant.
Hassan:	Ah, okay.
Manoj:	Whatever we are wasting here from tiles, this one we are consuming in our gypsum factory. Our waste is useful for them, and we are also taking something from here, and we are trying to use five percent from other companies waste in our industry. This research is always going on.
Hassan:	What is your raw material Mr Manoj?
Manoj:	Basically we use the minerals.
Hassan:	Minerals?
Manoj:	Yes, natural minerals like soda feldspar, potash feldspar, China clay, ball clay, these are the basic raw materials.
Hassan:	You import it from China and ...
Manoj:	China, Ukraine, and Iran, Turkey, Iraq.
Hassan:	Okay, then you process it, and you export to ...
Manoj:	Yeah, then we are exporting to all these GCC countries, European countries, Spain, Latin-America, Taiwan, we are supplying around the globe. We have more than 50 countries to export to. This is our product.
Hassan:	Very good, thank you very much Mr Manoj, I think we covered all the items in the interview. Thank you for your time, it's much appreciated, useful information.
Manoj:	This is my pleasure.
Hassan:	I would like you to just take me quickly through ...
Manoj:	Yes, yes, sure.
Hassan:	Thank you very much, I appreciate it.

## COMPANY C

Hassan	<p>So, good afternoon, Mr. Philip. As I discussed over the phone, we are doing research on the impact of implementing green supply chain management practices and corporate performance. We sent you a questionnaire one year ago, which you responded. Thank you for that. However we have some results that we wanted to share with you and take your opinion on these results.</p> <p>Basically, the model that we had is implementing those four practices - which are: eco-design, environmental corporation, green purchasing, reverse logistics - on four dimensions of corporate performance, environmental performance, operational performance, economic performance, social performance. Our research didn't find any relationship between eco-design and environmental performance, operation performance, economic performance, and social performance and found an impact of environmental corporation on operation performance. It found also that the green purchasing politically impacts operation performance and economic performance but not environmental performance and not social performance whereas the reverse logistics impacted only social performance.</p> <p>We just wanted to take ... We'll go through them one by one and we'll take your review. We'll take your opinion from your point of view what will be the reason for that. Basically when we say eco-design, eco-design is nothing but design of reduced consumption, design of products for reuse, recycle, design of products to avoid or maybe reduce the use of hazardous products and material, and design of processes for minimization of waste. From your opinion, Mr. Philip, why do you think that eco-design did not impact any of those performance dimensions? That means - those companies who implemented these practices we just mentioned - the eco-design failed to impact the environmental performance on the firm. The environmental performance of the firm: reducing air emissions, reducing waste water, reducing solid wastes, reducing consumption of hazardous material, reducing the frequency of environmental accidents. The implementation of eco-design did not reduce any of these things. What, from your point of view, might be the reason for that?</p>
Philip	Recording for this environmental performance ...
Hassan	Environmental performance of the firm. Those firms that implemented these eco-design practices. Did it not feel any improvement or the research not find that these practices did improve the environmental performance of these firms?
Philip	For me in my opinion regarding toward the recycle - you are telling regarding for our material recycle - if we are trying to recycle our injection or something, I think we need to invest more machinery for this one because what we are doing here is not able to recycle. We are sending this one as a scrap.
Hassan	Scrap, okay. Mr. Philip you manage the productions. You are the production manager.
Philip	Production in-charge.
Hassan:	Production in-charge, okay. Eco-design - I mean designing a friendly product as I mentioned to reduce the consumption of water, to reduce the consumption of wastes theoretically it should improve the environmental performance of the firm. It should, I said, reduce air emissions, it should reduce the frequency of environmental incidents, but again as you can see here it failed to improve the environmental performance of the firm. It did not physically reduce the carbon emissions. It did not reduce the waste water, so ...
Philip	No, our processing here is beyond this kind of environmental performance because ...
Hassan	Do you measure carbon emissions?
Philip	We don't have here. What we are doing here is only for electricity. This is the one thing.
Hassan	Electricity?
Philip	Yes, because all of our machinery now is made by automation ...
Hassan	They are automated.

Philip	Fully automated, so we don't have any by create environmental ... What do you think ...
Hassan	Yes, again, from my own point of view we said eco-design - designing environment-friendly products - should improve the operation performance, right? It should improve the economic performance. It should improve the social performance. The research finds that this particular practice, which is eco-design of product, did not improve the economic performance. What do you think from your point of view? What can be the reason for that? Economic performance means improving profit share, improving ... Let me just define it here. For example, economic performance is decreased cost of material purchasing, decreased energy consumption, decreased water discharge and treatment, decreased fine for environmental accident and improves return on sales, improves average profit and profit growth and average market share. The implementation of eco-design, as reverse logistics, did not improve the economic performance of the firm.
Philip	Is this really related from this?
Hassan	I mean, yes. The research, as I said, is to measure the impact of implementing these practices on those dimensions of the performance. The research found that environmental corporation impacts operational performance positively. It did not impact environmental performance. It did not impact economic performance. It did not impact social performance. Green purchasing impacted operational performance and economic performance. It improved the operational performance. Green purchasing is working with your suppliers or to green their operations, selecting suppliers based on environmental criteria. This practice improved operational and economic, but it did not improve environmental performance. It did not improve social performance, so any idea from your point of view what might be the reason? Is it problem in implementation, did not implement the practices well, is it?
Philip	Yes, that is possible. That is possible regarding for the implementation because, for example, here in our company we have lack of capable person to do this one.
Hassan	So you didn't have dedicated people to ...
Philip	There is dedicated but not more than enough to comply this kind of things.
Hassan	Do you cooperate with suppliers? Do you work with your suppliers and customers on environmental goals or environmental-related matters usually?
Philip	Yes, of course, because before we buying materials from them, at least we have some certificate.
Hassan	So you ask for some certification.
Philip	Yes.
Hassan	Okay, so you implement the green ... This would fall into green purchasing, so when you ask the suppliers for certification, this would fall into green purchasing, so you work with them. The research did not find that green purchasing impact the social performance. Social performance is the corporate image. It's employee job satisfaction, if employees are fine with the company they're working for and again the image of the organization is enhanced by ... But the research didn't find that green purchasing impacted the social performance. Any reason from your point of view?
Philip	No.
Hassan	How about reverse logistics? Again, reverse logistics only impacted social performance but not economic performance. Reverse logistics is again taking back the product to be re-manufactured, reused, and taking back packaging. You know the packaging?
Philip	Yes.
Hassan	This is called reverse logistics.
Philip	Reverse logistics.
Hassan	Yeah, theoretically reverse logistics should improve operation performance, should improve economic performance, should improve environmental performance, but the research found that it only improved the social performance, so what do you think from your point of view Is there a reason for that? Do you use packaging in your ...
Philip	No, we don't have any packaging, just only loading. It's not like ...
Hassan	So what do you manufacture, Mr. ...
Philip	It's DPE pipe, so ...

Hassan	It's pipes?
Philip	Yes, pipe, and we are not doing for packaging, just only for finishing. We would take that one as a finished product then after that loading.
Hassan	So it's pipes.
Philip	It's DPE pipe and steel pipe.
Hassan	Steel pipes, it's used for what, for sanitary and ...
Philip	District Cooling.
Hassan	For District Cooling only?
Philip	Yes, District ... If you heard about Tabreed company, we are the one who supply to ...
Hassan	Oh, you supply to Tabreed with these types of pipes?
Philip	Yes, only for the district cooling.
Hassan	So you don't recycle any of these materials or reuse or ...
Philip	That's why I called it ... If we are trying to recycle the materials, we need to buy some or to invest some good equipment, and it's very costly. Maybe we need to buy same with the more machinery, something like that. That's why we are doing this one only for selling as a scrap.
Hassan	So you sell it as a scrap.
Philip	Yes, especially for the jackets only - it's DPE materials - but for recycle it's processing that you make for new product, right? So this is very difficult for us as long as we don't have any good facilities for new machinery. We are totally compacted.
Hassan	Okay, all right. Very good. Again, as I said, the reverse logistics only impacted social performance but did not impact any other performance dimensions. From your point of view what might be the reason for ... As I said, your factory, when you take back packaging, reuse it, re-manufacture it, or take the product back, you should benefit, so those companies who did not feel any improvement on economic performance, what might be the reason? Was there any cause maybe associated with making the product reusable, re-manufacturing the product, and that's why there was no economic benefit?
Philip	Possible, we can repair something like that, but for recycling, it's not possible for us. We are not producing here like a small box.
Hassan	Ah, so you are producing a big box.
Philip	Yes.
Hassan	Okay, are you 14001 satisfied?
Philip	Yes.
Hassan	You are satisfied.
Philip	If you want some information I will call our QA manager
Hassan	He has got some information on this?
Philip	Yes, he is good regarding for this kind of question.
Hassan	Okay, maybe you can call him.
Philip	Okay, I will call him.
Hassan	Okay.
Hassan:	So again, good afternoon.
Anil	Good afternoon.
Hassan:	Can you answer these questions?
Anil	Pardon?
Hassan:	Your good name?
Anil	Anil, Anil.
Hassan:	Anil, and you are ...
Anil	I have been here for almost 10 years
Hassan:	Okay, so you are the QA manager?
Anil	Yeah.

Hassan:	Okay, very good, for the same organization, okay.
	My name is Hassan Younis, I was discussing with your colleague, and we have a research trying to measure the impact of implementing green supply chain management practices and performance.
Anil	Okay.
Hassan:	We sent you a survey a year ago, we got some results and we thought of coming back to you and discussing, showing you these results, taking your opinion.
Anil	Okay
Hassan:	There is no confidential information.
Anil	Okay.
Hassan:	Just your opinion.
Anil	Do you have any copy of the report we sent you?
Hassan:	Yeah, this is the survey that we sent you a year ago, we asked you some information on your location and your total amount of employees and so on. Then we started asking you about the green practices that you are currently implementing and the impact of these practices on corporate performance.
Anil	Mm-hmm (affirmative).
Hassan:	Basically as I said the research is to measure the impact of those 4 practices. Eco design, which is designing an environmentally friendly product. Environmental corporation, nothing but working with your supplies and customers on environmental goals. Green purchasing, selecting suppliers based on environmental criteria and certification and Reverse logistics, taking back packaging, taking back products for recycle use and such.
Anil	Maybe interesting
Hassan:	Yes, yes. Again, we wanted to measure the impact of those 4 practices on different dimensions of corporate performance. By the performance means, did the company manage to reduce carbon emissions, reduce waste water, solid wastes and so on. Preparation of performance, reducing the read time, improving the quality of the product. Economic performance improving profit, improving return on sales, reducing again the cost of purchase materials. Social performance, improvement of employee job satisfaction improvement of corporate image.  Maybe I can start with the first one which is Eco design. As you can see the research did not find that eco design impacted any of those 4 dimensions. I mean Eco design, designing an environment friendly product, did not reduce the carbon emissions for example or the solid waste or water waste. What from your point of view might be the reason for that?
Anil	Actually I do not know. Who sent those input from EPPI to you?
Hassan:	Yeah, yeah. In general, from your point of view, other companies, not even your own factory, generally, the implementation of such practices, theoretically it should improve the environmental performance. Why in the research that is said, "Did not find any relationship."
Anil	You are the one who done the research right?
Hassan:	I was the one who sent this to you and to other companies.
Anil	Who done the research here?
Hassan:	I think maybe Phillip Marcus, he replied to me.
Anil	Phillip Marcus has done the research?
Hassan:	Yeah, but the questions as I said is not confidential. We didn't want to get information from you, general opinion. As a QA manager, what can be the reason for that
Anil	The Eco design?
Hassan:	Eco design, it doesn't have an impact. There is said it does not have an impact of Eco design ...
Anil	That's wrong.
Hassan:	That's wrong?
Anil	Yeah.
Hassan:	So it should improve the ...

