



ADDIS ABABA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

**ASSESSMENT ON FACTORS AFFECTING GREEN SUPPLY CHAIN
MANAGEMENT PRACTICES: THE CASE OF YOTEK CONSTRUCTION
PLC: PERCEPTION SURVEY**

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**A THESIS SUBMITTED TO THE PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE MASTER OF ART DEGREE IN LOGISTICS AND
SUPPLY CHAIN MANAGEMENT**

JULY, 2021

ADDIS ABABA, ETHIOPIA

**ADDIS ABABA UNIVERSITY
COLLEGE OF BUSINESS AND ECONOMICS
SCHOOL OF COMMERCE**

**DEPARTMENT OF LOGISTICS AND SUPPLY CHAIN
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“Assessment on Factors Affecting Green Supply Chain Management Practices

The case of Yotek Construction PLC: Perception Survey”

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Declaration

I, Benyam Tesfaye declare that this thesis is a result of my independent research work on the topic entitled “Assessment on Factors Affecting Green Supply Chain Management Practices - The case of Yotek Construction PLC: Perception Survey” in partial fulfillment of the requirements for the Degree of Masters of Art in Logistics and Supply Chain Management at Addis Ababa University School of commerce. This work is original in nature and has not been presented for a degree in any other University. All the references are also dully acknowledged.

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Statement of Certification

This is to certify that Benyam Tesfaye has carried out this research work on the topic entitled “Assessment on Factors Affecting Green Supply Chain Management Practices - The case of Yotek Construction PLC: Perception Survey” under my supervision. This work is original in nature and it can be submitted for the partial fulfillment of the requirements for the award of the degree of Masters of Art in Logistics and Supply Chain Management.

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ACKNOWLEDGEMENT

First of all, I would like to thank the almighty God for giving me his grace to accomplish this research paper successfully. Then my deepest gratitude goes to my advisor Dr. Matiwas Ensermu for his valuable comments, advices and technical supports to prepare this research work. I would also like to thanks Yotek Construction staffs for giving me the necessary support on this research work. Furthermore, I would like to thank my colleagues and friends who have been helping throughout this study.

Table of Contents

Contents	Pages
ACKNOWLEDGEMENT	i
List of Tables	vi
Acronyms	viii
<i>Abstract</i>	ix
CHAPTER ONE	1
1. INTRODUCTION	1
1.1. Background of the Study	1
1.2. Statement of the problem	3
1.3. Research question	6
1.3.1. Research Objectives	6
1.4. Significance of the study	7
1.5. Scope of the Study	7
1.6. Definition of Terms	8
1.7. Organization of the Study	9
CHAPTER TWO	10
2. Literature review	10
2.1. Introduction	10
2.2. Overview of SCM	13
2.3. Supply Chain Management Definition	15
2.4. SCM as a Key Business Process	16
2.5. Role of SCM in Construction	17
2.6. Functional Departments of Supply Chain Management	17

2. 6.1 Operations Management.....	18
2.6.2. Logistics Management.....	18
2.6.3 Procurement.....	19
2.7. Green Supply Chain Management	19
2. 8. GSCM initiatives in the construction Industry.....	21
2. 8.1 Green Design (Green Initiation).....	21
2.8.2. Green Purchasing.....	22
2.8.3. Green Construction.....	22
2. 8.4 Green Transportation.....	23
2.8.5 End-of-life Management.....	23
2. 9. Challenges of GSCM in the Construction Industry	24
2.9.1 Internal Challenges	25
2.9.2 External Challenges	25
2.10 Importance of Green Supply Chain Management.....	26
2.11 Supply Chain Management in the Construction Industry	27
2.12 Green Supply Chain Management in the Construction Industry	28
2.13 Factors Affecting the Green Supply Chain Management practices	29
2.13.1 Internal Factors.....	30
2.13.2 External Factors.....	31
2. 14 Green Supply Chain Management Practices in Construction Industry.....	32
2.15 Empirical Literature Review	34
2.16 Conceptual Framework	36
CHAPTER THREE	38
3. Research Methodology	38
3.1. Research Design.....	38

3.2. Research Approach	38
3.3. Target Population and Sample	39
3.4. Data Sources and Types	40
3.5. Data Collection Procedure	40
3.6. Data Analysis	40
3.7. Content Analysis of the Interview Data	41
3.8. Ethical Considerations.....	41
3.9. Reliability and Validity	41
CHAPTER FOUR.....	43
4. Result, Discussion and Interpretation	43
4.1 Response Rate	43
4.2 Missing Data	43
4.3 Background of the Respondents.....	44
4.4 To find out how the Green Supply Chain Management function within Procurement, Planning and Logistics department of Yotek Construction	46
4.5 To find out the Factors that affects the Green Supply Chain Management Practices of Yotek Construction	50
4.6 Multi collinearity Test.....	53
4.7 Model Summary	54
4.8 ANOVA	54
4.9 Regression Analysis	55
4.10 To identify the Green Supply Chain Management initiatives implemented by Yotek Construction	57
4.11 To identify the Green Supply Chain Management implementation challenges at Yotek .	63
4.12 What are the actions that Yotek Construction took to overcome those factors that negatively affect the GSCM practices?.....	65

CHAPTER FIVE	67
5. Summary, Conclusion and Recommendation.....	67
5.1 Summary	67
5.2 Conclusion.....	69
5.3 Recommendation.....	70
5.4 Direction for future study.....	72
References.....	73
Appendices.....	86

List of Tables

Table 3.1 Cronbach's alpha coefficient of variables	42
Table 4.5 Department of Respondents	46
Table 4.6 How Green Supply Chain Management function within the Procurement Department	47
Table 4.7 How Green Supply Chain Management function within the Planning Department.....	48
Table 4.8 How Green Supply Chain Management function within the Logistics Department	49
Table 4.9 Correlation of independent variables with dependent variables.....	51
Table 4.10 Multi collinearity test.....	53
Table 4.11 Model summary	54
Table 4.12 Anova Table.....	55
Table 4.13 Regression Analysis.....	55
Table 4.14 Green Design	57
Table 4.15 Green constructions	58
Table 4.16 Green Purchasing	60
Table 4.17 Green Transportation	61
Table 4.18 End of Life Management	62
Table 4.19 Internal Challenges of the Green Supply Chain Management	63
Table 4.20 External challenges of Green Supply Chain Management at Yotek Construction.....	64
Table 4.21: Remedies replied to overcome the Factors that Negatively Affect GSCM Initiatives	

List of Figure

Figure 2.1:- An illustration of a company's supply chain	14
Figure 2.2:- Components of GSCM.....	24
Fig: 2.3 Conceptual Frame work	37

Acronyms

SCM	Supply Chain Management
GSCM	Green Supply Chain Management
SC	Supply Chain
CSCMP	Council of Supply Chain Management Professionals
OM	Operations Management
EM	Environmental Management
RL	Reverse Logistics
ECD	Environmentally Conscious Design
LCA	Life Cycle Assessment
GHG	Green House Gas
CSC	Construction Supply Chain
CI	Construction Industry
ROI	Return on Investment
MDG	Millennium Development Goals

Abstract

According to the report of World business council for sustainable development 2020, the weather of our world is changing drastically due to human made greenhouse gas emissions which bring unfavorable consequences to the human being. This weather changes were reflected in famine, floods, draughts and different diseases. For the weather changes in our environment, the construction sector accounted around 40% of the total share of GHG emission. By taking this into consideration, the main objective of the study was on identifying the factors affecting the Green Supply Chain Management practices by taking the case of Yotek Construction plc. For this research the data was collected using the means of semi- structured interviews with department managers and by using structured questionnaire distributed to all 42 respondents of the three departments namely Procurement, Planning and Logistics. The collected data was analyzed by using the latest IBM version 28 SPSS software. Both explanatory and descriptive research designs were deployed for the study. In addition correlation and linear regression were used for determining the relation between independent and dependent factors. The results of the study shows that from the six factors mentioned as affecting factors on supply chain practice, knowledge and experience, understanding among supply chain stakeholders and corporate leadership support found to be the major factors affecting the organization's green supply chain practice while on the other hand, cost, government support and technology found to be weak factors in affecting the Green Supply Chain Management practice of the organization compared to the others. From the results of the findings therefore, the researcher recommended methods for boosting the relation of stakeholders, corporate leadership mechanisms and development of knowledge and experience. In addition, the study also made suggestions including additional required study which need to be considered for further identification of different factors. Initiatives and challenges of the company and the green supply chain function within the planning, logistics and procurement departments of the organization were also included in this study.

Key Words: *Factors affecting, Green supply chain management, practices*

CHAPTER ONE

1. INTRODUCTION

This chapter addresses the introductory part of the research. It basically includes background of the study, statement of the problem, purpose and significance of the study and definition of basic terms.

1.1. Background of the Study

According to Christopher, M., (2005), companies are striving to get competitive advantage in a global marketplace within the increasingly huge competition. With this regard with the aim of minimizing the cost of processes such as procurement of resources, manufacturing, transportation, and recycling cost is achieved by the supply chain while also satisfying customers (Boubekri, 2001). These days, many fields including technology, management and supply chain (SC) are introduced to the sustainability concept. According to Hansmann and Claudia, (2003), new opportunities for organizations are created by implementing environmental strategies.

According to Hugos, (2011), a strong impact have occurred on the environmental sustainability by the supply chain core business processes such as reverse logistics, procurement, logistics, and operations management. Organizations and countries are encouraged by the growing focus on sustainable development driven by environmentalists, governments, and stake holders to advance their supply chain processes. According to Sarkis (2012), over the past two decades, the integration of supply chain management (SCM) and environmental issues has become a flourishing subfield.

The Green Supply Chain literature is extended with the quality revolution of 1980s and the supply chain revolution of the 1990s with the beginning of environmentally conscious manufacturing strategy, corporate environmental management and supply chain management literature, (Zhu & Sarkis, 2006).

According to Malviya and Kant, (2015), incorporating environmental concerns into supply chain management as a Green supply chain management (GSCM) has emerged as a holistic

environmental management approach. According to Srivastava, (2007), Green Supply Chain management is synchronizing the thinking about the environment into SCM, which include materials sourcing and selection, product design, manufacturing processes and delivery of the final product after its useful life. According to Stivastava, (2007), product design, manufacturing processes, material sourcing and selection, product end-of-life management and the delivery of the product to the customer are among some aspects included.

As the performance of the firm will improve drastically after the implementation of the Green supply chain management (GSCM) practice, it should be embarrassed by all as a contemporary approach in this era (Friso & Kai, 2014). In order to reduce the environmental footprint, GSCM emphasizes efficient, effective and extensive implementation of green practices and initiatives (Awaysheh and Klassen, 2010).

The construction industry is one of the most important sectors in the GSCM context as the outputs from this sector is used for providing vital utilities like production, shelter and commerce in the human civilization by improving the society's physical environment. (Moavenzadeh, 1994). However, the massive use of natural resources, pollution of the environment and high energy consumption are among the considerable and irreparable impact on the environment from production of construction materials to the end user created by the construction (CIEC, 1992).. According to Wyatt (1994), the term "sustainable construction" is becoming popular with the increasing need for environmental awareness not only in the serviceability of a building during its lifetime, but also the recycling of resources to reduce waste stream associated with the after use.

According to Malviya & Kant, (2015), the manufacturing and automotive sectors were given advantages from GSCM associated investigations while a comprehensive GSCM-orientated study is required to provide a comprehensive awareness of the various essential conditions. (Mochamad et.al. 2013), also reported that only a few studies have focused on the construction sector, conducting comprehensive and systematic green studies on assorted supply chain stages and stake holders.

This therefore motivated the researcher to provide awareness about the GSCM in the construction sector, by focusing on the factors affecting GSCM initiatives and to find out the

initiative and challenges of Yotek Construction P.L.C and on identifying the measures taken by the organization to overcome the factors that negatively affect on GSCM initiatives in their planning, procurement and logistics department.

Yotek Construction Plc is a grade one construction company that is engaged in construction activities in Ethiopia and is the focus of this study. YOTEK Construction Company is engaged on real estate construction, road construction and different building construction works. The company was certified with ISO 9001:2015 Quality Management Systems on February 2017. The Company creates job opportunity for more than 811 permanent workers that are engaged on different construction projects and head office level. Out of which 179 have been working in the head office, Addis Ababa.

1.2. Statement of the problem

Human made greenhouse gas emissions in these days are threatening humanity by increasing the global warming which is manifested directly through extreme weathers which in turn be reflected in the form of floods, draught and famine.

According to (WBCSD 2018) report, around 40% of global Green House Gas emissions were found to be from construction and building sector. Besides irreparable and considerable impact are loaded on our environment from the construction industry in the form of pollution and massive use of natural resources. According to Elizabeth and Helen (2015), the climatic changes in our environment, if not controlled by the respected body, has the potential to wipe out the life on our planet earth gradually through depletion of life supporting systems such as clean water and fresh air.

According to Lakshmi M. and Chitramani, (2014), many consumers, public and private businesses are becoming increasingly worried and joined the growing green campaign while on the other hand some countries actively started involving in mitigating climate change. In these regard, as the concept of GSCM is to integrate environmental thinking into the supply chain management, the total environmental impact of every firm which is involved in supply chain activities and contributing to the sustainability performance enhancement accordingly is influenced by the Green Supply Chain Management vital roles. The implementation of GSCM

practices is expected to result in improved environmental and operational performance. However, in order to implement and maintain a GSCM within a business, the factors that affect it must be identified (Dhull & Narwal, 2016).

According to (Golicic & Smith, 2013), most previous researches on this topic were skewed to countries, mostly in Asia, North America and Europe, even though there is evidence that throughout the world there is growing concern for environmentally sustainable supply chain practices. Qi et al. (2010), a survey study in small, medium and large firms in China finds that managerial concern is the most important driver for the adoption of green practices. Significant relationships have also been found between government regulations and business size with the adoption of green construction practices. However, there is no significant evidence on the relationship among the adoption of green construction practices with perceived stakeholders' pressures. The findings from this study were significant in the understanding on the factors of green construction management.

Another study conducted in UK by Sourani and Sohali,(2011) depict the results of a survey into the factors facing in an effort to address the parties most capable of removing the barriers and on sustainable construction in the procurement strategies. The study found lack of awareness, insufficient incentives and commitment by leadership; lack of funding, vagueness of definitions and diversity of interpretations; understanding restrictions on expenditure and reluctance to incur higher capital cost when needed; ; lack of sufficient time to address sustainability issues; commitment and demand; separation between capital budget and operational budget lack of long-term perspective; general perception that addressing sustainability always leads to incurring greater capital cost; research and development insufficient integration and link-up in the industry; resistance to change and identified them as barriers. Among the twelve factors to green purchasing, lack of funding and high capital cost, lack of awareness and knowledge, lack of long term partnership, and lack of government incentives found to be positive. This study gives a benchmark to further research and found out relationships between GSCM practices and the industry.

Another study from Germany conducted by Large and Thomsen also identified five major factors of green supply chain management performance namely the environmental commitment

level, the purchasing department strategic level, capabilities of the green supply management, the green supplier assessment degree, and the suppliers green collaboration degree. The results from this study suggest that green supplier assessment degree and the level of collaboration between them put forth direct influence on environmental performance. The results furthermore show that environmental performance has a positive impact on purchasing performance. Shen and Tam, (2002) found in their study in Hong Kong that lack of trained staff and expertise, lack of Government enforcement and increased cost as the decisive factors for GSCM. This paper provides a profile of environmental management in Hong Kong construction by identifying what contractors in Hong Kong consider the benefits of and the barriers of the practice. The appropriateness of the measures for mitigating the barrier effects is investigated. The paper provides empirical evidence of the benefits and at the same time the barriers to the process of escalating the implementation of environmental management among Hong Kong contractors. Adetunji et al.(2008) in UK also finds that top management commitment, Government regulations and associated fines, costs, organizational vision & sustainability and high cost ,image and reputation, as their factors.

When looking to factors affecting Green supply chain management in Ethiopian context, there are some research's conducted on different industries. The findings from an empirical study on Ethiopian Tannery Industry by Zelalem Tadesse,(2015) shows that cost factors, resistant to technology, unavailability of qualified human resources were found to be the major factors in implementing GSCM. Another study on Ethiopia Commercial Bank by Muruts Abera, (2017) shows that Lack of IT infrastructure and potential knowledge gap being potential factors affecting GSCM while information gap and resources shortage were not found to be potential factors. The study also gives the benchmark to further research to find out relationships between GSCM practices and other industries.

When we look at the Green Supply Chain Management in the construction industry, we still get different factors in different countries and even in different companies within the same country. In this regard as per the researcher's knowledge, no research has been carried out within Ethiopian Construction companies that identify the factors that affect the Green Supply Chain Management practices and the researcher feels that those factors on other countries and in the

same country but in different industries need to be investigated whether they are also a factor in the construction sector since the industry is complex.

