



**Barriers in Implementing Green Supply Chain Management in Manufacturing Industries:
A Case Study of Ethiopian Leather Industries.**

By; Mignot Dessalegn

Advisor; Dr. Shiferaw Mitiku

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of the Requirement for the Award of Masters of Arts Degree in Logistics and Supply Chain
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Addis Ababa, Ethiopia.

Signed Declaration

I declare that the thesis for the Master's degree at the university of Addis Ababa, here by submitted by me, is my original work and has not previously been submitted for a degree at this or any other university, and that all reference materials contained therein have been duly acknowledge.

Name: Mingot Dessalegn

Signature: -----

Advisor: Dr. Shiferaw Mitiku

Signature: -----

Addis Ababa University School of Commerce

Barriers to implement green supply chain management in manufacturing industries

BY: Mignot Dessalegn

Department of Logistics and Supply Chain Management

Advisor: Dr. Shiferaw Mitiku

Signature-----

Internal Examiner: Dr. Teklegiorgis

Signature -----

External Examiner: Dr. Tadiwos

Signature-----

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ABSTRACT

The leather Industry is one of the industries which have effect on the Environment especially if it is not managed properly. In Ethiopia the leather industry is one of the main exports earning and job creation. On the other hand, it has side effects to the environment, as tanneries do not want to include cost for environmental protection, because it increases their cost of production. This research paper assessed the barriers to implement green supply chain management, the study uses primary data sources, Survey questionnaires this research paper reveals there is awareness and technological gap according to the findings of this case study. The main barrier for implementation of green supply chain management are High cost of waste disposal and lack of alternate technology. Lack of technology has also greatest impact in implementation of green supply chain management. This research recommends strong supervision capacity, sufficient budget allocation for waste disposal and implementation of environmental standard and policies.

Key words: supply chain, green supply chain management

List of Acronyms

SCM; supply chain management

GSCM; green supply chain management

Chapter one

1.1 Introduction

Chapter one of the study contains background of the study, statement of the problem, research questions, objectives, significance, scope and limitation of the study.

1.2 Background of the Study

Along with the rapid change in global manufacturing scenario, environmental and social issues are becoming more important in managing any business. GSCM is an approach to improve performance of the process and products according to the requirements of the environmental regulations (HSU & HU, 2008). GSCM has emerged in the last few years and covers all phases of product's life cycle from design, production and distribution phases to the use of products by the end users and its disposal at the end of product's life cycle (Borade&Bansod,2007).

Green supply chain management is integrating environmental thinking (Gilbert,2000) in to supply chain management. So organizations need to focus on the utilization of energy and resources for making environmentally sound supply chain.

Today's business environment is characterized by increasing uncertainties. GSCM has emerged as important new approach for enterprises to achieve profit and market share objectives by reducing environmental risk and impact. In supply chains with multiple vendors, manufactures, distribution and retailers, whether regionally or globally dispersed, performance measurement is challenging because it is difficult to attribute performance results to one particular entity within the chain. Performance measurement in supply chain, and green supply chain is difficult for additional reason, especially when looking at numerous tiers within a supply chain, and green supply chain management performance measurement is virtually non-existent. With these barriers and difficulties in mind, GSCM is needed for a number of reasons, (including regulatory, marketing and competitiveness reasons). Overcoming these barriers is not a trivial issue, but

the long-term sustainability (environmental and otherwise) and competitiveness of organizations may rely on successful adoption of GSCM Sharman 2009.

The concept of supply chain emerged in the middle of 1980 & since has been widely used by academic experts & industrial practitioners & still in developing process. The SCM implementation in the manufacturing organization has active competitive advantage & strategic fit over other manufacturing organizations Hunegaw Abebaw (2015), leather industry and environmental challenges.

The traditional extended SCM may help in bringing out an effective flow of information in each organization but this alone will not be sufficiently building a good supply chain, Hunegaw Abebaw (2015), leather industry and environmental challenges. So the next concept of GSCM emerged to fulfill the environmental demands & makes the supply chain more environmentally effective. Hunegaw Abebaw (2015), leather industry and environmental challenges

The Government of the Federal Democratic Republic of Ethiopia (FDRE) has established a macro-economic policy and strategy framework. Sectoral development policies and strategies have been, or are currently being, formulated. Environmental sustainability is recognized in the constitution and in the national economic policy and strategy as a key prerequisite for lasting success. However, there is as yet no overall comprehensive formulation of cross-sectoral and sectoral issues into a policy framework on natural resources and the environment to harmonize these broad directions and guide the sustainable development, use and management of the natural resources and the environment. Therefore, given the current stage of the country's political and policy development, the time is opportune for developing a comprehensive environmental policy on natural resources and the environment. The overall policy goal is 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 {environmental policy of Ethiopia.}. Therefore, the research assesses identifies Ethiopia leather industry perspective issues drive for GSCM practices to help in form policy makers of current and future industry needs, Hunegaw Abebaw (2015), leather industry and environmental challenges.

1.3 statement of the problem

Today, environmental effects caused by the main problem that mankind faces every day, the traditional supply chain practiced in the industries in early 1990's, focuses on the cost reduction and improving of different flows within the organization but the environmental consideration is so the researchers and industries started to redefine the traditional supply chain by including the environmental factors in to the supply chain in the present globalized and competitive market the industries are pressurized to follow the environmental management, these pressures are derived from the internal and external sources in the organization (ZHU et al,2008). So the need interest of practicing is increased among the industries till to the end customer.

The concept of GSCM is relatively newer in Ethiopia. Recent literature found that there is still lack of researches study on GSCM adaptation and implementation based on Ethiopia context as a developing country, Hunegaw Abebaw (2015), leather industry and environmental challenges. Environmental concerns & environmental regulation have led to the demand of activities to increase environmental performance over all the industries including manufacturing sector. Among of many industries GSCM is particularly important in manufacturing sector considering that is one of main source of environmental problem, Hunegaw Abebaw (2015), leather industry and environmental challenges.

Supply chain management has become a critical factor of the organization success. In this regard a number of researchers attempt to find out variables that positively or negatively affecting the implementation of SCM and recently GSCM has been reciting the spot light in many studies. However, this research will identify the barriers to implement green supply chain management in manufacturing industries, Hunegaw Abebaw (2015), leather industry and environmental challenges.

1.4 Research questions

- What are the general conceptions of leather industries towards GSCM?
- What is the current status of leather industries in implementing GSCM?
- What are the barriers to the implementation of GSCM?

- Which barriers have the greatest and least impact on the implementation of GSCM?

1.5 Objectives of the study

1.5.1 General objective

- The main objective of the study is to identify barriers to implement green supply chain management in manufacturing industries.

1.5.2 Specific objectives

In view of the above fact, this research paper aims at the following specific objectives

- To determine the major barriers to the implementation of GSCM in the manufacturing industry.
- To identify the drives and barriers with greatest and least impact on the implementation of GSCM in the manufacturing industry and Which barriers have the greatest and least impact on the implementation of GSCM.
- To identify the current status of leather industries in implementing GSCM.
- To determine the general conception of leather industries towards GSCM.

1.6 Significance of the study

This study contributed to the academic and policy makers specifically by identifying the barriers to implement GSCM. The study also access Ethiopian manufacturing industries to better understand the challenge they meet during implementation of the GSCM concept. It will also enable Ethiopian manufacturing industries to get a clear picture of benefit and acquiring the concept of GSCM.

1.7 Scope and limitation of the study

Due to resource and time constraint the researcher select 28 manufacturing leather industries as the case of study. This manufacturing industry the researcher select is because tanneries have big production capacity in Ethiopia and there are complaints from its waste treatment with

environmental managements. Hence, it would be a good case study for problem raised in research.