Anil	Yeah, the systems should have a better impact on the environmental performance, right? For example we have emissions here have ozone emissions are there, these things maybe.
Hassan:	Okay, what other kinds of record is there? I know at home basically ... we said Eco design, we just mentioned eco design, designing a product that can consume less water, less electricity, can be easily recycled, degradable maybe. This is Eco design products.
Anil	Okay, in such case we cannot redesign our product because this is a standard product. For example pipe, we cannot redesign a pipe because ...
Hassan:	Is there Eco friendly pipes of carbon steel? It's carbon?
Anil	Its carbon steel pipes.
Hassan:	Carbon steel pipes, carbon steel pipes.
Anil	We are procuring that pipe from outside then we are insulating it and then we are selling it.
Hassan:	Okay.
Anil	If you want to tell me to have an alternative for it, it will be beyond our scope.
Hassan:	Okay, so ...
Anil	For example if you ask me, "Why don't you change the particular form to another form?" Yes, that is a question. That is possible.
Hassan:	If you do that you think your environmental performance should improve for example?
Anil	Well I would say environmental performance in the sense, we have emissions in paintings.
Hassan:	How about solid wastes and water wastes
Anil	Solid waste yes. We have solid that is taken by regular skip services. Then if you asked me about water use we don't use that much of water also. There is not that much water, only for the sanitation purpose and as skip cooling. Cooling the use, but it's not that much smaller what we are constantly making.
Hassan:	Generally speaking a good design should improve environmental performance, right?
Anil	It should.
Hassan:	I'm really shocked now, in our case it's does not improve. What will be the reason? You want those companies that did wrong for the environmental performance not to be improved. There must be something wrong in there, right? If you are up against ...
Anil	Maybe they used a lot of companies having a partner which has no direct impact, maybe that could be a reason.
Hassan:	Okay, so they have an ...
Anil	For example plastic bags, maybe that's applicable there.
Hassan:	Yes.
Anil	We do have to have a design, something alternative to plastic. Maybe of a chase that the product of paper type
Hassan:	Yeah.
Anil	Then that happened in back of that moment, but in industry wise it is difficult. Maybe consumables, maybe there are chances; I cannot tell you at the moment what you can alternate or what you can propose it.
Hassan:	Okay, again Eco design on operational performance, I mean pressure performance means improving the product quality, using the right time.
Anil	Yeah.
Hassan:	There must be a good relationship, but again the researcher find that Eco design improve the pressure performance. What can be the reason for that?
Anil	Not improving the performance?
Hassan:	Not improving the operational performance, again operational performance we said is reducing the lead time improving the quality of the product. Theoretically speaking having an Eco design product should improve the quality of the product. Again, the research didn't find that it improved the quality. Is there a reason from your point of view?
Anil	No, I have no idea about it.

Hassan:	Okay. How about Economic performance? Should it improve the Economic performance? I mean profit and return on sales
Anil	Sorry?
Hassan:	Should it improve the Economic performance as well? The profit.
Anil	Yeah, I know, I know. Probably there is impact.
Hassan:	Again there is said that it did not find this impact.
Anil	I have no idea how come that, reverse logistic. It has an impact here, right?
Hassan:	It should impact but the research found that it only impacted social performance. Social for improve the corporate image, improve the ...
Anil	There were no connections? I don't know who has done all these surveys and something went wrong there, I cannot tell you.
Hassan:	Yeah.
Anil	Reverse logistic, yes. If there is a reverse logistic there should be an impact on environmental performance. With reverse logistic for example you are buying a lot of chemical drugs and then you are sending it back, this chemical drug back to supplier.
Hassan:	Yes.
Anil	Then that means you are not dumping this hazardous material to any yard or something. That means it has an impact on that moment.
Hassan:	Ship them back?
Anil	Yes.
Hassan:	So those companies who did reverse logistics did not feel any improvement on their performance, what can be the reason for that?
Anil	Maybe they are not measuring it.
Hassan:	They are not measuring it?
Anil	Yeah.
Hassan:	Okay, they are not measuring it. If you measure only you would know that, okay.
Hassan:	How about reverse logistics and economic performance? It should improve the ... it should reduce the cost right?
Anil	It should reduce the cost yes. Especially chemical waste we send it to waste management companies and they will take and you have to pay to them to take the waste.
Hassan:	I see.
Anil	That's why it might save you if the supplier can take it back and reuse it or recycle it or they can use it again. Economically we have savings there.
Hassan:	Okay, but sometimes the companies they send it to recycling company and then pay. They pay and that's why they are not improving their corporate performance. Is this what you are trying to say?
Anil	What I'm trying to say that, for example we are receiving chemical drums here, okay?
Hassan:	Yes.
Anil	We want to dispose it. If you want to go in the proper way I have to call a company, approved by CWA and then they will collect it. At the moment they are claiming that there is something but at the moment nothing is there even the government also knows that, they are not here. They are trying to facilitate something for next 6 months.
Hassan:	Yes.
Anil	Okay, I really couldn't go. They have to collect it, such company has to collect it.
Hassan:	Yes.
Anil	We have to pay for the company to collect it.
Hassan:	You are incurring cost to different of these.

Anil	Yes.
Hassan:	Okay, agree.
Anil	If this company can take it back, the same supplier who supplied the drums to us can take it back free of charge, they can look like the same product there and then they can use it for their product.
Hassan:	Yes, how about reverse logistics and operational performance I mean?
Anil	Operational performance wise reverse logistics, the definition of reverse logistic basically taking back, re using materials, re-manufacturing, using the packaging as well. This is also all what reverse logistic is all about.
Hassan:	Operational performance maybe you said ...
Anil	Should improve the product quality or have convenience them. The moment they supply it and we consume it they can take it back. They will have less burden the control of all these things. Ideally operation wise we have improvement probably yeah.
Hassan:	Those companies would not get this improvement. What went wrong there from your point of view? For those who use those reverse logistics practices, but did not feel that operation performance has improved?
Anil	Maybe they are right.
Hassan:	Did they do something wrong?
Anil	Maybe their measurement.
Hassan:	Their measurement again?
Anil	Yeah. My product is you cannot measure all these things.
Hassan:	The way they measure the performance was not correct?
Anil	Probably.
Hassan:	Okay. The second practice is environment of corporation. Environment of corporation is working with your suppliers and customers on environmental goals.
Anil	Okay.
Hassan:	The research found that environmental corporation impacted operational performance. Environment corporation improved the product quality, reduced the lead time, improve the processes, but did not improve the environment of performance. It did not reduce the air emissions and did not improve the Economic performance. It did not improve the social performance.
Anil	The dotted line is there is not improvement.
Hassan:	Yes, yes, no improvement. Only black line where there is improvement.
Anil	You are trying to find an answer
Hassan:	Yes, I need to answer, I need to find an explanation for the companies who we sent the survey to. From your point of view, why environmental cooperation failed to improve environmental performance?
Anil	Environmental cooperation ...
Hassan:	Cooperation means working with your suppliers to produce an environment from the projects, putting common goals, working with them towards a common goal, achieving a common goal. These practices did not help improve the environmental performance.
Anil	Environmental performance?
Hassan:	Yes, from your point of view. What can be the reason for that?
Anil	That will be a reason, maybe measurement are not correct. They are not adequate resources in these companies to measure all these things. Blindly they say, "Not improved." When the survey is here, "What happened?" At the take, we will think it and take it, we are not collecting data.
Hassan:	They don't have resources.
Anil	Resources ...
Hassan:	Resources mean dedicated staff to look after environmentally.
Anil	Yes. That could be one of the reasons
Hassan:	Yeah. How about environment of corporation and Economic performance, again there is no relationship.



Anil	Economic performance.
Hassan:	It should, the correct performance is reducing the cost of the purchase material, improving your profit, improving your sales ...
Anil	Environmental cooperation.
Hassan:	Yeah, virtually is working with your supplies. Working with your supplies and customers to produce environmentally friendly product.
Anil	Okay.
Hassan:	This is environmental cooperation.
Anil	The customers mostly they are choosing supplier based on the price so if they change the strategy to look for suppliers who are having all these management systems in place and he will take material from this particular supplier only, because they have environmental compliance there.
Hassan:	Yeah.
Anil	Then there will be an impact. At that moment most of the customer they choose the product based on the price.
Hassan:	You mean okay, I see. Adding the environment that ask for the product will increase it's price and ...
Anil	Correct.
Hassan:	... then the companies will not Economically get any benefit.
Anil	Correct.
Anil	I see, but whatever I do for environment and emissions are reduced, but still my customer is looking at product which is cheaper than the others. You then have the criteria, they can change the criteria and they can conduct audit or something like here, then there will be an economic developing impact.
Hassan:	How about social performance? Again, environmental cooperation working with supplies and customers to produce an environment in a friendly conduct and working for a common goal. Should improve the social performance but again ...
Anil	What is your reference of your social performance?
Hassan:	Social performance, improving your corporate image, enhancing employee job satisfaction, so you are satisfied that you are working for an environment friendly company that are not harming the environment. This is social performance. Again, did not get improved. Working with suppliers and customers had no impacts on the corporate image and had no impact on the employee satisfaction and employee safety What from your point of view, again, might be the reason for that? Is there something in your mind?
Anil	That why the companies the environmental of corporation, which again?
Hassan:	Working with suppliers and customers for example together on a common environment and goal to produce an environment friendly product.
Anil	I don't see any. This is similar to what I said. Maybe all are looking at the prices.
Hassan:	Again, we are talking about the corporate image, you are working with suppliers and customers but the external people are reviewing your company and there is no difference. The company image within their mind remains the same, there is no improvement. They are working with suppliers, they are working with customers. What might be the reason?
Anil	Why there is no improvement in social performance?
Hassan:	In social performance, I mean for example ...
Anil	Social performance of EPPI or?
Hassan:	Yes, general, in your case for example. Let's assume that you as EPPI worked with your suppliers and your customers to produce an environment friendly product.
Anil	Okay.
Hassan:	You expected that the image of EPPI will improve, but after a year or 2 there is no changing of the sales, the same view in the mind of your customers demand about your EPPI. What can be the reason for that? Even internal employees they did not see any improvement on their safety, they did not feel any improvement or job satisfaction.

Anil	Maybe your regulations are not as tight as what you see in US or Europe.
Hassan:	Regulations are not tight.
Anil	Yeah.
Hassan:	You mean not only you need to implement environmental corporation to improve the image of your organization, there must be regulations, right? It will help you to enhance the social performance]. Without the corporation alone, won't be sufficient to improve the corporate image or improve employee satisfaction and eventually the social performance of your firm without government regulations to cover. Okay.
Anil	Correct and inspection too
Hassan:	There is no inspection?
Anil	They come here, inspect and rewrite something and then they are gone.
Hassan:	That's it?
Anil	That's all.
Hassan:	Okay, okay. There is no strict rules when it comes to ...
Anil	Only in the paper. The strict rule will come when there is no license available. Top management will see there is a problem.
Hassan:	Yes.
Anil	Another thing is working smoothly, no problem, no problem. Let it go as it is.
Hassan:	Okay, okay.
Anil	When something is there that you cannot proceed this, which you are not complying to that, then ultimately we start to go in that direction.
Hassan:	I see, okay, okay.
Hassan:	Very good, thank you very much.
Anil	Yeah you're from government?
Hassan:	No as I said I'm from the University of Wollongong in Dubai doing my research on the this subject
Anil	Okay, as part of your course?
Hassan:	It's part of my ...
Anil	Project?
Hassan:	... project to complete this ...
Anil	Masters, you are doing a masters?
Hassan:	PhD.
Anil	You are doing a PhD?

## Company D

Hassan	<p>As we discussed over the phone, we're doing research to measure the impact of implementing green supply chain management practices on corporate performance. We sent you a survey, December 2014, which we send it to many manufacturing companies in UAE. One of the companies filled the survey was Neopharma. Again, we thank you for filling this survey in. The purpose of this survey is to motivate other businesses to go green and to implement green practices.</p> <p>Basically we have four types of green supply chain management practices. We have four types, which is eco-design, environmental cooperation, green purchasing and reverse logistics. We wanted to measure the impact of implementing these practices on four dynamics of corporate performance: environmental performance, operational performance, economic performance and social performance. Four practices against four dimensions of corporate performance Theoretically. we thought that those practices will positively impact those dimensions, so, if you as a company implement eco-design, your environmental performance should improve, your operational performance, economic performance and social performance. In fact, environmental cooperation found to impact operational performance, but didn't impact environmental performance or economic performance or social performance. Green purchasing impacted operational performance and economic performance, but not social performance and not environmental performance. Whereas reverse logistics impacted social performance positively, but not other dimensions.</p> <p>Maybe we can start with the eco-design. Eco-design is defined as design of products for reduced consumption, consumption definitely of water and power; design of products for re-use, recycling; design of products to avoid and reduce the use of hazardous material; and design of processes for the minimization of waste. From your point of view, being in manufacturing industry, what do you think the reason for eco-design not to impact, for example, the environmental performance? Environmental performance is nothing but reduction in carbon dioxide emissions, reduction in solid waste, reduction on water waste, and so on.</p>
Praveen	We, in our company-
Hassan	Yeah?
Praveen	We are producing general wastes and medical waste
Hassan	So you are producing different types wastes
Praveen	A different type of waste, rejected tablets all those things.
Hassan	Yeah?
Praveen	It comes under hazardous
Hassan	Okay.
Praveen	So we are disposing through third-party.
Hassan	Third party.
Praveen	Yes
Hassan	Okay. Yeah.
Praveen	general waste must such as plastics
Praveen	Green third-party. They even take care of the general waste-
Hassan	So as an eco-design-
Praveen	And paper and cardboard, all those things, we are into the recycle party, called Aldhafra They will take care of the recycle and then money back. They will give the money back
Hassan	Okay. As an eco-design, do you implement eco-design? Eco-design, as we said, you design a product-
Praveen	Eco-design...?
Hassan	As I said, design of products to minimize waste, minimize carbon emissions, the product itself is eco-friendly. Do you consider this ... Do you implement such practice in your manufacturing?
Praveen	In the ...?
Hassan	Your industry ... You are into pharmaceuticals, right?
Praveen	Yes, that's right.