1.3. Research question

Based on the above research problem for this study, the following basic research questions are designed accordingly

1. How does the GSCM function within the procurement, planning, and logistics departments at Yotek construction PLC?
2. What are the factors that affect GSCM practices in the procurement, planning and logistics departments of Yotek construction PLC?
3. What are the actions that Yotek construction PLC took to overcome the factors that negatively effect on GSCM in the procurement, planning, and logistics departments?
4. What are the GSCM initiatives and challenges at Yotek Construction?

1.3.1. Research Objectives

1.3.1.1. General Objective

This study has a general objective identifying the factors that affect the GSCM practices in the procurement, planning, and logistics departments of Yotek construction PLC.

1.3.1.2. Specific Objectives

The paper has the following specific objectives.

- To provide insight into the GSCM initiatives in the Logistics, planning and procurement, and departments at Yotek construction PLC.
- To identify the factors that affect the GSCM practices in the procurement, planning, and logistics departments of Yotek construction PLC
- To find out whether Yotek construction PLC has taken measures to overcome the factors that negatively affect on GSCM in the procurement, planning and logistics departments.
- To analyze the GSCM initiatives and challenges at Yotek construction.

1.4. Significance of the study

Nowadays, the rapid industrial modernization and vast construction movements has led to negative environmental impacts including greenhouse emission, toxic pollutions, and chemical spills (Peng and Lin,2008). In response to the growing global environmental awareness, nothing can be more important than dealing with environmental concerns and setting the venue to situate the implementation of green supply chain management practices in the areas of interest.

Making responsible environmental practices as part of any supply chain management isn't just the moral thing to do these days for a sustainable business. A more effective sustainable supply chain is also a less wasteful supply chain on which reducing waste can lower the business cost while also enhancing industry reputation. Therefore it is highly significant to deal with the factors that affect GSCM practices in the construction industry.

This study can also enhance the company's GSCM practices and is helpful to reach its vision of "being a company that will inspire the construction industry in Ethiopia and the rest of Africa". The study findings can also benefit the management and staffs of Yotek Construction Company by showing how to effectively manage those negative factors that affect the GSCM implementation.

The other major significance of the study is, if the factors are well addressed, the company will enhance its reputation since customers around the world these days believe that businesses need to help improve the environment. This belief factors carried to buying decision can hurt companies that don't adopt sustainable practices. It also affects even businesses that don't sell directly to consumers, as businesses seeking to reduce their environmental impact; they will look into their vendors' policies on sustainable business practices. The study might also be valuable for academic uses to replicate similar researches with different scopes.

1.5. Scope of the Study

As Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities according to (Council of Supply Chain Management Professionals, 2016), it identifies the four major areas of SCM, namely, planning, procurement, conversion processes and logistics

activities. Yotek construction's supply chain focuses on three of the four core areas, namely planning, procurement and logistics management. The conversion process part is seen as its own department within Yotek Construction due to its size and the management of this functional area which falls under its own category called Construction management.

The scope of this study is therefore limited to the three functional areas of Yotek Construction's supply chain namely planning, procurement and logistics. The other functional areas like the finance were out of the boundaries of this study and they didn't take part in this study. This study is conducted at the head office where the majority of the procurement process is undertaken by centralization scheme. All other projects of the organization were excluded from this study and inputs from these branches are not included.

1.6. Definition of Terms

The terms listed below have multiple interpretations, but here, they are defined as follow for the purpose of this paper:

Supply Chain: - is a network that performs the different functions including procurement of materials, transformation of the procured materials into semi-finished and finished products, and distribution of these finished products to the final customers within a network of facilities and distribution options.

Supply Chain Management: - is the management of all activities that are involved in sourcing and procurement, conversion, and all related logistic management activities.

Going Green: - to incorporate environmentally friendly practices into business function or to improve the sustainability of the environment through practices that have a reduced negative effect on the environment.

Green Supply Chain Management (GSCM): - is the incorporation of environmental practices into supply chain activities to improve environmental performance and reduce a business' negative impact on the environment.

Logistics: - the movement and management of goods and services which includes transportation, warehousing and inventory management

Procurement:- the process by which companies acquire raw materials, components, products, services or other resources from suppliers to execute their operations.

1.7. Organization of the Study

The paper is organized with five chapters. The first chapter highlights the general overview of the study including the background of the study, statement of the problem, research questions, objectives of the study, significance of the study, scope and limitation of the study, definition of terms and ends giving highlight on research methodology. The second chapter deals mainly with the literature review part. The third chapter is the research methodology part which includes research design method applied, sources of data and data collection tools, population and sampling techniques, data collection procedures, data processing and analysis parts. The fourth chapter includes the data presentation analysis and discussions part.

The fifth chapter winds up the paper by summarizing of the major finding, conclusions, recommendations and areas of further research.

The last part lists the bibliography and appendices used in the thesis.

CHAPTER TWO

2. Literature review

The Literature Review gives detail explanation of the development of Green Supply Chain Management literature and on the factors affecting GSCM. It reviews the works on Green supply chain management and presents a summary of the conceptual framework, theoretical literature and empirical literature review of various empirical studies conducted on green supply chain management reviewed by the researcher.

2.1. Introduction

Business communities, industries, and policymakers have altered their interests to encourage and develop new sustainable economic forms that can be labeled as “green”, Gibbs & D.O’Neill, (2015), affirming the importance of environmental quality for development is recognized in the MDG framework. As noted throughout from this report, in addition to reducing the negative impacts from environmental degradation, better environmental management can also contribute to developing good governance, encouraging higher productivity, improving and enhancing the performance of environmentally related infrastructure and reducing public expenditures.

M.Rani & V.Shanker, (2018) also argued that there is no doubt that without the support of environment, Life will be threatening with the present scenario of environmental conditions which is alarming concerning degradation, climate change, sea level rise, imbalanced ecosystem, air, water, soil pollution etc. Most of the problem is created directly or indirectly by the activities of human being which indeed need proper environmental policy for mitigating and addressing it.

As can be seen throughout the above report of Gibbs & D.O’Neill, (2015), good environmental policy largely benefits society by protecting human health and the environment. But for progress to be made within the environmental policy areas (whether air quality, water, waste or biodiversity) cross-cutting, systemic flaws need to be addressed. Laws and regulations need to be clear, enforceable and feasible. Policy instruments need to be sound, packaged and well designed. The implementation of these instruments needs to be well supported by adequate

compliance assurance strategies and all this requires effective supporting institutions Gibbs & D.O'Neill, (2015)

Good environmental regulation has essential consequences in terms of realizing political, economic and public administration goals. For countries aiming to strengthen the rule of law and improving governance, effective environmental compliance assurance systems help to reinforce the credibility of regulation in general. Moreover, in the coming years the bar for governments in general and for environmental regulators in particular will be set higher. Businesses will expect policy solutions that minimize compliance costs and bureaucracy while the public on the other hand will demand better environmental performance, while. Gibbs & D.O'Neill, (2015)

Supply chains have evolved to GSCM in response to the growing needs of Environmental compliance. As such, Green Supply Chain Management is essential in changing the total impact of any organizations on the environment which are involved in supply chain activities. Besides this, GSCM will have a great contribution on sustainability and performance enhancement. Through protecting the environment and preventing pollution, companies would be able to make more profit, gain competitive advantage, cutting disposal cost, minimize risks, and at the same time provide costumers higher quality products (Di Peso, 2000).

Here we can see some examples of environmentally conscious well-known companies with green practices.

- **Panasonic:** Though you probably know Panasonic as a manufacturer of TVs and cameras, which are business-to-consumer products, the company also works as a big business-to-business company as well. That's where its green practices are really paying its dividends. Panasonic has gained a big following because of its green practices as a maker of lithium ion batteries used for electric cars and in-seat airline entertainment systems. The company makes sustainable products that other companies can feel good about using.
- **Chipotle:** The category of upscale quick-service restaurants has been growing like wildfire. People want a nicer meal more than they can get at McDonald's, but they don't want to spend too much money. From this trend, Chipotle has benefited, and just because it has been a leader in environmental concerns it has been booming. Despite the fact that it costs a lot more, the

chain only uses meat that is free of hormones and antibiotics, and it has called on other restaurants to do the same,

- **Starbucks:** Which is known for world's largest coffee chain has long been vocal about its support for reusing, recycling, and supporting sustainability. One of its biggest projects has been encouraging people to employ reusable cups for environmental concerns. This is due to the fact that paper coffee cups create a huge amount of waste each year and even the ones that are recyclable aren't always tossed in the right can. Starbucks has long offered reusable heavy-duty coffee mugs, but it also recently introduced lower-key plastic cups designed to look like the iconic original Starbucks cup for those who really like to advertise that they went to the coffee shop that morning. Although Starbucks is a chain, this is one of the reasons why people are eager to announce their allegiance to it. Starbucks has also uses low-energy light bulbs, installed low-flow water fixtures as additional ways to help our environment.
- **Adidas:** The world's famous sneaker and clothing label undertook a major initiative a few years ago to decrease its worldwide energy use by 15 percent within few years. That has helped to boost the company image both in the U.S. and abroad. For this the company has hired experts in each and every country where it operates to help figure out how best to wean itself off energy. The company has even undertaken a project in Brazil that encourages people to donate their old athletic shoes, which are made into sustainable energy sources.

Source: By (Kayla Matthews)

According to Craig and Easton (2011), the acceptance of social and other issues related to the environment is evolved from what was referred to as “standalone” to the concept we currently refer to as sustainability. Sustainability issues arising from this current business environment have warranted organizations to consider sustainable practices in their goals and policies.

This chapter therefore aims to give an insight into GSCM and the factors that affect it and also how SCM can help in sustainability issues of GSCM.

2.2. Overview of SCM

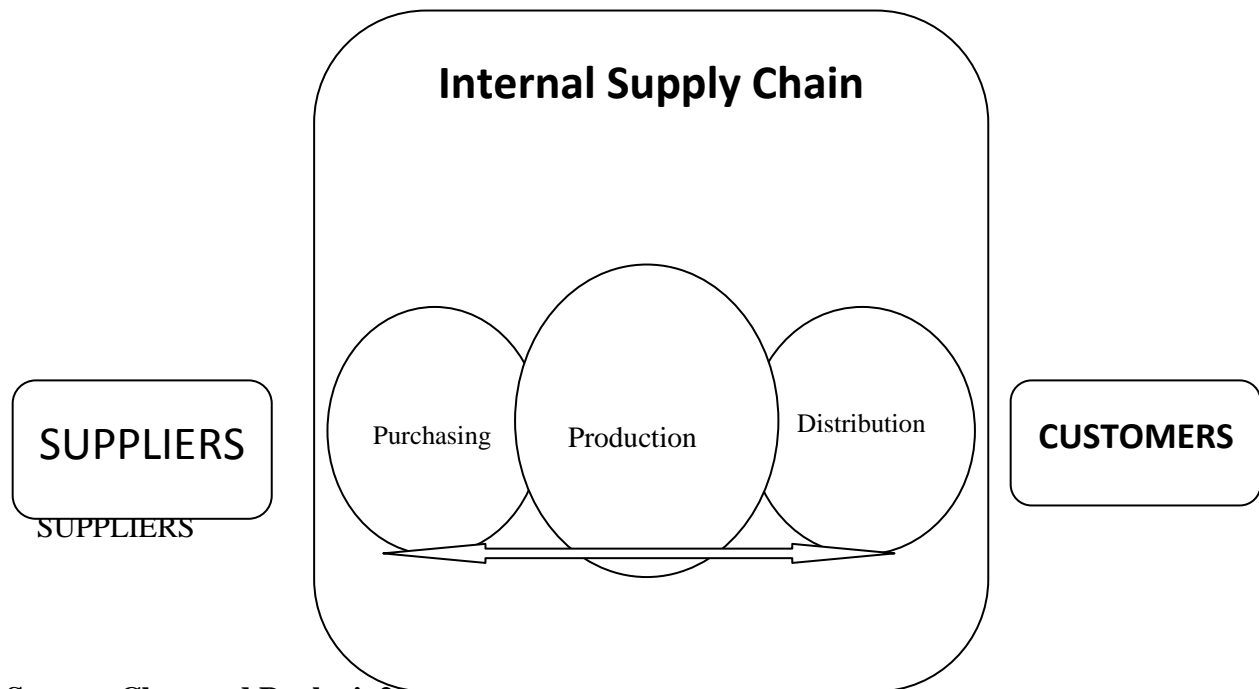
The term supply chain management which has emerged in the early 1980s as a concept that brought the different functional areas of logistics, procurement, operations and aspects of marketing and production together under one area of management (Lambert Cooper & Pagh D.J.,2000). The Supply chain management consists of the manufacturer and suppliers, warehouses, retailers, the customer, transporters, and all parties that are involved directly or indirectly in fulfilling a customer request..

According to Zuckerman, A. (2000), there are several key functions that make up the supply chains:-

- ❖ Purchasing of raw materials and components is the first and crucial step for the cost containment. Then the manufacturing process.
- ❖ Warehousing and shipping phase of the supply chain which is called as distribution or commonly called logistics- often “third-party logistics”
- ❖ Then the transport and delivery stage of the goods and services, both the finished product to customers and retail outlets as well as shipment of materials required both supporting a company and manufacturing a product.

SCM is seen as the internal and external integration of enterprise processes with the suppliers and customers to create value for the customers (Cooper et al., 1997). Internal supply chain with a final result of providing a product to the customer refers to a chain of functions or activities within an organization. Integration of these functions involves the holistic performance of different activities across departmental boundaries. A well-integrated and designed internal supply chain should result in excellent customer service and company performance. Basnet (2013)

Figure 2.1:- An illustration of a company's supply chain



Source: Chen and Paulraj, 2004

According to Simchi-Levi (2002), SCM is an integrated set of methods that are combined to synchronize different activities of stores, suppliers, warehouses and manufacturers effectively and efficiently so that products are produced and distributed in the correct quantities, to the right locations at the right time, so that business requirements are addressed and costs are minimized. The concept of SCM has grown in its scope ever since its advent. From the process of outsourcing, manufacturing and delivery of goods to customers in the end, it has taken all the processes of generation and distribution of goods into its tide (Mentzer, et al., 2001).

In today's ultra-competitive global business environment, a well-managed and organized supply chain is essential in creating competitive advantage and value for the firm (Lambert and Cooper 2000). From this definition one can note that, competition is no longer firm competing against another firm, but rather as supply chains competing against supply chains. To create value for companies, and for setting common goals among the supply chain members and organizations, supply chains will have to be managed accordingly. But these days SCM is no longer considered as just a competitive advantage only but also as a necessity to remain stable in the competitive market. Bilateral and joint collaborative efforts both by manufacturers and suppliers are needed

so that the number of defective products lessens and, integration of quality control measures set. Due to globalization and the need for increased outsourcing, organizations suffer a lot and it becomes more difficult for them to scrutinize supplier standards and activities without supply chain management. By SCM, organizations can easily involve with their global suppliers in bilateral goal setting, multi task training engagement, and information sharing systems.

Some of the key drivers for the evolution of SCM include globalization, greater environmental concerns, increased customer expectations, market uncertainty, on time product delivery, increased market value and the increased emphasis on quality all around the world.

2.3. Supply Chain Management Definition

In these modern science era different scholars and academics offers diverse definitions of supply chain management. From the different definitions one can note that there is no consensus on its content. Stock & Boyer (2009) depicts that the reason for the difference of the definitions is because of SCM varies between businesses and it evolves with time, changing economic and climate. Here are some definitions of SCM by different scholars:-

Council of supply chain management Professionals (2007)	<i>“the planning and management of different activities that are involved in sourcing and procurement, conversion, and all logistics management activities which includes the coordination and collaboration of different stake holders like customers, suppliers, third party service providers and intermediaries</i>
Desai et al. (2016)	<i>“the integration of key business processes that provide information, services and products that add values to stakeholders and customers from end users through original suppliers.</i>
Harjeet et al. (2016)	<i>“ is simply the management of transport or flow of goods and services, it also includes storage, shelf life, analysis of goods procured and goods sold logistics, etc. Supply chain management helps in planning and executing different supply chain activities of a particular company to reach up a net value of the organization.</i>
Simchi Levi(2002)	<i>“is a set of methods that are utilized to integrate suppliers, warehouses, manufacturers and stores efficiently so that products are produced and distributed with the right time, to the right location and with the correct quantities”.</i>
Martins et al. (2019)	<i>“The process of planning, implementing and controlling the operations of the supply chain with the purpose to satisfy customer requirements as efficiently as possible.”.</i>

For the purpose of this study SCM is defined as (Council of Supply Chain Management Professionals, (2016) definition.

“The planning and management of different activities that are involved in all logistics management activities the conversion process, the procurement activity and the sourcing”.