1.8 Organization of the research report

This research paper is categorized in to five chapters. The first chapter is the introductory part which addresses background of the study, statement of the problem, objectives of the study, research model significance of the study and delimitation of the study. The second chapter deals with the review of related literature where theoretical and empirical evidences are to be explored from different publications in the area of customer attitude. The third chapter presents the research design and methodology which focuses on the type of research, target population, sample size, sampling techniques, sources and instruments of data collection, procedures of data collection and finally method of data analysis. The fourth chapter is about the results and discussion that is concerned with the summarization and interpretation of the research findings by triangulation with extensive literature review. Finally in chapter five, summary of findings, conclusions, recommendations and limitations of the study are to be discussed.

Chapter two

Related Literature Review

The literature review part contains conceptual frame of the study concerning the theoretical frameworks by which the overall research tasks guided. It also covers some empirical literature review which helps in getting practical experience that could be taken as lesson and use full in making future recommendations.

2.1. Conceptual framework of the study

This section covers important theoretical literature reviews related to the leather industry which includes, leather manufacturing process flow, sustainability and the tanning industry, pollution and human health, tannery wastewater characteristics and management schemes, cleaner technologies, industrial ecology and EIPs.

2.1.1. Leather manufacturing process flow

In primitive times man used animal skins to cover himself in order to protect him from the environment. Although skins were resistant and available they had some weaknesses: they were damp, they would decompose and when trying to avoid purification by drying they lost their mechanical properties such as flexibility and softness due to drying. Because of this, leather production became an important craft dated more than 3000 years old. This process of turning skin into leather product is called tanning (Favazzi.A, 2003). Tanning is a process where putrefaction is avoided while maintaining or enhancing the mechanical properties of being flexible and soft even when dry. Hides and skins gain durability and can be used in a wider range of products because of this process. These skins usually come from large and medium size mammals such as the ox, cow, calf, buffalo, sheep, goat, pig and horses; although marine animals and some reptiles are also processed.

Generally speaking leather processing is a technology that is composed of a series of step Operations that aim at isolating collagen by removing non-collagenous components of skin and then improving the material by making it more resistant to environmental and use factors (Favazzi, A., 2003). Processing hides and skins to convert them into leather has evolved through the years from a manual craft process into chemical intensive industrial process. According to Sharp (1983), it is composed of the following three main stages:- 1. Pre-tanning (also known as beam house operations): this consists of unit operations from skinning the animal and preparing the skin for transport by curing, to treating the skin prior to tanning (washing, liming treatment, unhairing, fleshing, de liming, bating and pickling). 2. Tanning (also known as tannery operations): Tanning through chemical or vegetable treatment of the skin. 3. Post-tanning (finishing operations): That consists of operations to obtain the finishing mechanical and esthetic characteristics usually containing steps such as splitting to gain uniformed thickness, washing residue from tanning process, pH neutralizing, dyeing, flattening, oiling, drying and rolling. These steps require many natural resources such as water, metals, and derived chemicals in order to achieve the desired quality. If better manufacturing practices and control systems are not in place the tanning process can become an important environmental issue. Because of its potential and the many companies that have poor manufacturing practices, the tanning industry has generally been identified as a source of pollution and described as a problematic industrial sector in terms of environmental performance. In Western countries this has been met by legislation that outline and delimit industrial environmental performance. According to the European Commission in order to remain competitive in the global market place, European leather producers must exploit more efficiently their raw materials and avoid wasting collagenous material (hides and skins) that constitutes valuable raw material for other industries and agriculture, as well as, have high adverse environmental and cost implications.

By-products should be either reused/recycled or converted into new, higher value Products (DG Enterprise and Industry, 2012). Therefore, the laws of the market have resulted uncompleted. First of all because these laws take into consideration only the monetary aspects, but neglect the non-monetary aspects so important for the quality of life. The resources to which we are not able to give a monetary value are the purity of the air, of the water and of the soil around us. How much is the price for a cubic meter of pure air we breathe? In order to solve these kinds of problems, there are some economical approaches to the sustainable development. The following approaches are suggested by Favazzi (2003).

A) The functionalist approach, here the laws of environment are treated as an aspect of development and are managed by the traditional laws of economy, production and consumption; B) The economy of environment, dedicating great attention to the environment pollution and to the management of natural resources; C) The economy of ecology, completely moving the perspective and saying that the salvation of humankind's economy is subordinated to the reconstruction of the economy of nature. In reality, it will not be practical to side to only to one of the above approaches, rather it is required to balance between economic growth and environmental issues, if the economy is not allowed to grow it would be difficult to protect and sustain the environment, vice versa, looking only fast growth would be disastrous to the wellbeing of the society and increases the cost of future generation.

2.1.3 Pollution and human health

According to Kanagaraj *et al.* (2006), the leather industry throughout the world has been identified closely with the generation of air, liquid and solid waste pollution. The tanneries generate huge amounts of liquid and solid wastes and emit obnoxious smell caused by the degradation of protein material of skin and generation of gases such as NH₃ and H₂S and CO₂. Chrome tanning is the most common type of tanning in the world and in Ethiopia. Chrome tanned leathers are considered of top handling quality, high hydro-thermal stability and excellent user properties. However, chrome waste from leather processing poses a significant disposal problem. It occurs in three forms: liquid waste, solid tanned waste and sludge. In most countries, regulations governing chrome discharge from tanneries are stringent.

Today, all tanneries in developed countries must thoroughly check their waste streams (UNIDO, 2000). Chrome discharge into those streams is one of the components that have to be strictly controlled. Inappropriate management of the tanning industry has detrimental effect on health and environment, i.e. untreated effluents can negatively influence water supply, found to be severely under stress by the effects of climate change. Excessive Chromium III uptake can cause health issues and skin rashes; exposure to Chromium VI can cause: skin rashes, upset stomachs and ulcers, respiratory problems, weakened immune systems, kidney and liver damage, Alteration of genetic material, lung cancer and death (UNIDO, 2000). Access to clean and sustainable food resources are essential for the preservation of one of the largest livestock populations in the world. Untreated waste generated from the tanning process can negatively influence the animal food supply; for example, anomalous chromium can cause respiratory

problems, a lower ability to fight disease, birth defects, infertility and tumor formation. It can damage the gills of fish; it can alter genetic materials and cause cancer (UNIDO, 2000).

2.1.4 Tannery waste water characteristics and management schemes

Metacalf and Eddy (2003) characterize waste water in terms of its physical, chemical and biological composition with the parameters all interrelated. Characteristics of wastewater generated from the tanning process in each production stage can respectively be seen for beam house process as, BOD, COD, salt, pesticides, flesh, hair, suspended solids, sulfate, ammonia, base, chloride for tanning process (chrome tanning) as, BOD, COD, salt, acid, chromium, suspended solids and for finishing process as BOD, COD, salt, chromium, oils (Metacalf and Eddy, 2003). A significant number of operations within a tannery are wet operations consuming large amounts of water, chemicals and energy and leading to large amounts of polluted water. Through “process integrated” measures a significant reduction of water consumption and pollution load can be achieved, however tanneries keep producing waste water requiring special treatment. In cases where the potential for “process integrated” measures has worn out, further pollution reduction has to be found in the improvement of end-of-pipe measures (Layman, 2002).

2.1.5 .Cleaner technologies

Confronted with increasing legal and social pressures, no tanner can afford the luxury of not being familiar with the main issues and principles of environmental protection pertaining to tannery operations. Obviously, pollution prevention, the persistent promotion of cleaner leather processing, which ultimately leads to lower treatment costs, remains the supreme priority (UNIDO, 2011).