Hassan	You manufacture all types of tablets and medicines-
Praveen	Yeah, that is totally a separate department that we have to discuss other-
Hassan	Okay. Very good. From your point of view, those companies will implement these practices. As I said, they designed the product to minimize the generation of waste, to minimize the consumption of water, to minimize the consumption of power. They implement such practice, but they ... This practice, which is eco-design, failed to improve their environmental performance. Failed ... What do you think the reason, from their point of view? Why such practice failed to improve their corporate, I mean, environmental, performance, social performance, operational performance, economic performance. Let's take with operational performance. What can be the reason for eco-design not to impact environmental performance?
Praveen	It could be that they're implementing from the ..
Hassan	We said eco-design is implementing environment-friendly products, so the product does not consume too much water, does not consume too much power-
Praveen	Mostly awareness I mean, what will from the eco design who will do
Hassan	The company. The company implemented-
Praveen	Yeah-
Hassan	This practice-
Praveen	Yeah-
Hassan	Theoretically, their environmental performance should improve-
Praveen	Proper implementation
Hassan	But it did not improve. So what do you think the reason, from your point of view?
Praveen	That, what we call that-
Praveen	Proper way at the management level-
Hassan	Okay.
Praveen	Support of management.
Hassan	Oh, okay. Lack of management support-
Praveen	Yeah, lack of management support.
Hassan	They did not properly implement this practice, you mean?
Praveen	This, starting from the management.
Hassan	Okay.
Praveen	Without management supporting, you can't do any thing
Hassan	No improvement, okay, no improvement will take place.
Praveen	People are more listen to the authorities who's ... If authorities will implement, it will-
Hassan	Yes. They'll benefit
Praveen	When is support from management-
Hassan	From the management. Okay. How about, again, operational performance? Operational performance is improving product quality. Implementing eco-design practices, eco-friendly products, should improve the quality of the product, should reduce the lead time, should improve the process. Again, eco-design failed to improve the operational performance. What do you think the reason for that?
Praveen	Operational?
Hassan	Operation. We said operational performance is improving product quality, improving processes, reducing lead time.
Praveen	Lack of resources
Hassan	It should reduce the lead time. Should reduce, for example, if you're manufacturing a product and sending it to the market in thirty days, implementing eco-design should make it within twenty days, fifteen days, and so on, and should improve the quality of the product. What can be the reason for not improving the product quality?
Praveen	Product quality improvement
Hassan	As a result of eco-design implementation?

Praveen	Quality improvement
Hassan	How about economic performance? Economic performance: for example, increasing sales, right? If you design a green product, you expect that your sales will increase, definitely, because people are now looking for, right, environment-friendly products. Again, implementing eco-design did not improve economic performance, so the sales did not improve.
Praveen	Performance increasing will happen slowly like
Hassan	I mean, there is-
Praveen	Slowly? Slowly. Slowly.
Hassan	Slowly? You mean, by time economic performance will improve?
Praveen	By time.
Hassan	Ah, okay. By time, economic performance will improve?
Praveen	Yeah.
Hassan	Okay. How about social performance? Social performance is enhancing employee job satisfaction and enhancing health and safety, improving the corporate image. Again, eco-design failed to improve the social performance of the firm
Praveen	Health and safety is very important for the production purpose
Hassan	Yes.
Praveen	Because it is indirectly linked to the profit of the company and indirectly helps to improve health and safety.
Hassan	Ah, okay. Okay.
Praveen	That is not directly. That is not directly causal-
Hassan	Okay-
Praveen	To health and safety, like that.
Hassan	Okay. Again, now, improving the corporate image-
Hassan	Eco-design should improve the corporate image.
Praveen	reduce accident, into the product quality aspect-
Hassan	It should improve?
Hassan	Yeah, as health and safety ... So minimize the accidents, and-
Hassan	Very good, but the research failed to find any relationship. You're right, so eco-design should improve the corporate image, employees should be satisfied, but the research didn't find any relationship. What can be the reason for that?
Praveen	Marketing of these practices
Hassan	Marketing, you mean, the organization is not marketing their initiatives? That's why this is not improving the corporate ... Oh, I see.
Praveen	Yes
Hassan	Mm-hmm (affirmative). Okay. The second practice is environmental cooperation. You, as a company, you work with your suppliers, you work with your customers to improve the product, to make it, to reuse it, to re-manufacture it, and to ... You work with them for a common goal.
Praveen	Mm-hmm (affirmative).
Hassan	Again, this practice failed to improve the environmental performance. The companies they work with, their suppliers and customers, they cooperate with them, but there is no reduction in carbon dioxide emissions, there is no reduction in wastes, although they work with their suppliers and customers. What do you think ...?
Praveen	Which practice?
Hassan	We said, environmental cooperation, by definition, working with your suppliers and customers. You work with your suppliers, you agree on common goals to reduce the waste, to improve the product quality. But when it comes to environmental performance, there is no improvement on the environmental performance. There is no reduction in waste; there is no reduction in carbon emissions.
Hassan	So again, Mr. Praveen as we discussed, environmental corporation is working with new supplies and customers on common environmental goals to reduce waste so produce an environment friendly product and so on. So implementing this practice failed to improve the environmental performance of the Thames. Failed to

	reduce, for example, carbon emissions. Failed to reduce ... Waste and so on. What can be the reason?
Praveen	No, not waste like that.
Hassan	The research didn't find a relationship.
Praveen	Research you find like that.
Hassan	You can find the relationship. So there must be something wrong, right? There must be something wrong from this. What do you think from your point of view is the reason for that?
Praveen	Because of that people are not getting aware or involved
Hassan	Yeah.
Praveen	And they're going forty times.
Hassan	Yeah. And we're talking about environmental corporations. So you have a new pharma. You work with your supplies and customers. And you agreed to come aboard. And then you implemented.
Praveen	That we have to discuss with that particular department.
Hassan	Okay. So let's see, how about green purchasing. Green purchasing. Is that you overtake your suppliers. You search suppliers based on environmental criteria. If you are ISO 14001 certified for example, I will work with you. So if you implement green practices, and you evaluate your suppliers ... This is a practice that you implement. So green purchasing relatively impacted operation performance. Positively impacted operation performance. But it began to impact environmental performance. No reduction on carbon emissions, no reduction in waste and so on.
	Any idea why green purchasing ... Why would they think suppliers working with them in green initiatives failed to improve the company environmental performance? Failed to produce their emissions? Any ideas?
Praveen	Green practices.
Hassan	I mean green purchasing. Green purchasing.
Praveen	I don't know green practices like that.
Hassan	You don't audit your suppliers or you don't evaluate them
Hassan	So you pick your suppliers based on quality?
Praveen	Quality department ... They'll
Hassan	Oh, they ...
Praveen	Yes, this department did an invoice.
Hassan	Okay, so green purchasing failed to improve the social performance ... You as a company implemented the green purchasing you are auditing suppliers are asking them to have certifications. But when it comes to social performance ... Improving corporate image, this did not improve the corporate image. Did not enhance employee satisfaction. Did not enhance employee health and safety. So what do you think is the reason for that? Why green purchasing and why working with suppliers, and ordering them and helping them to become green did not improve the corporate image?
Praveen	They don't have health and safety proper policy.
Hassan	They might not have.
Praveen	Yeah. They have to ... They have to implement and ... What do you call? Execute health and safety policy and explain to all employees
Hassan	Uh uh. Okay.
Praveen	So it's come from management.
Hassan	How about corporate image?
Praveen	Corporate image also comes.
Hassan	Should improve, right? When you implement ... When you implement green practices. It should improve.
Praveen	It should improve.
Hassan	But it is not improving. What can be the reason for that?
Praveen	Lack of company ... What do we call ...
Hassan	Uh huh. Okay. Just give some time for the improvement to take place.

	Reverse logistics is taking back a product. To be a remanufactured or reused. Do you take back your products?
Praveen	No.
Hassan	You don't. So, you are You don't take...
Praveen	No, no.
Hassan	What packaging? Do you cover packaging?
Praveen	To send it.
Hassan	But you sold it.
Praveen	Yeah, yeah.
Hassan	Usually.
Praveen	I only reject the materials.
Hassan	Just reject it.
Praveen	Yeah.
Hassan	But I mean, okay.
Speaker 2:	Some companies take it back
Hassan	A material back. So what do you do, I mean, when you take this back?
Praveen	Some companies
Hassan	Not your company, okay. Usually...
Praveen	Some companies don't take anything back.
Hassan	Usually reverse logistics is taking back product. To be remanufactured or reused, or to be properly disposed.
Hassan	Or returning the packaging, for example, you return the carton and external packaging. So again, the reverse logistics. Reverse logistics, those are definitely in practice and push performance, as per the research. So it's enhanced the employee satisfaction, it's enhanced the corporate image, but did not improve the economic performance. So there is no increase in sales, there is no reduction in cost and so on. Any idea why reverse logistics did not improve economic performance?
Hassan	Reverse logistics and economic performance.
Praveen	Slowly it should improve.
Hassan	So it will improve by time?
Praveen	Yes by time.
Hassan	Okay.
Hassan	How about operational performance. It should improve the product quality. So again, it will need sometime. It won't happen overnight.
Praveen	Yes it needs time
Hassan	Okay. How about environmental performance again. It should improve the environmental the performance. But they're not improving. Instead they didn't find any relationships. Only with social performance. As per the dotted line, there is no relationship. It did not improve the environmental performance. It did not reduce the carbon emissions. It did not reduce the waste, and so on.
Praveen	Management support is required
Hassan	So it needs the management support to improve the performance
Hassan	Very good. I think we covered everything. So again thank you Mr. Praveen. You are the health and safety manager for Neopharma?
Praveen	Yes

## Company E

Hassan:	Again, thank you very much Mr. Abdul Shakur for receiving me in your office.
Abdul Shakur:	You are welcome. Yeah please.
Hassan:	My name is Hassan Younis I'm doing a research targeted towards finding the impact of implementing green supply chain management practices on corporate performance
Abdul Shakur:	You called me.
Hassan:	I called you, yes yesterday.
Abdul Shakur:	Yes.
Hassan:	Yeah. We just wanted to find out the impact of implementing green supply chain management practices on corporate performance. We focus on the manufacturing industry. We sent you a survey a year ago which you filled and you provided your contact information for further details.
Abdul Shakur:	Yeah, absolutely yeah.
Hassan:	We have 12 questions.
Abdul Shakur:	Would you like some coffee please?
Hassan:	I'm fine. Water should be fine.
Abdul Shakur:	Coffee.
Hassan:	Water, just water. Basically our research is to find the impact of those 4 practices which are eco-design, environmental corporation, green purchasing and reverse logistics. On those 4 dimensions of corporate performance. Initially, we believed that there must be a positive relationship, you as a company or you as a manufacturing industry. If you implement these practices, you should feel improvement on the environmental performance. You feel improvement on corporate performance, social performance and operational performance.
	In fact eco-design which I will just tell you what it is all about, didn't impact environmental performance. It does not impact operational, economic or social performance. Same as environmental corporation. It only impacted operational performance. It didn't not impact the environmental performance, the social performance, the economic performance. Whereas green purchasing impacted operational and economic performance, finally reverse logistics impacted social performance.
	Let me just tell you what do I mean by eco-design. Eco-design is simply designing products to reduce the consumption. Design products for reuse, recycling. Design products to avoid or reduce use of hazardous materials, and design of processes for minimization of waste.
	The implementation of these practices didn't impact environmental performance. From your opinion what do you think the reason for that?
Abdul Shakur:	I didn't get the question.
Hassan:	Okay. We said if we implement green practices, I mean eco-design. Eco-design is designing a product that is environmentally friendly.
Abdul Shakur:	Exactly.
Hassan:	This product ...
Abdul Shakur:	You are talking about the design or your usage of this?
Hassan:	Yeah, it's good eco-design. Eco-design is designing a product that is easy to recycle, easy to re-manufacture, to reuse, a product that does not consume too much water or too much power, too much electricity. When companies implement such practice and implement its design practices, did that feel any improvement on the environmental performance? Environmental performance means this implementation does not help them reduce air emissions or waste water or solid waste, or reduce consumption of hazardous material.
Abdul Shakur:	How come! We are having some performance improvements actually when we are producing the eco or the eco-designed products, whether they are recycled material or using the recycled