2.4. SCM as a Key Business Process

According to the Council of Supply Chain management Professionals (CSCMP), Supply Chain Management’ is principally responsible for synchronizing the major business processes and business functions across and within the different companies into a better functioning representation. It drives the coordination of activities and processes within information technology, finance, sales and marketing and product design. It also includes all manufacturing operations and the Logistics Management activities, (CSCMP, 2009). Firms may have to confront complex issues because of excessive dependence on suppliers and this in turn may affect their focus on core capabilities (McMullan, 1996).

Supply chain competence is a necessary precondition for firms to react to market and financial uncertainties so that to manage and uphold their supply chain performance and organizational performance (Gubi, Arlbjørn, & Johansen, 2003).

According to Stock & Lambert (2001) the following are the eight key business processes of supply chain management :- (1) procurement, (2) product development and commercialization, (3) manufacturing flow management, (4) order fulfillment, (5) demand management, (6) customer relationship management (7), and customer service management (8) returns. These processes subsume or include much of logistics, purchasing, marketing and operations management. Mentzer et al. (2001) also stressed out that all the traditional business functions should be included in the process of SCM. Cooper et al. (1997) also suggest that SCM can be the management of all business processes.

2.5. Role of SCM in Construction

The SCM have so many roles today's construction business. According to Ruben & Lauri (2000), there has been a focus on the co-operation between suppliers and contractors for improving the total flow of material, whereas traditional treatment of construction logistics and material handling has predominantly concentrated on activities occurring on site with the role of improving the interface between site activities and the supply chain. Wegelius-Lehtonen, (1995) also wrote about the In-depth cost and time analyses which are important for identifying potential improvement and for developing supply chains. Ruben & Lauri, 2000 again also approves that the goal is to reduce cost and duration of site activities in which the primary consideration is in insuring dependable material and labor flows to the site to avoid disruption on the work flow simply by focusing on the relationship between the site and direct suppliers. Secondly reducing costs especially related to logistics, lead time and inventory by focusing on the supply chain itself. Third is on transferring activities from the site to earlier stages of the supply chain with the goal of reducing the total cost and duration. Fourth is integrated management and improvement of the supply chain and site production, Ruben & Lauri, (2000).

2.6. Functional Departments of Supply Chain Management

The basic group of participants in the usual structure of a supply chain is an arrangement of a company and the suppliers and customers of that company while the extended supply chains involve additional three types of participants named the supplier's supplier or the ultimate supplier which is found at the beginning of an extended supply chain, the customer's customer or ultimate customer which is found at the end of an extended supply chain and thirdly a whole category of companies who are service providers to other companies in the supply chain. These are companies who supply services in marketing, logistics, finance, and information technology (Hugos, M., 2006). According to Hugos, M., 2006, in a certain supply chain, there is some combination of companies who perform so many different functions. For the purpose of this study the major actors of SCM found in the Council of Supply Chain Management Professionals will be used as a boundary, which are the Procurement management, the Operations management and the Logistics.

From the definition stated by CSCMP, three departments are pinpointed as key SCM departments namely procurement management, operations management and logistics (Council of supply chain management professionals)

2. 6.1 Operations Management

Operations management (OM) is defined as the planning, direction and control of business processes that transform inputs into services and products for internal and external customers (Krajewski *et al.* 2009). It is responsible for ensuring efficiency and efficacy in the transformation Process, (Prentis 1987) using a set of policies and practices that are defined and implemented by a company and are aimed at satisfying the market (Fleury 1999). Operations Management identifies all the activities which are necessary to plan, develop and improve the business processes involved in the manufacturing of a product or in the provision of a service, Chase & Jacobs (2008). Therefore OM can be recognized as the production function for a business. These days, operations management must address the growing complexity of production systems, deep changes in industry structure, and the different roles that must be performed by different companies within the supply chain. According Sohal *et al.* (1999), in recent decades, industries in many countries have been analyzed to examine strategies, and various production processes were adopted. Therefore Operations management can be taken as a key business process for all businesses (Kumar & Suresh, 2009).

2.6.2. Logistics Management

According to Lummus & Vokurka, (1999), Logistics is the process of planning, implementation and control of the effective and efficient flow of goods, services and information from the point of origin to the point of consumption in order to meet the final customers' requirements.

The integrated logistics is perceived as a set of interconnected activities and processes, with a goal of optimizing resources and minimizing the costs. Within this concept, the optimal solution is the one that better meets service level great to minimum total cost (Heaney, 2013; Colussi *et al.*, 2016). According to Ballou (2007), logistics aims to provide customer service that is of low

cost and better quality in the context of supply chain management. Marchesini & Alcantara (2016) stated that in order to assist in the implementation of major strategies, logistics activities should be a part of the process. Logistic is therefore considered as one of the key elements of Supply Chain Management and its functional efficiency well affect the level of success of a firm (Bowersox et al, 2013).

Therefore, in order to achieve success it is important to ensure that the strategic directions of the organization are aligned with the logistics capabilities (Morash et al, 1996; Yazdanparast et al, 2010). It is therefore; from the above points one can note that logistics is a key element in the supply chain management.

2.6.3 Procurement

Procurement is the business management function that ensures identification, sourcing, access and management of the external resources that an organization needs or may need to fulfill its strategic objectives (CIPS, 2013). According to Adisak Suvittawat (2017), Procurement plays a prominent and vital role in the supply chain networks which significantly affects the monetary and non-monetary domains of industry (Michelsen and De Boer, 2009; Baily et al., 2008; Monczka et al., 2005). Not only this, but numerous researchers also purported procurement as an important part of supply chain activities which significantly influence the organization performance (Lambert et al., 2000).

The effective supply chain management is very important for organization's competitive advantage and procurement is playing the major role for effective supply chain management as it relates to raw materials sourcing. The high procurement skills of the employees must create the effective procurement and cost effectiveness for supply chain organization.

2.7. Green Supply Chain Management

GSCM is a multidisciplinary concept generated by constructing environmental management practices in the context of supply chains (Eltayeb, Zailani, & Ramayah, 2011). The awareness that is created among the people about the environmental pollution is increasing around the world which made them to be more curious about the protection of the environment. The increasing scarcity of natural resources and the growing worry for being Green in the global

market place have changed the managements to view the supply chain strategies with an environmental perspective. According to Azzone & Noci, (1996), industries that have always considered improvements in their environmental performance and with high environmental risks are those found in heavy engineering, construction, automotive, chemical and plastic as one of their basic competitive priorities, alongside lower costs, manufacturing lead-time, and quality. Due to this reason people intend to buy green products and in turn the concept of green supply chain management is getting more popularity.

Nowadays, most organizations especially in the developed countries are starting to consider greening their business as their intention is changed towards the sustainability of the environment. According to Beamon, (1999), the manufacturing activities had increased due to the current changes in environmental requirements that influenced the attention of people in developing environmental management (EM) strategies for the supply chain.

On the more established “sustainability” of an organization or a supply chain concept, the term “green” is now more widely used interchangeably which points to a more broadened view of social and economic impact and with environmental concern (Dobers & Wolff, 2000). According to Hervani et al. (2005), GSCM is an action by adding “green components” into the traditional supply chain management.

As defined by (Emmet & Sood, 2010), in comparison to traditional Supply chain, the environmental effects of all processes within the supply chain is considered by the Green Supply Chains from the extraction of raw materials up to the final disposal of goods. Sustainable development theory and the thought of supply chain management together combined created the Green supply chain. The green supply chain management is a system which includes the process of material acquisition, processing, packaging, warehousing, transportation, sale and use till the end of life management and treatment and recycling (Bacallan, J.J. 2000). The process is guided by the principle of enhancing benefits, optimizing allocation of resources, achieving the goal of the compatibility with the environment. Generally speaking, it is a green system combines by environment, rules and cultural element, the suppliers, manufacturers, distributors, retailers and consumers. It is also the combination of logistics, information flow, cash flow and knowledge flow.

Customer demands and governmental pressures continue to press on businesses to be more and more sustainable (Guide & Srivastava, 1998). As a result, public mandates for environmental accountability and governmental legislations have helped many strategic planners in bringing several green concepts to take place.

According to Srivastava, (2007), green manufacturing, waste management, reverse logistics, green operations and green design are among the key green concepts that have emerged in the literature that come up over the years. According to Diabat and Govindan (2011), GSCM embodies a large number of activities such as green design, green sourcing and procurement, green operation and manufacturing, green distribution, and green logistics as well as marketing.

2. 8. GSCM initiatives in the construction Industry

2. 8.1 Green Design (Green Initiation)

Green design has an ultimate relevance for the sector, as decisions made during this stage will have a major influence on the life-cycle environmental impact of the construction industry. Eco-design comprises the integration of the design process and all other environmental dimensions by taking the full flow of supply chain into consideration. As Ghobakhloo et al. (2013) depicted in his study, greener product design encompasses of two major ideas, namely lifecycle assessment (LCA) and environmentally conscious design (ECD).

Opportunities to diminish any kind of environmental effects that are inherent in the production processes and establishment of new products are opened by designing products. As highlighted by Zhang et al. (2011), the process should start with an environmental impact assessment of the design to understand any probable effects on the surrounding environment. Similarly (Zhang et al., 2011) emphasizes that integrating the right technological systems within the building design, such as the use of solar panels, energy efficient heating, lighting and air-conditioning systems, and wastewater recycling technologies, are essential for improving the environmental performance of the building . Furthermore according to(Ng et al., 2012), the correct choice of construction materials and components like using prefabricated components will lessen the negative impacts during construction in addition to reducing the energy and harmful effects associated with the building. Architects and Consultants are the common stakeholders involved in green building design.

2.8.2. Green Purchasing

While purchasing function plays a crucial role in providing companies with a competitive advantage, it also affects the environmental performance through the selection of environmentally conscious supplier and purchase of environmentally friendly materials (Sarkis, 2003). Companies will have to select their appropriate supplier in order to realize and address their environmental objectives. According to the definition of Min and Galle (2001), green purchasing is defined as “an environmentally-conscious purchasing practice that promotes recycling and reclamation of purchased materials without adversely affecting the performance requirements of such material and reduces the sources of waste”. According to (Varnas et al., 2009), the integration of environmental considerations into purchasing programs, actions and policies are included in the green purchasing which includes the time of both during the awarding of the contract and in the material purchasing decisions. Material purchasing decisions include the purchasing of products with environmentally-friendly features, such as non-toxic ingredients and recycled materials are included in material purchasing decision, (Ofori, 2000). It is crucial to note that organizations must have green supplier criteria for deciding the right suppliers to make green purchasing for implementation of green supply chain management (Igarashi et.al, 2013). Environmental consideration during the tendering stage must be involved in establishing the environmental criteria in the pre-qualification stage such as the necessary quality certification, previous green project experience, and technical knowledge. Simultaneously, the selection phase must also give appropriate and suitable weights to the green aspects of the project.

2.8.3. Green Construction

Green construction and or manufacturing refer to use of onsite practices to diminish the environmental impacts that comes out of construction. These practices are relevant only for both main contractors as well as sub-Contractors, and it involves considerations of such activities as waste management planning (Shen and Tam, 2002). (Chen et al., 2010) also advises the use of automation, while (Shrestha, 2016) emphasizes on the implementation of wastewater recycling technology to the green construction. (Jaillon et al., 2009), (Shi et al., 2013) and (Shrestha, 2016) also wrote on the adoption of offsite-prefabrication, the use of fuel-efficient machinery and the

use of energy efficient and low hazardous materials respectively. The green manufacturing mainly aims at reducing energy consumption and waste emission (Li et.al, 2010).

2. 8.4 Green Transportation

The environmental impacts of distribution and transportation are essential topics for organizations sustainability. Green transport is mainly based on the logistic process, with the dramatic increase in the amount of logistics and increase of traffic flow, as the atmospheric environment is severely contaminated.

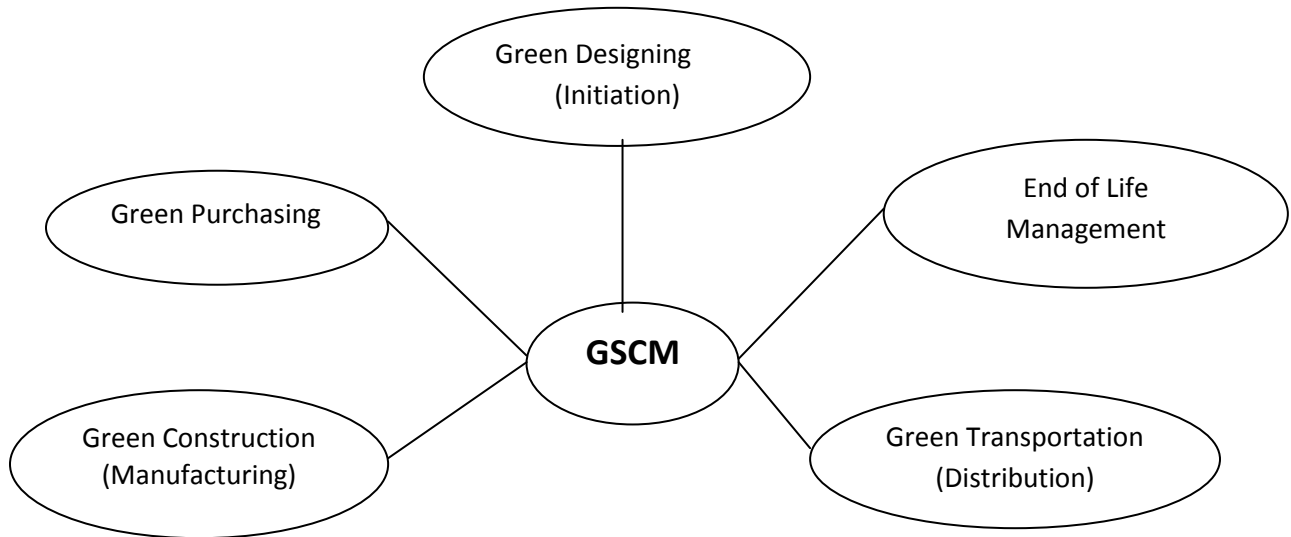
Green transportation is practices undertaken to minimize the environmental impacts associated with transportation (BRE, 2003). Construction projects naturally involve a considerable amount of transportation activities due to its nature, in which it includes both transportation of materials and employees. Green transports mainly include evaluation of centralized distribution and consumption of resources and reasonable transportation route planning (Christopher, M. 2005). According to Ng et al. (2012), the transportation of materials accounted about 6 to 8% of carbon emitted during a construction project is due to, and therefore transportation strategies, such as full-truck quantities and fuel-efficient vehicles to minimize emissions, should not be overlooked. Similarly, (Tema Nord, 2010; BRE, 2003) commented the use of video conferencing systems instead of face-to-face meetings, shared and public transport instead of personal transport, and employee accommodations near project sites can reduce employee-related transportation impacts.

2.8.5 End-of-life Management

End of life management refers to a carefully-planned and energy-efficient execution of demolition activities that is required to maximize the recovery and recyclability of construction materials (Ng et al., 2012). It is of paramount importance to reduce the environmental burden associated with materials in the building as (Thormark, 2002) indicated. Studies have shown that end-of-life management can reduce the total life-cycle energy of a building by approximately 30% and GHG emissions by 18%, Blengini (2009). For some materials, such as steel or aluminum, recycling can confer savings of more than half the embodied energy as well as

significant reductions in the associated GHG emissions which in turn have a major impact on the environment (Yan et al., 2010).

Figure 2.2:- Components of GSCM



Source:- Weiwei and Huiyu,2010 (Adapted by Author)

2. 9. Challenges of GSCM in the Construction Industry

The recent concern and alarm for environmental sustainability is a major driving force for the construction industry players to adopt GSCM in their firms. Even though it is believed that GSCM have a range of benefits, it has not been widely practiced due to different reasons. According to (Mathiyazhagan, 2013), the GSCM initiatives have shown positive outcomes for many companies but it is not without facing some challenges in the implementation process. Four broad categories of challenges are identified namely Institutional Challenges, Organizational Challenges, informational challenges & economic challenges.

2.9.1 Internal Challenges

These challenges are defined as challenges that occur internally within the players of the organization itself. The major significant internal challenge is financial constraint due to two types of involved costs which are the direct cost and transaction cost.(Balasubramanian,2012) Green Supply Chain Management involve higher operation costs thus hinder the adoption of the approach amongst organizations specially for organizations that have limited availability of resources. Besides the financial challenges, changing the mindset and culture of an organization and its players is another significant challenge on GSCM initiatives. Commitment and leadership starting from the Top management to every individual in the organization into the new direction is a crucial. The management need to create environmental awareness and support their subordinates .The other challenges faced by the industry is lack of resources in the form of Technical expertise, technology, material & process.