By applying industrially proven low-waste advanced methods such as the use of salt-free preserved raw hides and skins, hair-save liming, low-ammonia or ammonia-free deliming and bating, advanced chrome management systems, etc., it is possible to decrease significantly the pollution load, namely: COD and BOD₅ by more than 30%, sulphides by 80-90%, ammonia nitrogen by 80%, total (Kjeldahl) nitrogen by 50%, chlorides by 70%, sulphates by 65%, and chromium by up to 90%. Yet, despite all preventive measures, there is still a considerable amount of pollution load to be dealt with by end-of-pipe methods (UNIDO,2011). The pressure to adopt cleaner technologies normally emanates from environmental imperatives such as the need to meet specific discharge norms, reduce treatment costs or comply with occupational

safety and health standards. The typical primary targets are: lower water consumption, improved uptake of chemicals, better quality/re-usability of solid waste, and reduced content of specific pollutants such as heavy metals and electrolytes. The spread of cleaner technologies and processes has been neither spontaneous nor extensive. For all the claims about favorable cost-benefit ratios and/or environmental benefits to be derived from many of these technologies, tanners are not quick in adopting them, be it due to inertia, higher costs or the limitations mentioned earlier (UNIDO, 2000). Due to variations in raw material, process, chemicals, water consumption, etc., it is small wonder that figures about pollution load in the literature vary a lot and should be interpreted very cautiously. Wastewater treatment is a multi-stage process to purify wastewater before it enters a body of natural water, or it is applied to the land, or it is reused. The goal is to reduce or remove organic matter, solids, nutrients, Cr and other pollutants since each receiving body of water can only receive certain amounts of pollutants without suffering degradation. Therefore, ETP must adhere to discharge standards limits usually promulgated by the relevant environmental authority as allowable levels of pollutants, for practical reasons expressed as BOD₅, COD, suspended solids (SS), Cr, total dissolved solids (TDS) and others. The three main categories of tannery wastewater, each one having very distinctive characteristics according to (UNIDO, 2011) are: **a) Effluents emanating from the beam-house** – liming, deliming/bating, water from fleshing and splitting machines; they contain sulphides, their pH is high, but they are chrome-free. **b) Effluents emanating from the tan yard (tanning and re-tanning, sammying)** – high Cr content, acidic. **c) Soaking and other general effluents, mainly from post-tanning operations (fat-liquoring, dyeing)** – low Cr content.

It is very important to segregate these streams and to pre-treat them separately according to their characteristics to avoid possible safety risks (formation of deadly hydrogen sulphide) and to reduce the cost of treatment and sludge disposal (to avoid contamination of sludge with Cr). The mixing of liming and tanning streams gives rise not only to the obnoxious smell typical of poorly managed tanneries; the resulting lethally poisonous gas, hydrogen sulphide (H₂S), is still by far the most frequent killer in tannery accidents, which occur mainly in inadequately ventilated spaces, especially in pits and channels. The volume and pollution load of sanitary wastewater in comparison with industrial wastewater is insignificant. Very arbitrarily and not quite consistently we speak of the following main phases of treatment (UNIDO, 2011):- **A. Physical-chemical treatment (primary)** The objective here is the removal of settle able organic

and inorganic solids by sedimentation, and the removal of materials that will float (scum) by skimming. Approximately 25-50% of the incoming biochemical oxygen demand (BOD₅), 50-70% of total suspended solids (SS), and 65% of the oil and grease are removed during primary treatment. The effluent and sludge from primary sedimentation are referred to as primary effluent and sludge. The wastewater is received in wastewater collection sump having arrangement of screen chamber and grit removal chamber. Screen chamber and grit chamber is provided for the removal of coarse grit, floating matter and any suspended large particles which can damage internal part of pumps and other rotating equipment (Metcalf and Eddy, 2003). From wastewater collection sump, wastewater is pumped using effluent feed pump to equalization tank. Before equalization tank, effluent is passed through oil and grease trap for the removal of floating and insoluble oil and grease particles. Oil and grease trap is a baffled wall channel where wastewater is subjected to up and down flow for the removal of floating particles at the top surface. Separated oil and grease layer is collected from the top layer by manual skimming operation through collecting troughs and drain pipe. From oil and grease trap effluent is collected in equalization tank. Equalization tank is provided to ensure the complete mixing of varying quality and quantity. Complete mixing is achieved by floating type submerged mixers.

B. Biological treatment (secondary) In most cases, secondary treatment follows primary treatment, its goal being the removal of biodegradable dissolved and colloidal organic matter using aerobic biological treatment processes. Aerobic biological treatment is carried out in the presence of oxygen by aerobic micro-organisms (principally bacteria) that metabolize the organic matter in the wastewater, thereby producing more micro-organisms and inorganic end products (principally CO₂, NH₃, and H₂O). Several aerobic biological processes are used for secondary treatment and the differences among them have to do primarily with the manner in which oxygen is supplied to the micro-organisms and with the rate at which organisms metabolize the organic matter (Metcalf and Eddy, 2003). Biological treatment is achieved by providing activated sludge process. In this treatment soluble BOD is stabilized by oxidation of organic matter by microorganisms. Nutrient and food is supplied to microorganisms for enhancing their growth. Oxygen required is provided by air blower through non-clog type membrane diffusers to achieve higher rate of oxygen transfer efficiency. Mixed liquor overflow from aeration tank is taken into secondary clarification process, for the separation of microorganisms under gravity. Bottom sludge from secondary clarifier is re-circulated back in

the aeration tank. Excess biomass is transferred into bio sludge tank. Clear overflow from secondary clarifier is transferred to the tertiary treatment (Metcalf and Eddy, 2003). ***C. Advanced (tertiary) treatment*** Tertiary or advanced wastewater treatment is employed to reduce residual COD load and/or when specific wastewater constituents are not removed by previous treatment stages. Tertiary treatment consists of chemical oxidation, pressure sand filter and activated carbon filter. Effluent from biological treatment is passed through chemical oxidation tanks, where Hydrogen Peroxide dosing is done. Mixing in chemical oxidation tank is provided with air agitation using separate air blowers. Effluent from chemical oxidation tank is collected in intermittent storage tank. From where effluent is further subjected to pressure sand filter and activated carbon filter. Suspended solids get removed in pressure sand filter and activated carbon filter provides treatment for removal of color and COD so that final treated wastewater meets the discharge norms. Backwashing of both the filters is done daily for cleaning of filter beds. The backwashed water is diverted back into wastewater collection sump for further treatment (Metcalf and Eddy, 2003).

2.1.6. Industrial ecology

Industrial ecology introduces the possibility to learn from natural ecosystems to design and engineer industrial systems to reduce the ecological impact of human activity to levels natural systems can sustain. In ecological systems the flow of materials is cyclic, the wastes are recycled and energy is cascading. On the contrary, industrial ecosystems often emphasize the throughput of materials. Ecological systems put emphasis on interaction and interdependence related to the stability of the systems. Industrial systems emphasize independence and competition. Biological analogy is useful in framing industrial ecology. However, the ultimate differences between ecological systems and human systems should be considered; e.g. biological systems evolve through biology and culture, human systems also through technology. Moreover, industrial systems are dependent on the resources and services provided by the biosphere (Jelinski et al.,). Industrial ecology takes a material and energy flow approach to human society; it does not regard society merely from the point of view of organizational and social monetary and production processes. Subsequently, materials, energy and information are flowing in ideal industrial systems the way they do in ecosystems. The use of energy and material is optimized and the generation of waste minimized. Wastes from one process can be used as raw materials in another (Frosch & Gallopoulos, 1989). Industrial ecology seeks strategies to increase efficiency

and reduce the impact of these flows. Industrial ecology takes a systems approach to flows. This is convenient as material and energy flows do not respect the general boundaries of regions, countries etc.; the flows can even be global. The contribution of industrial ecology to regular environmental management is that the analysis crosses borders of countries and goes beyond individual products. Industrial ecology can have a few approaches: it can concentrate on products and materials or it can have a regional industrial ecosystem approach (Korhonen, 2002). The first approach uses tools like material flow analysis including substance flow analysis, life cycle analysis and design for environment.

