GREEN SUPPLY CHAIN MANAGEMENTPRACTICES IN BREWERY INDUSTRY: THE CASE OF BGI ETHIOPIA

By

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DECLARATION

I, the undersigned, declare that this thesis entitled "GREEN SUPPLY CHAIN MANAGEMENT PRACTICES IN BREWERY INDUSTRY: THE CASE OF BGI ETHIOPIA" is my original work.I have carried out the study with the guidance and support of the research advisor, Shiferaw Mitiku (PhD). Any other research or academic sources used here in this study have not been submitted for the award of any degree or diploma program in this or any other institution. all sources of materials used have been acknowledge.

Declared by

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CERTIFICATION

This is to certify that Nardos Goferie has carried out her research work on the topic entitled, GREEN SUPPLY CHAIN MANAGEMENT PRACTICES IN BREWERY INDUSTRY: THE CASE OF BGI ETHIOPIA" the work is original in nature and is suitable for submission for the award of the degree of master Arts in Logistics & Supply Chain Management.

Advisor Name: Shiferaw Mitiku (PhD)

Signature _____

Date_____

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The Researcher

Abstract

This paper is dedicated to assess the green supply chain management practices at BGI Ethiopia, a pioneer beer manufacturer in the country. The study focused on four green supply chain management (GSCM) practices: green procurement, green manufacturing, green transportation and reverse logistics. In order to capture the issue, a mixed approach of qualitative and quantitative techniques was applied. Dispatching a structured standard questionnaire, Key Informant Interview and review of company profile were the main approaches to gather the data. The whole population of the company (top management, midlle management and technical experts) were involved in this study. Later, the data was analysed using SPSS 23. A reliability test was done using Cronbach Alpha (0.966) which is an indicator of high reliability. The findings showed that BGI is exerting an effort to engage itself in the green production system while there is a very low green procurement practice. Among the enablers, pressure from competitors and availability of sustainabe supply chain management strategy took the most empowering role while government incentives are presumed to be low. On the other hand, among the challenges to impliment GSCM, the lack of cross departmental communication and lack of customer collaboration dominated the responses. A multiple regression was run after checking for the assumptions of linearity, indipendence, homoscedasticity, multicollenearity and indipendence. The result indicated that only the enablers have noticeable impact and are statistically significant which is an indication that positive reinforcement is required to effectively apply the GSCM practice. In order to corroborate this finding a correlation and a hypothesis test were undertaken. Finally, recommended modesl are developed to facilitate the implementation of GSCM at each stage in BGI Ethiopia. These models are designed to explicity indicate the procedures and formats to follow at each stage of production and give an overall picture of what the company's supply chain should look like.

Key Words: Distribution; Eco-friendly; Green Supply Chain Management; Procurement; Production; Reverse Logistics

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Acronym and Abbreviation

GSCM–Green Supply Chain Management

GSC- Green Supply Chain

SM- Supply Chain Management

ICT- Information Communication Technology

SEE- Std. Error of the Estimate

Env.t - Environment

CHAPTER ONE

INTRODUCTION

This chapter presents background of the study, problem statement, research objectives, scope of the study, delimitation of the study, significance of the study and organization of the study.

1.1. Background of the Study

The term logistics originated in the military, referring to the movement of equipment and supplies to troops in the field. Currently, logistics is used more broadly to refer the process of coordinating and moving resources, people, materials, inventory, and equipment from one location to the desired destination.

Green Logistics, even though is relatively a young theory and practice, has been gradually becoming a relevant matter in all factors relating to manufacturing, consumption, distribution and waste management. It is an effort aiming to manufacture environmentally compatible products. Since the 1980s, companies have been using the idea to minimize the damage to the environment, which is a direct result of supply and logistic operations.

Supply chain management is cross-functional approach. The management of activities that procure materials and services transform them into intermediate goods and final goods or products and deliver them through a distribution system to point of production consumption. Green supply chain management practices encompass a set of green activities in procurement, manufacturing, distribution and reverse logistics(Kadam, S *et al*, 2017).

Traditionally, the means of operating the transportation, storage and handling of materials were environmentally harmful therefore manufacturers are being encouraged and also pressured to adopt eco-friendlier practices. It is a concept which unifies strategies for product development and environmentally-sensitive methods for manufacturing and service. For a better advantage in competition, cost reduction, customer satisfaction and quality, green supply chain management or acts of environmental minded practices are essential.

The environmental policy of Ethiopia approved in 1997 by the Council of Ministers has included the idea of sustainable development. As its goal, it states that "to improve and enhance the health and quality of life of all Ethiopians and to promote sustainable social and economic development through the sound management and use of natural, human-made and cultural resources and the environment as a whole so as to meet the needs of the present generation without compromising the ability of future generations to meet their own needs" (National Report of Ethiopia, 2012). With this regard, there are many companies who have started adjusting their business in line with the environmentally compatible activities.

BGI is a large-scale brewery and beverage production wing of Group Castel, operating internationally in more than 53 countries. The company has stayed for more than 96 years, has 22 distributors and is currently producing 5 breweries (The Addis Ababa St. George Brewery, The Kombolcha Brewery, The Hawassa Brewery, The Zebidar Brewery and Raya Brewery). The researcher believes that the expansion of green supply chain management practice experience in the Brewery industry is very crucial because its value has grown dramatically, reaching USD620 million over the years, while consumption grew by 16 percent yearly, as studies show (Mutesi, 2018).Therefore, it is very important for the brewery industry to implement green supply chain management practice practices at large scale. This is because materials and equipment used in this industry are potentially susceptible to endanger the environment and sustainable development. As a result, in this research, it is aimed to investigate the level of green supply chain management practices implementation in BGI Ethiopia in the procurement, transportation, manufacturing and reverse logistics processes.

1.2. Problem Statement

Logistics is a physical network which connects consumers and the market. This network has two major effects on the environment: pollution and wastage of resources. The pollution can be raised from noise and air pollution caused by vehicle, from toxic and hazardous substance, from waste and used materials which are thrown out freely causing contamination to the environment. On the other hand, wastage of resources mostly occurs as a result of lack of efficient resource utilization. These effects can be considered as the initiating factors for the green supply chain management concept (Quan *et al,* 2008). Therefore, in order to decrease

this huge effect on the environment implementing green supply chain management is very important. But it is being challenging to implement and practice this concept as it is expected to be.

From grain to glass, all aspects of brewing and delivering beer to the marketplace are burdened with environmental issues. Energy and water consumption, waste water, solid waste and by-products and emissions to air are major environmental encounters in the brewing industry irrespective of main technological developments. These impacts can best be classified in three broad areas: a) upstream: the manufacturing and transportation of raw materials that will turn into beer and beer packaging; (b) operations: the resource consumption that can be tied directly to the brewery and the process of producing beer; and (c) downstream: the distribution of beer after it leaves the brewery. In this regard, for a desirable future it is a must to encourage sustainability actions globally and at all levels of society while eliminating actions which lead to the deterioration of environment.

The awareness about green supply chain management practice in BGI Ethiopia seems at low level. The company has a vision of becoming and remaining the absolute beer market leader in Ethiopia with a mission of producing, selling and giving their customers best quality. Despite its success in many business areas including expansion and branding, there is less attention given to green supply chain management in the company.

As per the preliminary interview with supply chain director of BGI Ethiopia, lack of top management commitment, lack of awareness in green supply chain management concept among the company staff and high cost of implementing green supply chain management practices facilities are some of the common reasons for not implementing green supply chain management effectively. At a company level implementing and practicing green supply chain operations has its own benefits. It positively impacts the productivity, positive company image, cost and efficiency of companies. The out-dated logistical practices are, on the other hand, most of the times applied at the expense of the environment. (Zelalem T., 2015, Eyob F.2019)

1.3. Research Objectives

1.3.1. General objective

The general objective of the study is to assess the level of green supply chain management practices and identify its enablers and challenges in terms of procurement, green transportation, green manufacturing and reverse logistics process in the BGI Ethiopia.

1.3.2. Specific objectives

1. To assess the green supply chain management practices in terms of green procurement, green transportation, green manufacturing and reverse logistics) at BGI Ethiopia.
2. To measure the level of green supply chain management practices at BGI Ethiopia.
3. To identify the enablers of green supply chain management implementation at BGI Ethiopia.
4. To determine the challenges of green supply chain management implementation at BGI Ethiopia.
5. To evolve green supply chain management model for the brewery industry and BGI Ethiopia in particular.

1.4. Research questions

1. How green supply chain management is being practiced in terms of green procurement, green transportation, green manufacturing and reverse logistics practice at BGI Ethiopia?
2. To what extent the green supply chain management practices (green procurement, green transportation, green manufacturing and reverse logistics) are being implemented at BGI Ethiopia?
3. What are the enablers of green supply chain management practices implementation at BGI Ethiopia?
4. What are the challenges of green supply chain management practices implementation at BGI Ethiopia?
5. What best fit green supply chain management model will be ideal for the brewery industry in Ethiopia and BGI Ethiopia in particular?

1.5. Scope of the study

This study assessed the level of green supply chain management practices implementation of BIG Ethiopia, specifically St. George Brewery in Addis Ababa around Mexico; it is purposefully chosen based on its history, experience and proximity. The study tried to assess the challenges encountered during implementing green supply chain management operations by formulating possible hypothesis regarding challenges and enablers of green supply chain management practices implementation.

The study was guided by the practices of green supply chain management which encompass green procurement, green transportation, green manufacturing and reverse logistics. After prior consult from the company officers on pilot research, the researcher discovered that the company gives priority to procurement; manufacturing, transportation and reverse logistics. Mixed research approach was used to conduct this study. Estimated time frame for this study was 1year.

1.6. Delimitation of the study

The study is delimited to five specific objectives which are believed to guide the undertaking. In addition, because of time and cost constraints, the study area is delimited to the St. George brewery which is the oldest, the biggest and is located in Addis Ababa. The study is delimited to four green supply chain management practices only; these practices are mainly practiced in the company.

1.7. Limitations of the study

This study is expected to have certain constraints shortage of related literature, especially regarding the topic of green supply chain practices, their implementation and application in brewery industry of Ethiopian context were limitation to this study.

1.8. Significance of the study

It is believed that computing this study gives a huge benefit for the academic sector by providing empirical suggestions. It is highly unlikely to find academic researches vis-à-vis

this study area. As a result, this study is aimed to provide an immense pragmatic input to this field and initiate further studies to the betterment and eco-friendly upgrades to the brewery industry in Ethiopia. The researcher is also optimistic that this study will provide an insight for BGI Ethiopia and help in areas concerning the implementation of green supply chain management practices since sustainable eco-friendly supply chain management practice has become one of the rising concerns in the industry. Regarding the policy makers, the researcher aims to provide an input on what the gaps and breaches are and help them recognize as to what should fall under strict considerations, not only for BGI Ethiopia, but for the existing and upcoming companies as well which in turn helps us to build better and eco-friendly companies for the foreseeable future.

1.9. Organization of the study

This study is composed of five chapters. The first chapter is an introduction which captures background of the study, problem statement, research objectives, scope of the study, and delimitation of the study, significance of the study and organization of the study. The second chapter reviews relevant literature used in order to help the study. Methodology of the study is presented in the third chapter and chapter four is composed of results, discussion and interpretation the fifth chapter of the study presents the summary, conclusion and recommendations as well as future research forward. Finally, reference and appendix is also presented.

CHAPTER TWO

2. REVIEW OF RELATED LITERATURE

This chapter summarized the literature related to logistics, green logistics, green supply chain especially green procurement, green transportation and reverse logistics concepts, enablers and challenges of implementing GSCM from theoretical and empirical perspectives.

2.1. Theoretical Literature Review

2.1.1. Concept of Logistics

The word logistics initiated in the military, speak of the movement of tools and materials to troops in the field. According to the American Council of Logistics Management, logistics is the process of planning, implementing and controlling the efficient, cost effective flow and storage of raw materials, in-process inventories, finished goods and related information from point of origin to point of consumption for the purpose of conforming to customers' requirements.

Logistics is a physical system which links consumers and the market. Basic functions of logistics consist of five major practices which are logistics networking, obtaining and purchasing, planning and forecasting, transportation and distribution (Tuzun and Gulmez, 2017). Moving materials into the organization from suppliers is called inbound or inward logistics; moving materials out to customers is outbound or outward logistics; moving materials within the organization is materials management and customer satisfaction and cost effectiveness are the two main objectives of logistics (Sople, 2012)

Scholars defined logistics management in various ways. Waters (2019) defined logistics management as part of supply chain management that plans, applies, and controls the well-organized, effective forward, and backward movement and storage of properties, services, and information from the point of origin to point of consumption to meet consumer's desires. According to Quan*et al.*(2008), pollution and wastage of resources are the two main impacts of logistics. Pollution of sound and air caused by vehicle, toxic and hazardous substance and used materials which are thrown out freely causing pollution to the environment. Waste of

resource mostly occurs due to absence of effective resource utilization. Therefore, in order to minimize those impacts of logistics going green is very critical and a major issue.

2.1.2. Green logistics

Green Logistics is a new developing idea in the today's business. It has become as an environmental tool which links environmental concerns and the logistics functions.

McKinnon, (2010) defined green logistics as the moving and delivering of goods so as to have as little impact on the environment as possible while keeping the cost as low as possible as well. Similarly, Rodrigue *et al.* (2010) defined green logistics as practices and approaches in order to reduce the environmental footprint that involves material handling, waste management, packaging and transport.

2.1.3. Green Supply chain management

Green supply chain management is the arrangement of obtaining, producing, transportation and reprocessing processes with the objective of decreasing a company's carbon foot print and in the 1990s companies were required to perform in environmentally and socially accountable way in their supply chain management as competition and awareness of green practices started increasing(Kadam, S *et al,* 2017). Green supply chain management practices include a set of green activities in procurement, manufacturing, distribution and reverse logistics. (Tan, K.C., 2002).

Green supply chain refers to all efforts diminish the ecological influence SCM practices. This includes all activities of the forward and backward flows of goods, information and services from the point of origin to the point of consumption (Rituraj Saroha, 2014). Some of the practices, which this study covers, are green procurement, green transportation, green manufacturing and reverse logistics.