2.9.2 External Challenges

The most significant external challenge faced by the construction industry is lack of support from the Government, (Balasubramanian, 2012). The government basically catalyzes since its support in the form of appropriate policies, standards and regulations can be both driver and challenge in the Green Supply Chain Management implementation.

The management of Suppliers is also another challenge since GSCM is involved in interaction with suppliers. (Mathiyazhagan, 2013). Thus it is very essential for the supplier to be responsive and provide a strong commitment in the GSCM implementation.

Trigos (2007) highlighted the availability of green products in the market these days is another major factor in the implementation of GSCM of the construction industry. According to Varnas et al., 2009 only few products can be considered as Green and made for recycle like Timber and concrete. The usage of green products is in its infant stage due to the cost preference.

The other external challenge is lack of adequate training and development, sustainable auditing and certification like ISO 14001, (Balasubramanian, 2012)

Some organizations also finds competition and uncertain nature of the construction industry, founds to be challenging for the GSCM implementation as the construction players are highly competitive among themselves and in providing reputable performance for their projects.

2.10 Importance of Green Supply Chain Management

There are plenty of researches that have tried to bond firm's performance with Green Supply Chain Management practices. Zhu and Sarkis (2004); Green et al. (2001) found positive relationships between performance of a firm and GSCM. Globalization with the rapid change in global manufacturing scenario, environmental and social issues which currently has given the opportunities for companies, are also becoming more important in managing their business. At the individual level, it cause to certain competitive advantages such as better integration with suppliers ,lower prices, greener products, and it can create markets for green products while it can also cause to better adoption of supplier with environmental issues at the GSCM national level. Making green the supply chain can cause to improve the organization's competitive position by reducing costs. For industrial firms at their private section with lower profit margins, supply chain costs can improve their market situation. Making green the supply chain can also create new market for companies.

Green Supply Chains are also equally important for every government in their industrial sector to achieve a better result in the international competition of their country at the national level. Additional advantage of GSCM is that it enables firms to reduce negative environmental effects by limiting the pollution via cleaner production and by minimizing wastage while also decreasing the use of harmful materials and recycling products and their wastage.

There are plentiful studies that mentioned the benefits of adopting GSCM. Among them, Duber-Smith (2005) identified ten different reasons why a company should go green. These are brand reputation, employee morale, return on investment, adapting to regulation and reducing risk, competitive and supply chain pressures, lowered costs/increased efficiency, product differentiation and competitive advantage, sustainability of resources, target marketing and the ethical imperative.

2.11 Supply Chain Management in the Construction Industry

The Construction industry these days is playing an important role in achieving rapid growth in almost all countries around the world. On the other hand the construction activities impact the environment in its daily routine activities. SCM offers a methodology to mitigate the intolerant problems in the supply chain that has been reinforcing waste and problems.

Construction supply chains (CSC) are usually very complex projects particularly in large projects. The complexity of SCM in construction projects are attributed to the variety of parties and materials involved in a single construction project. It therefore requires a great deal of management between supply chain partners which may cause the supply chain management complexity. A large construction company may interact with hundreds or thousands of suppliers and sub-contractors per annum in order to deliver a successful product and project.

In the construction industry mostly it is the client who takes the initiative to start a construction project, and this leads to the frequent conceptualization of the construction supply chain as a process explicitly starting and ending with the end user. It is unquestionable that the major distinctive characteristic of the construction supply chain is that each client represents a unique customer with unique requirements. And the construction supply chain need to adjust itself to it in order to be more effective and more efficient.

Different scholars and authors reported that the construction supply chain is affected by many problems Vrijhoef & Koskela, (1999), Akintoye et al., (2000), O'Brien, (1999). Most of these problems are not generated in the conversion process instead in the different interfaces that exist within the supply chain. Some of the general problems are

- Problems related to the Design
- Poor Quality of Materials and components
- Lack of coordination, collaboration and commitment between suppliers and clients within the supply chain.
- Poor communication and information transfer.
- Incompetent management within the supply chain having inadequate planning and control.
- Poor training of contractor's suppliers, subcontractors and workers.

- Lack of effective methods for measuring the performance of the different parties within the supply chain.

Besides, management of supply chain relationships is, however, especially problematic in project based industries due to; financial, and socio-political terms, the discontinuity of demand for projects, the uniqueness of each project in technical, and the complexity of each project in terms of the number of actors involved (Skaates et al., 2002).

2.12 Green Supply Chain Management in the Construction Industry

The construction Industry (CI) is among the largest industry sectors that are consuming huge amount of energy and raw materials in the world's economic activity. It accounts for about 39% of the world's total carbon emission, which may lead to severe environmental pollution, United Nations Environmental Program, (2017). On the other hand the construction industry plays a major role in the development of every country's economy.

This industry took waste that occurs in every phase of the project lifecycle as a key difficulty because of its devastating effects on the environment as well as the efficiency of the construction industry. Reasonably, the industry needs to take actions to reduce the environmental impacts in their activities, especially when the customers are becoming environmental conscious and stringent and above all environmental regulations are being imposed by the government (Mathiyazhagan, Govindan, NoorulHaq, & Geng, 2013).

In recent years, governmental concerns over greenhouse gas emissions is increasing and have initiated a wave of policy change in the industry in order to trim down the overall environmental impact and ensure a sustainable future. Due to this reason companies are becoming more positive and started addressing the emissions out of their direct control, referred as Sustainability (Ranconteur 2012).

Implementation of Green Supply Chain in construction projects meant to bring the concept of eco-friendly concept in every process from the initiation phase, planning phase, the construction phase, and the operation and maintenance phase, Beamon (1999).

2.13 Factors Affecting the Green Supply Chain Management practices

Globally, most industries are showing their interest in adopting GSCM due to pressures from the government legislation and customers. A lot of companies have started to reduce their part of pollution and improve environmental performance. The green supply chain initiatives have shown positive outcomes for many companies, but it is not without facing different challenges in the process of implementation. Adopting GSCM within an organization is a hard task which needs a detailed assessment and more significant analysis. During the adoption process, some factors that affect the implementation process are also anticipated during the transition time. Industries need to have notable awareness about the environmental conditions and they confront with so many different factors that affect the implementation during the adoption of GSCM. It is therefore advisable for the organizations to first identify those factors which will affect the implementation of GSCM and need to be removed away during the primary stages of GSCM implementation.

Many researchers have mentioned different factors that affect GSCM based on their own criteria. Among them Jagannath et al, (2018), mentioned five factors that can affect GSCM namely Government Policies and regulations, Customers, external factors, Costs and Production and Operation with seventeen sub factors under them. (Dhruti Sundar et.al 2018) also reported some nine factors that affect GSCM in Automotive industry. These are poor quality of human resources, lack of organizational encouragement, resistance to technology advancement adoption, lack of IT implementation, lack of top management commitment, Lack of government support systems, reluctance to change towards GSCM, unaware of customers and suppliers, cost implication, Lack of implementing green practice, uncertainty and market competition. Henriques, I. & Sadorsky, P. (1996) explained their view about the pressure in organizations as the elements influencing and affecting GSCM into two. The exterior factors like controllers, consumers, suppliers; and internal pressures for occasion shareholder's administration, and workers. According to Patrick T.I.et.al.. (2010) four possible factors leading to successful implementation of green specification are mentioned as stakeholder's involvement, leadership and responsibility, principle and techniques and feedback and building public confidence. Elizabeth Ojo,et.al (2014) also analyzed nine factors in the construction sector related to Lack of

resources, market, knowledge, information sharing, legal enforcement, sustainable practices, demand, public awareness and poor commitment by top management.

Walker et al., (2008) on factors affecting GSCM or green procurement identifies lacking of managerial support and practical tools, as well as training, as an extra factors affecting green procurement. Bowen (2001) point out that compared to single criteria considerations, the life cycle perspective adds to the complexity of green procurement in that the number and scope of purchasing criteria is increased and needs to cover various stages of a product life cycle. Education, especially training of purchasers in public and private organizations needs to be more widespread in incorporating GSCM elements in the operations of mining companies.

Factors that affect the green practice can be classified as external and internal based on their source of origin (Walker et al., 2008). But this factors that hinders firms from adopting the GSCM strategy differs from organization to organizations. (Carter and Dresner, 2001), wrote that firms may face the same amount or even more green barriers than drivers. The following are barriers that are going to be studied in this thesis. According to Walker et al.,(2008) the factors are divided in two categories as Internal Factors and external factors.

2.13.1 Internal Factors

Internal Factors are those factors which does exist inside the Organization itself .

Cost Implications

Factors related to high initial investment in implementing the GSCM and those costs related to slow return on investment (ROI) after implementing GSCM will be associated. The additional cost incurred for implementing green practices poses a significant challenge for all stakeholders as highlighted by several studies in construction and other sectors (Zhang et al., 2011; Liu et al., 2012)

Technology Infrastructure

Technology in construction and lack of technology are those factors related to waste management and recycling.

Skilled professionals

The green employees can have a great effect on the implementation of green practices in organizations. The implementation of green practices requires qualified professionals with expertise in the green industry. Previous studies have found this to be one of the main barriers for greening the construction sector (Ofori et al., 2002; DBIS, 2013).

Knowledge and Experience- As evident from several studies in the construction literature (Sourani and Sohail, 2011; Zhang et al., 2012), the awareness and knowledge about the green practices and its benefits is a possible significant barrier that holds back organizations and firms from investing resources and time for the implementing and adoption of green practices.

Corporate leadership support The top management support in the adoption of GSCM and the leadership and commitment from senior and middle level managers are associated with influencing the GSCM implementation. According to Green, (1995), top managers, namely the “CEO and its direct subordinates responsible for corporate policy” act as important drivers in implementing diverse managerial practices that influence organizational performance. According to Hu & Hsu (2010), the CSF “top management commitment” can make a critical difference to the success of GSCM practices through their understanding, support, and commitment by directly and indirectly affecting all GSCM practices.

Strategic Direction

Clear and consistent communication about environmental issues with their suppliers and stake holders should be provided by organizations in the Green Supply Chain. New supporting policies to promote GSCM and environmental practices are needed. Yan, (2011).

2.13.2 External Factors

These are obstacles that are beyond the firm’s locus of control. The identified factors for the construction sector that adversely affect the implementation of green practices include

Government support

Governmental incentives and preferential treatment as well as long term contracts can affect the adoption of GSCM in organizations. Government influential policies (Carter & Ellram, 1998; Yu, 2007; Linton et al., 2007) are important to the adoption of GSCM. Bower et al., (2006) conversely, look at the private companies to implement green procurement practices, lack regulatory demands and clear regulatory framework for criteria development, evaluation and incorporation, as well as for comparing alternatives and for following up the supplier performance.

Understanding among Supply chain stakeholders

The cooperation with the supply chain stakeholders and the communication and information sharing among the supply chain members are among the factors that affect GSCM implementation. Supplier collaboration (Sharfman et al., 2007; Vachon & Klassen, 2008), lack of supplier commitment (Wycherley, 1999; Walker & Preuss, 2008), supplier reluctance to change towards environmental sustainability are found to be significant to the adoption of GSCM. External stakeholders and environmental performance are also the important factors affecting GSCM practices according to Hall, (2006).

Competitive pressure

The heavy competition between firms can affect the firm's initiation towards the implementation of GSCM. . Competitive pressures (Cooper et al., 2000) and market uncertainty (Yu & Hui, 2008) also plays a vital role.

2. 14 Green Supply Chain Management Practices in Construction Industry

A construction supply chain is more complex compared to manufacturing supply chain as it usually consists of numerous participants within and a complex structure (Cheng et al., 2010). It includes consultants, project clients, main specialist contractors and various supplier key elements. The practice of GSCM involved reduce the emission of greenhouse gasses, increase energy efficiency, saving natural resources by reducing wastage , environmentally friendly packaging, recycling techniques and hybrid technology for transportation (Srivastata, 2007)

Green Supply Chain Management practices are internal environmental management, cooperation with supplier customers to motivate green purchasing for marketing environmental requirements, investment recovery and eco design (Zhu and Sarkis,2006)

According to (Green et al. 2012) different organizations and firms are adopting the Green Supply Chain Management practices with an effort to stakeholder request for more responsive environmentally sustainable processes and products. According to Rao & Holt, (2005), GSCM practice is classified into external practices with supply chain partners and internal practices within the firm. According to Azevedo et al. (2011) a firm's decisions to respond in an environmentally friendly way are reflected by internal GSCM practices while special requirement for some level of inter cooperation with other stakeholders, such as customers and suppliers are required by the external GSCM practices (Zhu et al. 2013).

Internal Environmental Management Practices in the organization are decisive element of the implementation of innovation (Kumar and Chandrakar, 2012). Zhu and Sarkis (2004) mentioned that Internal environmental management practices encompasses senior management commitment, mid-level manager's support, cross functional assistance, total quality management, environmental compliance auditing program and ISO 14001 Certification.

GSCM practices are found in various ways from purchasing to integrated lifecycle management as an upstream supply chain, manufacturers reverse logistics to the integrated downstream supply chain, closing loop with reverse logistics, suppliers to customers followed by reuse and recycling (Zhu & Sarkis, 2006). Green procurement is an upstream element of GSCM which helps to bring economic, social and environmental intangible benefits.

Design Changes can help to reduce waste processing and recycling cost (Chen & Sheu, 2009). Through sensitive design, eliminating hazardous environmental impact is possible. From the design stage the fundamental waste hierarchy (3R) reduce, reuse & recycle should be considered. It is therefore, appropriate design can extract maximum benefits from the products which also lead to least amount of waste.

Product Life cycle assessment is also another important factor to consider for green supply chain management. Material impact, design, data inventory, improvement, product process need careful consideration for life cycle assessment (Hervani et al., 2005)

Green collaboration Green supply chain management practices by the suppliers with the motivation training arranged by the organization for the better practice. By using environmental monitoring activities such as using markets transactions carried out by the buying organization so that to inform suppliers about the environmental requirements and to scrutinize the compliance of suppliers with environmental requirements. Selecting suppliers that have implemented environmental management systems which in turn comprises the direct involvement of the buying organization to jointly set common environmental goals with its suppliers which may result in the reduction of the environmental impact of coordinated activities (Green et al. 2012). This collaborative approach, in turn, over a long period of time aims at gaining competitive advantage and benefit for the whole supply chain (Brockhaus et al. 2013). According to Large and Thomsen (2011), green collaboration has a direct positive impact on environmental performance.

2.15 Empirical Literature Review

Different authors and scholars wrote so many papers and case studies on factors that affect the greening of the supply chain management. These scholars and authors found a lot of variables on their findings. This part of the study will give some highlight on their study and their findings.

James A.P. et.al.(2016),studied on the factors of GSCM in mining companies in Ghana and found that the goods purchased by the mining companies have encountered with a negative effects on the environment. In addition, their study also found that green procurement influence supplier selection through environmental regulations, suppliers environmental emission; cost for disposal of hazardous material; environmental partnership with suppliers; cost of environmentally friendly packages; mode of transporting the goods purchased; cost of environmentally friendly goods; potential liability for disposal of hazardous materials; focusing on buying company's environmental policy. They also argued that the most important factor influencing supplier selection in mining companies is the environmental regulation by the

government while the most notable factors influencing green supply chain in the mining companies in Ghana include lack of knowledge and expertise involving green supply chain.

Dhruti Sundar Sahoo et al (2018), has made his study in the factors that affect the automotive industry of India. In his study he found five factors named as reverse logistics, inbound greening, compliance greening, ecological greening and outbound greening. The study concluded that these five factors are crucial factors in the GSCM practices in the industry to increase the efficiency and is an integrated approach for providing both economic as well as environmental efficiency.

Thh May. I. et.al (2017) studies the factors affecting the agricultural sector. Their study encompasses 14 factors affecting the green supply chains in Vietnamese agriculture including: manager commitment, IT system, new technology, organizational culture, HR quality, energy & waste management, market & competition, political supports, knowledge & experience, actors' participation, costs, suppliers, logistics management and consumer awareness. By using a regression model with the above 14 independent variables, they determined the factors affecting for the success of green supply chains and found six significant factors that positively affect the green supply chains in Vietnam agriculture namely: manager commitment, new technology, HR quality, knowledge & experience, logistics management, and consumer awareness. s and the State for improving the performance of green supply chains in Vietnam agriculture.