	materials. Some other way, it will help the environment to avoid the waste factor but not always. Actually, we are using recycled material. Second thing, once we are using this actual material somebody else is also benefiting
Hassan:	You are using in your product
Abdul Shakur:	That means I am helping to reduce the impact on the environment
Hassan:	Awesome.
Abdul Shakur:	You will simply keep dumping it and just creating it, building up the waste cage. Powers are required to manage the place, so I'm taking it.
Hassan:	You are taking it. You are implementing this practice.
Abdul Shakur:	I'm a manufacturer; I'm the one who's taking the material, so I'm helping someone to reduce their waste. They are not wasting any power, to shift the material, the cost I reduced. They are gaining something from the waste; they are earning something from the wastes. Economically they are developing as well as environmentally as they are not keeping the waste.
	In this circumstance, somebody is telling there's no use, nothing is there. There is a plus and minus is there but there are so many merits and finally the merits will come. A case in point because I'm using this wastage, which he has to go and dump somewhere.
Hassan:	You are right.
Abdul Shakur:	Find something to transport, handling. Of course they have to do it, which now they are using to generate revenue.
Hassan:	For them.
Abdul Shakur:	Rather than throwing out, they are generating the revenue. At the same time they really don't have any waste with them. It's a product they have.
Hassan:	I agree to your point.
Abdul Shakur:	Somebody is telling there's no use, which I cannot agree.
Hassan:	When we put this information, information that we gathered from the survey, went to the system and asked the assistant to find the relationship. It looks that there is something missing. The system did not find this relationship. That's why we said we'll go back to our sample, we'll go back to you as a manufacturer, and that's the end.
	We'll ask you, from your point of view, why do you think implementing these practices failed to improve the corporate performance, economically, environmentally, socially, and operationally?
Abdul Shakur:	Actually, we are functioning, we are performing economically. Environmental we are performing better. Socially I didn't get you
Hassan:	Socially means that the image of your organization has improved.
Abdul Shakur:	Yes, it has improved.
Hassan:	People are feeling more comfortable to work for your organization because you are an environmental friendly organization.
Abdul Shakur:	Yes, so true.
Hassan:	There is no hazardous material. Safety is there.
Abdul Shakur:	Exactly. Socially much has gone up because we are using this cycle and the people are understanding what is the purpose of the setup we are using, and people are following us. Actually I am the first person to do this kind of recycling which is non-hazardous, declared as non-hazardous in Dubai and Abu Dhabi municipalities after that.
	I was also the first man to recycle the material, now everybody is using my material Yes, of course it will go up. It's not a failure. People are starting to understand what is it in wastage, how can they reuse it and save the environment
	To reduce the waste, actually the waste has to be used in the running industries, not design an industry to recycle the material.
Hassan:	I see.
Abdul Shakur:	We have to shoot that material to some other running industries, which will be very useful for

	them. I guess some of the slag waste for the industry. There's a slag waste, they are coveted to aggregate, which can be used for road work. I believe this is better than the natural aggregate I believe because of the density and the design of the aggregate, being a requisite, the molecules and other things. Because if you receive it, if you go in there technically, physical property and chemical property that will be better than the natural aggregate because It will hold the load.
Hassan:	To be honest this is what we got. Let's move to the second practice which is environmental corporation. Environmental corporation is nothing but corporation with suppliers and customers for eco-design products, cleaner production, green packaging using less fuel during product transportation. Developing a mutual understanding of responsibilities regarding environmental performance, and working together to reduce environmental impact of activities.
	Again, those practices when the companies implemented these practices, it looks they did not see any improvement on the operational performance.
Abdul Shakur:	Exactly.
Hassan:	Only on the operational performance but no improvement on the environmental performance. No improvement on the economic performance, no improvement on the social performance. From your point of view, what do you think is the reason why? If you work with your customers or your suppliers on environmental again practices, as we said to minimize the waste or to improve the product quality and so on. Why do these fail to improve the corporate economic performance?
Abdul Shakur:	Because the amount actually. I want to say the amount of the recycle; nobody is going to use 100%. We cannot convert 100%, we cannot. If they were using this material, they will be a part of the material. The ingredient, it will be enough ingredient. It cannot hold.
	As a 100%, they cannot use that material, recycled materials, so certain percentages there.
Hassan:	Only certain percentage.
Abdul Shakur:	Certain percentage only they can be able to use. They cannot use 100%. Secondly, the power of what is going to be used for version the same is going to be used for this work. It cannot release any water.
Hassan:	Okay, so it will be the same?
Abdul Shakur:	Absolutely the same.
Hassan:	Awesome.
Abdul Shakur:	Because I am replacing some percentage from this to that. Economically it's very beneficial.
Hassan:	It could be beneficial.
Abdul Shakur:	Definitely. Because in recycle there's always a value that surround this, the virgin material normally. That sort of material, original material, whatever it is. Economically of course it will be beneficial, but on the saving side, will not be, will not be having any.
Hassan:	Okay, so there will be no saving on the energy consumption.
Abdul Shakur:	Nobody can save energy if they are using this.
Hassan:	How about environmental performance of the firm? They can see that it improves their environmental performance.
Abdul Shakur:	Definitely there'll be environmental performance actually. Actually directly it may not be able to but indirectly it's performing enormously. Environmental aspects, it is maintaining, it's doing good.
Hassan:	They are not reducing the carbon emissions. They are not reducing environmental accidents for example.
Abdul Shakur:	You are taking about certain particular industries
Hassan:	Yes
Abdul Shakur:	It's because some of these particular products may generate emissions. Some recycled products may not generate, so it depends on the recycled and also the material. In general as per this, as per me, if you go for the recycled waste material, reduce waste, it will reduce risk. Use recycled materials, recycle your waste. It will definitely improve, economically and operationally. Environmentally it will do also.

Hassan:	I see. How about social performance?
Abdul Shakur:	Definitely, because if you are doing something good, something that protects the environment
Hassan:	I mean working with your suppliers and customers?
Abdul Shakur:	Definitely the people will support us, government will support. Now we have a very good name in this market because we are using recycled materials. We were the people who started this. We have the name today also with my supplier.
Hassan:	Where do you supply?
Abdul Shakur:	He's the man at the top of the company. If we are having any shortage, he will first give to me. Now everybody wants to take the material, so they will not be able to get it, just like this.
	Secondly, which company is generating this waste? Those companies, really they are reorganizing better because they are helping environment, because the environment bodies are putting pressure on them, sitting on their heads. By recycling their materials they are not having trouble, they are earning money.
Hassan:	I agree.
Abdul Shakur:	So they are benefiting environmentally, operationally, socially and economically.
Hassan:	How about environmental corporation? It only impacted operation performance. It failed to impact the social performance. It failed to impact it. There must be a reason why it. Either there is not enough awareness for example.
Abdul Shakur:	Awareness, possibly awareness.
Hassan:	Awareness. They are receiving the attention that they should receive from government organizations, XYZ company, rock and cement industries.
Abdul Shakur:	Yeah, that's why. As you see, I'm pressuring my supplier to give me a certificate too.
Hassan:	Yeah, certificate, okay.
Abdul Shakur:	The person who introduced me to it is in the market and it was thoroughly inspected by all the federal, municipality authorities. Thoroughly checked. It's declared as a non-hazardous material. They forced them to take all this. They hold the certificate. It's all running smooth actually.
Hassan:	Now how about the green purchasing? We said the green purchasing is providing design specifications to suppliers that include environmental requirements for purchase items. Environmental audit for suppliers and evaluation of second tier supplier. Suppliers are selected using environmental criteria, and they require the supplier to use environmental packaging.
	Again, when companies implemented this green purchasing practice as we just mentioned, auditing their suppliers, auditing second tier supplier. Asking them to use environmental friendly products. They did not see any improvement on the environmental performance or social performance. I mean they did not see any improvement for example as we said, emissions, carbon emissions. They did not see any improvement.
Abdul Shakur:	Yes of course
Hassan:	There'll be some emissions, okay.
Abdul Shakur:	There'll be some pollution
Hassan:	Pollution.
Abdul Shakur:	How to control the pollution. I'm going to earn 10 dirhams because of this recycled material. and ready to spend 2 dirhams on the emission control. That is our strategy.
Hassan:	I see.
Abdul Shakur:	Normally in our case, while handling the material, definitely some dust emission will come, dust will come. We are using recycled material, which may harm, which may. This and only dust is coming everywhere this is also there. To avoid that, we have made a system to reduce the emission because we have kept a blower sucking the dust and pumping inside the water, run downing the sediment. We are collecting 90%. Actually even we are performing better now, rather than using the natural way, virgin material.

	With the recycled material, we have really worked on that to control the emission; this is recycled material I mean already processed. We may have it more harm than the other one, the natural one. They have to in the sense, if there is somebody is telling, there is not beneficial, they are not trying to study and control the emission from what they are seeing.
Hassan:	I see, okay.
Abdul Shakur:	We are saving something now. Actually we have made good savings and now we can spend on controlling the emissions. Yes, I agree, there is emissions but now more controlled
Hassan:	I agree. How about the social performance? Again they do not feel that green practicing practices, otherwise what can the supplier or the customer, benefited their social image.
Abdul Shakur:	Awareness and awareness.
Hassan:	Lack of awareness is the reason for it?
Abdul Shakur:	Lack of awareness. The system is a good system
Hassan:	The last practice is repair logistics, use of re-manufacturing, use of free manufacturing, the recovery of company's end of line product, and taking back packaging. Again companies will prevent these practices. These practices only impacted the social performance, so it looks that they got rewarded by the community, by the organization, but the reverse logistics practices were just mentioned. They failed to improve the environmental performance of the firm. They failed to improve their operation performance. They failed to improve their economic performance.
	What do you think is the reason for that? Taking back packaging or using re-manufacturing or recovery of the company's end of line products, did not help them improve their operational or environmental or economic performance.
Abdul Shakur:	Not sure how they are telling that
Hassan:	The system that we put the information in, which is the SPA system, the system did not find any relationship.
Abdul Shakur:	Who is finding difficulty actually? Let me know. I didn't find any difficulty. Socially, there's not much awareness in this area, but the whole people know that. Actually awareness is not there, that's why they don't know about this.
Hassan:	Operational. Improving the product quality, improving the lead design for example to the market. Improving the processes.
Abdul Shakur:	Guess what? They should know how to shoot the product, the recycled product with that existing process line. They should be have the knowledge to study them. We need a lot of studies and we shoot the product, so we are doing well
Hassan:	Are you using the repackaging?
Abdul Shakur:	Packaging no, repackaging no
Hassan:	Re-manufacturing any product?
Abdul Shakur:	Re-manufacturing yes, re-manufacturing the final product. We are producing some kind of wastes we are recycling it again. Actually we are adding some cost. We are incurring a cost.
Hassan:	Some cost, okay.
Abdul Shakur:	To recycle it, then in using it, which is really a benefit of the company. The amount of the material we are recycling will save some amount of the natural material. The cost is going to be very different. Certainly, some emissions are there, yes of course, your systems must control such emissions, which you have to invest. People may not be having interest to invest. They may not be able to adapt to the system with the existing one. They may not be able to shoot in the system.
Hassan:	This might be the reason for them not getting the benefit of this.
Abdul Shakur:	Yes, totally we are keeping away. We've shoot over it, that's all. Each industry having a different status. They may not do with that process line, their sequence, their recycling. They may not be able to implement. They may find it difficult to implement because it takes high cost to implement.
	They skipping over that, they are moving away. Nobody wants to take this.