2.1.3.1. Practices of Green supply chain management

Green Procurement (Purchasing)

Green purchasing is the act of acquiring goods and services with harmful environmental effects in the least possible amounts. When faced with competing choices, it is the preference of materials that have fewer adverse effects on human health and environment. It is a

promotion approach with a confirmed achievement record, which includes purchasing products with recycled contents. (Corzine and Jackson, 2006).

Ninlawan *et al.* (2010) mentioned some activities in Green procurement, which are, obtaining only environmentally friendly resources only from "Green Partners" who consider environmental excellence, values and environmental principles for the environment-related materials, selecting suppliers who control hazardous substances in the company's standard lists and obtain green certificate achievements.

Green Transportation

Transportation is managing the flow of all the materials in the supply chain from the start to the destination. Green transportation rotates around proficient and effective use of resources, modification of the transport structure and making healthier travel choices (Sople, 2012).

It's the sector where the approach of green supply chain is the most applied. Actually, firms try to optimize the transport through the reduction of the travelled distances, the number of travels and the vacuous returns, the analysis of the transport network, the optimization of the tours of vehicles. Also companies be likely to call on to less contaminating means of transportation by the appeal recourse to the combined transportation. The selection of delivery network has a major impact on the environment *(*Quan *et. al., 2008).*

Green manufacturing

Green manufacturing is the use of green technology for the environmental improvement. It is the capability to produce in an environmentally mindful method. It also speaks of an environmentally aware production which tries to control pollution in the entire process with advanced technology. Green manufacture could lead to low raw material cost, gain in production efficiency, improve corporate image, and reduce environmental and occupational safety expense (Srivastava 2007; Ninlawan *et.al.,* 2010).

Reverse logistics

The reverse logistics concept refers to the movement of material from the point of consumption back to the point of origin. This differs from the forward logistics because forward logistics refers only to transports from point of origin to the place of consumption (Rogers and Tibben-Lembke, 2001).

2.2. Empirical literature review

2.2.1. Implementing Green supply chain management Practices

Why going green?

There might be many reasons for companies to go green, the basic assumption behind green concept is to improve environmental sustainability. Green supply chain can diminish the environmental pollution and production costs and it also can spur economic growth, create competitive advantage in terms of greater customer satisfaction, positive image and reputation and deliver enhanced opportunity to export products in pro-environmental countries therefore, firms adopt green concept as "kill two enemies with one bullet" (Khan *et.al*, 2017).

Rituraj Saroha 2014, stated that companies choose to "go green" because it provides them a competitive advantage as the customers are demanding at this time that the businesses go green. Also the motives why companies usually get a feel for a green transport system is in order to shrink traffic congestion, reduce pollution, and promote social harmony and to save transportation costs.

A review by Sanket D. *et al., (*2017) stated the aims of green supply chain management: to create business orientation eco-friendly, to attain competitive advantage and great performance through GSCM practices, to incorporate the GSCM into polices and strategies for smooth operation, to make a significant difference in approach, and to show how important it is to protect environment and sustain the natural recourses.

The study by Zhu and Sarkis (2004) about relationship between GSCM practices in Chinese manufacturing enterprises and their financial and environmental impact found as there is a strong and positive association between GSCM practices and concluded that there would be major "win-win" opportunities for Chinese manufacturing enterprises that aim to implement GSCM practices.

An empirical study by Rao and Holt (2005)about the connection between GSCM practices and increased competitiveness and economic performance between a sample of organizations in South East Asia presented that greening the different parts of the supply chain lead to an

integrated supply chain, which in time leads to better competitiveness and economic performance.

Gutowski *et.al*, (2005) look over the American, European and Japanese industries and indicated that the main inspirations for environmentally thoughtful manufacturing are: cost saving, risk mitigation, market gain, regulatory flexibility and company image.

Wu and Dunn 1995, described as the total logistics cost will be minimized as result of, manufacturer adding the cost of the returnable packaging, so the disposal cost is minimized since it can be used many times. Since reverse logistics contains reprocessing and eco-friendly packaging, it has a direct influence on carbon releases and is able to diminish the effect of companies on environment.

Larsen, *et al.,* (2007) after reviewing various companies, identified that reverse logistics have a positive influence on profitability by increasing revenues realized from secondary sales, contributing new products in place of unsold or slow selling stock, shareholder goodwill from acting with social and environmental responsibility, reduced operating costs from reuse of recovered products and components, higher asset turnover due to better management of returns inventory. Therefore, implementing green supply chain management practice, in particular green procurement, green manufacturing, green transportation and reverse logistics, is very important.

2.2.2. Challenges of green supply chain management implementation

A. Lack of top management support

Due to absence of confidence and understanding of GSCM practices and high initial costs, top management end up being fearful about these practices. According to the study conducted by five winds international (2003) on green procurement, good environmental Stories for North Americans, empirically identified absence of appropriate combination of green activities into current management structures are connected to lack of top management support.

Lack of manager's provision and enabling to work for green ideas results in a smaller amount facility of facilities and mobilization of organizational resource which sum up to failure to

accept new thoughts like green supply chain management practices (Roman, 2014; Nderui, 2020; Zelalem T, 2015; Corzine and Jackson, 2006).

H1: Lack of top management support negatively affects the level of GSCM practices implementation

B. Lack of customer's collaboration

The hiddenness of logistics to customers is one the challenge for going green. Supply chain isn't sustainable for the reason that neither is the consumer and it is hard to apply green logistics policies when the customer demands lower prices (Stremlau& Tao, 2016). Logistical costs are often not listed in an invoice or are negligible, this weakens their importance and, therefore, decreases the motives for a company to spend in its environmental sustainability. Generally, lack of customer's collaboration to meet the design prerequisite of businesses and struggle to accept due to lack of awareness challenges green supply chain implementation. (Roman, 2014; Nderui, 2020; Zelalem T, 2015).

H2: Lack of customer's collaboration negatively affects the level of GSCM practices implementation

C. Lack of cross-departmental communication

Lack of worker belief, support, inspiration, encouragement and commitment is a main trait for organizational survival, by reducing transparency and communication this lead to small innovation and absence of alertness and responsiveness to varying situations. Lack of communication decreases the efficiency and productivity of an organization. That means it affects the efficient and effective implementation of green supply chain management. (Masoumeh *et.al*,2018, Omer G *et.al*, 2019)

H3: lack of cross-departmental communication negatively affects the level of GSCM practices implementation

D. Lack of awareness about environmental issues

Zelalem (2015) stated that illiteracy of consumers is one of the major challenges for implementing green supply chain management. Sharma (2014) stated that environment assertiveness presence strongly advances the GSCM practices with the high worker commitment. The study found out that that having an awareness concerning environment will support GSCM practices implementation. The presence of environment thinking powers

businesses for better environmental performance, particularly when it inspires and teaches workers to be environment mindful. Therefore, lack of awareness regarding environmental issues is very challenges for implementing GSCM practices.

H4: lack of awareness about environmental issues negatively affects the level of green supply chain management practices implementation.

E. Lack of technological advancement

Within the reverse logistics there are challenges that differ from the forward flow of materials and products. Sabina (2012) showed timing, quality and the quantity of product returns as troubles in applying reverse logistics. There are only a few corporations that have formalized information system and standard operating techniques for the management of returns. ICT and technological other constrictions such as obsolete equipment create problems in achieving the requests of green supply chain management practices. (Stremlau& Tao, 2016)

H5: lack of technological advancement negatively affects the level of green supply chain management practices implementation.

2.2.3. Enablers of Green supply chain Implementation

A. Government incentives

Kumar Sandeep *et al*.(2013), identified various enablers for implementation of green concepts in Indian automobile supply chain consulting experts from industry and academia. The first one mentioned as an enabler is government's support and regulations to the industry, because this directly implies the governmental willingness to frame environment friendly policies and arrange special benefits to those organizations implementing the concept. Since, in every nation economy government play a significant role in facilitating the platform, it is considered to be the most important one. Incentive from government encourages companies that adopt green supply chain management practices. (Stremlau& Tao, 2016; Georgy Sone, 2019)

H6: Government incentives positively affect the level of green supply chain management practice implementation.

B. Collaboration with suppliers

Collaboration with suppliers is one of the enablers to implement green supply chain management. Good supplier commitment enables firms to acquire environmental and economically sustainable resources by involving in green initiatives. Good communication and modern is equipment at suppliers' accommodations supports to achieve the necessities of green supply chain management (Stremlau & Tao, 2016, Zelalem T.2015)

H7: collaboration with suppliers positively affects the level of green supply chain management practices implementation.

C. Pressure from competitors

Firms, especially brand-owning firms are often accountable for their environmental performance. Stakeholders and consumers can force firms; moreover if company's competitors all implement green supply management strategies, they are likely to put pressure on a company. Further, competitions among competitors and competitor's development in technology adoption which fulfil the economic, social and environmental sides of the business drive and empowers company's green supply chain management practice implementation(Stremlau& Tao, 2016).

H8: pressure from competitors positively affects the level of green supply chain management practice implementation.

D. Performance and reward system within organization

Performance rewarding system in organization powers job effort, performance, commitment and job satisfaction. Setting performance standards, specific goals and motivating employees by acknowledgement and bonus enables the implementation of green supply chain management (Georgy Sone, 2019; Zelalem T. 2015).

H9: Performance and reward system within organization positively affects the level of green supply chain management practice implementation.

E. Existence of sustainable supply chain management strategies

The existence of social, environmental and economic accountabilities in the organization enables the implementation of green concept. Organizational support and inspiration; adequate economic and internal resources to hire trained and qualified manpower and to familiarise suitable technology; quality of human resources with readiness to adopt the concept; top management's commitment; logical and well-organized planning to manage the resources, devotion to create consciousness, support and encouragement of customers so that they can demand environment friendly products are enablers. (Stremlau& Tao,2016).

H10: existence of supply chain management strategies positively affects the level of green supply chain management practice implementation.

2.2.4. Beer Production and the Environment

In the standard beer manufacturing, the main ingredients for beer production are barley, hops, water and yeast as well as carbon dioxide for carbonation. Auxiliary materials used during brewing are sodium hydroxide, sulphuric acid, phosphoric acid and diatomaceous earth. Carbon dioxide emitted during beer fermentation will be absorbed and liquefied for further process.

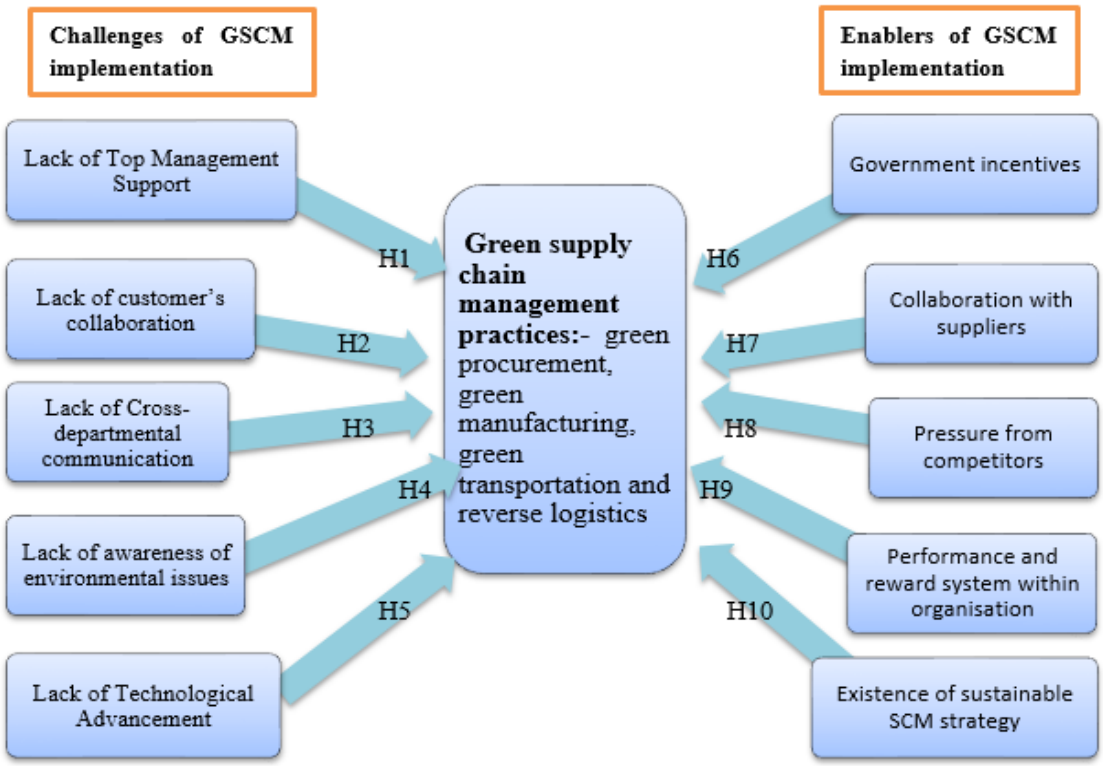
The beer production process starts with malted barley being crushed into a coarse powder known as grist. Malted barley is obtained by soaking and draining the barley grains to initiate germination of the seed. Germination activates enzymes which convert starch and proteins into sugars and amino acid (Palmer, 1999). The grain is then dried in a kiln and stored for use in brewing. The grist is transferred to a large vessel known as a mash tun where it is mashed with hot water. The sugars in the malt dissolve in the water to produce liquor called sweet wort, which is boiled with hops in large vessels known a copper. After filtration and cooling of the wort, it is then mixed with yeast and put in a fermentation vessel where yeast metabolizes sugars in the wort to produce alcohol and carbondioxide. The time required for this process varies from a few days to around 10 days depending on the yeast strain, fermentation parameters and taste profile (Galitsky*et al.* 2003). The addition of carbon dioxide and filtration are then carried out before filling the beer in bottles and cans.

Brewing industry is known for its large consumption of water and energy. Even though there are technological improvements in the recent years, environmental challenges like excessive water and energy consumption, waste of water, solid waste, buy products and emission of pollutants to the environment, are facing the brewing industry.

Olajire (2012) revealed some of environmental challenges of the brewing industry and focused on the waters consumption and waste generation, energy efficiency, emission management, environmental management practices, environmental impact of brewing process and suggested the best environmental management practices.