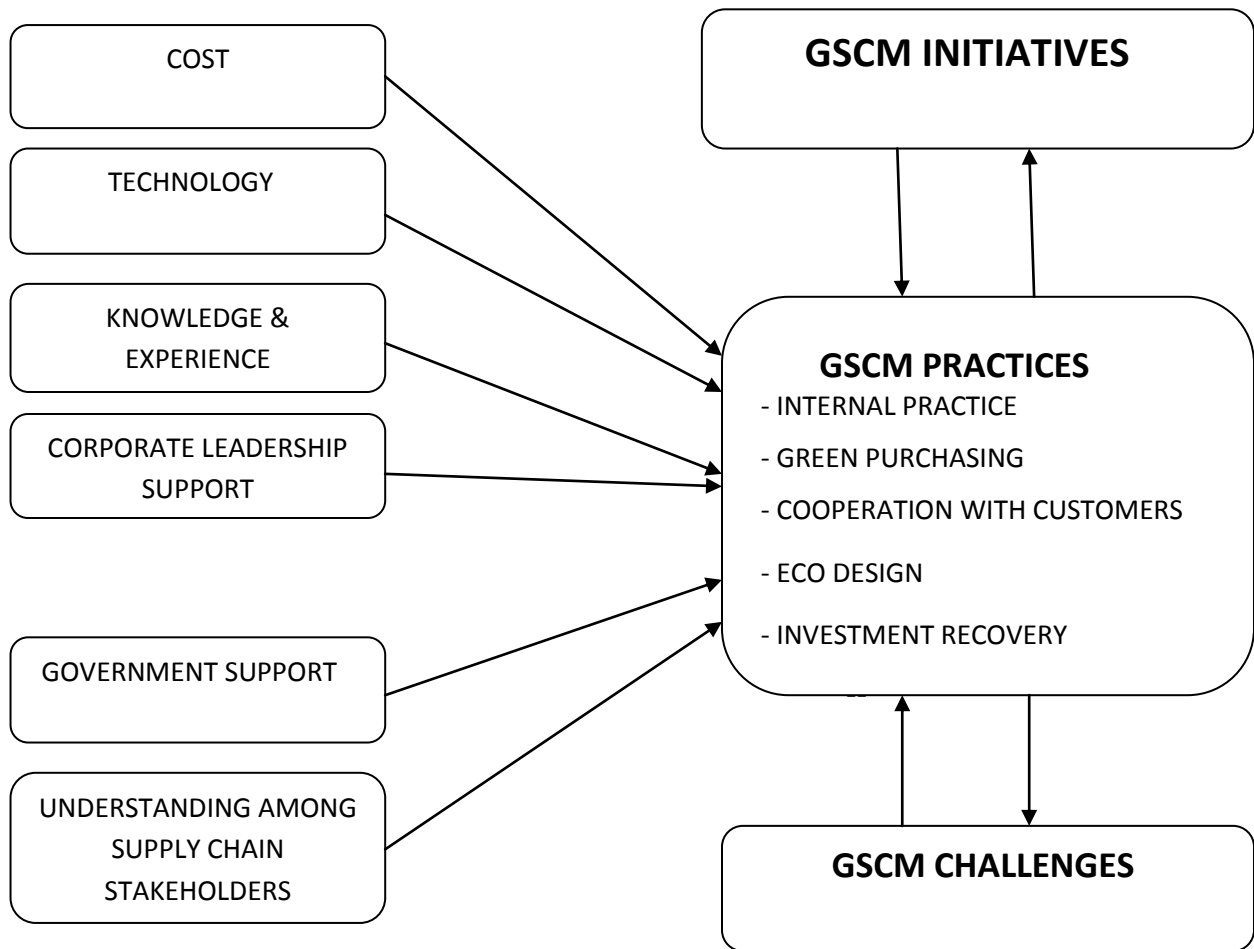
(Mochamad et. al., 2018) studied the factors affecting GSCM in the construction industry. They found that these factors are helpful in order to give solutions for the problems of energy usage, waste reduction and inefficiency in construction projects. They also commented that the implementation of GSCM in construction will help in improving the efficiency, reducing the waste and saving the energy usage by: (1) reducing the use of transportation and material handling during the construction process, (2) reducing energy use in the construction process and (3) reducing the use of materials in the design and construction stage through the development of building designs that can save energy use. Therefore, they advised that is better to be able to implement PLC management for the adoption of the GSCM concept in the construction industry.

Researchers suggested that an appropriate performance measurement system is a critical requirement for the effective management of a supply chain (Liang et al. 2006). As one can see from the above studies each study reveals different factors depending on the industry and the organization. (Shepherd and Gunter 2006), also stressed that there are a number of important problems have not been yet addressed. (Mochamad et.al. 2013), also reported that only few studies were found conducting systematic and comprehensive green studies on assorted supply chain stages and stake holders having focused on the construction sector .

2.16 Conceptual Framework

The conceptual framework of this study includes independent variables identified above as cost implication, lack of technology, lack of skilled professionals, lack of knowledge and experience, lack of corporate leadership support, lack of strategic direction, lack of government support, lack of understanding among supply chain stakeholders and competitive pressure while the independent variable is GSCM Practices.

Fig: 2.3 Conceptual Frame work



Source; - Sini Laari, 2016

CHAPTER THREE

3. Research Methodology

This chapter explains the research methodology that was applied for the research study by describing the research process, research design, population and sampling, data collection approaches and instrument, including approaches to the data analysis.

Selection of research methods depends on the research objectives, nature of the subject and implementing facilities so that identifying an approach to find out an answer to the research questions easily.

3.1. Research Design

It is under the conceptual structure within which research is carried out as it constitutes the blue print and bases for collection measurement and analysis of the data. In an attempt to assess on the factors affecting Green Supply Chain Management Practices - the case of Yotek Construction PLC, the researcher used Descriptive research studies and explanatory research design as this type of research design technique helps researchers establish a relationship between two different group of variables and the Descriptive part for those studies which are concerned with describing the characteristics of a particular individual, or of a group. Studies concerned with specific predictions, with narration of facts and characteristics concerning individual, group or situation are all examples of descriptive research studies (Kothari, 2004). It is therefore both the descriptive and explanatory study was employed to identify and describe the characteristics of variables of focus within a study.

3.2. Research Approach

It is believed by most researchers that the best method to use for a study depends on the purpose of the research, researcher data and the complementary research questions. According to (Kothari,2004) mixed research method is defined as the class of research welfare the researcher mixes or combines both quantitative and qualitative research approaches, techniques, methods, concepts or language in to a single study.

This study therefore adopted both qualitative and quantitative approach as the aim of the study is on identifying the factors affecting GSCM practices, initiatives and challenges. According to Greener, (2008) and Saunders et.al, (2007), the advantage of using mixed methods is that it enables the researcher to look from different angles and support the data with the result collected by questionnaire.

3.3. Target Population and Sample

Target Population

This study was carried out on the Supply Chain Management staffs of Yotek Construction Head Office. The Supply chain staffs from the three departments which are the planning, procurement and logistics department are all included in this study. A total of 42 staff members across the three operational areas participated in this study. This is because these departments are identified as essential departments in the implementation of GSCM. In order to ensure that data is reliable and contains only information that is relevant, only the most pertinent departments will be included (Pertamin Hulu Energi, 2012).

Sample

A non-probability purposive judgment sampling (Beri, 2013) was used to select the departments for this research. In this selection technique, all the elements in a population do not have even probabilities to be chosen as sample subjects because only information from specific individuals is needed for the research. According to Bougie and Sekaran (2013), non-probability purposive sampling is used when sampling is restricted to specific groups of people that can provide the desired and quality information to the researcher. That means the sampling is confined to specific groups of individuals as only these individuals believed to have the desired information for this study. The reason for using of this technique was because only personnel with the relevant information were required in the study, namely, SCM staffs of the organization. From these groups, all personnel were included to participate in the study (**a census sample**). This is because the number of personnel in the respective departments is small and these individuals have expert knowledge and have gone through experiences that provide important inputs for the study.

3.4. Data Sources and Types

To get all the necessary relevant information for this study, both primary and secondary data were used as an input for the research. The primary data was collected from Yotek Construction SCM staffs by using structured questionnaires and semi-structured interviews. The questionnaire was structured in such a way that it includes all relevant parts and information to clearly accustom the respondents. The questionnaire part uses close ended questionnaire in a 5 point liker's scales to collect data from the respondents. The questionnaire has 5 rating scales ranging from 1-Strongly Disagree to 5-Strongly Agree, one open ended question and a space for any additional information.

Interview: - In order to obtain adequate information the researcher has used personal interview with the department managers and one deputy manager of the procurement and supply department. The secondary data were collected by document review from organizational reports, manuals and through internet to assess relevant information about the industry under the study.

3.5. Data Collection Procedure

Both structured Questioners which included open and close ended questioners and semi-structured interviews using a semi-structured interview guide were used to collect the primary data from the SCM staffs of Yotek Construction. Data which are gathered through questionnaires are simple and clear for analyses and it allows the researcher for tabulation of responses and quantitatively analyzes factors. It is also time efficient for both the respondents and the researcher.

Interview: The reason for the using of the interviews was that it allows the study to be conducted by keeping the questions limited to only those that would be of value to the study (Flick, von Kardoff & Steinke, 2004:268).

3.6. Data Analysis

The questionnaires were administered in a manner that the mass of raw data that is collected were systematically organized to facilitate the analysis. All the data collected were checked for consistency of responses and cleaned before the entry was made into computer file. The gathered

data were checked adequately for reliability and clarification. Using IBM statistical Package for Social Sciences (SPSS) 28, the data were analyzed and the results were displayed using tables, percentages and with Correlation & Regression analysis while content analysis was used for the qualitative data because the data analyzed also include semi-structured interviews to facilitate description and explanation of the findings.

3.7. Content Analysis of the Interview Data

The data that was collected from the interviews were then reviewed and placed according to the departments of the interview participant were from. The information was then reviewed through content analysis to identify key words, concepts, sentences and related themes. The data was then tabulated. From these tables the researcher identified patterns in key terms and sentences and put them into context. This was then used to answer the research objectives and derive conclusions.

3.8. Ethical Considerations

The study primarily focuses to gather primary data in order to assess the factors that affect Green Supply Chain Management Practice in Yotek Construction. The study therefore neither involves any experiment on human subjects nor conducted without the consent of the respondents. In addition, the researcher didn't ask the respondents to engage into any risks as a result of participating in this study. The respondents were given every right to decline or be included in the study. Besides, the primary and secondary data collection in the organization was under the consent of the respective bodies of the organization and without any offence in ethical rules during the entire research process.

3.9. Reliability and Validity

Reliability

To test the reliability of the questionnaire cronbach's alpha was used. According to Zikmud et al (2010) cronbach's alpha is a measure for the internal consistency of items to the concept. Cronbach's Alpha is very useful in developing attitude scales and questionnaires as the alpha level (or reliability) indicates whether the items are measuring the same construct. Cronbach's

Alpha should be over 0.70 to produce a reliable scale and any scale less than this alpha coefficient should be eliminated according to Burns (2008).

Table 3.1 Cronbach’s alpha coefficient of variables

Reliability Statistics	
Cronbach's Alpha	N of Items
.885	73

Source: own survey, 2021

As shown in the above table 3.1, the coefficient of reliability for the data collection instrument for all 73 items is 0.885. In this regard, items with coefficient alpha greater than 0.80 are considered to be reliable. Therefore, based on the above test results, the instrument scored an acceptable Cronbach’s alpha and the instrument is found reliable.

Validity

To make the instruments measure what was intended to measure the respondents were clearly communicated on the contents of the questioner as well as the objectives of the research.

CHAPTER FOUR

4. Result, Discussion and Interpretation

This chapter presents, analyzes, and interprets the data obtained from the primary source. The primary data was obtained from the questionnaire and from the interviews made with the respective department managers which were designed to collect the necessary data to answer the research questions. In this study, data were collected mainly through questionnaire and interview, and the questionnaires were distributed to all staffs of Yotek Construction PLC supply & procurement, planning & logistics departments found in Addis Ababa. The collected data was then analyzing to present the results. Data were coded so that they will be understood and analyzed by IBM SPSS version 28.

4.1 Response Rate

A total of 42 questionnaires were distributed to procurement, logistics and planning departments of Yotek construction head office found in Addis Ababa and out of those 42 questionnaires all the 42 responses were collected representing 100% response rate. According to vice-chancellors committee and careers council of Australia (2001) which is cited by Duncan D.Nulty (2008) regarded as an overall response rate of 70% and above is said to be both desirable and achievable.

4.2 Missing Data

When a questionnaire is used as a data collection tool, it is possible that some data required might be missed. This usually occurs when respondents fails to answer questions in the survey. Incomplete or missing data will lead to the reduction of the size of data available for the analysis. In addition, any statistical results based on missing data could be biased, leading to erroneous or invalid conclusions (Hair et al. 2006, Hair et al. 2010). Thus, it is fundamental to check the data for any missing values. In this study there were no missing values in the data as all the 42 responses were filled properly and completely.

4.3 Background of the Respondents

This section describes the respondents' general characteristics about gender, age, education and work experience.

Gender of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	26	61.9	61.9	61.9
	Female	16	38.1	38.1	100.0
	Total	42	100.0	100.0	

Source: own survey 2021

From the total number of respondents which are 42, 26 of the respondents are male and the remaining 16 are female. This result shows that majority of the respondents are male. Though the ratio of the respondents is not proportional, both category of gender were participated in the survey. This confirms the researcher that there is no bias in the study associated to the gender of the respondents.

Age of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under 25	2	4.8	4.8	4.8
	26 - 35	18	42.9	42.9	47.6
	36 - 45	14	33.3	33.3	81.0
	46 - 55	6	14.3	14.3	95.2
	Above 55	2	4.8	4.8	100.0
	Total	42	100.0	100.0	

Source: own survey 2021

From the total number of questionnaires that were gathered during this study 2 respondents were under the age of 25, 18 respondents were between the age group of 26 and 35, 14 respondents found between the age group of 36 and 45, 6 respondents are between the age group of 46 and 55 and the remaining 2 respondents lie in the age group of 56 and above. The result shows that majority of the respondents (42.9%) are on the age group of 26 to 35.

Educational status of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High school graduate	3	7.1	7.1	7.1
	College Diploma	10	23.8	23.8	31.0
	Degree	24	57.1	57.1	88.1
	Masters	5	11.9	11.9	100.0
	Total	42	100.0	100.0	

Source: own survey 2021

Among the total of 42 respondents of the questionnaires for the study, 5 respondents hold a master's degree, 24 respondents holds a degree, 10 respondents holds a diploma and the remaining 3 respondents are high school graduates. The table shows that most of the respondents have first degree and above, people with higher level of education are believed to have good knowledge to give relevant information regarding the topic under study.

Year of experience of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 5 Years	3	7.1	7.1	7.1
	5 - 10 Years	8	19.0	19.0	26.2
	10 - 15 Years	17	40.5	40.5	66.7
	More than 15 Years	14	33.3	33.3	100.0
	Total	42	100.0	100.0	

Source: own survey 2021

When we come to the work experience of the respondents, 3 respondents have less than 5 years of experience, 8 respondents have 5 to 10 years of experience, 17 respondents have 10 to 15 years of experience, and 14 respondents have above 15 years of experience. It can be noticed that most of the respondents are well experienced so that they have a good understanding and knowledge about the environment they are serving and it can be concluded that the information they provide is relevant.

Table 4.5 Department of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Supply and Procurement	21	50	50	50.0
	Planning	9	21.4	21.4	71.4
	Logistics	12	28.6	28.6	100.0
	Total	42	100.0	100.0	

Source: own survey 2021

When looking at the departments of the respondents, 21 respondents are from supply and procurement department, 9 respondents are working for the planning department and the rest 12 respondents work on the logistics department of the company.

4.4 To find out how the Green Supply Chain Management function within Procurement, Planning and Logistics department of Yotek Construction

This section presents the data from the second part of the questionnaire that was gathered regarding how the Green Supply Chain Management function within Procurement, Planning and Logistics departments of Yotek, and respondents were asked to indicate their level of agreement on a five point Likert response format ranging from 1(Strongly Disagree) to 5(Strongly Agree). Fifteen statements representing different functions of the departments are presented using a table which presents frequency in percent per statement and analysis was done accordingly.

Table 4.6 How Green Supply Chain Management function within the Procurement Department

	Strongly disagree %	Disagree %	Neutral %	Agree %	Strongly agree %
Considers capacity planning with Suppliers in compliance with environmental standards	0.0%	0.0%	54.8%	33.3%	11.9%
Considers Suppliers compliance with environmental standards	0.0%	0.0%	28.6%	71.4%	0.0%
Considers recycled materials in Procurement process	0.0%	0.0%	35.7%	64.3%	0.0%
Considers reuse of materials in procurement process	0.0%	0.0%	38.1%	61.9%	0.0%
Considers reduction of Materials in Procurement Process	0.0%	0.0%	21.4%	59.5%	19.0%

Source: own survey 2021

From the above table on considering capacity planning with suppliers in compliance with environmental standards, the majority of respondents (54.8%) stayed neutral, (33.3%) agree and the rest (11.9%) strongly agree. The responses show that the department is moderately considering capacity planning with suppliers on environmental standards. From the table it can also be noted that the majority of the respondents (71.4%) disagrees that the department considers supplier's compliance with environmental standards, while (28.6%) replied that they are neutral on the department's consideration of Supplier's compliance. The result shows that the department is also moderately considering supplier's environmental standard compliance which will have an impact on promoting responsibility for the environment within the organization. The responses of employees on procurement department's consideration of recycled materials in its procurement process result show that (64.3%) agree (35.7%) of the respondents stayed neutral. The results showed that the department is again moderately considerate on recycled materials procurement. The above table also shows that the majority of the respondents (61.9%) agreed that the department considers reuse of materials on the procurement process and (38.1%) stayed neutral. From this it can be noted that the department is doing moderately in considering the reuse of materials in its procurement process. Finally on the result from the above table, all of the

(19%) of the respondents replied strongly agree, (59.5%) agree and the rest (21.4%) remained neutral for the responses of the department on consideration of reducing of materials in the procurement process out of which the majority. With a grand mean of (3.704) it can be seen that the department is doing well in reducing of excess materials in procurement process. Green procurement can boost the availability of greener products and services and also stimulate innovation.