2.1.7. Eco-Industrial Parks

Eco-industrial parks pay attention to material and energy exchanges between companies in local and regional economies. It concentrates on closing the loop of materials and enhancing energy cascading in industrial areas. Close synonyms for eco-industrial Park are e.g. industrial ecosystem, industrial symbiosis, eco-industrial estate, eco industrial network, eco-industrial development, etc. Different concepts imply different objectives, operational characteristics and system boundaries. For example, „industrial ecosystems“ enhance the analogy to nature ecosystems, „industrial symbiosis“ gives attention to symbiotic and synergistic linkages between companies whereas „eco-industrial networking“ emphasizes cooperation and can sometimes be used as an umbrella term for a number of concepts. „Eco-industrial parks“ can also be seen as a form of symbiotic industrial relationships (Chertow, 2000). Eco-industrial parks can be best defined as a community in cooperation and interaction, efficiency in the use of natural resources and through its system view (Cote and Cohen-Rosenthal). The environmental impact is reduced at a regional level, not only separately in individual companies. Industrial symbiosis engages traditionally separate industries in a collective approach to a competitive advantage involving a physical exchange of materials, energy, water, and by-products (Chertow, 2000). New unexpected connections between diverse types of industries or even outside industrial production can occur in eco-industrial parks thanks to the physical proximity of the actors (Heeres et al, 2004). The EIP can be also defined as follows;

“An eco-industrial park is a community of manufacturing and service businesses located together on a common property. Member businesses seek enhanced environmental, economic, and social performance through collaboration in managing environmental and resource issues. By working together, the community of businesses seeks a collective benefit that is greater than the sum of

individual benefits each company would realize by only optimizing its individual performance. An eco-industrial park also looks for benefits for neighboring communities to assure that the net impact of its development is positive.” (Lowe, 2001)Eco-industrial parks aim at achieving economic, environmental and social benefits. Eco-industrial parks seek to increase business competitiveness. Reduced raw material, waste, energy and emission control costs reduce the costs of companies. Compared with more wasteful competitors, a higher environmental and business performance is a way of achieving cost competitiveness and business advantages. Consequently, seeking competitive advantages is one of the main reasons for companies to want to engage in eco-industrial park networking. Networking may provide companies with competitive advantages mainly by giving them access to critical resources and by allowing for cost savings and inter –organizational learning (Starlander ,2003). There are also benefits based on nonmaterial linkages like transportation networks, sharing offices and information, and security services (Chertow, 2000). Eco-industrial parks use resources effectively and are flexible actors in the market. Networks usually adapt flexibly to strain and change. They are organized to use information and resources optimally.

2.2.2 Environmental policy of Ethiopia

The Environmental Policy of Ethiopia was approved in 1997 and is the first key document that captured environmental sustainable development principles. The goal of the Environmental Policy of Ethiopia is 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 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 (EPA, 1997). For the effective implementation of the Environmental Policy of Ethiopia, the policy encourages creation of an organizational and institutional framework from federal to community levels. The Environmental Policy of Ethiopia provides a number of guiding principles that require adherence to principles of sustainable development; in particular, the need to ensure Environmental Impact Assessment. It considers impacts on human and natural environments, provides for early consideration of environmental impacts in projects and programs design, recognizes public consultation, includes mitigation and contingency plans, provides for auditing and monitoring; and is a legally binding requirement (EPA, 1997).

2.2.3. Ethiopia's climate resilient green economy strategy

To cope with the prevailing environmental problems such as land degradation and other climatic hazards (rainfall fluctuation, increasing temperature, flooding), and speed up its socioeconomic development, the Government of Ethiopia has initiated climate-resilient green economy as a development strategy in 2011. This development direction promotes environmental protection, reducing fossil fuel consumption which releases greenhouse gases into the atmosphere. With demand for energy growing with the increasing population, industrialization and urbanization, the Government realized that harnessing clean and renewable energy sources such as wind, solar, hydro and geothermal energy sources was critical. It has indicated that these natural resources would deliver electricity at virtually zero GHG emissions. The generated electricity is a fundamental enabler of modern economic development, from powering cities and fuelling industrial activity to pumping water for irrigation purposes in agriculture. The Government also decided to increase its income through exporting electric power generated from clean sources to neighboring countries (CREGS, 2012). Ethiopia has the ambition to develop along a green economic trajectory. It has consequently outlined a strategy to build this green economy. So far, it has identified and prioritized more than 60 initiatives that could help the country to achieve its economic development goals while at the same time limiting net GHG emissions in 2030 to below today's 150 Mt CO₂e – around 250 Mt CO₂e less than estimated for the current development path. Building a green economy will lead to further socio-economic benefits and allow Ethiopia to tap climate finance (CREGS, 2012).

2.2.4. Establishment of Environmental Protection Organs

Proclamation 295/2002 establishes the organizational requirements and identifies the need to establish a system that enables coordinated but different responsibilities of environmental protection agencies at federal and regional levels. The Proclamation indicates the duties of different administrative levels responsible for applying federal law. Depending on the decisions made, resources available and specific organizational situation in each Region, Regional States have devolved duties and responsibilities to woredas and kebeles. Participatory process of making the country's economy green and climate change resilient was initially planned to be undertaken under the ownership of the then EPA. However, such effort did not receive the necessary attention either at the federal or regional level thereby necessitating the establishment

of the new Ministry. AS a part of the effort to realize the government's Climate Resilient Green Economy strategy, the former EPA has been upgraded into MoEF in 2013.

2.2.5. Environmental Impact Assessment

The Federal Government has issued a Proclamation on Environmental Impact Assessment, (Proc, 299/2002) and the primary aim of this Proclamation is to make EIA mandatory for specified categories of activities undertaken either by the public or private sectors, and possibly, the extension of EIA to policies, plans and programmes in addition to projects.

The provisions of the proclamation include; projects will be subject to EIA and execution is subject to an environmental clearance from the former EPA or Regional Government Environmental Agency, as applies; EPA or the Regional Agency depending on the magnitude of expected impacts, may waive the requirement of an EIA; All other licensing agencies shall, prior to issuing of a license, ensure that either EPA or the regional Environmental Agency has authorized implementation of project; a licensing agency shall either suspend or cancel a license that has already been issued, in the case that EPA or the Regional environmental agency suspends or cancels the environmental authorization; and approval of an Environmental Impact Study Report (EISR) or the granting of authorization by the EPA (Proc, 299/2002).

2.2.6. Environmental Pollution Control

Proclamation No. 300/2002 on Environmental Pollution Control primarily aims to ensure the right of citizens to a healthy environment and to impose obligations to protect the environment of the country. The proclamation is based on the principle that each citizen has the right to have a healthy environment, as well as the obligation to protect the environment of the country. The law addresses the management of hazardous waste, municipal waste, the establishment of environmental quality standards for air, water and soil; and monitoring of pollution. The proclamation also addresses noise and vibration as one source of environmental pollution and it seeks for standards and limits for it providing for the maximum allowable noise level taking into account in the settlement patterns. In general, the Proclamation provides a basis from which the relevant environmental standards applicable to Ethiopia can be developed, while sanctioning violation of these standards as criminally punishable offences. Furthermore, it empowers the EPA and/or the Regional Environmental Authority to assign environmental inspectors with the duties and responsibilities of controlling environmental pollution. In order to ensure implementation of environmental standards and related requirements, inspectors belonging to the

EPA or the relevant regional environmental agency are empowered by the Proclamation to enter, without prior notice or court order, any land or premises at any time, at their discretion.

2.2.7 Solid Waste Management

Proclamation no.513/2007 aims to promote community participation in order to prevent adverse effects and enhance benefits resulting from solid waste.