According to Olajire (2012), beer is popular drink and the fifth most consumed beverage next to tea, carbonates, milk and coffee. The study showed that the environmental impact can be divided into three groups, resources availability, nuisances and toxic effects. The resource availability and utilisation is seen from a sustainable development perspective, scarcity of water resources, combustion of fossil fuels, utilisation of raw materials, emission of ozone depletion chemicals, CO2, etc. Compared to other types of industries, the utilisation of resources is the most characteristic environmental impact from breweries. This means that optimisation of the resource utilisation will result in reduced environmental impact and operational costs. The nuisance impact is typically felt by the neighbours of a brewery and is related to the emission of noise, odour (even in cases of high acceptance rates) and dust mainly from handling malt and adjuncts. Reduction of the nuisance impact will often result in additional costs and is to some extent coupled with occupational health measures. The toxic effect is more diverse as it covers the toxic impact from uncontrolled products or chemical spills into e.g., rivers and wastewater treatment plants. Potential toxic impact from breweries is often related to the evaluation of purchased goods and the contingency measures employed in order to reduce the effects of accidents.

2.3. Conceptual Framework



2.4. Identified Literature Gaps

The majority of literatures are related to traditional logistics and supply chain management practice and no major analysis is done on green supply chain management implementation. And also, there are only few literatures regarding the relation between supply chain management and the brewery industry in Ethiopia. In Ethiopia green supply chain management is a new and very young concept and started gaining attention in recent years and it is very unlikely to find literatures regarding its trend in the country's context. Therefore, there is limited literature in this thematic area and this research work is believed to fill in the gap that exists towards green supply chain management practice in general and the beer industry in particular. As mentioned earlier, to the best knowledge of the researcher there is no clearly designed green supply chain management practice model for brewery industry in Ethiopia. Therefore, this research is believed the fill the gap by providing one. In addition, it could be used as a springboard to develop other related supply chain management practice model in the area.

2.5. Research hypothesis

H1: Lack of top management supportnegatively affects the level of GSCM practices implementation

H2: Government regulations negatively affect the level of GSCM practices implementation

H3: Lack of cross-departmental communication negatively affects the level of GSCM practices implementation

H4: Lack of awareness of environmental issues negatively affects the level of GSCM practices implementation

H5: lack of technological advancement negatively affects the level of GSCM practices implementation

H6: Government incentives positively affect the level of GSCM practices implementation

H7: Collaboration with suppliers positively affects the level of GSCM practices implementation

H8: Pressure from competitors positively affects the level of GSCM practices implementation

H9: Performance and reward system within organisation positively affects the level of GSCM practices implementation

H10: Existence of sustainable SCM strategy positively affects the level of GSCM practices implementation.

CHAPTER THREE

3. METHODOLOGY OF STUDY

3.1. Description of the study area

BGI is a large-scale brewery and beverage production wing of Group Castel, operating internationally in more than 53 countries. It has been operating in Ethiopia since 1998 and engaged in the production and distribution of beer, wine and beverages. BGI owns five breweries including the iconic St. George Brewery in Addis Ababa, the Kombolcha Brewery, the Hawassa Brewery, Zebidar Brewery and Machew Northern Brewery. The company also owns and manages the Castel Winery and vineyard located in the town of Zeway. Established in 2012, the winery produces twelve thousand Hectolitres of different wine varieties annually under the brand names Acacia and Rift Valley. BGI Ethiopia's products are distributed by partner agents in all corners of the country and exported internationally.

The company has a vision of becoming and remaining the absolute beer market leader in Ethiopia with a mission of producing, selling and giving their customers best quality. Despite its success in many business areas including expansion and branding, it is very clear that green supply chain management is not even given a proper attention by the company. This instigated studying the challenges of implementing eco-friendly supply chain management practice operation in BGI Ethiopia.

The company is purposefully chosen based on its history, experience and proximity. The research is designed to use both descriptive and inferential statistics and mixed approach that comprises both qualitative and quantitative analysis are used. Primary data (interview and questioner) and secondary (company data) are gathered for analysis and necessary statistical tools were used to thoroughly examine the green supply chain management implementation in BGI Ethiopia.

3.2. Research Approach

In order to answer the research questions developed in chapter one mixed research approach was used to conduct this study, which means qualitative and quantitative research approaches were applied. The qualitative analysis discussed the company's experience, challenges and practices in the implementation of green supply chain management. It also helps to, vividly, understand the challenges affecting the green supply chain management practice at BGI and the enabling environment that prevails and lacks within the company. Finally, the prospect of the company to the implementation and its potential replication to the rest of the industry were analysed.

The quantitative analysis principally was intended to assess the status of the company regarding the availability of resources and potential capacity to implement the green supply chain management concept in the future. Within this analysis, based on the available enablers within the company, both short run and long run measures was suggested.

3.3. Research Design

The research design for this study was descriptive and explanatory inferential statistics in order to test the hypotheses. These designs were chosen based on the nature of the study putting the development of green supply chain management model for brewery industry in Ethiopia.

3.4. Population and Sample Design

Currently there are six main brewers that together own 12 breweries producing 24 different brands of Beer. Of these BGI is the first private foreign investor and has bought oldest brewery factory i.e. St, George which was established in 1922. It has five brewery factories in Kombolcha, Addis Ababa, Hawassa and Maichew. For this study purposive sampling technique was used because the research mainly targets the level of implementation of green supply chain practices and for this purpose the oldest brewery company is chosen.

Purposive sampling technique was employed for this study for several reasons. Besides its proximity, it is assumed that since the company is well established through time, it is expected to be a pioneer in the practice of environmental protection. To substantiate the above argument, it is known that in Ethiopia most breweries release their wastewater into the

environment. The case for St. George Brewery Company was also the same. It produces approximately 107.7 thousand hectolitre (hL) beer and about 7.5 million hL total wastewater annually and this amount of wastewater was discharged into the water bodies particularly to Akaki river. However, St. George Brewery installed the modern treatment plant with re-aeration system in recently for better treatment of its waste (Alayu, 2018). In the same fashion, the researcher was interested to study the measures taken by the firm towards green supply chain.

Supply chain management department of the company has 40employees; managerial, middle employees and expertise. Due to small number of supply chain management department employees this research used the whole population using census method. Questionnaire was distributed for40 employees who were familiar with the GSCM concept and 87.5% or 35 questionnaire were returned.

3.5. Data source and collection Procedure

For this research both primary and secondary data were gathered. The primary data was collected through interview and questionnaires. The interview was with heads of supply chain, procurement and logistics (transportation) departments of BGI Ethiopia and questionnaires for supply chain, procurement and logistics personnel of the company to understand the current status of the company towards green supply chain management using a five-scale rating (1-5 strongly agree to strongly disagree).

Secondary data was gathered from survey, key informant interview and company profile. Based on this the company's procurement, transportation and reverse logistics were assessed and evaluated to come up with a model that could fit the context of beer companies in general and BGI Ethiopia in particular.

3.6. Method of Data Analysis and Presentation

The gathered data through questionnaires, interview was analysed both thematically and content based. The data was interpreted in relation to specific research questions and specific

objectives of the study. Therefore, after the ranked questionnaire is gathered from the respective stakeholders, an average was pulled out so that it could represent the company's current status in relation to green supply chain management.

Information obtained from respondents was analysed and interpreted with the help of Statistical Package for Social Science (SPSS 23). Descriptive statistics was calculated for each variable. Then Correlation between these variables also runs to see the strength of their relationship. Finally, after checking all the assumptions, multiple regressions were computed for determinants of green supply chain practices using the aggregated variables from enablers and challenges. As a part of recommendation and future guideline, on the bases of the data and information collected from survey and key informant interview, the researcher developed a model on how to implement green supply chain management in the brewery industry. In this aspect, benefits, enablers and challenges were put in to consideration before developing a full-fledged model.

3.7. Validity and Reliability Test

Validity of an instrument is how accurate the instrument was in obtaining the data it intended to collect and indicates the degree to which the instrument measures what it was supposed to measure (Kothari, 2004). To ensure precision, relevance and content validity of the instrument, the questionnaires were subjected to critical evaluation by the researcher and the supervisor.

Once the first draft of questionnaire was developed, it was handed out to the advisor for comment and content validity, in order to make sure that the questionnaire can answer the research questions. After refining the questions, an improved draft questionnaire was approved and dispatched to the respective stakeholders.

Cronbachs alpha is a coefficient of reliability. It is commonly used as a measure of the internal consistency or reliability of a psychometric test score for a sample of examinees. The Cronbach's Alpha result of 0.7 and above implies acceptable level of internal reliability. To meet consistency reliability of the instrument, the questionnaires was distributed to 35 individuals who work at BGI Ethiopia and Cronbach's alpha was found to be 0.966 which is above 0.7 and is generally taken as best.

Reliability Analysis

Reliability Statistics

Cronbach's Alpha	N of Items
.966	54

3.8. Ethical Considerations

The researcher recognized the principles of ethical issues like confidentiality and dignity of the participants, integrity, never constructing and destroying data and on no account, plagiarism. The researcher has taken at most safeguard before undertaking the research and inform the participants in the study about the objectives of the study, and deliberately considers ethical issues in seeking agreement, avoiding dishonesty, maintaining confidentiality and respecting privacy of all respondents. The researcher considered these points because the law of ethics on research condemns conducting a research without the consensus of the respondents for the above listed reasons.

CHAPTER FOUR

4. RESULTS, ANALYSIS AND INTERPRETATION

4.1. Demographic profile of Respondents

A total of 40 questionnaires were distributed and 35 appropriately filled questionnaires were collected with an attrition rate of approximately 10%. The collected data were analysed with the statistical package for social science (SPSS version 23).

Table 1: Demographic characteristics of employees at BGI, Ethiopia (n=35)

Variable		Valid Percent
Age	18-25	14.3
	26-35	34.3
	36-45	37.1
	>=46	14.3
	Total	100.0
Education Status	Diploma and Below	8.6
	Bachelor Degree	45.7
	Masters and Above	45.7
	Total	100.0
Work Experience	Below 2 years	12.1
	2-5 years	9.1
	6-10 Years	33.3
	Above 10	45.5
	Total	100.0

Source: Own Research

As can be seen from the table, the majority of the respondents (37.1%) are between the ages of 36 and 45, 34.3% are between 26 and 35 and 14.3% between 18 and 25. Regarding the education status, 8.6% of the respondents are diploma holders, 45.7% of respondents are bachelor degree holder's and 45.7% Masters and above degree holders. When we see the work experience with in the company, 12.1% of respondents served the company below 2 years, 9.1% served 2 to 5 years, 33.3% served 6 to 10 years, and 45.5% of the respondents served for 11 and above years.

As per the standard questionnaire, the survey was undertaken for three major components of Green Supply Chain Management (GSCM) which are: the green supply chain practice, the enablers of green supply chain and the barriers to implement the green supply chain in the company.

4.2. Green supply chain management practices

Table2: -Green procurement practices

Green procurement practices	1	2	3	4	5	Mean
BGI Ethiopia considers the environmental impact of product to be procured by collaborating with its suppliers.	1	5	4	16	8	3.74
BGI Ethiopia provides design specification to suppliers that include environmental requirements for purchased item.	0	5	10	15	5	3.57
BGI Ethiopia assesses supplier's environmental management protocols in its procurement decisions.	0	8	12	13	1	3.21
BGI Ethiopia involves local suppliers (raw material suppliers and employees) in its procurement to benefit the society.	0	5	3	23	4	3.74.
BGI Ethiopia considers means of optimizing the total procurement cost to secure its economic objectives.	0	4	5	18	7	3.82
Procurement Average						3.619

Source: - own research

The first GSCM practice that was analysed was the green procurement practice. This stage basically involves the idea of incorporating green practices into the procurement framework by working in collaboration with different departments such as financial, production, supply chain and logistics, quality, marketing, etc. in order to make the procurement process eco-friendly.

As can be seen from the mean score, the highest mean score is obtained on BGI Ethiopia's experience on optimizing the total procurement cost to secure its economic objectives (3.82). On the other hand, the company's experience in assessing supplier's environmental management protocols in its procurement decisions is close to neutral, which is 3.21. Overall,

all green procurement activity has a mean score of 3.619 with a standard deviation of 0.65331.

Table 3: - Green transportation practices

Green transportation practices	1	2	3	4	5	Mean
BGI Ethiopia considers reduction of energy consumption (fuel) to reduce carbon emission.	4	3	10	14	4	3.31
BGI Ethiopia reasonably plan sales networks that would help to avail their product on time to consumers.	0	3	2	18	12	4.11
BGI Ethiopia designs products in an easy way to deliver (designing packages that require less space in shipment) to reduce transportation cost.	0	5	6	12	12	3.89
Green transportation Average						3.77

Source: - own research

Green Transportation or Sustainable Transportation comprises of those modes of transportation that do not depend on diminishing natural resources like fossil fuels. It is a form of transportation that takes humanity in to account, offers affordable, safe, and sustainable types of transport mode. It is also known to rely on renewable or regenerated energy rather than non-renewables and has a low impact on the environment. These transportation modes rely on renewable energy sources.

As can be seen from the table among green transportation practices, 85% of the respondents agreed that BGI's experience to reasonably plan sales networks that would help to avail products on time to consumers , is high or very high with the mean score of (4.11). On the other hand, BGI Ethiopia's consideration of reducing energy consumption (fuel) to reduce carbon emission is agreed by less than 50% of the respondents, which could be considered low (3.31).

Table4: -Green manufacturing practices

Green manufacturing practices	1	2	3	4	5	Mean
BGI Ethiopia's production adopts design, uses raw materials and converts into output with greater emphasis to environmental consideration.	0	4	3	18	10	3.97
BGI Ethiopia's production process ensures how the local society benefits in its design, raw material, employment and wastage emission.	2	2	5	21	5	3.71
BGI Ethiopia adopts design, uses raw materials and converts into output by optimizing its total production cost.	1	1	3	18	12	4.11
Green manufacturing Average						3.933

Source: - own research

Under the production unit, quality and food safety management system, steam recovery system, carbon treatment system, waste water treatment system and physical waste separation system are currently running. Incoming material inspection and testing procedure, raw material test and inspection procedure, stock and inventory follow up procedure, work production procedure, beer fermentation and maturation procedure, beer filtration procedure, procurement procedure, steam and air production procedure and energy management procedures are procedures implemented in the production section with the aim of minimizing pollution and maximizing energy saving. These procedures guide and follow the efficiency and effectiveness of the systems mentioned above. Even though the application and the current production system of the company seem well established and modernized, there are some downsides bearing in mind green supply chain management aspects.