The GSCM help ensure that there is sharing of environmental responsibility in supply chain at every stage and process to ensure that the adverse impact on the environment is minimized. As per researchers in this area, professional purchasers who consider environmentally preferable criteria in the procurement process have the power to reduce or even eliminate waste and environmental impacts as well as reduce costs.

Table 4.7 How Green Supply Chain Management function within the Planning Department

	Strongly disagree %	Disagree %	Neutral %	Agree %	Strongly agree %
Designs for encouraging use of renewable resources and energy	0.0%	0.0%	31.0%	35.7%	33.3%
Designs for resource efficiency	0.0%	0.0%	31.0%	45.2%	23.8%
Designs for reducing the amount of harmful Materials	0.0%	0.0%	40.5%	26.2%	33.3%
Designs for Recycling that facilitates reprocessing	0.0%	0.0%	42.9%	35.7%	21.4%
Designs for reuse of materials or whole product	0.0%	0.0%	50.0%	33.3%	16.7%

Source: own survey 2021

Table 4.7 shows that (31%) of the respondents remained neutral on planning department's designs on encouraging use of renewable resources and energy, (35.7%) of the respondents agree, while (33.3%) of the respondents strongly agreed on the designs. The responses of the respondent's showed that the planning department's designs well in encourage use of renewable resources and energy. The table also shows that (23.8%) of the respondents strongly agreed on

the departments resource efficiency design, while (45.2%) agreed and the remaining (31%) of the respondents are neutral. As the vast majority agrees, the department's designs for resource efficiency are acceptable. On the design of reducing the amount of harmful materials, (33.3%) of the respondents strongly agreed, (26.2%) agreed while the rest (40.5%) of the respondents are neutral. The result implies that the department's effort on designing for reducing the amount of harmful materials is again moderate. (21.4%) and (35.7%) of the respondents replied that they strongly agreed and agreed respectively that the department designs for recycling that facilitates reprocessing while (42.97%) are neutral which shows that the planning department again is doing moderately on considering recycling that facilitates reprocessing. Lastly from the above table, half of the respondents (50%) of the respondents remain neutral for reuse of materials or whole product while (33.3%) replied that they agree and the remaining (16.7%) strongly agree. This will show us that the planning department is doing moderately well on designing the reuse of materials (Grand mean=3.868). Green plans are comprehensive environmental strategies that are intended to improve environmental quality and designed to replace more conventional methods of protecting the environment.

Table 4.8 How Green Supply Chain Management function within the Logistics Department

	Strongly disagree %	Disagree %	Neutral %	Agree %	Strongly agree %
Considers using vehicles that use technological innovations for efficiency	0.0%	0.0%	26.2%	35.7%	38.1%
Considers consolidation of deliverables to reduce carbon emission	0.0%	0.0%	28.6%	45.2%	26.2%
Considers redesigning of Logistics network on timely basis	0.0%	0.0%	31.0%	52.4%	16.7%
Considers increasing degree of vehicle usage	0.0%	0.0%	28.6%	64.3%	7.1%
Considers combining of transportation for its deliverables	0.0%	0.0%	28.6%	33.3%	38.1%

Source: own survey 2021

Table 4.8 shows that the majority that covers (38.1%) and (35.7%) of the respondents strongly agree and agree on the department's consideration of using vehicles that use technological

innovations while (26.2%) of the respondents were neutral on the department consideration of using technologically innovated vehicles. From this we can see that the consideration of using vehicles that use of technological innovative vehicles moderately high. The above table also shows that (26.2%) of the respondents strongly agreed on the consolidation of the deliverables by the logistics department, (45.2%) agrees and the rest (28.6%) stayed neutral which shows that consolidations of deliverables are moderately well considered by the department. On redesigning of the logistic network, (16.7%) and (52.4%) of the respondents strongly agree and agree respectively that the logistics department considers redesigning of its logistics network on timely basis while (31%) of the respondents are neutral on it. From the total percentage it can be noted that the department moderately considers the redesigning of its logistics network. Table 4.8 also shows that (7.1%) of the respondents strongly agreed that the department considers increasing the degree of vehicle usage for its deliverables while (64.3%) of the respondents also agreed on it while the remaining (28.6%) which can show the department's moderate increased degree of vehicle usage. Finally the results from the respondents of the above table shows that all the respondents replied that the majority of respondents agreed on the logistics department consideration of combining transportation for its deliverables out of which (38.1%) strongly agreed, (33.3%) agreed with it while the remaining (28.6%) remain neutral. Having the grand mean of (3.97) the logistic department is performing well. Greening the logistics mitigate business risk and speed up innovations besides of helping becoming preferred vendor in the supply chain.

4.5 To find out the Factors that affects the Green Supply Chain Management Practices of Yotek Construction

CORRELATION ANALYSIS

During research investigation it is expected to recognize concepts beyond the means and standard deviations of the dependent and independent variables. The researcher therefore needs to know how one variable is related to the other which comes with the concept of correlation. Correlation is the relationship between two random variables or bivariate data. So, the researcher would like see the nature, direction, and significance of the bivariate relationship of the variables used in the study. The Bivariate Correlations analyzes the pair wise associations for a set of variables and displays the results in a matrix. It is helpful for determining the direction and

strength of association between variables. According to Field (2005) correlation coefficient is a very useful means to summarize the relationship between two variables with a number that falls between -1 and +1. The general symbol for the correlation coefficient is 'r' with a perfect positive correlation +1.00 and the -1.00 shows a perfect negative relationship. Consequently, this study uses Spearman rho correlation analysis to examine the relationship between those factors and Green Supply Chain Management Practices using a two-tailed test of statistical significance at the level of 95% significance, $P < 0.05$.

Table 4.9 Correlation of independent variables with dependent variables

		Correlations							
		GS CM Prac t ices	Cost	Techn ology	Knowle dge And Exper ience	Corporate Leadership support	Gover nment support	Under standing among Supply chain stake holders	
Spear man's rho	GSCM Practices	Correlation Coefficient	1.00	.332*	.329*	.412**	.365*	.210	.183
		Sig. (2-tailed)	.	.032	.034	.007	.017	.182	.247
		N	42	42	42	42	42	42	42
	Cost	Correlation Coefficient	.332*	1.000	.234	-.070	.279	.110	.067
		Sig. (2-tailed)	.032	.	.136	.659	.073	.488	.671
		N	42	42	42	42	42	42	42
	Technology	Correlation Coefficient	.329*	.234	1.000	.014	.031	.820**	-.342*
		Sig. (2-tailed)	.034	.136	.	.931	.843	<.001	.027
		N	42	42	42	42	42	42	42
	Knowledge And experience	Correlation Coefficient	.412**	-.070	.014	1.000	.224	.029	-.210
		Sig. (2-tailed)	.007	.659	.931	.	.153	.854	.182
		N	42	42	42	42	42	42	42
	Corporate Leadership support	Correlation Coefficient	.365*	.279	.031	.224	1.000	.008	-.015
		Sig. (2-tailed)	.017	.073	.843	.153	.	.960	.925
		N	42	42	42	42	42	42	42
	Government support	Correlation Coefficient	.210	.110	.820**	.029	.008	1.000	-.500**
		Sig. (2-tailed)	.182	.488	<.001	.854	.960	.	<.001
		N	42	42	42	42	42	42	42
Understanding among Supply chain stakeholders	Correlation Coefficient	.183	.067	-.342*	-.210	-.015	-.500**	1.000	
	Sig. (2-tailed)	.247	.671	.027	.182	.925	<.001	.	
	N	42	42	42	42	42	42	42	

*. Correlation is significant at the 0.05 level (2-tailed).

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

Correlation was used to find out the relationship between the independent variables (cost, technology, knowledge and experience, corporate leadership, government support and

understanding among supply chain stake holders) and the dependent variable (Green supply chain management practice) as conceptualized in the framework. The correlation coefficient expresses quantitatively the magnitude and direction of the linear relationship between variables, Pearson correlation coefficient reveal magnitude and direction of (either positive or negative) and the intensity of the relationship (-1 to +1). The researcher used one of the most commonly used types of correlation coefficient, which is a Spearman's rho correlation coefficient method because it is more appropriate for measurements taken from ordinal scale unlike Pearson which is more appropriate for measurements taken from interval scale. The strength of correlation interpreted by Evans (1996) as shown in the following pattern was used for this study.

0.00 - 0.19 very weak

0.2 - 0.39 weak

0.4 - 0.59 Moderate

0.6 - 0.79 strong

0.8 -1.0 very strong.

The results from table 4.9 showed that there is a weak positive correlation between cost and Green Supply Chain Management Practice (.332). The correlation between the dependent variable green supply chain management and technology founds to be (.329) which is positive and weak. Green supply chain management practice and knowledge and experience have positive and moderate correlation which is (.412). Corporate leadership and government support both have a positive weak correlation with the dependent factor GSCM practice which founds to be (.365 & .210) respectively. Understanding among supply chain stakeholders and the dependent variable green supply chain management practice have a very weak positive correlation.

The above correlation results showed that all the independent internal and external variables have a positive correlation with the dependent variable Green Supply Chain Management Practice. This implies that an increase in the independent variables will also increase the dependent variables and vice versa. The findings of Jagannath R. et.al (2018) also support the

findings of all the above factors except technology in that the five factors having correlation with the dependent variable.

4.6 Multi collinearity Test

Multi collinearity refers to the circumstances in which the independent/predictor variables are highly correlated or not. In this study, multi collinearity was checked with tolerance and Variance Inflation Factor (VIF) statistics. According to Andy (2006), cited by Mebit (2020) suggested that a tolerance value less than 0.1 describe that there is a serious collinearity problem. Burns and Burns (2008) on the other hand stated that a VIF value greater than 10 is also a concern. Similarly, Field (2009), emphasize that, values for “tolerance” below 0.1 indicate serious problems, although several statisticians suggest that values for “tolerance” below 0.2 are worthy of concern. In this study, all of the independent variables found to have a tolerance of more than 0.1 and a VIF value of less than 10.

Table 4.10 Multi collinearity test

Model	Coefficients ^a	
	Tolerance	VIF
1 (Constant)		
Cost	0.813	1.230
Technology	0.321	3.111
Knowledge and experience	0.900	1.111
Corporate Leadership support	0.873	1.146
Government support	0.286	3.500
Understanding among Supply chain stakeholders	0.695	1.438

a. Dependent Variable: GSCM Practices

Source: own survey 2021

The result in table 4.10 above shows that the collinearity between independent variables shows that there was no series problem except for technology and government support with a slightly higher VIF values which are (3.111 & 3.500) since the value of tolerance for all independent

variable is greater than 0.1 and all VIF is less than ten ($VIF < 10$). Therefore, the assumptions for regression analysis for the variables are met.

4.7 Model Summary

From the following model summary in Table 4.11, it can be seen that R is .727 and R² is 0.529. This indicates about 52.9% of the variance of Green supply chain management practices (dependent variable) can be affected by the internal and external factors (independent variable), the remaining 47.1% of the variance is explained by other factors which are not included in this study.

Table 4.11 Model summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.727 ^a	.529	.448	.16841

Source: own survey 2021

4.8 ANOVA

From the ANOVA Table 4.12, the F- test result and the P Value tests whether the overall regression model is good predictor and the probability of this result is occurred by chance or not. In this regard, the F- test result is 6.542 with a significance of less than .000. This means, the probability of those results occurs by chance is < 0.01 . This implies, 99 times out of 100, the estimate will reflect the true population characteristic. And it can be concluded as the overall regression model is significant, $F(6, 35) = 6.542$, $P < 0.01$, $R^2 = 52.9\%$ (the regression model is a good to fit the data). Therefore, significant amount of Green supply chain management Practice is affected by those factors. In other words, independent variable (Internal and External Factors) significantly predict the dependent variable (GSCM Practice). This implies that, the factors affect the GSCM practice of Yotek construction PLC. This result is also in line with the study finding of Jagannath R. et.al.,(2018) found that GSCM Practice is affected by the above factors except technology.

Table 4.12 Anova Table

		ANOVA ^a				
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.113	6	.186	6.542	<.001 ^b
	Residual	.993	35	.028		
	Total	2.106	41			

a. Dependent Variable: GSCM Practices

Source: own survey 2021

4.9 Regression Analysis

Multiple regression analysis was employed to examine the effect of independent variables over the dependent one. The result also helps us to have overall understanding between the relationship of dependent and independent variables.

Hereunder in the table coefficient, standard error, t-value, and p-value for all explanatory variables and the value of R-squared, adjusted R-squared, S.E of regression and F- statistics with p-value analyzed as follow:

Table 4.13 Regression Analysis

		Coefficients ^a				
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.664	.386		4.313	<.001
	Cost = X1	.093	.059	.202	1.568	.126
	Technology =X2	.102	.096	.219	1.069	.292
	Knowledge and experience =X3	.111	.039	.343	2.807	.008
	Corporate Leadership support =X4	.103	.037	.343	2.764	.009
	Government support =X5	.061	.057	.234	1.077	.289
	Understanding among Supply chain stakeholders=X6	.129	.042	.425	3.056	.004

a. Dependent Variable: GSCM Practices

Source: own survey 2021

From the above coefficient table 4.13, Beta value indicated that there is a positive relationship exists between Green supply chain management practice and knowledge and experience, corporate leadership support and understanding among supply chain stake holders which is equal to(.008 < 0.05), (.009 < 0.05), and (.004 < 0.05) respectively. This means changes in the predictor value is related to changes in the response variable; i.e. knowledge and experience,

corporate leadership support and understanding among supply chain stakeholders have significant effect on GSCM practice of Yotek construction plc but not the others. To summarize, the equation of the regression line is defined as follows.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k + \alpha$$

Where:

Y is the dependent variable (GSCM Practice),

β_0 is the regression coefficient/constant/Y-intercept,

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ are the slopes of the regression equation,

X1 is cost,

X2 is technology,

X3 is knowledge and experience,

X4 is corporate leadership support

X5 is government support and

X6 is understanding among supply chain stake holders

α is an error term at 95% confidence level.

The regression was:

$$Y = 1.664 + .093X_1 + .102X_2 + .111X_3 + .103X_4 + .061X_5 + .129X_6 + e \quad 0.05$$

The major finding of the test of the above mentioned models were that there is a positive, significant impact of the three factors: knowledge and experience, corporate leadership support and understanding among supply chain stakeholders. But the rest three factors: Cost, technology and government support were not supported. The findings of Sreejith B.,(2012) also supports the

research findings that knowledge & experience, corporate leadership support and understanding among supply chain stake holders affect the Green Supply Chain Management practice.

4.10 To identify the Green Supply Chain Management initiatives implemented by Yotek Construction

This section presents the data from the fourth part of the questionnaire that was gathered to identify the Green Supply Chain Management initiatives implemented by Yotek, and respondents were asked to indicate their level of agreement on a five point Likert response format ranging from 1(Strongly Agree) to 5(Strongly Disagree). Twenty seven statements representing different initiatives are presented using a single table which presents frequency in percent per statement and analysis was done accordingly.

Table 4.14 Green Design

	Strongly disagree %	Disagree %	Neutral %	Agree %	Strongly agree %
Your company considers the correct choice of construction materials and components in its design	0.0%	0.0%	31.0%	52.4%	16.7%
Your company considers integrating the right technological systems within the building designs	0.0%	0.0%	28.6%	64.3%	7.1%
Your company considers environmentally conscious design in its design activities	0.0%	0.0%	28.6%	33.3%	38.1%

Source: own survey 2021

Regarding the organization consideration of choosing the correct construction materials and components in its design activities, (16.7%) of the respondents believe and replied that they strongly agree and the rest (52.4%) of the respondents replied that they agree. On the organizations' consideration of integrating the right technological systems within the building designs, the majority of respondents (64.3%) replied that they agreed, (7.1%) strongly agree and the rest 28.6%) of the respondents remain neutral. When looking at the organizations consideration of environmentally conscious design in its design activities, the majority which consists (38.1%) of the respondents replied that they strongly agree while the rest (33.3%) of the respondents notified that they agree

and the rest (28.6%) of them stayed neutral. The result of the above table with a grand mean of (3.92) shows that the organization has a good consideration on choosing the correct construction materials and components and it also considers integrating the right technological systems within its building designs. It also shows that the organization considers environmentally conscious design in its design activities in a better way.