Hassan:	Okay, then I can understand from your answer that those companies who implemented reverse logistics practices and they got their social performance improved, they just implemented this practice for the sake of telling the community that we are environment friendly. They did not implement it the way they should implement it, so they can get their operational performance improved, their environmental performance improve, and their economic performance improve.
Abdul Shakur:	See, as for me, whatever we are introducing, the raw material changes, process changes, which is helping the recycling. Green water initiatives should help the company.
Hassan:	They should help the company improve their ...
Abdul Shakur:	Definitely
Hassan:	Unless you are doing it for the sake of telling the community that I'm environment friendly, I'm re-manufacturing, and I'm doing repackaging.
Abdul Shakur:	No.
Hassan:	In this case only, the social performance then should be improved.
Abdul Shakur:	Only for the social performance.
Hassan:	The other performance okay.
Abdul Shakur:	They will not be improved. Actually they have to shoot for that material into the existing processes. We should rank continuously, then the organization will get operational benefit. The plant will benefit with the water we are using. It'll really get successful.
Hassan:	Okay. Thank you very much Mr. Mohammad Abdul Shakur.
Abdul Shakur:	Welcome.
Hassan:	Very nice information. As we said, this research should benefit all organizations in UAE. Our goal is to motivate organizations and businesses to implement the green practices. We wanted to tell them, if you implement these practices, those are the benefits you are going to get, and it will help you and will help the entire region to become environment ...
Abdul Shakur:	Simple. Everybody wants to have an easy life. They are not interested. When we started, we had a lot of difficulties, quite a lot of problems with missionaries and the processes but we didn't give up.
Hassan:	... You didn't give up.
Abdul Shakur:	We didn't give up because if this succeeds, it's going to do enormous benefit to the company. We want to have, further we have developed our systems. We spent alto of money on that environmental benefits.
Hassan:	Very good.
Abdul Shakur:	We shoot to the product, the recycled product to have a process.
Hassan:	How long have you been in business?
Abdul Shakur:	Basically in this, totally 25.
Hassan:	25 years.
Abdul Shakur:	As an engineer, working as a general manager. The particular product I'm talking about, so 18 years.
Hassan:	18 years, okay. Thank you very much again for your time.
Abdul Shakur:	You are welcome.
Hassan:	Have nice day.
Abdul Shakur:	Thank you very much.

## COMPANY F

Hassan:	Thank you very much, Mr. Meer, for seeing me in your office today. My name is Hassan Younis. I'm doing a doctorate of business administration. My research is focused on the implementing of green supply chain management practices on corporate performance. We have some questions, uh, we will be appreciate if you can help us find answers for these questions.
Meer:	Surely.
Hassan:	Can you just introduce yourself?
Meer:	My name is Meer Mahdi Hussein. I am from company F I am here the purchasing manager
Hassan:	Oh, okay. Okay. Okay. Thank you very much. As I said, Mr. Meer, now we have four practices, as well as we have four dimensions of corporate performance. We sent you a survey, like, a year ago. Thank you for getting that survey. Now we believe that a dramatic boost for green practices, which is eco-design, environmental cooperation, green purchasing, green reverse logistics, should have a positive impact on the four dimensions of the corporate performance. For example, eco-design should improve the environmental performance, should improve operation performance, economic performance, and social performance.  So if we can start with the first practice, which is eco-design. Now why you think eco-design practices, such as design of products for reduced consumption, design of products for reuse, recycling, design of products to avoid overuse, use of hazardous products, and design of processes for minimization of waste, did not impact the corporate environmental performance. I mean, these practices did not help the organization reduce air emissions, reduce waste water, reduce product waste, reduce consumption of hazardous material, and reduce frequency of environmental accidents and improve the company overall situation.  So the company that we implemented these practices-
Meer:	Okay.
Hassan:	Did not see any improvement on the environmental performance of the organization. As we mentioned, did not reduce emissions or wastewater or some waste or production of hazardous materials.
Meer:	Not like that. Normally, it will be increased. For example, we are using reduced paper.
Hassan:	Okay.
Meer:	We are sending the documents by mail all together. So there we have found with eco-design that we will save the paper and the thing is there. So digitally we are transferring the data. So the way you are transferring, it will reduce the environmental effects. It will not affect the logistics, and all
Hassan:	Okay, so eco-design, it has to do with the product.
Meer:	Yeah.
Hassan:	For example, the geometry of the product, the product will not consume much water, not consume much ... Now, the companies that implemented these practices, they did not get any improvement on the environmental performance. I mean, the air emissions did not get reduced. The waste did not reduced
Meer:	No, we have set emission policies.
Hassan:	Yeah.
Meer:	Abu Dhabi government, they are specific on that front. There should be some kind of noise pollution rules there, and emission noise, which would be calibrated year over year. Every year, there is some maintenance practices there so that we can reduce these things. It will help to improve. So normally, it will be very useful. If you are implementing ecosystem in your company, it will give you benefits one day.
Hassan:	Yeah, yeah. Very good, but the companies that did not get benefits, so is there any reasons

	from your point of view? Have we made some issue, I mean-
Meer:	It's only minor effect on that one, but it will be .. You cannot see the effect directly. It will be indirectly helpful for you. For example, if you implement these kind of ecosystems so that levels those who are working, they will get benefit because there is some. For example, the sound, the emissions sound. There should be some kind of limitation. If you can go beyond that, that person will lose their hearing from constantly-
Hassan:	Okay, so this is the social impact, which is this one, employee. So from point of view in eco-design, eco-design improves the social performance.
Meer:	Social performance, uh-huh, of the employee. Not only the social things. It will improve the company's policies, also. For example, the production, and it will impact on all the things. For example, if a person who can improve these things, he can do directly all the things, and in transferring the environmental information's like ecosystems, like that, they can share the information between all the climates in the top level to the end user level. We can pull it, and we can use these things as a digitally, so it can be improved more.
Hassan:	Again, those companies who implemented those eco-design, as we mentioned, redesigning the product to be environmentally friendly, they did not feel any operational performance. They did not improve their operation performance. I mean, you ... Redesigning the product to be an eco-product did not help them improve the quality of that product, did not help them reduce lead time, did not help them to improve the ... What do you think, from your point of view? Has it to do with the implementation? Has it to do with the timing?
Meer:	There should be some time frames there.
Hassan:	Time frames.
Meer:	Time frames. There should be time frames there.
Hassan:	They should allow some time?
Meer:	Sometime so that you can-
Hassan:	Wait and realize the benefits.
Meer:	The benefits, yeah. Definitely. For example, if you're doing one product, means you should have some time to redo from one stage where steadily it will be transforming. Finally, the end product will come. So once it is going to wait, the entire thing, it will be teamwork. So once the teamwork will come, so it should be some kind of operational procedure. So through that, we can avoid these things, and we can follow these rules, so it can be easy.
Hassan:	Okay. Now again, on the economic performance, they did not find any, it did not improve their economic performance. I mean, it did not increase. So when they implemented these eco-design practices, they changed the product into more environmentally friendly product that is not consuming too much water or too much electricity. And again, it did not feel any economic benefit. What formula do you believe might be making up for that?
Meer:	No, it's having some reasons, but economic performance; there is some, basically, the product which we are doing. The product should have some kind of reuse-ability.
Hassan:	Reuse-ability, yes.
Meer:	Reuse-ability and it should be eco-friendly, also.
Hassan:	So these, I mean, changes to the product, it will increase the cost of the product?
Meer:	Yeah, it will increase.
Hassan:	That's why those companies didn't not see a benefit.
Meer:	They did, they're increasing.
Hassan:	They don't realize these economic benefits because the cost increased, right?
Meer:	Yeah.
Hassan:	When they implemented more green practices and, okay. How about social performance? Again, those companies who implemented these green, as we said, eco-design practices, they did not see any improvement in their social performance. I mean, social performance should not

	be that their corporate image improved or their employee positivity increased-
Meer:	No, no, no. It's not like that. It will definitely give a good mark on your company. For example, basically if you are coming from outside, you will see that company is eco-friendly and they have all the ISO 14001 certifications, you know? Then they can think that this company is going to support the labourers and they are taking care of their health also.
Hassan:	Right, and so-
Meer:	Not only the work. They are concentrating on their personal life. That is their taking care of health also.
Hassan:	Right, agreed, so-
Meer:	It will be giving social performance.
Hassan:	But those companies, I mean, interestingly, they did not find that improvement. So what's the reason for incorporating these benefits?
Meer:	They are financially not enough to support these kind of things. Maybe, I feel that, financial reasons. That is the reason because some small companies that do not have to be-
Hassan:	You mean they did not market their selves? They did not prepare for some marketing campaigns?
Meer:	Campaigns, and they do not have the funding to support, sufficient funds for-
Hassan:	To market themselves.
Meer:	Yeah. Market them.
Hasan:	Okay, so, although they implemented such eco-design practices, but-
Meer:	They should have some kind of-
Hassan:	Funds to market these, these things. That's a good point. That's a good point. Okay, the second one is the environmental cooperation. Again, environmental cooperation, we say environmental cooperation, you cooperate with your suppliers, you cooperate with your customers. For example, when you have a project with your customers and they specify the specification of the product. You think this might not be environmentally friendly, so you go back to your suppliers, "No, I won't use these." Sort of with the use and the effort, for example. So environmental cooperation is working with your suppliers and customers for environmental goals. Those companies who implemented environmental cooperation practices, I mean, those who worked with their suppliers and customers, they found that the operational performance improved. The product quality improved. The process improved. The time reduced. But no impact on environmental performance. I mean, there is no reduced air emissions. There is no reduced wasted. What do you think the reason for that?
Meer:	Maybe the reason is because they take time.
Hassan:	Again, time.
Meer:	Time.
Hassan:	Okay.
Meer:	Time to go through the steps.
Hassan:	Get these benefits.
Meer:	Get these benefits. Maybe it's the time frame. Normally, there should be some kind of chain of reactions is there. We should be carrying out these things. We should be noting down when it's going to be productive.
Hassan:	On the correct, therefore, once again, operational performance fine, economic performance, there is no increase in this, so again, I mean, if you work with your suppliers and your customers on environmental aspects of your product and ... You should expect to get some economic benefits, but they did not get their economic performance improved. What do you think the reason for that?
Meer:	Actually, maybe again it can be some kind of reasons. For example, management related reasons may be there.



Hassan:	Okay, hold on just a second.
Meer:	Yes.
Hassan	Okay, so again, we go back to as we said about the environment of cooperation, they did not benefit -
Mr. Meer:	They did not have benefits because of the reason why Because of benefits. For example, if the company, they're implementing this affecting this, and it takes, sometimes delay. For example, they would not, maybe, have this kind of system in that site, the supplier, from the customer, those who are having So, they maybe prefer time to be ... change their system. Accordingly too much tax and delay, in the work. For example, if you are giving them work. So we are doing that work, and you are coming here for the inspection. During that time you will need to check all of those documents. What do you have? Do you have the facilities to manufacture this ... There is some kind of information which you need more. During that time it will be time delayed ...
Hassan	It's just the environment of this corporation is nothing but working with your suppliers and customer. So they worked with this supplier and customer, and they agreed to something, but those companies, they did not get any economic performance improvement. Means, they did not improve their profit, they did not improve the average sale, they did not improve these things ... Market share ...
Mr. Meer:	Actually, all of these things are all for management, they have that they ... What you call ... It was some kind of ... For example, you would have good reputation in the field. You have to gain that thing, maybe they can go for it. First of all, if you are financially good at stuff, then you can go for it. Otherwise, these people normally hear that the people's mindset is to reduce the cost. They are looking always where it will be given for them unless they will go for it. Maybe that's the reason why economically they are not checking these things and they are overcoming these things and they are going directly to ... That's the reason why it is not benefiting.
Hassan	Economically, they are not benefiting. We implemented ... We worked with our suppliers, we worked with our customers to improve the product specifications, but economically, we did not benefit.
	Now again, for the green purchasing. Green purchasing, again auditing your suppliers, making sure you are working with your environment and the suppliers. You don't purchase from any supplier ... They must be environmentally friendly, they might have some environmental management type of thing. They might have type certification.
Hassan	The company who implemented these green purchasing practices ... Their operational performance improved, their economic performance improved, but not their environmental performance. Air emissions did not get reduced, waste water did not get reduced, service waste wasted did not get reduced, so what is the reason for the ...
Mr. Meer:	Maybe again, you see the reason for manpower, maybe. Those who are well trained personnel. There should be some kind of person ... they should have well trained. According to the green ... The ecosystem.
Hassan	Yes, there should be one person looking at the environmental ...
Mr. Meer:	Companies should appoint a resource to manage green related matters who should be taking care of these things and who should train all other persons in the company on how green practices must be deployed and then only things can improve
Hassan	I see, okay, okay, very good. How about in the end ... The social performance, those who implement the green purchasing practices, as we said now, they audited their suppliers and asked them to be environmentally friendly, having ISO certification ... The social performance of these firms did not get improved.