According to the table above, adoption of design, uses of raw materials and converting into output by optimizing total production cost in BGI Ethiopia is very high (4.11) and adoption of design, use of raw materials and converting into output with greater emphasis to environmental consideration is low (3.71).

Table5: -Reverse Logistics practices

Reverse Logistics practices	1	2	3	4	5	Mean
In BGI Ethiopia there is safe disposal of unrecyclable or un re-usable waste (especially hazardous waste) to make environmentally friendly.	1	3	8	12	8	3.72
In BGI Ethiopia there is incentives to employees who collect sizeable amounts of recyclable materials for proper disposal or recovery of useful parts.	0	3	12	12	5	3.59
In BGI Ethiopia there is recycling and reselling(reuse) of waste materials to enhance the economic benefits of its reverse logistics practices of green supply chain management.	0	5	6	13	8	3.75
Reverse Logistics Average						3.687

Source: - own research

Reverse logistics is for all operations related to the reuse of products and materials. It is "the process of moving goods from their typical final destination for the purpose of capturing value, or proper disposal. As indicated by the respondents, recycling and reselling (reuse) of waste materials to enhance the economic benefits of its reverse logistics practices of green supply chain management in BGI Ethiopia is very high (3.75) whereas, the practice of giving incentives to employees who collect sizeable amounts of recyclable materials for proper disposal or recovery of useful parts is low (3.59) and the overall green logistics practice is mentioned as above average only by 60% of the respondents.

Generally, The result indicated that of the alternatives of GSCM (procurement, production, transport and reverse logistics), the respondents agreed that BGI is exerting an effort to engage its self in the green production (manufacturing)system (3.93/5.00) while there is a low procurement practice (3.61/5.00) and reverse logistics (3.68/5.00). The experience of the company also corroborates the above finding. Specifically, the company invests a great deal of resources on updating and modernizing production technologies. Under the production

unit, quality and food safety management system, steam recovery system, carbon treatment system, waste water treatment system and physical waste separation systems.

Similarly, though the company is trying to implement reverse logistics by following strategic procurement approaches, planning sales networks, collecting and reprocessing crown cork and empty bottles, incinerating the label from collected empty bottles and providing the ash as fertilizer and supplying famers unions with spent grain, these activities seem to be less impactful.

4.3. Green supply chain management Enbalers

Table 6:- Government incentives

Government incentives	1	2	3	4	5	Mean
Government incentives enables the implementation of green supply chain management at BGI Ethiopia.	1	8	17	9	0	2.97
Subsidy polices of the government enable the implementation of green supply chain management at BGI Ethiopia.	1	8	11	15	0	3.14
Reducing taxes in adoption of technology that would ensure the economic, societal and environmental benefits to enable the implementation of green supply chain management at BGI Ethiopia.	0	5	11	12	7	3.60
Governmental environmental regulations on the brewery industry enable the implementation of green supply chain management at BGI Ethiopia.	0	4	11	17	3	3.54
Government incentives Average						3.314

Source: - own research

Government incentivizes GSC practices as a part of its plan to establish a sustainable economy and promote a healthy, low carbon, resource efficient and socially inclusive environment. As can be seen from the table, reducing taxes in adoption of technology that would ensure the economic, societal and environmental benefits at BGI Ethiopia have a better focus from the government. Using this opportunity, the company has imported an eco-friendly machinery in its production process. For instance, it has installed the modern treatment plant called Up-flow Anaerobic Sludge Blanket (full-scale UASB) with re-aeration

system in recently for better treatment of its waste. On the other hand, findings indicate a weaker subsidy policy to promulgate GSCM.

Table 7:- Collaboration with supplier

Collaboration with supplier	1	2	3	4	5	Mean
Collaboration with supplier enables the implementation of green supply chain management at BGI Ethiopia.	0	4	10	19	2	3.54
Suppliers' commitment to the design requirement of BGI in terms of economic, social and environmentally friendly specifications enables the implementation of green supply chain management at BGI Ethiopia.	1	5	9	18	2	3.43
Suppliers adoptability to the green supply chain requirement of BGI enables the implementation of green supply chain management at BGI Ethiopia.	0	6	7	19	3	3.54
Cooperation with customer for eco-design, green packaging enables the implementation of green supply chain management at BGI Ethiopia	0	6	3	18	8	3.80
Cooperation with customers for using less energy during product transportation enables the implementation of green supply chain management at BGI Ethiopia	0	5	9	13	8	3.69
Environmental partnership with suppliers enables the implementation of green supply chain management at BGI Ethiopia	0	5	7	15	6	3.67
Collaboration with suppliers Average						3.611

Source: - own research

Closer relationships between buyers and suppliers could create significant value and help supply chains become more resilient. Buyers and suppliers can work together to develop innovative new products, for example, boosting revenues and profits for both parties. They can take an integrated approach to supply-chain optimization, redesigning their processes together to reduce waste and redundant effort, or jointly purchasing raw materials. Or they can collaborate in forecasting, planning, and capacity management—thereby improving service levels, mitigating risks, and strengthening the combined supply chain. With this aspect, the study finding indicates that there is a relatively strong belief that cooperation with customer for eco-design, green packaging enables the implementation of green supply chain management at BGI Ethiopia (3.80) which is around 75%. On the other hand, suppliers' commitment to the design requirement of BGI in terms of economic, social and environmentally friendly specifications enables the implementation of green supply chain management at BGI Ethiopia seem to be low (3.43) which is around 60%.

Table8: - Pressure from competitors

Pressure from competitors	1	2	3	4	5	Mean
Pressure from competitors enables the implementation of green supply chain management at BGI Ethiopia.	0	2	7	18	8	3.91
Competitor's green supply chain strategies adaptation enables the implementation of green supply chain management at BGI Ethiopia.	0	2	6	19	8	3.94
Competitor's improvement in technology adoption which satisfy the economic, social and environmental aspects of the business enables the implementation of green supply chain management at BGI Ethiopia.	0	1	7	19	8	3.97
Competition among competitors enables the implementation of green supply chain management at BGI Ethiopia.	0	1	7	20	7	3.94
Pressure from Competitors Average						3.942

Source: - own research

The competitive reality that companies today face forces them to constantly fine tune and update every aspect of their performance. Besides governmental regulations and pressure from non-governmental organizations, tough market competition for green image and international acceptance could act as an enabling factor to the GSC practice. The finding shows that competitors' improvement in technology adoption which satisfy the economic, social and environmental aspects of the business is the most significant enabler (3.97) and he overall mean from competitors' pressure also remains close to 4.00 which makes it a very significant variable with this regard.

Table 9:- Performance evaluation and rewarding system

Performance evaluation and rewarding system	1	2	3	4	5	Mean
Performance evaluation and rewarding system in the organization enables the implementation of green supply chain management.	0	2	10	18	5	3.47
Setting performance standards in the organization enables the implementation of green supply chain management.	0	2	5	18	10	4.03
Setting specific goals related to green supply chain management practices (economic, social and environmental) in the organization enables the implementation of green supply chain management.	0	2	2	25	6	4.00
Motivational acknowledgement and bonuses for the adoption of green supply chain management practices enables the implementation of green supply chain management.	0	4	5	21	5	3.77
Performance evaluation and rewarding Average						3.885

Source: - own research

The incorporation of environmental and social responsibility goals into organizational strategic plans requires a mechanism to measure and reward performance contributing to that objective. It can also be useful when communicating sustainability objectives, monitoring sustainability performance and rewarding employees for their sustainability performance or for reaching sustainability goals. 80% of the respondents believe that setting performance standards in the organization enables the implementation of green supply chain management while only 65% of the respondents believe that performance evaluation and rewarding system in the organization enables the implementation of green supply chain management. The overall mean for performance evaluation and rewarding system as an enabler to the implementation of GSCM is 3.88.

Table 10: Existence of sustainable supply chain management strategy

Existence of sustainable supply chain management strategy	1	2	3	4	5	Mean
Existence of sustainable supply chain management strategy enables the implementation of green supply chain management.	1	0	7	20	7	3.91
Existence of social responsibilities enables the implementation of green supply chain management.	0	1	6	17	11	4.09
Existence of environmental responsibilities enables the implementation of green supply chain management.	0	0	7	19	9	4.06
Existence of economic responsibilities to reduce the total supply chain cost enables the implementation of green supply chain management at BGI Ethiopia.	0	1	7	23	4	3.86
Existence of sustainable supply chain management strategy Average						3.978

Source: - own research

Sustainable supply chain management is the management of supply chains in a way that integrates the sustainability objectives and requirements defined by the firm, suppliers, customers, and external stakeholders (e.g., consumers, policy-makers, associations). These sustainability objectives include economic, social, environmental, and ethical targets that all members of the supply chain must reach in order to make the supply chain sustainable. As can be seen from the table above, existence of social responsibilities and existence of environmental responsibilities at enabling the implementation of green supply chain management is very significant.

Overall, Among the enablers, pressure from competitors (3.94/5.00) and availability of sustainabe supply chain management strategy (3.97/5.00) took the most empowering role while government incentives are presumed to be low (3.31/5.00). On the other hand, among the challenges to impliment GSCM, the lack of cross departmental communication (3.84) and lack of customer collaboration (3.83/5.00) dominated the responses.

In order to understand the situation and substantiate the finding, thorough Key Informant Interviews (KIIs) were undertaken and sustainable SCM, performance and reward system, larger organizational setup, capacity to implement technologies, training platforms, a

committed labour force (employees), a committed management system, government incentives, growing green consumers, international regulations, government environmental regulations, positive publicity and local suppliers were found as the most significant enabling variables to the implementation of GSCM at BGI, Ethiopia.

4.3. Challenges of GSCM practices

Table11: -Lack of top management support

Lack of top management support challenges	**1**	**2**	**3**	**4**	**5**	Mean
Lack of top management support challenges the implementation of green supply chain management.	2	4	8	10	11	3.69
Lack of organizational culture that would promote economic, social and environmentally friendly business challenges the implementation of green supply chain management.	1	5	7	11	11	3.74
Lack of empowerment to work for green supply chain management challenges the implementation of green supply chain management.	1	5	8	12	9	3.66
Lack of top management support Average						3.695

Source: - own research

Commitment and support from management is a necessary factor for innovation in especially for environmental concern through employee empowerment and involvement. This is because the top management team is likely to influence the organization to develop capabilities in green product design and green manufacturing. And a company's green practices can greatly improve its strategic and environmental performance. The result of the study also unveils that the lack of organizational culture that would promote economic, social and environmentally friendly business challenges the implementation of green supply chain management could hamper the implementation of GSC practices.

Table12: -Lack of customer's collaboration

Lack of customer's collaboration challenges	1	2	3	4	5	Mean
Lack of customer's collaboration to meet the design requirement of the BGI's green supply chain management challenges the implementation of green supply chain management.	0	4	9	13	9	3.77
Lack of customer awareness about green supply chain management challenges the implementation of green supply chain management.	0	2	11	10	12	3.91
Customer's resistance to adopt green supply chain management practices challenges the implementation of green supply chain management.	0	2	11	13	9	3.83
Lack of customer's collaboration Average						3.838

Source: - own research

Supply chain management involves coordination and collaboration *f*or the flow of information and resources between various channel partners. Therefore, collaboration *of* Green Supply Chain Participants is critical to the success of GSC practices. In this study, among the alternatives, lack of customer awareness about green supply chain management plays a significant role as a challenge to the implementation of GSCM at BGI Ethiopia.

Table13: -Lack of awareness about environmental issues

Lack of awareness about environmental issues challenges	1	2	3	4	5	Mean
Lack of awareness among employees about environmental issues challenges the implementation of green supply chain management.	0	4	5	16	10	3.91
Lack of environmental education and training for employees challenges the implementation of green supply chain management at BGI Ethiopia.	0	4	5	14	12	3.97
Lack of awareness regarding government regulation regarding GSCM challenges the implementation of green supply chain management at BGI Ethiopia.	1	4	9	12	9	3.69
Lack of employee awareness about the economic, societal and environmental benefits of green supply chain management practices challenges its implementation.	0	3	11	13	8	3.74
Lack of awareness about environmental issues Average						3.828

Source: - own research

One of the reasons behind the low adoption of sustainable supply chain practices is the Lack of awareness about environmental issues by the stakeholders. As the aim of implementing a sustainable supply chain system is to create, keep and flourish long-term environmental benefits, among other factors, the lack of environmental education and training for employees challenges the implementation of green supply chain management in general and at BGI Ethiopia in particular.

Table13: - Lack of technological advancement

Lack of technological advancement challenges	1	2	3	4	5	Mean
Lack of technological advancement challenges the implementation of green supply chain management.	0	7	7	14	7	3.60
Resistance to new technological adoption with low air pollution, sound pollution and water pollution challenges the implementation of green supply chain management.	0	4	8	15	8	3.77
Lack of integration of new technology with green supply chain management challenges the implementation of green supply chain management at BGI Ethiopia.	1	3	11	11	9	3.69
Lack of awareness about economic, social and environmental benefits of new technology adoption challenges the implementation of green supply chain management at BGI Ethiopia.	1	3	13	7	11	3.69
Lack of technical expertise with the technologies adopted for green supply chain management challenges its implementation.	1	5	4	16	9	3.77
Lack of technological advancement Average						3.702

Source: - own research

Among the technological factors expected to challenge the implementation of GSC practice at BGI Ethiopia, resistance to new technological adoption with low air pollution, sound pollution and water pollution challenges the implementation of green supply chain management has the highest mean (3.77) and the overall average is 3.702 with a standard deviation is 0.94.