Table 4.15 Green constructions

	Strongly disagree %	Disagree %	Neutral %	Agree %	Strongly Agree %
Your organization considers decreasing waste emission mechanisms in its construction projects	0.0%	0.0%	45.2%	45.2%	9.5%
Your organization considers using low hazardous materials in its construction projects	0.0%	0.0%	42.9%	45.2%	11.9%
Your organization considers using energy efficient machineries in its construction projects	0.0%	0.0%	35.7%	54.8%	9.5%
Your organization considers using fuel efficient machineries on its construction projects	0.0%	2.4%	54.8%	28.6%	14.3%
Your company uses waste water recycling technology on its projects	0.0%	0.0%	31.0%	47.6%	21.4%
Your company considers waste management planning on all its construction projects	0.0%	0.0%	31.0%	38.1%	31.0%
Your company selects subcontractors that strictly follows onsite construction practices that minimize environmental impact	0.0%	0.0%	26.2%	35.7%	38.1%
Your company strictly follows onsite construction practices that minimize environmental impact	0.0%	0.0%	28.6%	45.2%	26.2%

Source: own survey 2021

From the above table, responses on the organization consideration of decreasing waste emission mechanisms in its construction projects showed that the most of the respondents (45.2%) respond that they are neutral, (45.2%) of the respondents agree on it while the rest (9.5%) replied that they strongly agree. This shows that the waste emission mechanisms in the organization are implemented in good level. On the part of considering using low hazardous materials in its

construction projects, (11.9%) of the respondents believe and strongly agree that the organization is using low hazardous materials while the rest (45.2%) of them agree and the rest (42.9%) stayed neutral. The responses showed that the organization moderately considers using low hazardous materials in its construction projects. Regarding the company's usage of energy efficient machineries (54.8%) of the respondents replied that they agree and the rest (9.5%) of respondents replied that they strongly agree while the rest (35.7%) stayed neutral. This implies that the organization is moderately using energy efficient machineries in its construction projects. The responses on usage of fuel efficient machineries in the organization's projects, (2.4%) of respondents disagree, (54.8%) remains neutral, (28.6%) agree while the rest (14.3%) of the respondents strongly agree. This shows that the usage of fuel efficient machineries in the organization projects is again moderate. On the part of water recycling technology of the organization, (21.4%) and (47.6%) of the respondents replied strongly agree and agree respectively while the rest (31%) remains neutral. This result strictly shows that the organization considers the usage of water recycling technology in its projects. When we look at the waste management planning of the company, (31%) of the respondent's remains neutral, (38.1%) agree while the remaining 31% replied that they strongly agree. Again this result shows that the organization is doing the waste management planning on its construction projects. When looking at the company's subcontractor selection on the basis of strictly following practices that minimize environmental impact, (26.2%) of the respondent's remains neutral, (35.7%) agree while the rest (38.1%) strongly agree. This result shows that the company is strictly following onsite construction practices that can minimize environmental impact. Finally looking at how the organization strictly following onsite construction practices that minimize environmental impact, (28.6%) of the respondents stayed neutral, (45.2%) agree, while the rest (26.2%) strongly agree. Having a grand mean of (3.82), the result implies that the organization is strictly follow onsite construction practices that minimize environmental impact.

Table 4.16 Green Purchasing

	Strongly disagree %	Disagree %	Neutral %	Agree %	Strongly Agree %
On your organizations supplier selection phase, appropriate weight is given to greener aspects	0.0%	0.0%	21.4%	59.5%	19.0%
Your organization follows environmental consideration in its tendering stage	0.0%	0.0%	40.5%	45.2%	14.3%
Your organization has greener supplier selection criteria	0.0%	0.0%	16.7%	66.7%	16.7%
Your organization integrates its purchasing policies and programs with environmental considerations	0.0%	0.0%	23.8%	52.4%	23.8%
Your organization purchases materials that promotes recycling	0.0%	0.0%	31.0%	50.0%	19.0%
Your organization considers purchasing of materials that reduce waste	0.0%	0.0%	57.1%	26.2%	16.7%
Your organization considers purchasing of environmentally friendly materials	0.0%	0.0%	59.5%	31.0%	9.5%
Your organization considers selecting environmentally conscious suppliers during its selection process	0.0%	0.0%	38.1%	47.6%	14.3%

Source: own survey 2021

From the Green purchasing practices of the organization, the responses of the respondents for the organization consideration of selecting environmentally conscious suppliers during its selection process phase, (19%) replied strongly agree, (59.5%) agree while the rest (21.4%) remains neutral. This shows that the company has given weight to greener aspects on its supplier selection process. On consideration of environmental thinking in the organization tendering stage, (14.3%) of the respondents strongly agree, (45.2%) agree while the rest (14.3%) of the respondents marked strongly agree. This means the organization is doing well in considering environmental thinking on its tendering stage. When looking the greener supplier selection criteria part (16.7%) remain neutral, (66.7%) agree, while the rest (16.7%) strongly agree which resulted in that the organization had greener supplier selection criteria. The responses for integrating the organization purchasing policies and programs with environmental consideration showed that (23.8%) strongly agree while the rest (52.4 %) of respondents agree and the

remaining (23.8%) remains neutral. This implies that the organization’s purchasing policies and programs are well integrated with environmental considerations. The result about purchasing of materials that promotes recycling shows that (26.2%) of the respondents agree, (16.7%) strongly agree, while the majority that is (57.1%) remains neutral. From this we can notice that the organization didn’t give much weight for promoting recycling when purchasing. When we come to considering purchasing of materials that reduce waste (16.7%) of the respondents strongly agree, (26.2%) agree and the rest (57.1%) remains neutral. The replies for considering purchasing of environmentally friendly materials, the results of the responses showed that (9.5%) strongly agree, (31%) agree and the rest (59.5%) stayed neutral. This shows that the organization is not effectively considers purchasing of environmentally friendly materials and also materials that reduce waste. Finally on the green purchasing practice of the organization the respondent’s response for considering selecting of environmentally conscious suppliers during the purchase process, (14.3%) strongly agree (47.6%) agree while the rest (38.1 %) remains neutral. With a grand mean of (3.81), shows us that the organization moderately consider selecting environmentally conscious suppliers during its purchasing process.

Table 4.17 Green Transportation

	Strongly disagree %	Disagree %	Neutral %	Agree %	Strongly agree %
Your organization considers using shared and public transports	0.0%	0.0%	50.0%	33.3%	16.7%
Your organization uses fuel efficient vehicles for transportation of goods and its employees	0.0%	0.0%	54.8%	33.3%	11.9%
Your organization considers reasonable transportation route planning	0.0%	0.0%	28.6%	71.4%	0.0%
Your organization uses centralized distribution and consumption of resources	0.0%	0.0%	35.7%	64.3%	0.0%
Your organization selects green transportation methods for moving its materials and employees	0.0%	0.0%	38.1%	61.9%	0.0%

Source: own survey 2021

From the above table showing the response for the Green Transportation Practices of the organization, the responses of the respondents for organizational consideration of shared and public transports showed that (16.7%) strongly agree, (33.3%) agree while the remaining (50%) remain neutral. This shows us that the organization is considering using shared and public transports moderately. Regarding using of Fuel efficient vehicles (11.9%) strongly agree,(33.3%) of the respondents agree while (54.8%) of responses show neutral. Here it can be seen that the organization is not effectively using fuel efficient vehicles for transporting good and its employees. When looking at the reasonable transportation route planning, (28.6%) of the respondents remains neutral while the rest (71.4%) of the respondents believe that the company has reasonable transportation route planning by replying “agree”. Therefore it can be noted that the company has reasonable transportation route planning. On the organizations’ centralized distribution & consumption of resources usage, (64.3%) agree while the rest (35.7%) replied neutral. This shows that the organization has moderately good centralized distribution and consumption of resources. Finally on selection of green transportation methods for moving materials and employees the majority (38.1%) replied neutral while the rest (61.9%) agree. A grand mean of (3.42) entails that the organization is moderately doing good in selecting green transportation.

Table 4.18 End of Life Management

	Strongly disagree %	Disagree %	Neutral %	Agree %	Strongly agree %
Your organization considers decreasing Greenhouse gas emission	0.0%	0.0%	31.0%	45.2%	23.8%
Your organization considers recycling of materials	0.0%	0.0%	40.5%	26.2%	33.3%
Your organization implements carefully planned demolition activities	0.0%	0.0%	42.9%	35.7%	21.4%

Source: own survey 2021

From the above table showing the responses on End-of-Life management practices of the organization, the responses on organizational consideration in decreasing Green House Gas

emission, (23.8%) replied strongly agree, (45.2%) agree and the rest (31%) remains neutral. This result shows that the organization has a moderate consideration on decreasing green house gas emission. On the part of organizational consideration regarding recycling of materials (26.2%) of the respondents agree, (40.5%) remain neutral while the rest (33.3%) of the respondents strongly agree with it. The result shows that the organization is again moderately considering the recycling of materials. Regarding carefully planned demolition activities, (21.4%) replied strongly agree, (35.7%) agree and the rest (42.9%) remain neutral and the grand mean of (3.883) which entails that the organization fairly implements a carefully planned demolition activity.

4.11 To identify the Green Supply Chain Management implementation challenges at Yotek

This section presents the data from the fifth part of the questionnaire that was gathered to identify the Green Supply Chain Management implementation challenges at Yotek, and respondents were asked to indicate their level of agreement on a five point Likert response format ranging from 1(Strongly Agree) to 5(Strongly Disagree). Eleven statements from both internal and external challenges are presented using a single table which presents frequency in percent per statement and analysis was done accordingly.

Table 4.19 Internal Challenges of the Green Supply Chain Management

	Strongly disagree %	Disagree %	Neutral %	Agree %	Strongly agree %
Lack of technology and material are challenges in GSCM at your organization	0.0%	0.0%	31.0%	38.1%	31.0%
Lack of technical expertise is a challenge in GSCM at your organization	0.0%	0.0%	26.2%	35.7%	38.1%
Lack of resources are challenges in GSCM at your organization	0.0%	0.0%	28.6%	45.2%	26.2%
Lack of commitment and leadership from top management are challenges in GSCM at your organization	0.0%	0.0%	31.0%	52.4%	16.7%
Changing the mindset and culture of players are challenges in GSCM at your organization	0.0%	0.0%	28.6%	64.3%	7.1%
High Operation cost is a challenge for GSCM at your organization	0.0%	0.0%	28.6%	33.3%	38.1%
Financial constraints are challenges for GSCM at your organization	0.0%	0.0%	31.0%	35.7%	33.3%

Source: own survey 2021

From the internal challenges part, responses for lack of technology and material are (31%) strongly agree while (38.1%) agree and (31%) stayed neutral. Here it is clear that lack of technology and material are moderate challenges for the organization green supply chain management implementation. Response for the lack of technical expertise shows that (38.1%) strongly agree, (35.7%) agree, and the rest (26.2%) remain neutral. Here again the result shows that the lack of technical expertise is also another challenge in the organization. Regarding the lack of resources, the responses showed that (26.2%) strongly agree, (45.2%) agree and the rest (28.6%) remain neutral which shows that the organization is moderately challenged by the lack of resources for the GSCM initiation. From the lack of management commitment & Leadership responses (16.7%) % replied strongly agree, (52.4%) agree while (31%) remain neutral. This result shows that there is lack of commitment and leadership from top management in the organization. On changing mindset and culture of players, responses showed that (7.31%) of the respondents strongly agree that changing the mindset and culture of players are challenges while the majority (64.3%) agree and the rest (28.6%) relied that they are neutral. Regarding the challenge of “ high operation cost” on the green supply chain management (38.1%) and (33.3%) of the respondents replied strongly agree and agree while 2.6% stayed neutral which showed that high operation cost is a challenge for green supply chain management in the organization . When looking at the financial constraint part (33.3%) and (35.7%) of the respondents replied strongly agree and agree while the rest (31%) stays neutral. The result of the responses shows that financial constraints are also other challenges on implantation of green supply chain management in the organization.

Table 4.20 External challenges of Green Supply Chain Management at Yotek Construction

	Strongly disagree %	Disagree %	Neutral %	Agree %	Strongly agree %
Competition and uncertain nature of the construction industry are challenges in GSCM at your organization	0.0%	0.0%	42.9%	45.2%	11.9%
Availability of greener products in the market is a challenges in GSCM at your organization	0.0%	0.0%	35.7%	54.8%	9.5%
Management of suppliers is a challenges in GSCM at your organization	0.0%	2.4%	54.8%	28.6%	14.3%
Lack of Government support is a challenges in GSCM at your organization	0.0%	0.0%	31.0%	47.6%	21.4%

Source: own survey 2021

From the above table showing the responses on external challenges of Yotek construction, responses on competition and uncertain nature of the construction industry as a challenge showed (11.9%) strongly agree, (45.2%) agree and the rest (42.9%) stayed neutral which shows that there is moderate challenge from competition and uncertain nature of the construction industry. On challenges of availability of greener products, the responses were (9.5%) strongly agree and (54.8%) agree and the rest (35.7%) remain neutral. This again shows that there is a moderate challenge from availability of greener products. When looking at the responses to the challenges of managing suppliers, (14.3%) of the respondents strongly agrees, (28.6%) agree, (54.8%) stayed neutral and the rest (2.4%) disagree. This shows that management of suppliers is not that much a challenge for the organization. Finally the response for the challenge from lack of government support is (21.4%) strongly agree, (47.6%) agree and the rest (31%) remains neutral, which shows that the lack of government support is also another moderate challenge for the organization. The findings of Nur S.et.al.,(2019), also reported that Lack of government support, changing mindset and culture and lack of commitment & leadership support found to be challenges for the GSCM.

4.12 What are the actions that Yotek Construction took to overcome those factors that negatively affect the GSCM practices?

The aim of this section was to determine whether Yotek Construction has taken any measures in place to overcome those factors that negatively affect the GSCM initiatives. The purpose of this section overall was to find out if Yotek Construction PLC have already developed a strategy to overcome the negative factors or not. Table 4.23 identifies the results that have been collected from the interview on section 6.

The last part of the questionnaire was developed to answer this part of the research question. It is developed with an open ended question.

From the collected 42 questionnaires responses, 17 responses replied that there was no or satisfactory measures taken by the organization to mitigate those negative factors that affected the green supply chain management practice. 14 respondents replied reduction of cost as the

measures taken by the organization, 8 respondents replied that hiring of competent employees is one action taken by the organization. Among the respondents 5 of them replied that the organizations' newly developed green policies and procedures as a measure taken. Four respondents replied that their organization developed a mechanism to communicate with their suppliers and collected supplier's data so that they will have common understanding on the green supply chain.

Here under are also the responses of the interview respondents compiled in tabular form.

4.21: Remedies replied to overcome the Factors that Negatively Affect GSCM Initiatives

	Actions that Yotek took actions to overcome the factors that negatively affect GSCM practices	Does this action successfully overcome those negative factors?
Participant 1	Improved consolidation, Cost reduction & buying locally	YES
Participant 2	Improved consolidation, Cost reduction	YES
Participant 3	Policies & consolidation	YES
Participant 4	Not Sure	NOT SURE

From the results gathered from the interview participants, only three interview participants replied that Yotek Construction has taken actions to overcome those negative factors that affect GSCM practices, whilst one participant stated that he is not sure that whether the organization take actions or not to overcome the negative factors.

Participant 4 said:

“To be honest, I am not sure if there are any actions made or practiced”.

From the results it can be seen that three of the participants of this study made some suggestions on the actions that the company made to overcome those negative factors that affect GSCM practices. But it can be noted that these are not the only actions that the organization made but instead, but perhaps that the participants are not aware of them.

CHAPTER FIVE

5. Summary, Conclusion and Recommendation

In this chapter, the main findings with regards to the research questions are summarized and conclusions are drawn based on the results of the study. Furthermore, the strengths and limitations of this thesis are considered and suggestions for further research were presented. From the study analysis, the conclusions and recommendation were made in line with various objectives of the study on factors affecting green supply chain management practices on Ethiopian construction industry- the case of Yotek construction

5.1 Summary

Reduction of materials is highly considered management function during the procurement process at Yotek followed by consideration of their supplier's compliance with environmental standards, consideration of recycled materials and consideration of reuse of materials in the procurement process. On the contrary Capacity planning with suppliers in compliance with environmental standards is the green supply chain management function which is not considered well on their green procurement process. This result tells us that the procurement department is doing moderately well on the green supply chain.