Mr. Meer:	Yeah, I agree.
Hassan	The corporate image did not get improved.
Mr. Meer:	Did not get improved, because, you know the reason, because nowadays everybody, they are doing these things. Every company, they are checking, auditing everything.
Hassan	Oh, okay.
Mr. Meer:	It is now normal. Only paperwork like that is going on. There is no social impact on that ... Only paperwork that they are keeping the records. No benefits that they are thinking, that stuff isn't going to, maybe, reduce that ...
Hassan	I mean, we said the employees job satisfaction is not improving, the image of the organization and the social committee is not improving
Mr. Meer:	It is improving but it takes time, because normally the management who should have ... They should look all of the things, and they should have some kind of a review system. If you have the review system in your company, then you can check the performance of the employees and you can check the benefits of what we can offer, so it can be improved if we are going for green purchasing. The social performance, doing this way you can improve -
Hassan	The last one is Reverse Logistics. Reverse Logistics is nothing but use of remanufacturing, recovery of the company's end-of-life product, and taking back the packaging. I think you are furniture manufacturers, and you must have been using some of these practices, right? So sometimes. Do you use any of these manufacturing?
Mr. Meer:	Sometimes. It is not regular. It is sometimes, not regular.
Hassan	How about taking back packaging when you send items from your firm do you take back the packaging?
Mr. Meer:	No, we don't do that.
Hassan	The company who is implementing these, as we said, re-manufacturing, or recovery of the product, or taking back packaging ... The social performance only improved, but not the environmental performance, not the operation performance, not the economic performance ... What do you think the reasons for that?
Mr. Meer:	Again, if you will come to this point, for example, there is some kind of interlinkage there. For example, each and every aspect, there is some kind of something, and the people, those who are there, they need to know everything, where it is going to be used. There should be some kind of product time there. Normally they are not looking, that time it may fail that case. So, for example, if you are doing one for one table, you are sending to your customer. During and the design, he likes that one, but the final product he does not like, and he can reject that time. You maybe go back and again, you have to bring it back.
Hassan	Very good.
Mr. Meer:	Well, so, during that time, it depends upon the environmental aspect that makes interlink people's mind-set, because normally everybody, all the thing that's in their hand, it's not same. Like that every people have different ideas and opinions
Hassan	How about economic performance, again, those companies that bring back products to be re-manufactured, reused ... Did they not feel that the economic performance improved?
Mr. Meer:	Economically, it will not, because normally the people, those who are having in the company, they look for new things to do.
Hassan	Yeah.
Mr. Meer:	Normally, they do the same work which we did, and there is no benefit. For example, the profit, maybe reduce.
Hassan	That's my question, they implement these practices, which is, as I said, the manufacture ... They took the product after ... For example, you sold some furniture items to a company, and after ten years they call you, "Okay, are you ready to take your furniture back?" You took your furniture back and you re-manufacture it, you send it somewhere else ... So the companies who

	did these, you and myself should believe that they should have their economic performance improved. They should improve their sales, they should ... But again, they did not get these improved. Only the social performance got improved, but the economic performance; the return on sales, the return on assets ... They did not get improved.
Mr. Meer:	It will not improve because there is some kind of -
Hassan	Are they incurring an additional cost to make the product again, the -
Mr. Meer:	Normally, for example, there is some kind of warranty, a product warranty for the lifetime. Every product, there is some kind of lifetime ... During that time it will be social, economically. There is some kind of depreciation value is there, for each and every product. Based on that one, you will see that if you waste logistic time, it will be waste of your time also.
Hassan	You bring your product to your facility, it will be a cost on you. That's why there is no economical ... Recovering products, re-manufacturing them, you will incur additional cost, that's why there might not be an economic performance improvement.
	Okay, looks that we are done, so that you very much, Mr. Meer, for your information.
Mr. Meer:	Can I get your ...
Hassan	Yeah, we can. I'll send it by e-mail, maybe.
Mr. Meer:	That will be nice.
Hassan	It will have all of the questions, and you can keep -
Mr. Meer:	- Because, you know, these are all really important -
Hassan	- General information.
Mr. Meer:	Actually, I have ISO auditor for my company so where I can use these things that are good
Hassan	Thank you very much, Mr. Meer, again, and have a great day.
Hassan	Okay, so again, we go back to as we said about the environment of cooperation, they did not benefit -
Mr. Meer:	They did not have benefits because of the reason why Because of benefits. For example, if the company, they're implementing this affecting this, and it takes, sometimes delay. For example, they would not, maybe, have this kind of system in that site, the supplier, from the customer, those who are having So, they maybe prefer time to be ... change their system. Accordingly too much tax and delay, in the work. For example, if you are giving them work. So we are doing that work, and you are coming here for the inspection. During that time you will need to check all of those documents. What do you have? Do you have the facilities to manufacture this ...
	There is some kind of information which you need more. During that time it will be time delayed ...
Hassan	It's just the environment of this corporation is nothing but working with your suppliers and customer. So they worked with this supplier and customer, and they agreed to something, but those companies, they did not get any economic performance improvement. Means, they did not improve their profit, they did not improve the average sale, they did not improve these things ... Market share ...
Mr. Meer:	Actually, all of these things are all for management, they have that they ... What you call ... It was some kind of ... For example, you would have good reputation in the field. You have to gain that thing, maybe they can go for it. First of all, if you are financially good at stuff, then you can go for it. Otherwise, these people normally hear that the people's mindset is to reduce the cost. They are looking always where it will be given for them unless they will go for it. Maybe that's the reason why economically they are not checking these things and they are overcoming these things and they are going directly to ... That's the reason why it is not benefiting.
Hassan	Economically, they are not benefiting. We implemented ... We worked with our suppliers, we worked with our customers to improve the product specifications, but economically, we did not benefit.

	Now again, for the green purchasing. Green purchasing, again auditing your suppliers, making sure you are working with your environment and the suppliers. You don't purchase from any supplier ... They must be environmentally friendly, they might have some environmental management type of thing. They might have type certification.
Hassan	The company who implemented these green purchasing practices ... Their operational performance improved, their economic performance improved, but not their environmental performance. Air emissions did not get reduced, waste water did not get reduced, service waste wasted did not get reduced, so what is the reason for the ...
Mr. Meer:	Maybe again, you see the reason for manpower, maybe. Those who are well trained personnel. There should be some kind of person ... they should have well trained. According to the green ... The ecosystem.
Hassan	Yes, there should be one person looking at the environmental ...
Mr. Meer:	Companies should appoint a resource to manage green related matters who should be taking care of these things and who should train all other persons in the company on how green practices must be deployed and then only things can improve
Hassan	I see, okay, okay, very good. How about in the end ... The social performance, those who implement the green purchasing practices, as we said now, they audited their suppliers and asked them to be environmentally friendly, having ISO certification ... The social performance of these firms did not get improved.
Mr. Meer:	Yeah, I agree.
Hassan	The corporate image did not get improved.
Mr. Meer:	Did not get improved, because, you know the reason, because nowadays everybody, they are doing these things. Every company, they are checking, auditing everything.
Hassan	Oh, okay.
Mr. Meer:	It is now normal. Only paperwork like that is going on. There is no social impact on that ... Only paperwork that they are keeping the records. No benefits that they are thinking, that stuff isn't going to, maybe, reduce that ...
Hassan	I mean, we said the employees job satisfaction is not improving, the image of the organization and the social committee is not improving
Mr. Meer:	It is improving but it takes time, because normally the management who should have ... They should look all of the things, and they should have some kind of a review system. If you have the review system in your company, then you can check the performance of the employees and you can check the benefits of what we can offer, so it can be improved if we are going for green purchasing. The social performance, doing this way you can improve -
Hassan	The last one is Reverse Logistics. Reverse Logistics is nothing but use of remanufacturing, recovery of the company's end-of-life product, and taking back the packaging. I think you are furniture manufacturers, and you must have been using some of these practices, right? So sometimes. Do you use any of these manufacturing?
Mr. Meer:	Sometimes. It is not regular. It is sometimes, not regular.
Hassan	How about taking back packaging when you send items from your firm do you take back the packaging?
Mr. Meer:	No, we don't do that.
Hassan	The company who is implementing these, as we said, re-manufacturing, or recovery of the product, or taking back packaging ... The social performance only improved, but not the environmental performance, not the operation performance, not the economic performance ... What do you think the reasons for that?
Mr. Meer:	Again, if you will come to this point, for example, there is some kind of interlinkage there. For example, each and every aspect, there is some kind of something, and the people, those who are there, they need to know everything, where it is going to be used. There should be some

	kind of product time there. Normally they are not looking, that time it may fail that case. So, for example, if you are doing one for one table, you are sending to your customer. During and the design, he likes that one, but the final product he does not like, and he can reject that time. You maybe go back and again, you have to bring it back.
Hassan	Very good.
Mr. Meer:	Well, so, during that time, it depends upon the environmental aspect that makes interlink people's mind-set, because normally everybody, all the thing that's in their hand, it's not same. Like that every people have different ideas and opinions
Hassan	How about economic performance, again, those companies that bring back products to be re-manufactured, reused ... Did they not feel that the economic performance improved?
Mr. Meer:	Economically, it will not, because normally the people, those who are having in the company, they look for new things to do.
Hassan	Yeah.
Mr. Meer:	Normally, they do the same work which we did, and there is no benefit. For example, the profit, maybe reduce.
Hassan	That's my question, they implement these practices, which is, as I said, the manufacture ... They took the product after ... For example, you sold some furniture items to a company, and after ten years they call you, "Okay, are you ready to take your furniture back?" You took your furniture back and you re-manufacture it, you send it somewhere else ... So the companies who did these, you and myself should believe that they should have their economic performance improved. They should improve their sales, they should ... But again, they did not get these improved. Only the social performance got improved, but the economic performance; the return on sales, the return on assets ... They did not get improved.
Mr. Meer:	It will not improve because there is some kind of -
Hassan	Are they incurring an additional cost to make the product again, the -
Mr. Meer:	Normally, for example, there is some kind of warranty, a product warranty for the lifetime. Every product, there is some kind of lifetime ... During that time it will be social, economically. There is some kind of depreciation value is there, for each and every product. Based on that one, you will see that if you waste logistic time, it will be waste of your time also.
Hassan	You bring your product to your facility, it will be a cost on you. That's why there is no economical ... Recovering products, re-manufacturing them, you will incur additional cost, that's why there might not be an economic performance improvement.
	Okay, looks that we are done, so that you very much, Mr. Meer, for your information.
Mr. Meer:	Can I get your ...
Hassan	Yeah, we can. I'll send it by e-mail, maybe.
Mr. Meer:	That will be nice.
Hassan	It will have all of the questions, and you can keep -
Mr. Meer:	- Because, you know, these are all really important -
Hassan	General information.
Mr. Meer:	Actually, I have ISO auditor for my company so where I can use these things that are good
Hassan	Thank you very much, Mr. Meer, again, and have a great day.

## COMPANY G

Hassan:	<p>Good afternoon, Mr. Aldino. We are here at G Manufacturing factory. Mr. Aldino is the production manager. We just informed him that we sent the survey like a year ago and he responded to the survey, he filled the survey. We found some results we thought of sharing these results and discussing these results with some selected companies. Basically Mr. Aldino was identified for green supply chain practices, eco-design, then environmental cooperation, green purchasing and reverse logistics.</p> <p>We found that there is a positive relationship between environmental corporation and operational performance. Again we have four types of performance. Environmental performance, operation performance, economic performance and social performance. If you can start with the eco-design. Eco-design is nothing but the product is environment friendly, does not consume too much water or too much power. Again, we define it as design of products for reduced consumption, design of products for reuse, recycle, design of products to avoid or reduce use of hazardous products and design of processes for minimization of waste. We didn't find that this practice had any impact on any of those performance measures. Eco-design did not impact these. What do you think from your opinion?</p>
Mr. Aldino:	Eco-design?
Hassan:	The eco-design, why it did not impact the environmental performance of the firm, operation performance, social performance, economic performance ...
Mr. Aldino:	The eco-design, actually ... It depends on the product.
Hassan:	It depends on the product?
Mr. Aldino:	On our side, it does not impact. Do you know why? The product itself is already environmentally friendly. It is recyclable.
Hassan:	It's recyclable?
Mr. Aldino:	Yes. When product is already broken or what, we can recycle it and reuse it again to produce the same product.
Hassan:	So you can recycle it again?
Mr. Aldino:	Yes.
Hassan:	Okay.
Mr. Aldino:	One of the most important thing is, if you say eco-friendly, it will not damage the soil, or the environment, or the soil. Anything.
Hassan:	Very good. Your product is eco-designed.
Mr. Aldino:	Yes.
Hassan:	Again, the companies that we surveyed, including you, the eco-design did not improve their environmental performance, or social performance, or economic performance.
Mr. Aldino:	No.
Hassan:	It should improve, but it didn't improve. What do you think the reason for that?
Mr. Aldino:	The reason is because of the implementation.
Hassan:	The implementation?
Mr. Aldino:	Yes.
Hassan:	Okay.
Mr. Aldino:	Remember that because PVC pipes ...
Hassan:	Yes, PVC pipes.
Mr. Aldino:	PVC pipes are a recyclable material. Reusable.
Hassan:	Recyclable. Okay.
Mr. Aldino:	If you go to others, like to plastic, because, you know, plastic is non-biodegradable.
Hassan:	Non-biodegradable.
Mr. Aldino:	Yes. Mean to say ... If the plastic product is not recyclable, we need to say, "What happened?" It will pollute the soil.