Table14: -Lack of cross-departmental communication

Lack of cross-departmental communication challenges	1	2	3	4	5	Mean
Lack of cross-departmental communication challenges the implementation of green supply chain management.	0	4	8	14	9	3.80
Lack of employee trust and commitment in adoption of green supply chain management challenges its implementation.	0	5	5	16	9	3.83
Lack of employee support, encouragement, and motivation to adopt green supply chain management challenges its implementation	0	3	9	11	12	3.91
Lack of cross-departmental communication Average						3.847

Source: - own research

The other challenge to the implementation of green supply chain practice is the lack of Inter-departmental co-operation. Though internal pressures on the supply chain towards sustainability come from different directions and for in the case of BGI, the most significant variable is the lack of employee support, encouragement, and motivation to adopt green supply chain management challenges its implementation (3.91). The overall mean value to the mean is 3.84 and with a standard deviation of 0.89.

In order to understand the situation and substantiate the finding, thorough Key Informant Interviews (KIIs) were undertaken and lack of know-how and experts on green supply chain, lack of know-how about current environmental threats, attention on short term profit obscured the need for sustainability, resistance to take risk to be a green pioneer in the market (failure to incorporate long-term investment policies), low attention to corporate environmental policy, unjustly linking unjustly environmental- friendly tasks to higher costs, small emphasis on research and development, counteracting and inconsistent local and global policies, higher initial cost of green technologies, free riding competitors that prioritize profit maximization and/or cost minimization over any societal and/or environmental welfare, poor government emphasis and enforcement capacity towards GSC, shortage of hard currency to import eco-friendly technologies, absence of convenient markets and suppliers for recycled goods and underdeveloped ICT infrastructure were found as the most significant challenges to the implementation of GSCM at BGI, Ethiopia.

4.4. Pearson Correlation Test

In order to determine the extent of relationship between GSC practices and the determining variables, a Pearson correlation test was run. The result is as follows:

Correlations				
		GSCM Practice	Enablers	Challenges
GSCM Practice	Pearson Correlation			
	Sig. (2-tailed)			
	N	35		
Enablers	Pearson Correlation	.667**		
	Sig. (2-tailed)	.000		
	N	35	35	
Challenges	Pearson Correlation	.282	.496**	
	Sig. (2-tailed)	.101	.002	
	N	35	35	35
**. Correlation is significant at the 0.01 level (2-tailed).				

Source: - own research

A Pearson product-moment correlation was run to determine the relationship between GSCM and the enablers at BGI Ethiopia. There is a relatively strong and positive correlation between GSCM and the enablers, which was statistically significant (r = 0.667, n = 35, p = .000). However, the correlation result also indicates that the correlation between challenges and green logistics practice is statistically insignificant.

Therefore, this calls forth a further check up to see if there is any causal relationship between the dependent and the independent variables. In order to answer this question, a multiple regression model was developed with a rigorous check on its assumptions.

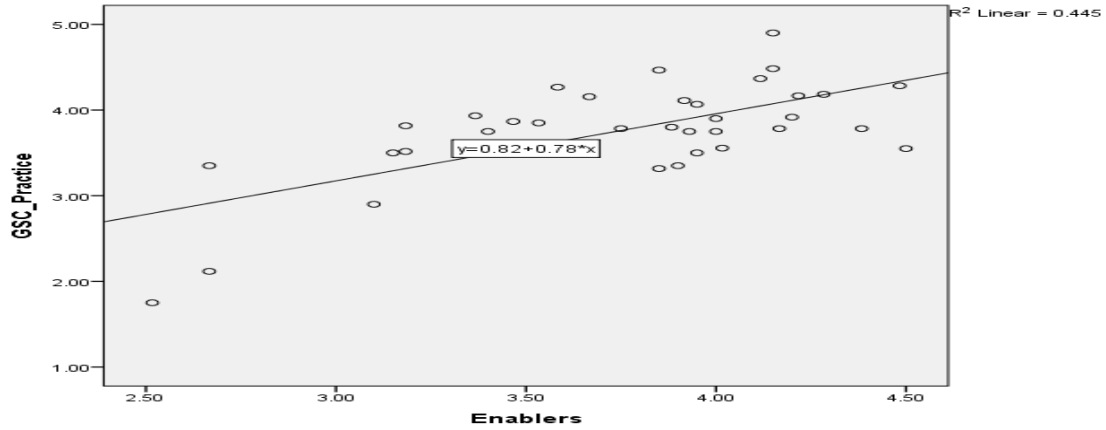
4.5. Multiple Regression

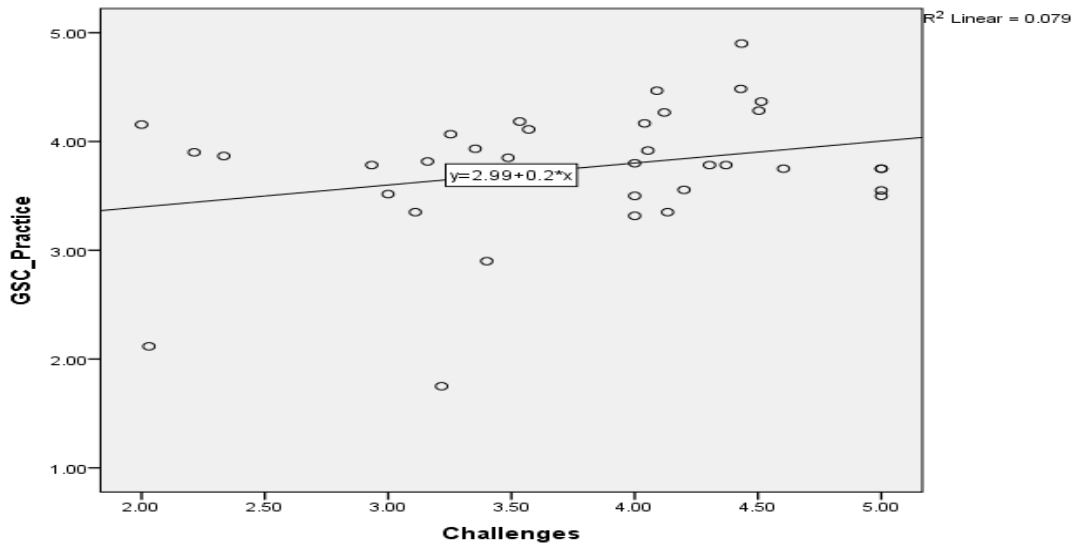
Multiple linear regression (MLR), also known simply as multiple regression, is a statistical technique that uses several explanatory variables to predict the outcome of a response variable. Multiple regression is an extension of linear (OLS) regression that uses just one explanatory variable. On this basis, in order to determine the statistical viability of the variables, after checking for the assumptions, a multiple regression was run.

Assumptions of Multiple Linear Regression Model

Assumption #1: Continuous level variables. Since all the variables are aggregated to their mean, they are in a continuous format.

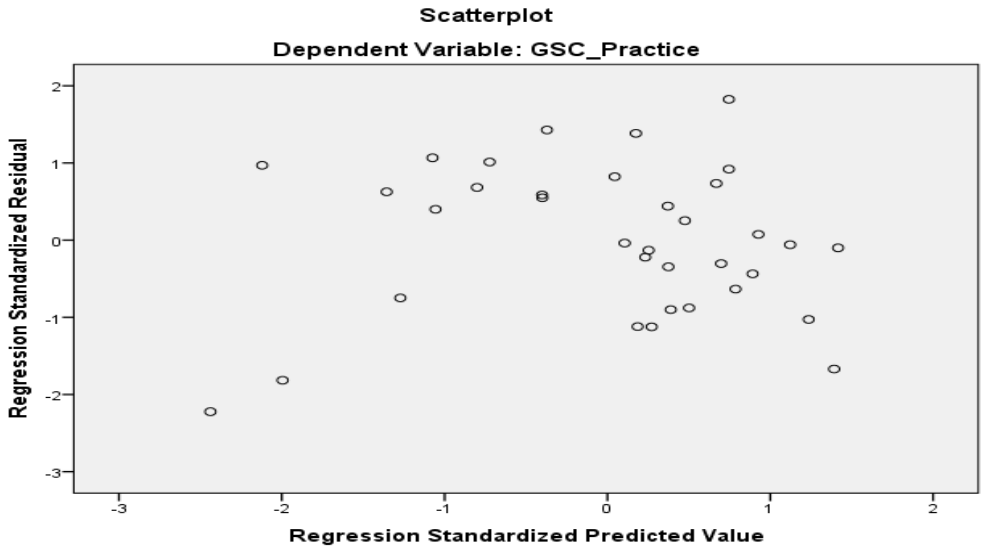
Assumption #2: There needs to be a **linear relationship** between the two variables. The scattered dot plot indicated that there is a linear relationship between variables.





Assumption #3Homoscedasticity Test, which is where the variances along the line of best fit remain similar as you move along the line or so that there is equality of variance. The plot does not have an obvious pattern, there are points equally distributed above and below zero

on the X axis, and to the left and right of zero on the Y axis. Therefore, the result shows that the residuals are equal across the regression line and there is homoscedasticity.



Assumption #4Multicollinearity Test: Multicollinearity refers to when your predictor variables are highly correlated with each other. Variance inflation factor (VIF) values need to be below 10.00, and best case would be if these values were below 5.00. The result indicates that the there is no multicollinearity because both challenges and enablers have a VIF value of 1.327 and tolerance scores above 0.2 (0.754)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.859	.588		1.461	.154		
	Enablers	.821	.177	.700	4.628	.000	.754	1.327
	Challenges	-.047	.108	-.065	-.433	.668	.754	1.327

a. Dependent Variable: GSC Practice

Assumption #5Independence of Observations: The researcher used the Durbin-Watson statistic to test the assumption that the residuals are independent (or uncorrelated). This statistic can vary from 0 to 4. For assumption #3 to be met, we want this value to be close to 2. Values below 1 and above 3 are cause for concern and may render your analysis invalid. The result 1.933 indicated that the variables are independent to each other.

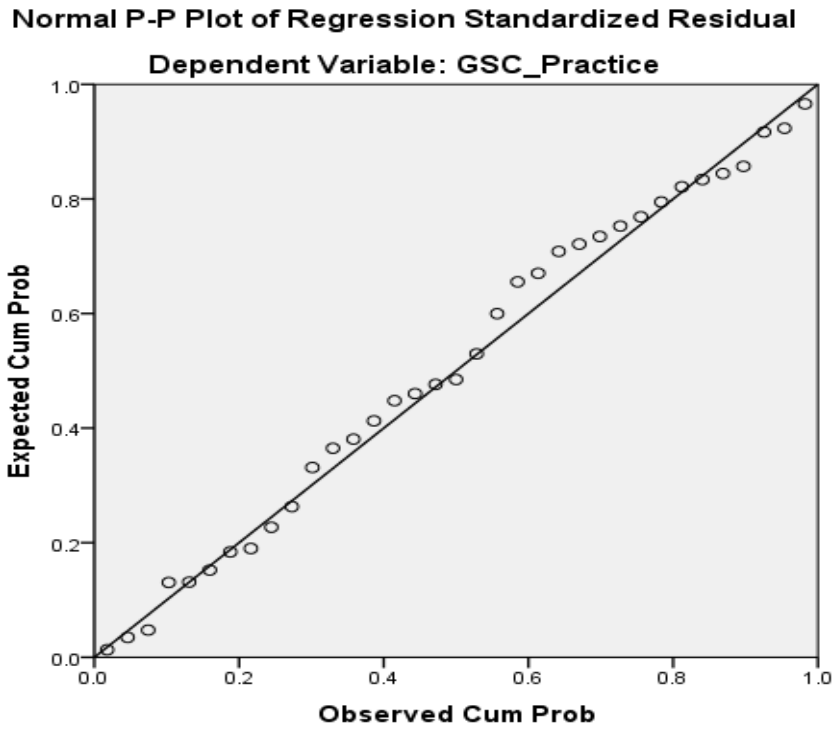
Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.670[a]	.449	.414	.46101	1.933

a. Predictors: (Constant), Challenges, Enablers

b. Dependent Variable: GSC Practice

Assumption #6 Normally distributed residuals. This assumption is tested using the **P-P plot** for the model. As the closer the dots lie to the diagonal line, the closer to normal the residuals are distributed which is the case for this model.



Result

Table15: Model Summary

Model Summary[b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.670[a]	.449	.414	.46101	1.933
a. Predictors: (Constant), Challenges, Enablers					
b. Dependent Variable: GSC_Practice					

Table16: ANOVA Test

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.532	2	2.766	13.014	.000[b]
	Residual	6.801	32	.213		
	Total	12.333	34			
a. Dependent Variable: GSC_Practice						
b. Predictors: (Constant), Challenges, Enablers						

ANOVA test result shows that there is a statistically significant difference between the means of the independent variables

Table17: Regression Result

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.859	.588		1.461	.154		
	Enablers	.821	.177	.700	4.628	.000	.754	1.327
	Challenges	-.047	.108	-.065	-.433	.668	.754	1.327
a. Dependent Variable: GSC-Practice								

The result of the test indicates that only the enablers are statistically significant to determine the implementation of green supply chain while the challenges are not. This implies that basically the empowering factors are more powerful in determining GSC practices than the deterring ones. Therefore, overall, only enablers have a statistically significant relationship with GSC practices which, as indicated, that positive reinforcements to application of GSCM rather than the focus on challenges that would help create an efficient system. This is confirmed by making a test for each enabler and challenge.