Design for encouraging renewable resources and energy and design for resource efficiency are highly considered in the greening of the planning department while designing for reducing the amount of harmful materials and design for recycling that facilitates reprocessing of materials are considered moderately. The design for reuse of materials is not well considered and neglected by the planning department. The results showed that the planning department's effort on harmful materials, recycling and reuse are not satisfactory.

When looking at the greening of the logistics department at Yotek, relatively good exercises were exhibited on using technologically innovated vehicles, combining of transportation, consolidation of deliverables, redesigning of the logistic network, and on increasing the degree of vehicle usage. The results showed the green supply chain managements function in the logistics' department is considered well.

From the internal and external factors affecting the Green Supply Chain Management practices, , knowledge and experience, corporate leadership support and understanding among supply chain stake holders found to significant factor in affecting the green supply chain practice of the organization while the rest three found to be insignificant.

The action taken by Yotek construction for combating the negative factors that affect the green supply chain management are improving the consolidation of materials, reduction of cost, acquiring better technologies and hiring of qualified staffs in addition to developing green policies and procedures.

The green supply chain management initiatives implemented by Yotek under green design are choosing the correct construction materials, integrating the right technological systems and considering environmentally conscious designs were well implemented.

From the green construction initiation, the implementations of all practices were not found to be satisfactory. All the initiatives, onsite construction practices, waste management planning, waste water recycling, using energy efficient materials and decreasing the waste emission were not implemented in a satisfactory level.

From green purchasing initiatives, appropriate weight is given to suppliers greener aspect followed by greener selection criteria and integrating purchasing policies and programs with environmental consideration on their initiatives.

When looking at the green transportation initiatives, using reasonable transport route, using centralized distribution of resources and green transport methods are the initiatives that are well used while using shared and public transport and fuel efficient vehicles were the least considered.

Finally from end of life management initiatives considering of decreasing GHG emission is the more used initiative followed by the moderately used initiatives carefully planned demolition and recycling.

The green supply chain management implementation challenges of Yotek are lack of technical expertise, resources, changing the mindset & culture, high operation cost, availability of green

products. Lack of government support found to be the major challenges while management of suppliers found to be the least challenge when compared to the others.

5.2 Conclusion

The following conclusions were drawn based on the study findings from both the quantitative and qualitative data collected and analyzed on the factors affecting Green Supply chain Management practice.

The study shows that the organization's procurement department is committed to the overall Green supply Chain management practices. According to the findings, the departmental consideration on reduction of materials, recycled materials and capacity planning with suppliers on compliance with environmental standards like ISO has worked well while the considerations on capacity planning with suppliers in compliance of environmental standards were moderate. In general the GSCM function within the procurement department was fairly considered even though not yet fully considerate.

Again the study depicts that planning department of the organization was contributing better inputs for the GSCM practice. The department has an excellent design consideration on use of renewable energy, resource efficiency, reducing the amount of harmful materials and recycling. The design for reuse of materials was also in good shape next to the above functions. The planning department was really doing excellent work on the Green Supply Chain Management as compared to the procurement departments towards the GSCM practice of the organization.

The logistics department of the organization, according to the findings, is said to have a better contribution to the Green Supply chain management practice of the organization compared to the procurement and planning. Consideration of using technologically innovated vehicles, combining of transportation, consolidation of deliverables, redesigning of logistic networks and increased degree of vehicle usages all are well functioned by the department. This implies that the department is well organized to satisfy the GSCM practice desires of the organization.

From the findings, the study arrives at a conclusion that the major factors that affect the green supply chain management practice of Yotek are knowledge and experience, corporate leadership

support and understanding among supply chain stakeholders which were found to be statistically significantly affecting the green supply chain management practice of the organization. The other three factors cost, technology and government support were found to be insignificant in affecting the green supply chain management practice of the organization.

The actions that the organization took to overcome the factors that affect the Green Supply Chain Management practices found to be unsatisfactory since there were no structured plan and action that was undertaken by the organization according to the findings.

The finding again shows that all the initiatives in green design, green construction, green purchasing, green transportation and end of life management were implemented by the organization with different levels. As the Green Supply Chain Management initiatives were new to the organization the organization has done good efforts on implementing the initiatives.

From the study findings, lack of technical expertise, high operation cost, financial constraints and lack of technology were the major challenges followed by lack of commitment, lack of government support, lack of commitment and leadership from top management, changing mindset and culture of players, availability of greener products, competition and management of suppliers by their rank starting from higher challenge. These challenges are challenges that hinders the Green Supply Chain Management implementation of the organization

5.3 Recommendation

Green supply chain management can be seen as a development tool for construction companies to make them structurally healthier and more effective. There is potential to gain competitive advantages by adopting green practices. Since the green supply chain management is functioning well on the procurement department by considering recycled materials, reuses and reducing materials it must keep up the trend and for improving the weakness of capacity planning with suppliers in compliance with environmental standards. This can be done by conducting suppliers evaluation that include onsite review of the suppliers facility's environmental and health and safety audits for the previous years and making evaluation on it. The organization also needs to document the specific environmental requirements in their contact with their suppliers.

The planning department needs develop a well organized cross functional team which can ensure that the procedures are effective and practical and build an environmental management system. The top management also needs to have a commitment to the environmental management system and training need to be provided to the planning department employees. The other important recommendation for the planning department is to consider utilizing an ISO 14001 self-assessment tool.

As Green Supply Chain Management activities were well considered by the logistics department of the organization, the recommendation for the organization from the study is to keep the green logistics activities and maintain the growing need of the company to a better level.

Regarding the findings of this research on the factors affecting the GSCM practice, knowledge and experience, corporate leadership support and understanding among supply chain stakeholders are the major factors on the green supply chain management practices. The organization therefore needs to take necessary actions on these factors. The researcher therefore recommends that making an organizational stand on environmental matters open to outsiders is a good technique to share information among the supply chain stakeholders and partners. In view of that, managers need to develop their knowledge of GSCM. According to Jabbour et al., (2017), all top leaders and managers need to be outfitted with adequate knowledge on GSCM practices and must utilize green concept in staff recruitment, performance evaluation, rewards and training.

The study also recommends that working in cooperation with all stakeholder groups is particularly important to understand the social and environmental aspects of the organization which is fundamental to designing effective policies so that it can boost the understanding among the supply chain stakeholders and developing suitable policies which can bring mutual benefit.

Regarding on the knowledge and experience factor, the organization need to boost its competent manpower in greening its supply chain by adding additional competent and experienced employees as well as upgrading the existing once since most of the employees found to have a good education level. Therefore consistent trainings need to be given by the organization accompanied by leadership mentoring and effective coaching to upgrade the existing ones.

5.4 Direction for future study

As green supply chain is a newly emerging concept specially for developing countries like Ethiopia, additional study is needed and researchers can do further study to find out other major determinant factors that affect the green supply chain management practices in the construction industry as well as other industries.

Besides as the study was specific to Yotek construction and since the population under the study was relatively low, slightly different results might be found with increased population therefore future research could focus on identifying whether the factors identified on this study will result the same and are unique to Yotek construction or prevalent throughout the construction industry.

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Appendices

Appendix I

Addis Ababa University School of Commerce
Master of Art in Logistics and Supply Chain Management
Questionnaire for Yotek Construction PLC Employees

My name is Benyam Tesfaye from Addis Ababa University, School of Commerce Logistics and Supply Chain Management Department.

Dear respondents;

This survey is prepared to conduct a study in the partial fulfillment of a Masters Degree in Logistics and Supply Chain Management (MA) program entitled with “Assessment on factors affecting Green Supply Chain Management (GSCM) Practices- “The Case of Yotek Construction” In order to make the research outcomes complete, reliable and fruitful, genuine and accurate response to each item will have decisive contribution. Therefore, you are kindly requested to respond to each item frankly and accurately.

There is no need to write your name and address. The information that you provide will be kept **confidential**. The accuracy, honesty, and fairness of your response will have a great impact on the outcome of the research.

Aim of the questionnaire: This questionnaire is developed to assess the views of Employees on some of the factors affecting the Green supply chain Management Practices of Yotek Construction PLC.

If you have any question, please don't hesitate to ask: Benyam Tesfaye, Cell: 0911404600 or email: binihamada@gmail.com which ever convenient to you.

**Thanks in advance for your cooperation,
Benyam Tesfaye**

General guidelines:

Please read each question carefully and make a tick under your choice and you can write your opinion on the remark section.

Part I: Personal information

1. Gender: Male Female
2. Age: Under 25 26-35 36-45 46-55 Above 55
3. Educational status: High school graduate College diploma
 Undergraduate degree Postgraduate degree PhD
- If other, Please specify _____
4. Year of experience: less than 5 years 5-10 years 10-15years more than 15
5. Department _____
6. Title/position _____

PART II: To find out how the Green Supply Chain Management function within the procurement, planning & Logistics departments of Yotek Construction

Please indicate your level of agreement by putting tick (/) mark accordingly on the following sentences by using the Following Rating Scales.

SDA=strongly disagree, DA=disagree, N=neutral, A=agree, SA=strongly agree;

3.10. How Green Supply Chain Management function within the procurement department at Yotek	SDA	DA	N	A	SA
3.10.1. The procurement department considers reduction of materials in its procurement process					
3.10.2. The procurement department considers reuse of materials in its procurement process					
3.10.3. The procurement department considers recycling of materials in its procurement process					
3.10.4. The procurement department considers their suppliers compliance with environmental standards like ISO 14001 certification					
3.10.5. The procurement department considers capacity planning with their suppliers in compliance with environmental standards					
3.11. How Green Supply Chain Management function within the planning department at Yotek	SDA	DA	N	A	SA
3.11.1. The planning department designs for reuse of materials or whole product by minimal procedure					
3.11.2. The planning department designs for recycling that facilitates reprocessing of materials					
3.11.3. The planning department designs for reducing the amount of harmful materials used during the construction process					
3.11.4. The planning department designs for resource efficiency including energy reduction, and material consumption					
3.11.5. The planning department designs for encouraging the use of renewable resources and energy					
3.12. How Green Supply Chain Management function within the Logistics department at Yotek	SDA	DA	N	A	SA
3.12.1. The logistics department considers combining of transportation for its deliverables					
3.12.2. The logistics department considers increasing the degree of vehicle usage					
3.12.3. The logistics department considers redesigning the logistics network timely					
3.12.4. The logistics department considers consolidation of deliverables to reduce carbon emission and effective utilization of vehicles					
3.12.5. The logistics department considers using vehicles that use technological innovations for efficiency					

PART III: To identify the factors that affects Green Supply Chain Management practices in Procurement, Planning and Logistics department of Yotek Construction

Please indicate your level of agreement by putting tick (/) mark accordingly on the following sentences by using the Following Rating Scales

SDA=strongly disagree, DA=disagree, N=neutral, A=agree, SA=strongly agree;

A. Green Supply chain management practices in your organization	SDA	DA	N	A	SA
Internal Environmental Management Practices					
1.Senior Managers are committed to the Green Supply Chain Management					
2.Mid level managers support the Green Supply Chain Management					
3.There is cross-functional cooperation for environmental improvements					
Green Purchasing					
1.Your organization cooperates with suppliers for environmental objectives					
2.Your organization performs environmental audit on suppliers					
3.Your organization selects suppliers with ISO certification					
Cooperation with customers					
1.Your organization cooperates with customers for eco design					
2.Your organization cooperates with customers for cleaner construction					
Eco- Design					
1.Your organization designs products for reduced consumption of materials/ energy					
2.Your organization designs products for reuse, recycle & recovery of materials and components					
3.Your organization designs products to avoid hazardous products					
Investment Recovery	SDA	DA	N	A	SA
1.Your organization sales excess inventories /materials					
2.Your organization sales excess materials and scraps					
3.Your organization sales excess capital equipments					
B. Internal factors that affect the implementation of Green Supply Chain Management practice	SDA	DA	N	A	SA
1.Cost affects the implementation of Green Supply Chain Management practice in your organization					
2.Technology affects the Green Supply Chain Management practice in your organization					
3.Knowledge and Experience affects the Green Supply Chain Management practice in your organization					
4.Corporate Leadership support affects the Green Supply Chain Management practice in your organization					
C. External factors that affect implementation of Green Supply Chain Management practice	SDA	DA	N	A	SA
1.Government Support affects the Green Supply Chain Management practice in your organization					
2.Understanding among Supply chain Stakeholders affects the Green Supply Chain Management practice in your organization					

PART IV: To identify the Green Supply Chain Management initiatives implemented by Yotek Construction

Please indicate your level of agreement by putting tick (/) mark accordingly on the following sentences by using the Following Rating Scales

SDA=strongly disagree, DA=disagree, N=neutral, A=agree, SA=strongly agree;

A. Green Design/ Green Initiation	SDA	DA	N	A	SA
1. Your company considers environmentally conscious design in its design activities					
2. Your company considers integrating the right technological systems within the building designs					
3. Your company considers the correct choice of construction materials and components in its design.					
B. Green Construction	SDA	DA	N	A	SA
1. Your company strictly follows onsite construction practices that minimize environmental impact					
2. Your company selects subcontractors that strictly follows onsite construction practices that minimize environmental impact					
3. Your company considers waste management planning on all its construction projects					
4. Your company uses waste water recycling technology on its projects					
5. Your organization considers using fuel efficient machineries on its construction projects					
6. Your organization considers using energy efficient machineries in its construction projects.					
7. Your organization considers using low hazardous materials in its construction projects					
8. Your organization considers decreasing waste emission mechanisms in its construction projects					
C. Green Purchasing	SDA	DA	N	A	SA
1. Your organization considers selecting environmentally conscious suppliers during its selection process					
2. Your organization considers purchasing of environmentally friendly materials					
3. Your organization considers purchasing of materials that reduce waste					
4. Your organization purchases materials that promotes recycling					
5. Your organization integrates its purchasing policies &					

Programs with environmental considerations					
6. Your organization has greener supplier selection criteria					
7. Your organization follows environmental consideration in its tendering stage					
8. On Your organization's supplier selection phase , appropriate weight is given to greener aspects					
D. Green Transportation	SDA	DA	N	A	SA
1. Your organization selects green transportation methods for moving its materials and employees					
2. Your organization uses centralized distribution & consumption of resources					
3. Your organization considers reasonable transportation route planning					
4. Your organization uses fuel efficient vehicles for transportation of goods & its employees					
5. Your organization considers using shared and public transports					
E. End of Life Management	SDA	DA	N	A	SA
1. Your organization implements carefully planned demolition activities					
2. Your organization considers recycling of materials					
3. Your organization considers decreasing Green House Gas Emission					

PART V: To identify the Green Supply Chain Management implementation challenges of Yotek Construction

Please indicate your level of agreement by putting tick (/) mark accordingly on the following sentences by using the Following Rating Scales

SDA=strongly disagree, DA=disagree, N=neutral, A=agree, SA=strongly agree;

A. Internal Challenges for Green Supply Chain Management initiation	SDA	DA	N	A	SA
1. Financial constraints are challenges for Green Supply Chain Management at your organization					
2. High operation cost is a challenge for Green Supply Chain Management at your organization					
3. Changing the mindset and culture of players are challenges in Green Supply Chain Management initiation at your organization					
4. Lack of commitment & leadership from top management are challenges in Green Supply Chain Management initiation at your organization					
5. Lack of resources are challenges in Green Supply Chain Management initiation at your organization					
6. Lack of technical expertise is a challenge in Green Supply Chain Management initiation at your organization					
7. Lack of technology and material are challenges in Green Supply Chain Management initiation at your organization					
B. External challenges for GSCM initiation	SDA	DA	N	A	SA
1. Lack of Government support is a challenge in Green Supply Chain Management initiation at your organization					
2. Management of suppliers is a challenge in Green Supply Chain Management initiation at your organization					
3. Availability of greener products in the market is a challenge in Green Supply Chain Management initiation at your organization					
4. Competition and uncertain nature of the construction industry are challenges in Green Supply Chain Management initiation at your organization					

Are there any additional factors to be mentioned that affect the Green Supply Chain Management in Procurement, Planning and Logistics department of Yotek Construction to be mentioned?

PART VI:- To identify the actions that Yotek Construction took to overcome those factors that affects the Green Supply Chain Management

Please write the actions that your organization took to overcome the factors that affect the green supply chain management practice_____

Appendix II

INTERVIEW GUIDE

(Proposed interview estimated time:15 minutes)

Date _____

Person interviewed _____

Position _____

To identify the actions that Yotek construction took to overcome those factors that affect the Green Supply Chain Management practices

1. What actions do Yotek took to overcome those factors that negatively affect the Green Supply Chain Management Practices?
2. Were these actions short term or long term actions?
3. From your point of view, do you believe that these actions were successful in overcoming the factors?
4. Were there any actions that you identified and proposed in order to overcoming the factors?