It provides for preparation of solid waste management action plans by urban local governments. Therefore, Solid Waste Management Proclamation No. 513/2007 states (Article 5.1) that Urban Administrations shall ensure the participation of the lowest administrative levels and their respective local communities in designing and implementing their respective solid waste management plans. In Article 5.1 each Region or urban administration shall set its own schedule and, based on that, prepare its solid waste management plan and report of implementation. Further information on preparation and implementation of solid waste management plans may be obtained from the Regional Environmental Protection Authorities and federal EPA. Measures related to waste handling and disposal. According to this proclamation, any person shall collect waste in an especially designated place and in a manner, which does not affect the health of the society and no person shall dispose solid, liquid or any other waste in a manner which contaminate the environment or affects the health of the society.

2.2.8. Prevention of Industrial Pollution Regulation

As a follow up to Proclamation 300/2002, a regulation to prevent industrial pollution was developed by the Federal Environmental Protection Authority and endorsed by the Council of Ministers to ensure compatibility of industrial development with environmental conservation. This Regulation confers important obligations to industrial operators. A factory subject to the regulations is obliged to prevent or minimize the generation and release of pollutants to a level not exceeding the environmental standards. The regulation also obliges industrial operators to handle its equipment, inputs and products in a manner that prevents damage to the environment and to human health. Moreover, the regulations urge industrial operators to prepare and implement an emergency response system of their own. On the other hand, industrial operators are required to prepare and implement internal environmental monitoring systems and keep written records of the pollutants generated and the disposal mechanisms used to get rid of the pollutants. In relation to it, factories are required by the regulation to submit annual compliance reports with the provision of the regulations (**Regulation 159/2008**).

2.2.9 labor proclamation

The Labour Proclamation which was revised in 2003 provides the basic principles which govern labour conditions taking into account the political, economic and social policies of the Government, and in conformity with the international conventions and treaties to which Ethiopia is a party. The proclamation under its Part Seven, Chapter One, Article 92 of this proclamation deals with Occupational Safety, Health and Working Environment, Prevention Measures and Obligations of the Employers. Accordingly the Proclamation obliges the employer to take the necessary measure for adequate safeguarding of the workers in terms of their health and safety (Proclamation 377/2003). Moreover, the Occupation Health and Safety Directive (MOLSA, 2003) provides the limits for occupational exposure to working conditions that have adverse impacts on health and safety. Despite the above proclamation there is still considerable issue regarding to the relationship between employers and workers for issues such as wage, safety and other benefits. The former complains that this law opens window for inefficiency and tilted to the workers because they can make their case to the court. On other hand still employees have dissatisfaction on benefit package and other rights.

2.2.10. Public Health Proclamation

The Public Health Proclamation (200/2000) comprehensively addresses aspects of public health including among others, water quality control, waste handling and disposal, availability of toilet facilities, and the health permit and registration of different operations. The Proclamation prohibits the disposal of untreated solid or liquid hazardous wastes into water bodies or the environment that can affect human health.

2.2.11. Sectoral environmental policies

Sectoral policies have been prepared by various agencies. The Federal Water Resource Policy formulated by the former Ministry of Water Resources (nowadays restructured to be the Ministry of Water and Energy) advocates comprehensive and integrated water resource management. The overall goal of the policy is to enhance and promote all national efforts towards the efficient and optimum utilization of the available water resources for socio economic development on a sustainable basis.

2.2.12 Environmental guidelines and standards

During 2008 – 2010 EPA had prepared draft environmental standards for several industrial sector activities and ambient environmental qualities. During the same period, the EPA also

prepared several draft guidelines that includes the draft Guideline on Sustainable Industrial Zone/Estate Development. Few years back, the Environment Council, which is a higher body with a mandate to endorse guidelines, have selectively accepted the industrial environmental standards for twelve specified industrial sub-sectors. The accepted industrial emission standards include Tanning and leather finishing, Manufacturing and finishing of textiles, pharmaceutical manufacturing etc.(MoI,2012) In general starting from the constitution to different law Ethiopia in corporate useful environmental laws this is a positive step in applying the environmental policy and laws, however additional policy instruments and mechanisms are required to in force the above law. Sectoral approaches should be used to study the binding constraints in implementing Environmental policy, laws and standards. There are serious weaknesses in the use of the strategy of environmental policy integration in industrial sector especially the tanning area as a tool for the promotion of sustainable development (Baker, 2006). For example issue of implementation of environmental standard for tanning industry is quite different for food industries, i.e. Sector specific strategies should be designed to make environmental policy practical. In addition laws which motivate enterprises in the form of tax or cost sharing shall and other innovative tools should be formulated to address the cost of using ETP and installations for keeping the environment clear.

As cited by Zeleke (2011), Gashaw (2007) tried to pinpoint that, tanneries should select key strategy to maintain achievement and enhance its performance that extends beyond compliance in promoting EMS in general in tanning process, transfer technological and eco-friendly management practice. According to him, the tanneries development path way should comply with five pillars of sustainable development: ecologically protective, socially acceptable, economically productive and environmentally just and efficient.

2.3 THEORETICAL BACKGROUNDS

2.3.1 Supply Chain Management

In the present competitive world the relationships with supplier and customer plays a significant role in a company's growth. Generally, the companies seek benefits for both themselves and their clients; these benefits can be achieved by a formalized process known as Supply chain. According to Somoygi et al (2009) Supply chain includes managing supply and demand, purchasing raw materials and spare parts, manufacturing and assembling, warehousing and inventory managing, order entry and management, distribution and logistics across all channels and

finally delivery to the customer. Supply chain management can be defined as the integration of all these activities into a seamless and formalized process (Somoygi et al, 2009). Initially the supply chain was introduced to integrate the key business process, from supplier to the end user, where the information on the process adds value for the consumers.

According to Wallerius and Zakrisson (2010) in recent years the demands and conditions of supply chain have been changed according to the manufacturing and distributing companies. The core competencies are kept with the manufacturing firm itself and most of the other processes are outsourced in large extent, so this increases the demand of supply chain and management within the firm. Mentzer et al (2001) defined supply chain as a —set of three or more entities (organizations or individuals) directly involved in the upstream and downstream of products, services, finances and information from a source to a customer.

The supply chain can be identified by three different complexities —a traditional supply chain, an extended supply chain and an ultimate supply chain.

The traditional supply chain can be defined as the flow of upstream and downstream between supplier, manufacturer and customer (Mentzer et al, 2001). According to Beamon (1999) traditional supply chain is an integrated manufacturing process where the raw materials are turned into a final product and then delivered to the customer. The extended supply chain defined by Mentzer et al (2001) is the supply chain which includes suppliers of the immediate supplier and customers of the immediate customer with upstream and downstream flows of products, finances and information. Extended supply chain proposed by Beamon, (1999) can be defined as the process of strictly considering the environmental aspects into the manufacturing process from the purchasing of raw materials, to the products manufactured, to the final disposal of the products.

According to Mentzer et al, (2001) Ultimate supply chain can be stated as the upstream and downstream flows of all the organizational process from the ultimate supplier to the ultimate customer. The results of adopting traditional or extended SCM may help in bringing out an effective flow of information in each organization but these alone will not be sufficient to build a good supply chain. The concept of lean and waste management may come under SCM but this alone cannot reduce the environmental effects made by the supply chain, so the new concept of Green Supply Chain Management emerges to fulfill the environmental demands and make the supply chain more environmentally effective.