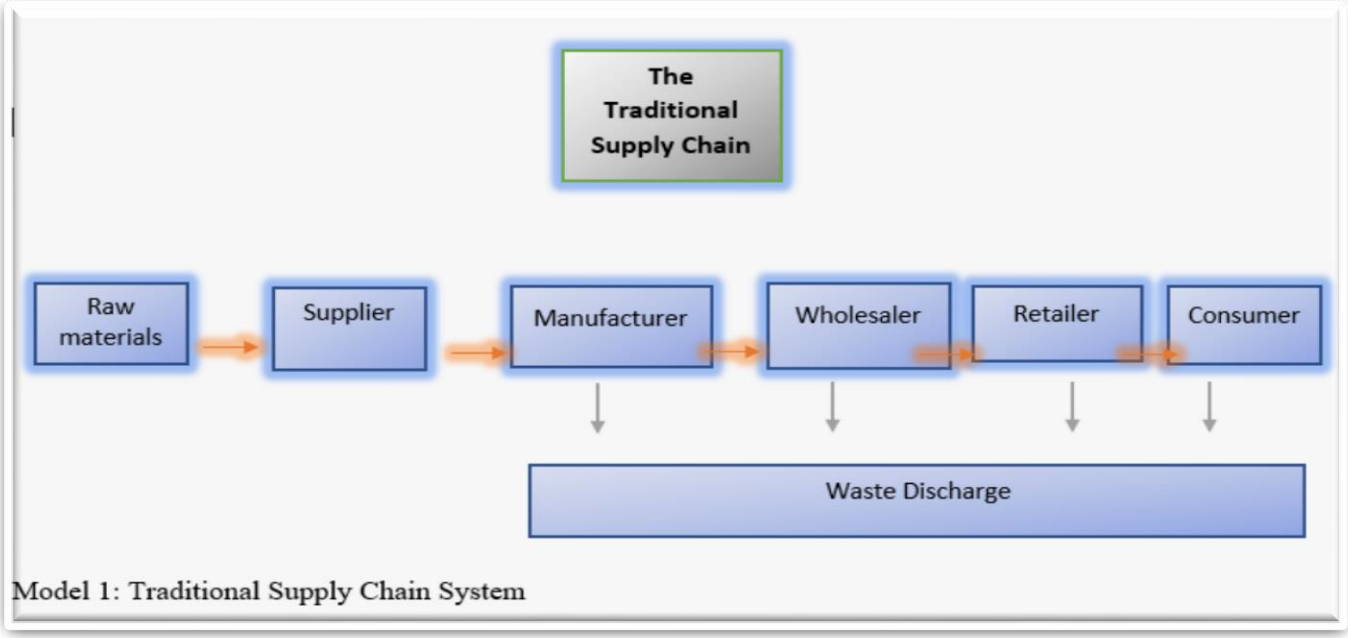
Hypothesis	Sig.	Beta	Remark
H1: Lack of top management support negatively affects the level of GSCM practices implementation	0.075	0.165	Reject
H2: Lack of customer's collaboration negatively affects the level of GSCM practices implementation	0.136	0.180	Reject
H3: lack of cross-departmental communication negatively affects the level of GSCM practices implementation	0.812	0.028	Reject
H4: lack of awareness about environmental issues negatively affects the level of green supply chain management practices	0.56	0.220	Reject

implementation.			
H5: lack of technological advancement negatively affects the level of green supply chain management practices implementation.	0.67	0.200	Reject
H6: Government incentives positively affect the level of green supply chain management practice implementation.	0.005	0.401	Accept
H7: collaboration with suppliers positively affects the level of green supply chain management practices implementation.	0.000	0.411	Accept
H8: pressure from competitors positively affects the level of green supply chain management practice implementation.	0.009	0.400	Accept
H9: Performance and reward system within organization positively affects the level of green supply chain management practice implementation.	0.002	0.479	Accept
H10: existence of supply chain management strategies positively affects the level of green supply chain management practice implementation.	0.000	0.581	Accept

4.6. Model for Green Supply Chain Management in BGI Ethiopia[1]

From the time where manufacturing of goods was directly dependent on the accessibility of raw materials, where logistics was frequently obstructed and disrupted by limitations in transportation technology, to the recent green approach, the supply chain has evolved through several steps. The following diagram depicts the most common supply chain route in many companies. As can be seen from the model below, it begins from the extraction of raw materials and ends by disposing whatsoever is left as a waste material. This approach has always jeopardized and disrupted the natural eco-system to many levels.

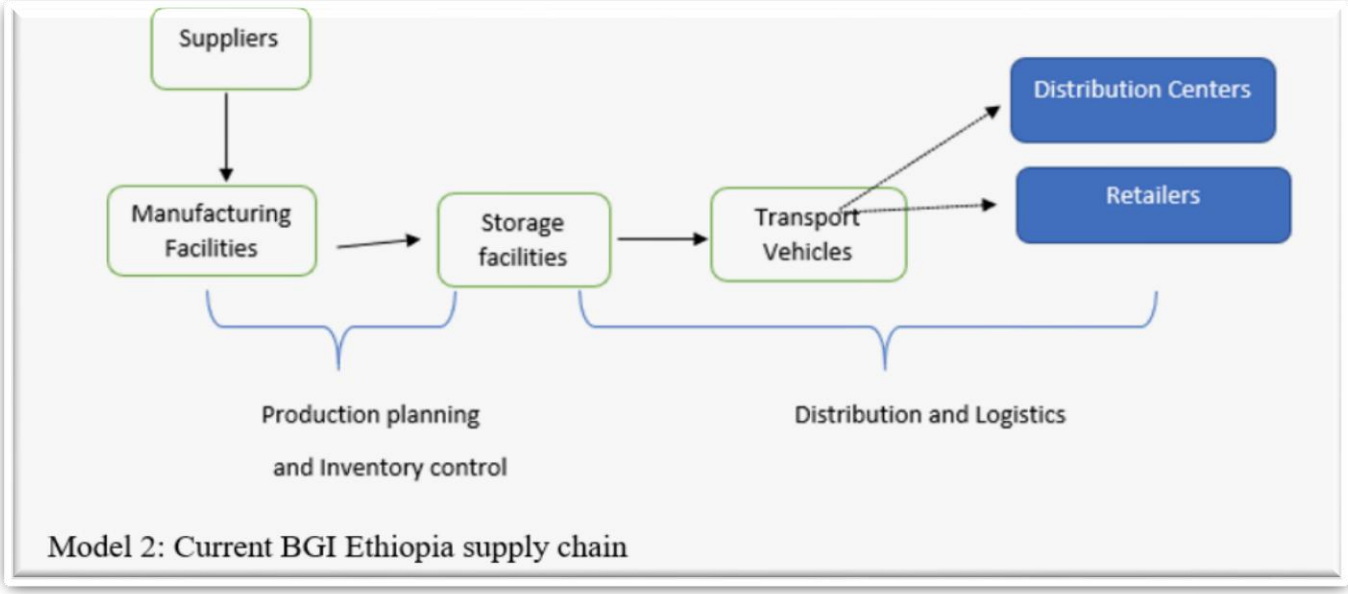
[1]*The models developed to the GSCM of BGI Ethiopia are[1] adopted from the various works of CharisiosAchillas, Dionysis D. Bochtis, DimitriosAidonis, Dimitris Folinas, Benita M. Beamon, Joseph Sarkis, Yijie Dou,Hemmel and Keldmann*



Model 1: Traditional Supply Chain System

Model 1: Traditional SC system

When we come to the case at hand, BGI Ethiopia basically collects raw materials (Such as Barely) from farmers, items such as crown cork and cardboard from domestic suppliers and chemicals from foreign suppliers.



Model 2: Current BGI Ethiopia supply chain

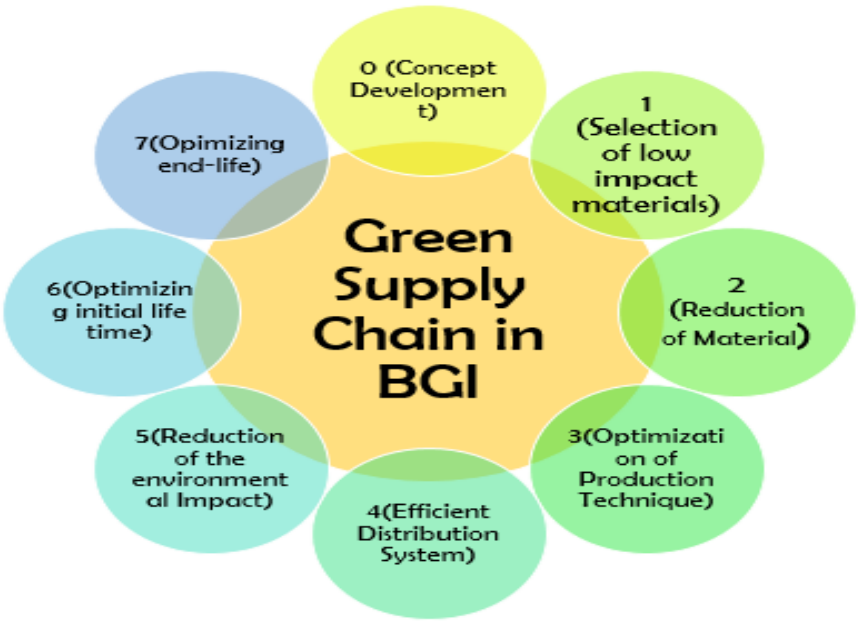
Model 2: Currents BGI Ethiopia SC

The production Planning indicates the design and management of the entire manufacturing process in BGI including raw material scheduling and acquisition, manufacturing process design and scheduling, and material handling design and control. The Inventory Control

Process includes the design and management of the storage policies and procedures for raw materials, work-in-process inventories, and final product. On the other hand, using the Distribution and Logistics Processes the company determines how its products (the Beer) are retrieved and transported from the warehouse to retailers. These products are usually transported to retailers directly, or sometimes moved to distribution facilities, which, in turn, transport products to the retailers. The management of inventory retrieval, transportation, and final product delivery are all included in this process which in the end deliver the required supply chain. There are also some signs of effort to apply reverse logistics process to collect back bottles, the crown-cork and other disposable materials for reprocessing which still actually is at an incipient stage.

Developing an Overall Green Supply Chain Model for BGI

The traditional model, which is linear with a single side flow is not an advocated one any more. As it is frequently mentioned in this research, due to environmental and sustainability issues a closed loop model (a nonlinear and circular one) has become a recommendable approach. This approach begins with concept development and ends up optimizing end life of the product.



Model 3. A new supply chain approach for BGI Ethiopia

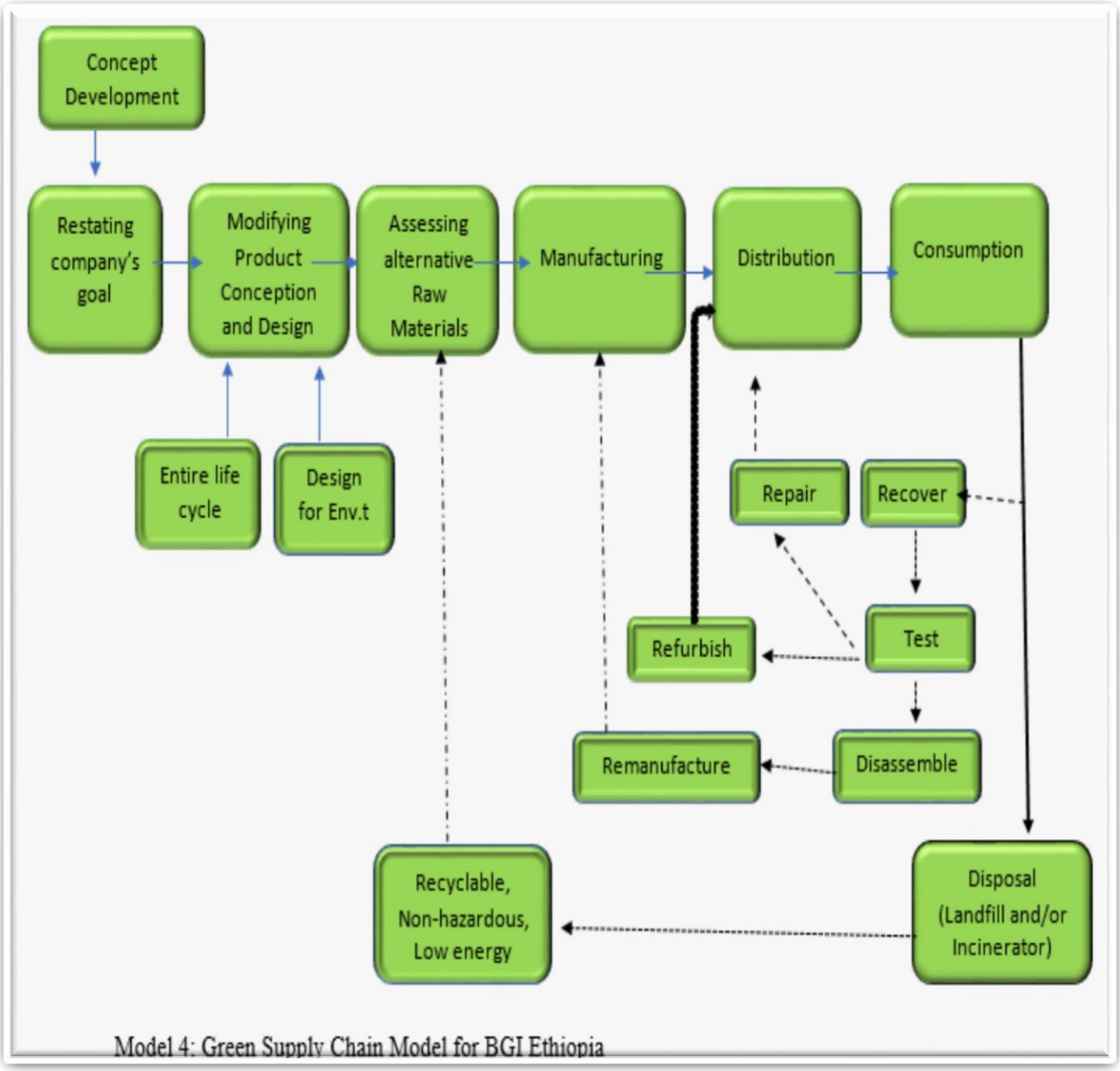
Model3: A new SC approach for BGI Ethiopia

0- A participatory approach to engage stakeholders to the implementation of green logistics within the company
1- Using non-hazardous, low-energy consuming recyclable materials
2- Reducing the weight and volume of the materials in use
3- Using an eco-friendly production alternative, fewer production processes and cleaner energy.
4- Less Packaging with efficient transport mode and logistics
5- Low energy consumption from clean energy source with few and clean consumables
6- Promoting reliability, easy repair and modular product structure
7- Re-use, remanufacturing and recycling of materials

As can be seen from model 3, the developed forward supply chain to BGI Beer company begins with product and process design. The procurement process should focus on the upstream supply chain i.e., it should incorporate organization's raw material suppliers and the processes for managing relationships with them. After the raw material (such as Barely, water, yeast, carbon dioxide etc.) are acquired for production purposes green approach suggests the Carbon dioxide emitted during beer fermentation to be captured and liquefied for future production. In addition, there are auxiliary materials in use such as sodium hydroxide, sulphuric acid and phosphoric acid are utilized. Arranging a proper and an eco-friendly disposal mechanism is necessary. In addition, other production processes such as grist preparation and milling, fermentation, carbonation, storage, filtration and filling should all be in environmental-friendly way. The packaging process that involves glass bottles, steel caps, cardboards etc. and the transportation and distribution process that currently uses oil fuel, trucks and road transport are detrimental the environmental health in one or another way. This also demands a new approach of supply chain management.