Hassan:	Okay. You said an important word, implementation. You mean that those companies who implemented these eco-design practices, they did not implement it well?
Mr. Aldino:	Yeah.
Hassan:	That's why they did not reap these benefits of eco-design?
Mr. Aldino:	That's right. Okay. Some plastic manufacturers, and kind ... Pipe, or some disposable items, if they will not educate even their employees, and the user, there is no benefit.
Hassan:	I see. I see.
Mr. Aldino:	It is not only us. We are the manufacturer. You are the end user. We should both agree that the product we are using is eco-friendly and is not putting humanity itself, humanity ... Not only the environment, because if you say humanity, everything is there. End user, everything.
Hassan:	This is the social performance, then. The social dimension.
Mr. Aldino:	Yes.
Hassan:	Okay. Operationally, why you think eco-design did not improve the operational performance of these firms that we surveyed? They said that there's no improvement.
Mr. Aldino:	The operational performance?
Hassan:	Yeah.
Mr. Aldino:	There is no value on the eco-design. It's luck. Normally, in the design of raw materials, but in manufacturing, the eco-design is very, very important. Why? The equipment or machinery. During the previous years ... I've been in the industry since 1978.
Hassan:	Oh my God.
Mr. Aldino:	Same manufacturing industry, yeah?
Hassan:	Yeah.
Mr. Aldino:	As I see it now, the equipment and design using too much lubrication. Some are using a lot of water for cooling. Use a submersible type. Eco-design, we need to say, "Are we using same volume of water for the same product?" Before, I'll be producing saying 500 millimetres of pipe. I'll be using the same process equipment, some 30 years ago, I'll be using a lot of water. Now, because of the latest design, instead of submerging the pipe in production to cool it off, we are only use spraying. The volume of water used during the process have maybe have been made by about around 75%.
Hassan:	70% production. From your opinion maybe others who are using these they are not implementing it well.
Mr. Aldino:	Eco-design does not only affect the ... It is also affecting the corporation's responsibility of the company.
Hassan:	That's why again, it's interesting that those companies, they said it did not improve our social performance.
Mr. Aldino:	Implementation.
Hassan:	Implementation problem. They are not-
Mr. Aldino:	How you look at the eco-friendly design, in response to your system. It's basically corporate social responsibility had been there for a long time, but it is only recently, maybe from the onset of the millennium, that the company always look at the CSR as one of the factors to provide the end user some kind of decision making. I am a manufacturer. I can educate the user. "Sir, please, if you purchase this cup, don't throw it anywhere. Put it in the proper rubbish bin. We will take that one, and reuse it again. Recycle and instead of."
Hassan:	Okay.
Mr. Aldino:	It's very important. Any kind of product user. The end user must be properly educated.
Hassan:	Ah, this is the problem from your point of view. Okay.
Mr. Aldino:	If the manufacturer does not educate the end user, they are putting the question of their responsibility.
Hassan:	I see, okay. How about economic performance? Mr. Aldino, why again the companies that we surveyed, they said "Eco-design did not improve our economic performance."?

Mr. Aldino:	For us, it's a lot better.
Hassan:	In your case-
Mr. Aldino:	Say, eco-friendly design. Normally, in the manufacture of PVC, there are only three basic ingredients. The resin, the plastic; then the calcium carbonate, the filler; then the stabilizer that make plastic processable, and the pigment. Before, if you can see the kind of material we are using, it easily get burn. Even during the process, it easily get melted. As the years ago ahead, the raw material design is very effective. Why? The effectivity of the raw material design will also enhance and put maximum efficiency on the use of raw material and the equipment. The volume of production as compared long years before, it's much better nowadays.
Hassan:	Oh okay. Economic performance from your point of view has improved in your company.
Mr. Aldino:	Yes a lot.
Hassan:	From your point of view, why do you think others did not any ...
Mr. Aldino:	Same, same thing. If they want to see it, they should be there on top and see everything. If you'll just be looking like a horse, like this, you cannot see everything. If you look at these things, as an eagle, bird's eye view, you can see everything.
Hassan:	When you say economic performance here, we mean they did not feel any improvement on the profit or did not reduce cost on-
Mr. Aldino:	If you're thinking economic say, in terms of economy. Because of this eco-design, we know that the product will ... Okay, black PVC pipe is guaranteed to last 25 years. Based on this design capability, you will try to look for materials, cheaper material, high efficiency material, but of good quality. Sometimes good quality, but, we need more money. I mean to say, you have to balance it. You have to balance it. Once, remember before, before the drop of oil price, our raw material is averaging around 1250 dollars per metric ton. Now only so much, 750. We are using the same material.
Hassan:	The same material.
Mr. Aldino:	Yeah, but-
Hassan:	The cost has come down.
Mr. Aldino:	Yeah. When I started in PVC in 1978, the cost of raw materials maybe around 350 US dollar per ton, but you can see inflation. 350 dollars before is not the same as 350 dollars today.
Hassan:	Very good. You want to say, Mr. Aldino, that those companies, they did not feel any improvement in their economic performance because of the external conditions such as oil prices. Oil prices impacted-
Mr. Aldino:	Everything, because more money. When you say eco-design, you have to consider a lot of factors. First of all is internally, externally, the shareholder, the stockholder, and the shareholder. You know what I mean by the shareholder?
Hassan:	Yeah yeah, of course. Yeah I know, definitely.
Mr. Aldino:	Stockholders are the investor. The shareholder is the end user, the competitors, everything, correct?
Hassan:	Very good. Agree, agree.
Mr. Aldino:	Eco-design, it should involve the shareholders, not only the stockholders.
Hassan:	The second one is environmental cooperation. Environmental cooperation is cooperating with suppliers and customers to produce eco-design and to produce a degradable product. Again, the survey found that there is positive relationship with operational performance, but not with economic performance, not with social performance. Environmental cooperation again, let me define it for you. Environmental cooperation such as cooperation with suppliers and customers for eco-design products, cleaner production, green packaging, using less energy during product transportation, developing mutual understanding of responsibilities regarding environmental performance, and working together to reduce environmental impact of activities. None of them did impact the-
Mr. Aldino:	There's no impact at all?
Hassan:	-economic performance. Only on operational performance, but economic performance, no.
Mr. Aldino:	There is.



Hassan:	There is? Okay.
Mr. Aldino:	In the standard, the ISO standard ...
Hassan:	Yes. ISO 14001.
Mr. Aldino:	ISO 14001 standard, when we start implementing the ISO 9008 like that, even the customer they're not asking about ISO, correct? When we apply for the certification ISO, they will ask. You have to go to the ... Actually ISO is a lot of paperwork, but paperwork also requires the involvement of the supplier, and the end user. A customer will require from us our say, what you call that? Details of our product. From these details, you must specify who are our suppliers. Are these suppliers certified by ISO? Even these companies, before you can purchase any material, you have to go through bidding. One of the requirements is our supplier should be ISO certified.
Hassan:	Very good. Agree. Why you believe cooperating with suppliers and customers, as per the company surveyed, they did not improve their environmental performance? Environmental performance, reduction of waste, reduction of carbon emissions. The research found no relationship. What do you think from your point of view? Why there is no relationship found here?
Mr. Aldino:	I think the survey or the research didn't find it appropriate for them. I meant to say, they did not study the effect of the search.
Hassan:	Okay. How about again, for example, social performance? Again, they said that cooperating-
Mr. Aldino:	Social performance?
Hassan:	Now we are talking about environmental cooperation at this point. It only impacted operational performance. Means, it improved product quality, reduced lead time, but again, the research didn't find any relationship with economic performance, any relationship with social performance.
Mr. Aldino:	Economic performance ... The product itself, can I look at that? I want to see ...
Hassan:	Yeah.
Mr. Aldino:	Environmental.
Hassan:	Only impact operational, but not economic, not social, not environment.
Mr. Aldino:	Environmental cooperation ...
Hassan:	We said environmental cooperation is working with suppliers and customers and all parties to produce an environmentally friendly product.
Mr. Aldino:	If I am the manufacturer and you are the end user, if you know that my product is a hazardous and it will not benefit you, you think you'll buy from me?
Hassan:	No, I will not buy, definitely.
Mr. Aldino:	That's why educating people is very important.
Hassan:	It has to do with education .
Mr. Aldino:	Yes.
Hassan:	Okay. There might be cooperation with other parties but if it-
Mr. Aldino:	Although, one more thing is ... The end user, they should be properly acquainted with the product or the service, the product design or the service life or the life warranty. For PVC we are guaranteeing 25 years
Hassan:	I see. Product life. Okay.
Mr. Aldino:	Mean to say, the customer say ... Normally this is not the part of the production, it should be the part of the marketing or the sales. Normally they know what effect. They will ask "What is your material?" Before the consultant will say "It's okay, it's okay", but now, the consultant will visit you, ask your material ...
Hassan:	Samples.
Mr. Aldino:	Not only sample, but the specification material. If in accordance with specification, they agree. Mean to say, they are doing their work.
Hassan:	Okay. Again, the next practice is green purchasing. Green purchasing again is nothing but auditing the suppliers' performance, auditing if they are ISO 14001 certified, selecting suppliers based on their environmental criteria. This is, we call it green purchasing. Again, the research found that green

	purchasing improved the operational performance of the firm, the economic performance, but not the environmental performance. It did not for example-
Mr. Aldino:	No actually it is, it actually ... When you go green purchasing, it's an umbrella. Improve this one ...
Hassan:	The research found it improved this one but not this one. It improved this one but not that one. How much social performance? Again-
Mr. Aldino:	Yes. Green. What do you mean green? Reducing carbon dioxide gasses emission, environmental pollution?
Hassan:	Mr. Aldino again, from your point of view ... Now those companies, they must have a problem, right? That's why they did not get any impact on the social performance. They implemented the green purchasing, but there is no improvement on the-
Mr. Aldino:	They are not transparent on their system.
Hassan:	They are not transparent on their system. Okay.
Mr. Aldino:	They are not transparent. Just looking on a bird's eye view, I am the supplier, you're manufacturer. If I supply something, how will this product be used, and what will be the effect? In humanity, all animals. Especially, you can see now, those shopping bags that end up on the sea, we are killing animals. We are killing birds. Even camels. They are killing camels because sometimes they eat those. Those manufacturers of plastic bag, should ... Now recently maybe 10 years ago, they started using that biodegradable plastic. This plastic will normally disintegrate afterwards, not just keep flying on the desert, or there on the sea.
Hassan:	Okay again, from your point of view, green purchasing should improve the social performance. What would be the reason for those companies who said "No, we implemented the green purchasing but it did not improve our social performance." Social performance means improving the company image in the market, increasing the employee satisfaction about their organization.
Mr. Aldino:	If you do the green purchasing, the employer should tell the workers, because this proper education. This is educating the workers. Why are they doing this kind of things
Hassan:	Okay. Again green purchasing, when we say green purchasing, providing design specification to suppliers that include environmental requirement for process license, and environmental audit of suppliers in internal environmental management. Second tier supplier environmental friendly practice evaluation. Suppliers are selected using environmental criteria and request suppliers to use environmental packaging, which is degradable. The research found no impact on the-
Mr. Aldino:	Why? Okay. Purchasing. If I purchase the raw material, I know what is the specification of the raw material. If I use this kind of material during the production, and this material is not suitable for my equipment, meaning to say, I just waste the material, waste of time, effort, everything is wasted. Remember, time is very important ... Money, I think, I can change the money. Time, you cannot recall it. Your time over is time finished, time gone. If I produce something there, I just tell the everybody let it pass. Give to customer.
	When you say "There's a problem, it got broken", what happened? It come back to me. What have been damage to me? The credibility with you, my company, and the credibility of my product.
Hassan:	Okay. Again, you refer to implementation. The way that practices are not properly implemented. The last practice is reverse logistics. Reverse logistics practices is nothing but use of re-manufacturing, recovery of the company's end of life products, and taking back packaging. The research find that it only impacted social performance. Reverse logistics impacted social performance, but did not impact environmental performance, it did not impact operational performance, it did not impact economic performance.
Mr. Aldino:	Okay. It does not affect this.
Hassan:	It did not affect this. Only C, only social performance.
Mr. Aldino:	If I have a wooden pallet, especially we are using materials by Sabic, from Turkey, everywhere. That pallet is from Sabic, correct?
Hassan:	From Sabic.