2.3.2 Green Supply Chain Management: An Overview

Today, environmental effects caused by the industries is the main problem that mankind faces every day. The traditional supply chain practiced in the industries in early 1990's, focuses on the cost reduction and improving of different flows within the organization but the environmental consideration is ignored (Srivastva 2007). So the researchers and industries started to redefine the traditional supply chain by including the environmental factors in to the supply chain and also making the industries economically profitable by using this extended supply chain. In the present globalized and competitive market the industries are pressurized to follow the environmental management, these pressures are derived from the internal and external sources in the organization (Zhu et al, 2008). So the need of interest of practicing is increased among the industries till to the end customer. According to Srivastva (2007) Green Supply Chain Management has its roots from Green management and supply chain management. Srivastva(2007) defined Green supply chain management as integrating environmental thinking into supplychain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product after its useful life. This indicates that the environmental aspects are considered in every process of the product life cycle. Johansson and Winroth (2009) stated that Green supply chain aims for continuous improvements of industrial processes and products to reduce or prevent pollution to air, water and land. They also suggested that by these improvements, there is possibility of minimizing risks to humans and other species. There are some challenges that has been pointed out by Richards (1994) in associating with the Green manufacturing which are meeting the customer demands for environmentally sound products, development of recycling schemes, minimizing the materials use, and selecting the materials causing low environmental impacts. Adding the concept of green to the supply chain invokes the consideration of natural environment in to the process. Similar to the supply chain, the green supply chain has its boundary and scope ranging from green procurement to integrated green supply chain to green distribution flowing from supplier to manufacturer to customer. Zhu and Sarkis (2004) even included the concept Reverse Logistics (RL) in to the Green Supply Chain Management. Green Supply Chain Management is a broad term in which all the industries work with their suppliers and customers to improve their environmental performance. These

environmental performances can be practiced by different focuses (Green Business Network, 2001).

- Focus on reducing or eliminating the excess materials used in the manufacturing processes or products.
- Focus on the supplier's environmental compliance status during the operations.
- Joint venture for developing the new materials, products and solutions for environmental issues.
- Requiring suppliers to implement and possibly certify environmental management systems.
- Educating the suppliers regarding the material use, prevention of pollution and tools of interest to the customer company.
- Refining the suppliers would help in developing new materials, parts and processes with environmental concern.
- Auditing suppliers' compliance status.

2.3.3 Motives for green supply chain management

The Green supply chain is emerged as a response for long term trends in manufacturing industries. In the early 20th century the manufacturing industries are characterized by consolidation of vertical integration i.e. the major components for the product is manufactured and assembled within the industry. In the later part of the 20th century it is characterized by outsourcing functions were the industries made to be more dependent on their suppliers for good and needed quality, promptly delivery of goods and to make the product in competitive prices. So the supplier's environmental impact can affect the any of those elements, so it is demanded that the suppliers should practice the green supply chain to help the organization to overcome the environmental challenges (Green Business Network, 2001). The green supply chain can be practiced in organization through several internal and external drivers. New Zealand Business Council for Sustainable Development (NZBCSD) as described in their practical guide for Business Guide to a Sustainable supply chain (2003) is that the supply chain is mainly focused on three areas as central:

- Improving the performance of business's own operations.

- Ensuring that the goods and services provided by suppliers are sustainable and working with the suppliers increases the efficiency and competitiveness.
- Working effectively with customers and sales channel to design sustainable products and services.

On against the backdrop of these general trends the companies mainly rely on the motivation factors which are classified as internal and external motivations. The primary motivations explained in the Green Business Network (2001) are risk management, regulatory stance, enhanced brand image, international purchasing restrictions and customer pressure.

1, Primary motivations

A: Internal motivations and possible effects

- **Risk management:** supply interruption, long term risk to human and environment, competitive disadvantage.
- **Regulatory stance:** desire to go beyond compliance, suppliers knowingly or unknowingly provide problematic substance, supplier noncompliance poses production risk

B: external motivations and possible effects

- **Enhanced brand image:** corporate culture of forecasting trends and moving proactively, Potential for harm to public image for environmental concern
- **International purchasing restrictions:** eco labeling and product take back gaining momentum, may drive the creation of system for collection, frequently focused on high profile brands transport and disassembly or recycling.
- **Customer pressure:** often appear in conjunction with a threat to brand image, regularly focusing on high profile brands.

2, secondary motivations

A: Internal motivations and possible effects

- Cost reduction as suppliers apply pollution prevention
- Enhanced quality

B: increased innovation: can result from supplier participation in new product development.

2.3.4 Environmental and Economic Benefits of Green Supply Chain Management

The major researches have been preceded in the areas of initiating green supply chain and their implementation. The study on environmental performance and their benefits were done by several authors. According to the study performed by Lefebvre et al. (2000) on the SME's in Canada by implementing green strategies into the organization can help in improving organizational innovativeness i.e. product, process and managerial innovation can be improved and also the organizational competitiveness (cost containment, liability management and export performance) can be developed. Zhu et al. (2007) mentioned that environmental management systems such as GSCM as positive relationship on the organizational economic performance.

According to a study performed by Sangwan K.S (2011) the benefits are classified into two types: quantitative and qualitative benefits of green manufacturing. A survey study was conducted on these benefits: initially Sangwan K.S (2011) differentiated these benefits as qualitative and quantitative.

Qualitative benefits: improved working condition, better organization in public, improved staff morale, enhanced customer loyalty/satisfaction, establishing or improving brand value, lowered regulatory concerns, increased market opportunities, improved product performance, decreased liabilities.

The benefits mentioned above or derivative results from several works. Sangwan K. S (2011) classified different quantitative benefits such as: **Quantitative benefits(waste related):** reduced waste handling cost, lowered waste categorization cost, reduced waste treatment cost, reduced waste disposal cost, and reduced waste storage cost. **Quantitative benefits(life cycle related):** lowered transportation cost, decreased packaging cost, lowered cost of production, low maintenance cost, reduced overall cost of organization.

The reliability and validity analysis performed by Sangwan K. S (2011) using SPSS statistical tool, clearly identifies that the benefits mentioned above are highly reliable and valid for the Small Scale Enterprises in India. So it clearly states that by implementing/practicing Green supply chain these benefits can be achieved.

2.3.5 Green Supply Chain Management throughout the Product Life Cycle

According to Wang et al, (2003) Green supply chain is an effective way for manufacturers to manage the environmental strategies. The basic principle of Green supply chain management is to incorporate the concept of green into their product life cycle. Designing a supply chain concurrently with the product is a supply chain best practice and the supply chain would be made more eco friendly by implementing the concept of green in each process of their supply chain. Srivastva (2007) has classified the Green supply chain management in three broad categories which are green design, green operations and green manufacturing.

2.3.6 Barriers to GSCM implementation

Barriers to GSCM implementation in SCM are different from those of larger enterprises in many ways including generation of less environmental data, fewer resources less environmental expertise/experience, technical, financial, time) environmental performance being driven by personal views of business owners no common access points and different in organizational structure. The special challenges that hinder SCM from taking up GSCM Many studies confirm that adoption of GSCM in SCM is unhurried mention that organizations fail to adopt environmental initiatives due to internal factors including sunk costs, improper communication structures, internal politics and institutional norms. *Hillary (2000)* has classified internal and external barriers to implementation of environmental initiatives in SCM. *Kogg (2003)* pointed out that lack of influence is an important barriers to implementing GSCM practices in industries similarly, *Luken and Stares(2005)* found significant road blocks among small and medium enterprise suppliers to provide green materials then, (Porter and Karmer) (2016) mentioned that sometimes green products customers might switch over to other normal products, resulting in a negative motivation for new firms to engage in GSCM practices. Later, in 2009 then and *Muller* investigated the states also of GSCM implementation in the green automotive industry from a practitioner's point of view. It is evident from literature that both academicians and practitioners are fully aware and are interested in analyzing barriers to GSCM adoption (Zhu and Zarkis, 2006; walker *et al*, 2008. Diabat and Govindan 2011).min between 1995 and December 31,2010 of these sigartries, and specifically from an Indian context. Some Indian GSCM studies are Jumma raised here. *Mudgalet et al (2010)* investigated and ranked barriers against GSCM adoption based on an exhaustive questionnaire from more than 100 industries in different sectors by using interpretative structural modeling (ISM). Even with so many barriers against GSCM implementation, recent years have witnessed large changes.The GSCM barriers which need to be

removed for GSCM adoption similar studies were conducted on industries in china and Malaysia {wooi and Zailani 2010; zhu et al, 2007} but different industries have different opinions about the pressure or barriers against GSCM implementation' every country has its own environmental policies and environmental regulations (Mathiyazhaganet *al'*). Regulations and policies vary depending on people's culture, and the polices of that country. Similarly, Indian industries also have different opinion about barriers against GSCM adoption (Luthra et al, 2011, Diabat and Govindan, 2011, mudgalet *al*, 21010) Mudgalet *al*, 2010} and Math Iyazhaganet *al* found that various automotive industries had had differing judgments about barriers to GSCM adoption.Hence, it is clear that globally, not all industries share similar opinions, so this study is essential of essential barriers against GSCM implementation.