The last but not the least one is the management of reverse logistics functions. This process should flow back into various stages of the forward supply chain via reusing, remanufacturing and recycling activities. Because, as the flow of returned products and materials occurs back to the forward supply chain, the less energy is expended, fewer operations occur, which in the end results less environmental challenge and reduction of

materials and waste throughout the supply chain practices. The overall supply chain model developed by the researcher is depicted as follows:



Model 4: GSC Model for BGI Ethiopia

In the next part we will see how each step of the supply chain functions in detail

GREEN PROCUREMENT

The following stages are recommended for the Beer company to develop an eco-friendly procurement system.

Model 5: Suggested Green Procurement Model in BGI Ethiopia

Model 5: Suggested Green Procuremnt Model in BGI Ethiopia

The first Stage is Choosing Green Sourcing Strategy. This stage basically involves the idea of incorporating green practices into the procurement framework by working in collaboration with sister departments as financial, production, supply chain and logistics, quality, marketing, etc.

Second stage: determining the technical/environmental specifications. In this stage the main activity should be to establish the specifications for the green products to be purchased. BGI Ethiopia could request for products that should contain certain percentage of recycled or reused content, that are made following specific procedures or to exclude or demand a reduced percentage of harmful for the environment or health characteristics, etc.

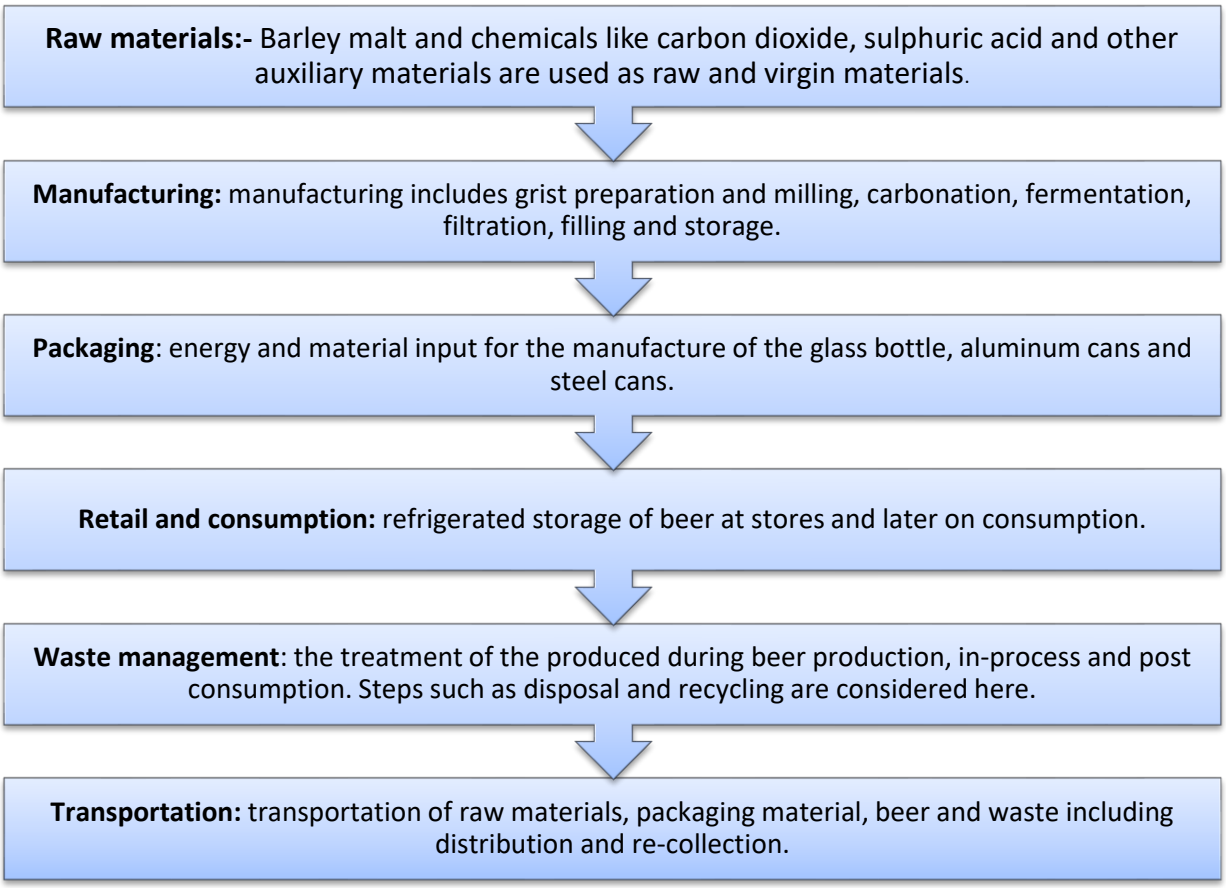
The third stage: screening of the green market basically involves screening the market to find the suitable suppliers using previous suppliers' records, company profiles and environmental indexes. The Fourth Stage is choosing green suppliers using either or both inclusion and exclusion criteria such as after-sales services, the quality of the products and services, capacity and availability of infrastructure, equipment and systems, reliability with respect to service times, adjustment to the particular demands of clients, etc.). In the fifth stage the firm

finalizes the contract Technical in this case the company should include issues such as the mechanism of transportation/distribution of the products, the selection of eco- friendly transportation systems, the use of the routes and delivery times, and the use of telematics applications etc.

The Last stage measures the contract performance. This step determines the success of the current and upcoming future contracts because it serves as a spring board for monitoring and evaluation of the green procurement performance. For this purpose, indicators such as quality of products and/or services, on-time delivery, compliance with contract and/or service level agreements, cost savings, procurement lead/cycle time, inventory turnover ratio, etc., as well as specific environmental indicators such as the reductions in of CO2 or other greenhouse gas emissions, toxic materials, solid waste and energy use over the life cycles of the products increasing recycled content, the degree of the application of green practices, standardized packaging, etc. should be included.

GREEN MANUFACTURING

In order to understand the production process, it is important to know what the process uses from cradle-to-grave life cycle of a beer:



The concept of green production basically involves a production process that respects the carrying capacity of the environment. In the case of Beer productions in general and BGI Ethiopia in particular, the following production stages are recommendable to enhance green production process. This helps the firm to identify its weak links and take corrective measures effectively.

Model 6: Suggested Green Production Process in BGI Ethiopia

Overview stage: is a stage where analysis of the production process and identification of all the individual stages (from Barley Smashing to Bottling) is made. In addition, the environmental impacts caused and the contribution of each stage will be estimated in this stage.

Eco-Profile stage: During this stage, the data obtained from the previous stage are organized and categorized in order to create the ecological profile of the company and determine where the environmental impact emanates from.

Department-network stage: This stage involves defining the role of each department in the production process and the interconnections created by different departments during production.

Quantification Stage: This is a stage to create a quantified value in the environmental impact by addressing each production stage. This reveals the magnitude of the impact by each manufacturing process on the environment.

Conceptualization: As Beer production affects and is affected by the existing environment, in order to adopt a greener production system, the impact of the production on the rest of the eco-system need to be understood well. If properly implemented, this might lead to identifying weak spots or opportunities and initiate a creative and innovative adaptation using the contemporary environmental situation.

Green Production Stage: This is the last stage in the production process. The above stages could be taken as governing principles for this stage. In addition, continuous evaluation and review is necessary to the success of the production process.

GREEN TRANSPORTATION

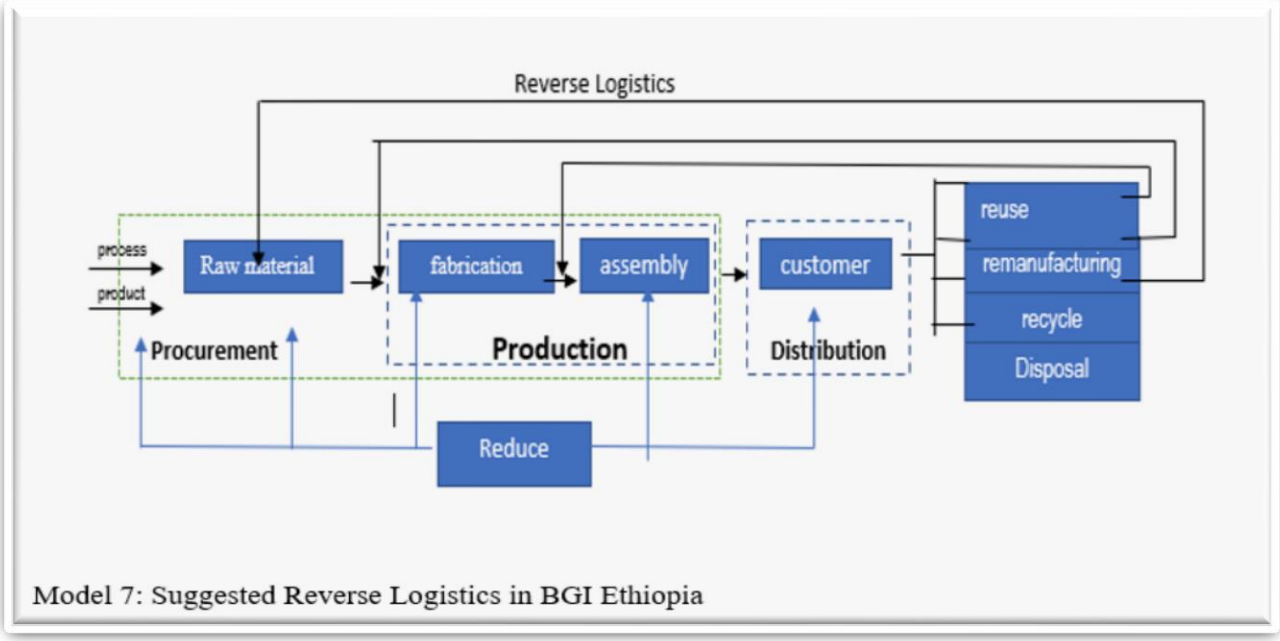
The largest share of total energy consumption comes from transport and from this, road transport is known to consume most of the energy. As a result, an efficient and green transportation mechanism should be established in order to succeed in controlling the damage to the eco-system. Here are fewer suggestions that could be used as a spring board for the green transportation.

Suggested Green Transportation practices	Recycling of old vehicles *and* increase of utilization degree
	Designing green-sustainable distribution networks
	Adoption and implementation of telematics systems and technologies
	Use of appropriate packaging
	Adoption of eco-driving habits and preference and use of non-polluting means of transport
	use of an energy efficient transportation and distribution fleet
	Design of efficient distribution networks and better route design

Model 7: Suggested Green Transportation practices

REVERSE LOGISTICS

The reverse logistics process is expected to be applied in every step of the supply chain: raw material usage, fabrication, assembly, and distribution to customers. With this regard, items in the packages such as bullpacks, pallets, chests and foils, unit packs, glass bottles, pet bottles and kegs; packaging wastes such as cullet, cardboard, paper; and waste products as grain stillage and malt dust should be appropriately recycled either for use and remanufacturing or for proper disposal without disrupting the eco-system. The following model suggests the process.



Model 7: Suggested Reverse Logistics in BGI Ethiopia

Model 8: Suggested reverse logistics in BGI Ethiopia

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1. Conclusion

This Paper tried to assess the green supply chain practices in BGI Ethiopia. The reseacher basically followed a survey method and used the whole population of the company i.e. top level management, middle level management and experts to throroughly analyze the issue. With 10% attrition rate, 92% percent of the respondents are holders of Bachelor degree and above, and around 80% of them have a work experience of 6 years or more. The questionnaire mainly addressed three topics: the availability of green logistics practice, the enablers to green logistics and barriers to impliment it with in the company.

The result indicated that of the alternatives of GSCM (procurement, production, transport and reverse logistics), the respondents agreed that BGI is exerting an effort to engage its self in the green production system while there is a very low green procurement practice. Among the enablers, pressure from competitors and availability of sustainabe supply chain management strategy took the most empowering role while government incentives are presumed to be low. On the other hand, among the challenges to impliment GSCM, the lack of cross departmental communication and lack of customer collaboration dominated the responses.

A multiple regression was run after checking for the assumptions of linearity, indipendence, homoscedasticity, multicollenearity and indipendence. The result indicated that only the enablers have noticeable impact and are statistically significant which is an indication that positive reinforcement is required to effectively apply the GSCM practice. In order to corroborate this finding a correlation and a hypothesis test were undertaken.

Finally, on the basis of the existing condition of the company i.e. putting the challenges and enablers to GSCM into consideration, a model adopted from various companies and countries experience is developed to facilitate the implementation of GSCM in BGI Ethiopia. These models explicity indicate what to follow at each stage of production and give a full picture of what the overall company’s supply chain should look like.

Overall, this paper has tried to to address the major objectives and has shown possible way outs for the implementation of Green Supply Chain Practices in the beer industry.

5.2. Recommendation

As part of the recommendation, the researcher developed green supply chain models and practices- one for the overall and four for each practice. In addition, based on the findings of the research, the following actions points are recommended for each practice.

- **Green Procurement: -**In collaboration with government and other beer companies in the industry, BGI should work to challenge wrong perceptions on environmentally friendlier products, the absence of broadly accepted environmental standards and regulations in the system. In addition, as BGI is a pioneer in the sector creating awareness and encouraging suppliers' engagement in green procurement programs is expected. Finally, working on the information side, BGI should work at organizing updated and reliable information sources including regulatory and legal frameworks to manage the supply cycle and share among the supply chain members.