Mr. Aldino:	Yeah.
Hassan:	The pallet itself, the wooden pallet.
Mr. Aldino:	Yes. It is not actually being sent back to Saudi Arabia. What do you ... Some companies they want pallet, the resell it. We don't resell it, because after removing the raw material from the pallet, we can't reuse it. This is reverse logistics. Instead of just throwing it away, we sell it, and other companies can use it.
Hassan:	The research found that it improved employee satisfaction. It improves the company image, reverse logistics, but it did not improve environmental performance.
Mr. Aldino:	I'll just dump those pallets in the landfill, what happened?
Hassan:	Yeah, it will impact the environment.
Mr. Aldino:	Very easy.
Hassan:	How about economic performance? You think reverse logistics should improve economic performance?
Mr. Aldino:	Yeah. Normally, if I just throw it in the landfill, it will take some years. It get ... I resell it, okay.
Hassan:	Those companies who implemented this and did not feel any improvement, what would be the problem?
Mr. Aldino:	Maybe, they see it with nothing, because they improvement in that part is very marginable. Very small. If say I am producing 100 metric tons, or 1000 metric tons of PVC pipe, meaning to say I'll be using probably more than 1000 pallet a month, if I just throw it, what happen? Before, scrap is scrap, nobody took it. Now, we can use. If one pallet is say 3 kilograms, 1000 pallet is 3000 kilograms thrown in landfill. Instead of just throwing it away. Actually, environmentally friendly designs are designed to improve the outlook of people regarding the product.
Hassan:	Those companies who are unable to get the benefits of reverse logistics ...
Mr. Aldino:	Maybe they get, but very ...
Hassan:	Marginal.
Mr. Aldino:	It's more percentage.
Hassan:	Marginal, okay. Okay. I think we covered everything Mr. Aldino. Thank you very much for the information. Very much appreciate it.
Mr. Aldino:	Actually, I just want to ask. For what is this research?
Hassan:	It's a research for a PhD certificate in University Wollongong in Dubai. Again, the purpose is to motivate businesses and manufacturers to go green, to implement green practices-
Mr. Aldino:	You have a business card?
Hassan:	I don't have a business card, but I can give you my details, my full name, my details, I can give it you. There is no issue. Thank you Mr. Aldino for information, it's very much appreciated.

## COMPANY H

Hassan:	<p>Maybe you can start. Good morning Mr. Muhammad, good morning Mr. Chandran for ... As I mentioned, my name is Hassan Younis. I'm doing research on the impact of implementing green supply chain management on corporate performance. We sent you a survey a year ago, and you filled the survey. We thank you for that. We thought of coming back to a sample of the survey and show them the results, that we've reached to and take your opinion on this. Basically the research is intended to measure the impact of implementing four main green supply chain practices, on four dimensions of corporate performance. The practices are the eco-design, environmental cooperation, green purchasing, reverse logistics, and the dimensions are environmental performance, operational performance, the economic performance and the social performance.</p> <p>Eco-design is nothing but designing an environment friendly product that consumes less water, consumes less power, and easy to be recycled and maybe reused or remanufactured. Environmental cooperation is working with your suppliers and customers and all the stakeholders to produce an environmentally related and environment friendly product, and working with them on environmental goals together. Green purchasing is auditing your suppliers and selecting them based on environmental criteria. For example ISO 14001 certified are selected to work with us. Reverse logistics is taking back the product to be remanufactured or reused, or repackaged. Repackaging of the product. Environmental performance is reduction in the emissions for example in your organization, reduction in the waste production and the water waste. Operational performance improvement of product quality improvement, reduction of the lead time, improvement of the processes. Economic performance is increasing your sales, increasing return on sales, increasing profits. Social performance is improving the corporate image, enhancing employee job satisfaction, and enhancing health and safety.</p> <p>The research found that eco-design failed to impact any of that environmental performance, that corporate performance. What do you think can be the results for ...</p>
Mr. Chandran:	See basically, our industry has only 20% relationship with this thing.
Hassan:	You can start in with eco- design for example.
Mr. Chandran:	For design is there. These what they call ... They call ...
Mr. Muhammad:	Green concrete?
Mr. Chandran:	Green concrete. There is another standard for that, what Tariq is doing sometime.
Mr. Muhammad:	Ah, sustainability build.
Mr. Chandran:	Yes.
Mr. Muhammad:	Pearl grading
Mr. Chandran:	The product is ... See, we have only single product-
Hassan:	Which is the ...
Mr. Chandran:	Concrete.
Hassan:	Concrete. Okay.
Mr. Chandran:	Which, once produced, it cannot be taken back. It cannot be recycled. Only the waste we can recycle after a person take back the aggregate. The product, we cannot use. No nothing. It is once produced, it's over.
Hassan:	You have a green concrete?
Mr. Chandran:	Green concrete is there
Hassan:	Once introduced, did you impact?

Mr. Chandran:	The green concrete concept is to minimize the CO2 emission. Using less cement and use cementitious materials for the design, like waste byproducts, like microsilica, something like that. Am I right?
Mr. Muhammad:	Yes.
Mr. Chandran:	This will reduce the quantity of the cement used in each meter cube of concrete, so indirectly controlling the CO2 emission.
Hassan:	Okay. Theoretically, having such green concrete should reduce impact on emissions, right?
Mr. Chandran:	We are using less cement.
Hassan:	The research did not find such relationship. What do you think can be the reason for that?
Mr. Muhammad:	Say it again.
Hassan:	Theoretically, using green concrete should reduce CO2 emissions as he just mentioned. In fact, the research and the survey collected under condition that we put in the-
Mr. Chandran:	No. The main reason is we are not the producer of cement. We are only the consumer. It is one of raw materials. Cement is a raw material. We are reducing the quantity of the cement for the production of concrete.
Hassan:	Has the CO2 emissions been reduced?
Mr. Chandran:	When all the people are using less cement, the production will be less.
Hassan:	Production of cement.
Mr. Chandran:	Yeah, automatically. When the demand is less, the production will be less. When the production goes down, automatically, the emission level also goes down. It is not direct. In our industry, we are not directly controlling, but indirectly controlling.
Hassan:	Theoretically it should improve, as I said, the environmental performance of Quick Mix Beton.
Mr. Chandran:	Not only Quick Mix. All the Ready Mix producers are doing this thing nowadays.
Hassan:	Yeah, but, as per the survey, it looks that's not impacting. There is no reduction in CO2 emissions. Is there a reason from your point of view? If there a reason for that maybe-
Mr. Chandran:	That you have to check with the cement producers.
Hassan:	Cement producers.
Mr. Chandran:	CO2 emission is directly related to them, not to us.
Mr. Muhammad:	Manufacturing of the cement.
Hassan:	How about operation performance? It should again improve the product quality, but it looks again the research didn't find such relationships. There is no improvement on the product quality.
Mr. Chandran:	No. The product quality's always fine. The multiple blends concrete it gives more of a strength and durability I would say.
Hassan:	Okay. Others I mean, did not see any improvement on their product quality. Do you think that there must be something wrong with the way they're implementing the eco-design-
Mr. Chandran:	That is what I told you. You cannot compare our product with the other products. It is an entirely different thing. For example, in factory we can't produce and stock their products for sending to the market and something like this. We cannot do like that. If you order that "I want concrete on this day at this time." Then only we will produce. It cannot be produced and stocked. Comparing products and concrete as a product is a little difficult.
Hassan:	Okay. How about economic performance? Did you feel improvement on economic performance, increasing in sales once you introduced the eco-design?
Mr. Muhammad:	No. Nothing related. It depends on the demand market.
Hassan:	Has companies for example started asking for more green cement?
Mr. Muhammad:	There's some kind of government project insisting for the-
Mr. Chandran:	Only to be used.
Mr. Muhammad:	Yes, to be used a green concrete.
Hassan:	Regulations to use-

Mr. Chandran:	Regulations by the government for municipalities.
Hassan:	This reduce because of the raw material?
Mr. Chandran:	No it increased the cost.
Hassan:	It increased the cost. That's why it did not impact your economic performance. It did not improve your profits because there is an increase in the cost of having an environmental friendly products. Okay. How about social performance? Using an eco-design or as I said an environment friendly product such as as I said the green concrete. Did this impact your company's image, the employee starts feeling more satisfied that they are working for an environment-
Mr. Muhammad:	Yes I think it's yes.
Mr. Chandran:	You cannot produce ... As per the demand we cannot survey, because many of the agencies top level private concerns, they are asking for green concrete or multiple blend concrete as a first step to the green concrete. If you will not supply what they are asking for, we are out of the picture.
Hassan:	Those were implemented such practice and they did not feel that there is any improvement in the corporate image, in employee safety-
Mr. Chandran:	Employee safety is also a little risky, because for example, everybody's using now microsilica. Microsilica fume is one of the finest dust materials, and if you go to the lungs it's over.
Hassan:	It's green product, the microsilica?
Mr. Chandran:	Microsilica is used to make the green product.
Hassan:	Ah okay.
Mr. Chandran:	It is very harmful to the health of the employees.
Hassan:	Okay. That's why the social performance did not improve. Okay. Very good. If we go to the other, the second practice which is environmental cooperation. Environmental cooperation is working with the suppliers, working with other parties to produce as we said a green product, or to work jointly on a common environmental goal. Again, the research found that it impacted the operation performance. It improved the product quality. It reduced the lead time. It improved the processes, but it did not impact the environmental performance. It did not impact-
Mr. Chandran:	See, environmental controls are not giving immediate control or result.
Hassan:	Ah okay, so it has to-
Mr. Chandran:	It takes time, and we are planning it for the coming generations.
Hassan:	Okay. Thank you. This is the key word. Again, economic performance, it did not improve economic performance.
Mr. Chandran:	No. It is more expensive. The controlling is expensive, the cost is more, everything is more.
Hassan:	How about social performance? Working with suppliers, working with customers, working with other all stakeholders. Did that impact the social performance of the-
Mr. Chandran:	Not directly. Not directly. This will give results later. The coming generations, they will get the benefit from it because it will improve their health conditions.
Hassan:	Okay. How about green purchasing? I mean green purchasing, the research found that it improved operational performance, it improved economic performance, but not environmental performance. Green purchasing we said, selecting suppliers based on an environmental related standard. For example those who are ISO 14001 certified are selected to work with us, or auditing your suppliers. You go to their offices, you audit them "Ah okay, you are environment friendly."
Mr. Chandran:	No, it is just like I said before. In our industry, you cannot standardize like that. Even if they have, for example one party doesn't have what 14000 or 18000 whatever, but he's the only supplier of our material, you have no other option. Go to him.
Hassan:	You have to go to them. Okay. Then there is no way, it cannot impact the-
Mr. Chandran:	The raw materials are fixed. You cannot change it. It should be aggregate, you have limited

	sources. There is no other option. Cement, there are mainly some producers. You have to take it from them. This microsilica is supplied from China or in South Africa, or Malaysia. There are three sources. Just like our products, we don't have multiple options. We have limited options. Within that limited options, we have to see that we are obliging to the rules of the government to minimize the CO2 emissions, and other hazardous conditions.
Hassan:	Okay. How about again social performance? Again green purchasing such as working with suppliers, auditing them did not impact the social performance, did not improve your corporate image, did not enhance employee satisfaction.
Mr. Chandran:	It will improve, because if you are not able to supply, you will not be in the market. The demand is there. Around 40% of the total demand is now this concrete or blended concrete.
Hassan:	Okay. How about the last practice is the reverse logistics. As I said, taking back packaging, or-
Mr. Chandran:	No, it doesn't apply to us.
Hassan:	You don't have ... You don't recycle.
Mr. Chandran:	We cannot.
Hassan:	You don't recycle product, or you don't even repackaging?
Mr. Chandran:	Nothing. No package.
Hassan:	No packaging. Okay.
Mr. Muhammad:	In our product there's no-
Hassan:	Yes, it's only okay. I believe we covered all the practices as well as the from emissions. Thank you for your time Mr. Chandran. It was a pleasure meeting you.
Mr. Chandran:	Okay Muhammad?