2.3.7 Activities in Green supply Chain Management

Ninlawan et al (2010) had done a study on Green implementation on electronics industrieswhere he proposed activities of Green supply chain management. These activitiescompromises all the process in green supply chain starting from green procurement to greenmanufacturing to green distribution till recycle and waste management of the product. The manufacturers presented their findings of Green manufacturing activities in different aspects(Ninlawn, et al., 2010)

Chapter Three

Methodology of the Study

3.1. Introduction

This chapter focuses on the methodology which is used to study the research objective. Here, the research designs, target population, sampling design, data collection and analysis will be discussed.

3.2 Research approach

In this research there are two primary approaches to conduct a research project and generate knowledge. They are quantitative and qualitative methods. Each of these has its own strengths and weakness. Multiple research method bridge the gap and makes use of the quantitative and qualitative. Qualitative method is based on the interpretation of researcher and often depends on words and descriptions to create a deeper understanding of a specific area interviews and observations are example of qualitative analysis while the quantitative method is based on numerical and statistical data, and is a convenient approach to manage a large amount of data which can be measured in a numerical way. The goal of qualitative approach is to answer question or test hypothesis.

3.3 Description of the study area

This research focuses on manufacturing industries specifically on leather industries in Ethiopia.

3.4 Research design

To empirically explore the driver and barriers in the implementation of GSCM, the researcher adopt a basic qualitative research strategy. Basic research is particularly applied when the basic research is driven by curiosity and a desire to expand existing knowledge. It is the most adequate research method for this research as it is directed solely towards acquiring new knowledge. In this research, an explorative study is conducted on 28 organizations using questionnaire developed by the researcher. According to green supply chain practice in Ethiopian tannery industry, ZelalemTadesse (2015), all of the leather industries in Ethiopia have the same considerable size with the smallest soaking capacity of 3000 skins per day (with one shift).

3.5 Population of the study

In this research, the population consisted of all leather manufacturing firms that are situated currently. Since the number of tanning companies in Ethiopia have increased to 31 in 2014 (ELI ,2014) 31 manufacturing firms are the population of this research.

3.6 Sample size

There are several approaches to determine the sample size. These include using a census for small populations, imitating a sample size of similar studies, using published tables and applying formulas to calculate a sample size. Among all these alternatives, this study prefers the formula derived by Yamane (1967). From a total of 31 population a sample of 28 using the below shown formula is drawn from the total population.

$$n = \frac{N}{1 + N(e)^2}$$

Where n = sample size, N= population size, e= level of precision given that 95% confidence level and P = ±5% are assumed.

From the 28 manufacturing companies the researcher considered 58 respondents which is 2 respondents from each. The respondents are general managers and production or supply chain managers. The questionnaires are gathered by the researcher and via direct contact and through email.

3.7 Data analysis

Quantitative techniques is used to analyze the data which is going to collect. The researcher will made use of the statistical measure of central tendency such as mean, median, and standard deviation to analyze the objective of the study which is going to determine the effects of implementing green supply chain management among leather manufacturing firms.

3.8 Ethical considerations

The researcher provide clarity and assure that participation would be treating anonymous and that all information they convey would be treat as confidential. Some information will be provided to the participants verbally before each question.

Chapter four

4.1 Introduction

This chapter focuses on the data analysis and interpretation part of the study.

4.2 Data analysis

Among the 58 questionnaires 40 were filled and returned to the researcher. Here the collected data is analyzed as follows.

Table 4.1 sex of the respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	31	73.8	77.5	77.5
	female	9	21.4	22.5	100.0
	Total	40	95.2	100.0	
Missing	System	2	4.8		
Total		42	100.0		

Source: own survey, 2017

As shown in the above table the majority of the respondents which was 31 (73.8%) of them were male, the rest 9 (21.4%) of them were females. This implies that there are few general and production managers in the industry.

Table 4.2 age of respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-25	7	16.7	17.5	17.5
	26-35	10	23.8	25.0	42.5
	36-45	21	50.0	52.5	95.0
	46-55	2	4.8	5.0	100.0

Total	40	95.2	100.0
Missing System	2	4.8	
Total	42	100.0	

Source: own survey, 2017

As shown in the above table 50% (21 respondents) are in the age between 36-45, 23.8 % (10 respondents) are between 26-35, 16.7% (7 respondents) are between the ages of 18-25.

Table 4.3 level of education

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid degree	35	83.3	87.5	87.5
masters	4	9.5	10.0	97.5
PHD	1	2.4	2.5	100.0
Total	40	95.2	100.0	
Missing System	2	4.8		
Total	42	100.0		

Source: own survey, 2017

35 respondents are degree holders which constitute 83.3% of the total respondents, 4 respondents (9.5%) have masters' degree and the other 1 respondent (2.4%) is PHD holder. Which indicate only few general and production managers are highly educated.

Table 4.4 years of experience

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 0-5 years	7	16.7	17.5	17.5
6-10 years	17	40.5	42.5	60.0
11-15 years	12	28.6	30.0	90.0
16-20 years	4	9.5	10.0	100.0

Total	40	95.2	100.0
Missing System	2	4.8	
Total	42	100.0	

Source: own survey, 2017

As it is showed in the table 40.5 % (17 respondents) have 6-10 years of experience, 12 (28.6%) of the respondents have 11-15 years of experience, 7 respondents (16.7 %) have 0-5 years' experience, and the rest 4 (9.5%) respondents have 16-20 years of experience.

Table 4.5 Does the company use green supply chain management?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid -88	7	16.7	17.5	17.5
Yes	27	64.3	67.5	85.0
No	6	14.3	15.0	100.0
Total	40	95.2	100.0	
Missing System	2	4.8		
Total	42	100.0		

27 (64.3%) of respondents reply that their company use green supply chain management, 14.3% (6 respondents) reply that their company doesn't use green supply chain management.

Table 4.6 What is your level of awareness and knowledge about the concept of green supply chain management?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid -88	4	9.5	10.0	10.0
Low	2	4.8	5.0	15.0
medium	19	45.2	47.5	62.5
High	13	31.0	32.5	95.0

	very high	2	4.8	5.0	100.0
	Total	40	95.2	100.0	
Missing	System	2	4.8		
Total		42	100.0		

Source: own survey, 2017

Among the respondents 45.2% (19 respondents) have medium awareness and knowledge about the concept of green supply chain management. 13 respondents (31%) are highly aware of the concept of green supply chain management, 2 respondents (4.8%) have very high awareness about the concept of green supply chain management, and the other 2 respondents (4.8%) have low awareness about the green supply chain concept.

Table 4.7 Do you understand the concept of GSC?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	-88	2	4.8	5.0	5.0
	yes	36	85.7	90.0	95.0
	no	2	4.8	5.0	100.0
	Total	40	95.2	100.0	
Missing	System	2	4.8		
Total		42	100.0		

Source: own survey, 2017

85.7% (36 respondents) understand the concept of green supply chain, 4.8% (2 respondents) doesn't understand the concept of green supply chain.