- **Green Production: -**In order to enhance the implementation of green production, BGI Ethiopia is should be able check the material and energy intensity of production inputs, the usage of harmful substances, the appropriateness and robustness of the production processes with increased awareness to the environment. Moreover, developing life cycle and sustainability thinking and the use of recyclable materials among its employees is very crucial.

- **Green Transport:** -As long as the company engages itself in green logistics activities, creating awareness within and outside the working environment is very important. With this regard, increasing the environmental awareness of consumers, encouraging those who require deliveries using "green" practices, reducing operating costs to conserve environment, offering environmentally friendly products using eco-friendly mechanisms, replacement of old-technology trucks and fuelling systems with "green" ones and inspiring citizens to protect their environment plays a very crucial role.
- **Reverse Logistics:** -As this practice engages various departments altogether, strengthening interdepartmental connection is very necessary. As the result of the

regression indicated, the lack of interdepartmental communication showed a significant detrimental impact in the implementation of green supply chain in BGI Ethiopia. Therefore, due attention should be given at integrating these different departments. In addition, collaboration across the supply chain suppliers, project manager, construction workers, recyclers of construction waste are necessary for effective reverse logistics management.

Training workers on waste minimization techniques and on the collection and management of the waste produced is mandatory to efficiently utilize the existing materials and to keep workers and the environment healthy all the time. With this regard, building temporary storage units for onsite recycling and reuse of waste, implementing qualitative and quantitative controls, and avoiding toxic and hazardous substances will do much of the damage control.

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Appendix

Appendix A; Questionnaire

ADDIS ABABA UNIVERSITY SCHOOL OF COMMERCE

GRADUATE STUDIES, LOGISTICS AND SUPPLY CHAIN MANAGEMENT

Questionnaire to be filled by BGI Ethiopia

Dear respondents,

I am a graduate student at Addis Ababa University School of Commerce, pursuing a graduate degree with specialization in Logistics and Supply Chain Management. I am conducting an academic research on "Green Supply Chain Management implementation in brewery industry the case of BGI Ethiopia" for the partial requirement for the award of Masters of Art Degree in Logistics and Supply Chain Management.

You have been identified as suitable person to provide information on green supply chain management practices in your specific factory in respect to implementation. Your participation is entirely voluntarily and the questionnaire doesn't require writing your names. The information you share with me will remain confidential and only used for the academic purpose, thus, not affects any one rather it might provide insights regarding the implementation of green supply chain management practices in your company. So, your clear and timely response is vital for the success of the study. I would like to thank you in advance for your kind cooperation and dedication of your precious time to fill up and return back to me this questionnaire form.

Best Regards,

NardosGoferie

Email:nardosgoferie@gmail.com

SECTION 1: Respondents Demographic Profile

The following questions are about the respondent's profile in the organization. Kindly indicate the appropriate characteristics of the respondent profile using √

1. Age

   □ Below 18 years □18-25years □26-35years □36-45years □ 46years and above

2. Educational background

   □ Diploma and below □ Bachelor Degree □ Master's degree and above

3. Work experience

   □ Below 2 years □ 2-5 years □ 6-10 years □ Above 11 years

SECTION 2: Green supply chain management practices

The following questions are about the existence of Green Supply Chain Management Practices in your organization. Please indicate the level of your agreement or disagreement using **(√)** on the following statements based on your experience in your company on the following supply chain practices. (1=Strongly disagree, 2=Disagree 3=Neutral 4= Agree 5= Strongly agree)

Green supply chain management practices		**Scale**				
Code	**Green procurement practices**	**1**	**2**	**3**	**4**	**5**
Env.1	BGI Ethiopia considers the environmental impact of product to be procured by collaborating with its suppliers.					
	BGI Ethiopia provides design specification to suppliers that include environmental requirements for purchased item.					
	BGI Ethiopia assesses supplier's environmental management protocols in its procurement decisions.					
Soc.1	BGI Ethiopia involves local suppliers (raw material suppliers and employees) in its procurement to benefit the society.					
Econ. 1	BGI Ethiopia considers means of optimizing the total procurement cost to secure its economic objectives.					
	Green transportation practices	**1**	**2**	**3**	**4**	**5**
Envt.2	BGI Ethiopia considers reduction of energy consumption (fuel) to reduce carbon emission.					
Soc.2	BGI Ethiopia reasonably plan sales networks that would help to avail					

	their product on time to consumers.					
Econ. 2	BGI Ethiopia designs products in an easy way to deliver (designing packages that require less space in shipment) to reduce transportation cost.					
	Green manufacturing practices	**1**	**2**	**3**	**4**	**5**
Env.3	BGI Ethiopia's production adopts design, uses raw materials and converts into output with greater emphasis to environmental consideration.					
Soc.3	BGI Ethiopia's production process ensures how the local society benefits in its design, raw material, employment and wastage emission.					
Econ. 3	BGI Ethiopia adopts design, uses raw materials and converts into output by optimizing its total production cost.					
	Reverse Logistics practices	**1**	**2**	**3**	**4**	**5**
Env.4	In BGI Ethiopia there is safe disposal of unrecyclable or un re-usable waste (especially hazardous waste) to make environmental friendly.					
Soc.4	In BGI Ethiopia there is incentives to employees who collect sizeable amounts of recyclable materials for proper disposal or recovery of useful parts.					
Econ. 4	In BGI Ethiopia there is recycling and reselling(reuse) of waste materials to enhance the economic benefits of its reverse logistics practices of green supply chain management.					

SECTION 3: - Enablers and Challenges of Green Supply Chain management

The following questions are about enablers and challenges of green supply chain management practices implementation. Please indicate the enablers and challenges of supply chain management practices implementation faced at company level using **(√)** on the following statements. (1=Strongly disagree, 2=Disagree, 3=Neutral, 4= Agree, 5= Strongly agree)

i	**Enablers of Green Supply Chain management**	**1**	**2**	**3**	**4**	**5**
A	**Government incentives**	**1**	**2**	**3**	**4**	**5**
1	Government incentives enables the implementation of green supply chain					

	management at BGI Ethiopia.					
2	Subsidy polices of the government enable the implementation of green supply chain management at BGI Ethiopia.					
3	Reducing taxes in adoption of technology that would ensures the economics, societal and environmental benefits enable the implementation of green supply chain management at BGI Ethiopia.					
4	Governmental environmental regulations on the brewery industry enable the implementation of green supply chain management at BGI Ethiopia.					
B	**Collaboration with supplier**	**1**	**2**	**3**	**4**	**5**
4	Collaboration with supplier enables the implementation of green supply chain management at BGI Ethiopia.					
5	Suppliers commitment to the design requirement of BGI in terms of economic, social and environmental friendly specifications enables the implementation of green supply chain management at BGI Ethiopia.					
6	Suppliers adoptability to the green supply chain requirement of BGI enables the implementation of green supply chain management at BGI Ethiopia.					
7	Cooperation with customer for eco-design, green packaging enables the implementation of green supply chain management at BGI Ethiopia					
8	Cooperation with customers for using less energy during product transportation enables the implementation of green supply chain management at BGI Ethiopia					
9	Environmental partnership with suppliers enables the implementation of green supply chain management at BGI Ethiopia					
C	**Pressure from competitors**	**1**	**2**	**3**	**4**	**5**
10	Pressure from competitors enables the implementation of green supply chain management at BGI Ethiopia.					
11	Competitor's green supply chain strategies adaptation enables the implementation of green supply chain management at BGI Ethiopia.					
12	Competitor's improvement in technology adoption which satisfy the economic, social and environmental aspects of the business enables the implementation of green supply chain management at BGI Ethiopia.					
13	Competition among competitors enables the implementation of green					

	supply chain management at BGI Ethiopia.					
D	**Performance evaluation and rewarding system**	**1**	**2**	**3**	**4**	**5**
14	Performance evaluation and rewarding system in the organization enables the implementation of green supply chain management.					
15	Setting performance standards in the organization enables the implementation of green supply chain management.					
16	Setting specific goals related to green supply chain management practices (economic, social and environmental) in the organization enables the implementation of green supply chain management.					
17	Motivational acknowledgement and bonuses for the adoption of green supply chain management practices enables the implementation of green supply chain management.					
E	**Existence of sustainable supply chain management strategy**	**1**	**2**	**3**	**4**	**5**
18	Existence of sustainable supply chain management strategy enables the implementation of green supply chain management.					
19	Existence of social responsibilities enables the implementation of green supply chain management.					
20	Existence of environmental responsibilities enables the implementation of green supply chain management.					
21	Existence of economic responsibilities to reduce the total supply chain cost enables the implementation of green supply chain management at BGI Ethiopia.					
ii	**Challenges of Green Supply Chain management**	**1**	**2**	**3**	**4**	**5**
A	**Lack of top management support challenges**	**1**	**2**	**3**	**4**	**5**
21	Lack of top management support challenges the implementation of green supply chain management.					
22	Lack of organizational culture that would promote economic, social and environmental friendly business challenges the implementation of green supply chain management.					
23	Lack of empowerment to work for green supply chain management challenges the implementation of green supply chain management.					
B	**Lack of customer's collaboration challenges**	**1**	**2**	**3**	**4**	**5**
24	Lack of customer's collaboration to meet the design requirement of the					

	BGI's green supply chain management challenges the implementation of green supply chain management.					
25	Lack of customer awareness about green supply chain management challenges the implementation of green supply chain management.					
26	Customer's resistance to adopt green supply chain management practices challenges the implementation of green supply chain management.					
C	**Lack of awareness about environmental issues challenges**	**1**	**2**	**3**	**4**	**5**
27	Lack of awareness among employees about environmental issues challenges the implementation of green supply chain management.					
28	Lack of environmental education and training for employees challenges the implementation of green supply chain management at BGI Ethiopia.					
29	Lack of awareness regarding government regulation regarding GSCM challenges the implementation of green supply chain management at BGI Ethiopia.					
30	Lack of employee awareness about the economic, societal and environmental benefits of green supply chain management practices challenges its implementation.					
D	**Lack of technological advancement challenges**	**1**	**2**	**3**	**4**	**5**
31	Lack of technological advancement challenges the implementation of green supply chain management.					
32	Resistance to new technological adoption with low air pollution, sound pollution and water pollution challenges the implementation of green supply chain management.					
33	Lack of integration of new technology with green supply chain management challenges the implementation of green supply chain management at BGI Ethiopia.					
34	Lack of awareness about economic, social and environmental benefits of new technology adoption challenges the implementation of green supply chain management at BGI Ethiopia.					
35	Lack of technical expertise with the technologies adopted for green supply chain management challenges its implementation.					
E	**Lack of cross-departmental communication challenges**	**1**	**2**	**3**	**4**	**5**
36	Lack of cross-departmental communication challenges the implementation					

	of green supply chain management.					
37	Lack of employee trust and commitment in adoption of green supply chain management challenges its implementation.					
38	Lack of employee support, encouragement, and motivation to adopt green supply chain management challenges its implementation					

3) Considering the economic, social and environmental benefit of adopting green supply chain management practices what best practices does BGI Ethiopia adopted in terms of its procurement, transportation, manufacturing and reverse logistics _____

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4) If you have any comment

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Thank You!

Appendix B; Key InformantInterview

Interview Questions to BGI Ethiopia supply chain management, logistics and procurement department heads.

6. What are the green supply chain management practices being implemented (green

procurement, green transportation, green manufacturing and reverse logistics) at BGI Ethiopia?

7. To what extent the green supply chain management practices (green procurement, green transportation, green manufacturing and reverse logistics) are being implemented at BGI Ethiopia?
8. Which supply chain practice of the company is more green? Is it possible to make every supply chain management practices green?
9. What are the possible organizational benefits gained from the implementation?
10. Despite the external factors like governmental regulation and social responsibility what are the reasons for BGI Ethiopia implementing green supply chain practices?
11. What are the enablers of green supply chain management practices (green procurement, green transportation, green manufacturing and reverse logistics) implementation at BGI Ethiopia?
12. What are the challenges of green supply chain management practices (green procurement, green transportation, green manufacturing and reverse logistics) implementation at BGI Ethiopia?
13. Considering the economic, social and environmental benefit of adopting green supply chain management practices what best practices does BGI Ethiopia adopted in terms of its procurement, transportation, manufacturing and reverse logistics

Appendix C:- Sample of Green Procurement Criteria

Sample of Green Procurement Criteria				
Criteria (inclusions/exclusions)	Weight Given	Competitor-1	Competitor-2	Competitor-3

Cost of green products				
Compliance with applicable international and national environmental laws				
Experience in environmental products				
Efficiencies in performance of substantive requirement under prior contract				
Use of recognized eco-labels and/or evidences from third-party agencies				
Utilization of life cycle assessments methods and tools.				
Total Weight	100%			

Appendix D: - Hypothesis Testing for Enablers and Challenges

Enablers

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.430	.451		5.392	.000
	Gov.t Incentives	.401	.133	.464	3.010	.005

a. Dependent Variable: Overall GSC Practice

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.272	.392		5.796	.000
	Collaboration with Suppliers	.411	.106	.560	3.884	.000

a. Dependent Variable: Overall GSC Practice

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.181	.578		3.776	.001
	Pressure From Competitors	.400	.145	.434	2.766	.009

a. Dependent Variable: Overall GSC Practice

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.896	.572		3.313	.002

	Performance and Reward	.479	.145	.498	3.295	.002

a. Dependent Variable: Overall GSC Practice

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.446	.589		2.456	.019
	Sustainable Supply Chain Strategy	.581	.146	.568	3.969	.000

a. Dependent Variable: Overall GSC Practice

Challenges

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.149	.346		9.101	.000
	Lacking Top MgmtSupport	.165	.090	.305	1.837	.075

a. Dependent Variable: Overall GSC Practice

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.067	.463		6.630	.000
	Lacking Customer Collaboration	.180	.118	.257	1.530	.136

a. Dependent Variable: Overall GSC Practice

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.915	.436		6.685	.000
	Lacking_awareness_on _Env.t	.220	.111	.327	1.984	.056

a. Dependent Variable: Overall GSC Practice

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.016	.404		7.468	.000
	Lacking Technology	.200	.106	.313	1.894	.067

a. Dependent Variable: Overall GSC Practice

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.650	.462		7.894	.000
	Lacking Cross-departmental communication	.028	.117	.042	.240	.812

a. Dependent Variable: Overall GSC Practice