Table 4.8 Which of these obstacles you consider as most important while implementing GSC?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	-88	1	2.4	2.5	2.5
	lack of information	1	2.4	2.5	5.0
	high cost	14	33.3	35.0	40.0
	lack of alternate technology	20	47.6	50.0	90.0
	government support	4	9.5	10.0	100.0
	Total	40	95.2	100.0	
Missing	System	2	4.8		
Total		42	100.0		

Source: own survey, 2017

20 (47.6% of the respondents) consider lack of alternate technology as the most obstacle while implementing green supply chain, 14 respondents (33.3%) consider high cost as the obstacle to implement green supply chain, 1 respondent (2.4%) consider lack of information as the obstacle while implementing green supply chain.

Table 4.9 associate over production with product supply chain

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	very unimportant	3	7.1	7.5	7.5
	unimportant	11	26.2	27.5	35.0
	neutral	13	31.0	32.5	67.5
	important	9	21.4	22.5	90.0
	more important	4	9.5	10.0	100.0
	Total	40	95.2	100.0	
Missing	System	2	4.8		
Total		42	100.0		

Source: own survey, 2017

11 respondents (26.2 %) respond that among the waste parameters over production is unimportant when associated with product supply chain, 13 respondents (31%) are neutral about the association between over production and product supply chain, 9 respondents (21.4%) consider over production important associated with product supply chain, 3 respondents (7.1%) consider over production as very important associated which product supply chain and the other 4 respondents (9.5%) consider over production as more important waste parameter associated with product supply chain.

Table 4.10 associate delay with product supply chain

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	-88	1	2.4	2.5	2.5
	very unimportant	5	11.9	12.5	15.0
	unimportant	3	7.1	7.5	22.5
	Neutral	11	26.2	27.5	50.0
	Important	15	35.7	37.5	87.5
	more important	5	11.9	12.5	100.0
	Total	40	95.2	100.0	
Missing	System	2	4.8		
Total		42	100.0		

Source: own survey, 2017

15 respondents (35.7 %) respond that among the waste parameters delay is important when associated with product supply chain, 11 respondents (26.2%) are neutral about the association between delay and product supply chain, 5 respondents (11.9%) consider delay more important associated with product supply chain, 5 respondents (11.9%) consider delay as very un-important associated which product supply chain and the other 3 respondents (7.1%) consider delay as un important waste parameter associated with product supply chain.

Table 4.11 associate inventory with product supply chain

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	very unimportant	17	40.5	42.5	42.5
	unimportant	2	4.8	5.0	47.5
	neutral	11	26.2	27.5	75.0
	important	8	19.0	20.0	95.0
	more important	2	4.8	5.0	100.0
	Total	40	95.2	100.0	
Missing	System	2	4.8		
Total		42	100.0		

Source: own survey, 2017

17 respondents (40.5 %) respond that among the waste parameters inventory is very important when associated with product supply chain, 11 respondents (26.2%) are neutral about the association between inventory and product supply chain, 8 respondents (19%) consider inventory important associated with product supply chain, 2 respondents (4.8%) consider inventory as very un-important associated which product supply chain and the other 2 respondents (4.8%) consider inventory as more important waste parameter associated with product supply chain.

Table 4.12 Associate space with product supply chain

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	-88	1	2.4	2.5	2.5
	very unimportant	3	7.1	7.5	10.0
	unimportant	9	21.4	22.5	32.5

	neutral	20	47.6	50.0	82.5
	important	5	11.9	12.5	95.0
	more important	2	4.8	5.0	100.0
	Total	40	95.2	100.0	
Missing	System	2	4.8		
Total		42	100.0		

Source: own survey, 2017

9 respondents (21.4 %) respond that among the waste is parameters space un important when associated with product supply chain, 20 respondents (47.6%) are neutral about the association between space and product supply chain, 5 respondents (11.9%) consider space important associated with product supply chain, 3 respondents (7.1%) consider space as very un-important associated which product supply chain and the other 2 respondents (4.8%) consider space as more important waste parameter associated with product supply chain.

Analysis for part three questions

Most of the respondents consider chemical and water pollutants like Biochemical Oxygen (BOD), Chemical Oxygen (COD), total dissolved solids (TDS) and solid pollutants like fleshing-fat containing organic matter, hair, and lime as the major waste of their company concerned with the environment.

The respondents also dispose their waste directly to the environment in the form of liquid, solid and gas.

Most respondents consider the production area as most barrier in the organization since most of the wastes are produced during producing those leather products.

Chapter five

5.1 Introduction

This chapter provides the summary of the major findings of the study; it draws conclusions and forwards recommendations by the researcher in relation to the basic research questions of the study.

5.2 Summary of findings

The objective of this study was to identify the barriers to implement green supply chain management in manufacturing industry specifically leather industries in Ethiopia. After the data interpretation and analysis the following major findings were obtained.

- From this study it is found that most of the managers consider lack of technology as the major obstacle for the implementation of green supply chain management.
- Waste discharge of the leather industry is affecting human and animal health since it is directly disposed to the environment.
- Since most of the industries focus on their level of production less attention is given to the environment.
- High cost of waste disposal and lack of alternate technology to manage those wastes is the major barrier in implementation of green supply chain management.

5.3 Conclusion

After the Data interpretation and analysis from the previous chapter and the main findings from the following points are derived as the conclusions of this study.

- The managers have the understanding of environmental issues however they are in delinquent situation regarding to the environmental sustainability with economic growth, there have been tilted approach to the economic benefit rather than environmental issues because of the strong desire to economic growth.
- Since they incur a lot cost of production they do not want to bear additional cost to environment.
- Lack of alternate technology has greatest impact on the implementation of green supply chain management in manufacturing industries.

5.4 Recommendation

The following recommendations are made by the researchers for those who are involved different activities relation to the research topic of this study.

- Training should be given on the environmental protection and workers safety.
- To implement environmental standards and policies to tanneries, the supervision capacity should be strengthened; sufficient budget should be allocated to it. All in all, institutional capacity building task and effective coordination mechanism should be given emphasis.
- There are different constrains which makes Ethiopian leather industries less competitive in the international market. Hence, the government should apply more measures which help to decrease their production and logistics costs, also support should be provided in marketing. This will incentivize to apply environmental standards and guide lines.

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Appendix

Addis Ababa University School of Commerce

Master of Art in Logistics and Supply Chain Management

Questionnaires on “Barriers to Implement Green Supply Chain Management in Manufacturing Industries”

Dear respondents,

The main purpose of this questionnaire is to identify the barriers to implement green supply chain management in manufacturing industries. Based on the response by you the researcher will provide the findings and recommendation to the responsible body. So that, they may take actions for improvement.

So you are kindly requested to answer all the questions honestly, the researcher assure you that the information you provide will be confidential.

Thank you!

N.B put tick marks for your response in the box or write on the blank space that you think would be the right option of yours.

Part One: General information

1 Gender

Male

Female

2 Age 18-25

36-45 56 and above

26-35

46-55

3 level of education

Diploma

Masters

Degree

PhD

4 years of experience

0-5 years 11-15 years 21 years and above
 6-10 years 16-20 years

Part two: to assess the level of green supply chain management implementation in manufacturing industries

- Does the company use green supply chain management?
 Yes No
- What is your level of awareness and knowledge about the concept of green supply chain management?
 Very low low medium high very high
- Do you understand the concept of GSC?
 Yes No

Part three: To identify the barriers in implementing green supply chain management.

- Which of these obstacles you consider as most important while implementing GSC?
 Lack of information
 High cost
 Lack of alternate technology
 Lack of government support

If it is other could you explain about it? -----

- Which of these waste parameters do you associate with product supply chain? Rank them in order of importance where 1 being very unimportant and 5 being more important?

Factor	1	2	3	4	5

Over production					
Delay/wasting time					
Inventory					
Space					

3. What are the major wastes of your company in concern with environment?

4. How do you dispose these wastes from your company?

5. Does your company consider ergonomic parameters and other safety parameters for improving GSC?

Part four: To implement green supply chain management to the manufacturing industry

1. What is the company green supply chain strategy?

2. What are the supply chain areas that are considered as barriers in the organization?

3. Please write any additional points to be considered in this study.

Thank you!