Chapter 1
Introduction

The inception of Green Supply Chain Management (GSCM), conceptually taken its roots during the Industrial Revolution. However lately it came to the forefront with increased sensitivities of the nations & society towards mitigation of the industrial or other waste’s malefic effects on environment. As the concept of Supply Chain Management (SCM) gained attention making manufacturing firms integrated with suppliers & customers through various supply & distribution logistics networks in order to ship products to customers with competitive advantage, the environmental concerns led the companies to incorporate mechanisms regarding disposal, recovery, recycling & reuse of material/energy waste generated within the ambit of supply chain infrastructure [1].

However, the aim of supply chain management in the 20th century i.e. waste minimization for economic considerations the 21st century approach took environmental issues predominantly [2, 3].

The Green Supply Chain Management (GSCM) defined as “integrating environmental concerns into the inter-organizational practices of SCM including reverse logistics” There are nine Based on the principle of GSCM: complexity, ecological Modernization, information, institutional, resource-based view, Resource dependency, social networks, stakeholder, and transaction costs Economics. They form the basis for GSCM implementation & provides insights for research extensions GSCM [162].

Sustainability refers to integration of environment, society etc to operations of the firm minimizing the impact of the waste generated on the well being of the inhabitants of mother earth aims to alignment of profit realization activities along with environmental considerations. The triple bottom line concept emphasizes giving equal weight Companies and the economy, people's future success and long-term future of the planet. A similar concept i.e. 3P’s refereeing to profit, people & planet echoes the similar overtones nudging the Operations or supply chain management to toe in line [102].
It bifurcates the two distinct drivers of SCM into terms and corporate image stability, regulatory compliance, liability, and regulatory drivers of sustainability as community relations, public expectations of employee health and safety, customer relations, cost reduction, and quality improvement to public expectation dimensions [102]. Moreover Regulations, Marketing, Suppliers, Competitors and Internal factors have been identified to be motivational factors into GSCM practices [223].

In spite of research conclusions indicating necessity to adopt GSCM in modern era, the absence of literature for empirical studies corroborating GSCM concepts. Therefore it is desperately desired that corporate sector needs to devise more practical & cost effective approach to realize their high ideals to make profit while achieving global environmental objectives. The major trouble is improper alignment of profitability & environmental objectives leading to alienate global environmental issues firm industry’s corporate practices[194].

This work is an attempt examining the impact of green environmental issues on the formulation of organization’s overall strategy leading to implementable configuration of SCM drivers/barriers. Therefore it attempted to diagnose differences in GSCM drivers/barriers in the different levels of importance of green/environmental issues existing at various levels of corporate strategy leading conclusions that may help resolve the conflicts between corporate strategies & global environmental concerned developed in India through empirical study [227].

1.1.1 Green Supply Chain Management Environmental Sustainability

The Green supply chain management, environmental sustainability, global and local environmental problems in recent years as a result of the natural environment has become a challenging issue for business organizations. Such outsourcing business, manufacturing, and logistics operations, responsible for most of these problems are considered [17]. As a result, government agencies such as the conduct of business, workers, neighbors, and not-for-profit groups, [223] as the pressure from different stakeholders inside and outside the organization and are under increasing scrutiny [223].
More environmentally friendly products for the customers and the environment is above society's growing demand. These challenges and pressures of their business, while severely push companies to consider environmental impacts. Green products, processes, systems and technologies to present environmentally friendly image becomes a common thing, and the way business is done [190]. However, mostly they are, try to reduce or eliminate negative environmental impacts to the traditional command-and-control or a firm "end-of-life" remain to be resolved but where, especially in developing countries, green the solution adopted for waste or green supply chain by adopting a proactive approach designed to reduce sources of pollution [194].

The traditional green proposal is many weaknesses and problems associated with it. End-of-pipe approach to eliminate pollution, but does not change them from one medium to another [223]. In addition, the organization is focusing its supply chain green practices in other organizations may expose negative environmental performance of the organization. For example, poor environmental performance of small suppliers of acquiring badly affects performance and image [41]. In addition, community stakeholders and environmental organizations often do not distinguish between methods of practice and its suppliers [150]. A firm responsibility to the environment extends beyond its boundaries and its entire supply chain tries to reduce waste and pollution sources, where in recent years, has emerged a more outward-oriented approach [223].

The extended supply chain responsibility, many organizations up and down, across, and the addition of green supply chain, product stewardship, closed-loop supply chain have different names, including [190].

The study and practice of promising green supply chain issues and the firm's ability to provide significant benefits to society. Green supply chain tries to identify the key drivers or motivators for the proposed study. The study of global as well as local (Indian) levels and concept of green supply chain importance of environmental issues or concerns begins with the background to provide explanations. This literature review, methodology and analysis discussed. Lastly, studies and represents the importance of their contribution [3].
1.2 Drivers for the adoption of green supply chain

The driver of the adoption of green supply chain as feed motivators or business organizations that are defined in this study led to proposals. Previous studies proposed to adopt environmental organizations that have a potential to inspire many drivers identified. These drivers are usually the government, investors, customers, suppliers, community groups and employees as well as organizational culture or things related to the right or acceptable moral values emanate from external and internal stakeholders pressure [55]. To request a review of the literature on environmental drivers of green proposal that shows many drivers. Regulations, expected business benefits, customer pressure and social responsibility, the consequences of adopting the usual green supply chain as well as to propose that the drivers that motivate organizations to disclose [7]. The study provides the drivers for the green supply chain; green supply chain to offer the ability to significantly influence the key drivers of the top four drivers support, Green supply chain, other studies found no significant effects of these drivers provides. No significant correlation between green procurement rules [25]. External pressure and green supply chain motion, no significant relationships between [224]. Accordingly, this study is to determine the key drivers for the green supply chain and green supply chain at the level of adoption of the proposal to gauge the precise impact drivers in India, to further investigate the issues. Regulations, customer pressure, the trading profit, social responsibility, supplier pressure, competition, market demand, community pressure, the expected and the pressure of the employee, as described in Section 2.2, the analysis of literature offers nine basic drivers for the green supply chain that indicates. Green supply chain purposes of this proposal in the context of India to explore the drivers interviewed analyze [7]. Most companies are multinationals and most of them based companies in India, the green movements are for commercial reasons. These companies are some products which they export to Europe or the U.S. to try to ensure that it will be accepted. Perhaps in Europe or in Japan so as not to loose their business, Indian companies have green supply activities. Most Indian companies dealing directly with customers and clients is looking for Green Purchasing Committee needs to do, and most customers buy the distinctive green, non-hazardous metal, recycled content, energy efficiency, use of renewable resources green procurement list spelling list or need to come up with any
other criteria. In addition, the government promotes green activities and to embark on a green activity gives financial incentives to producers. The government, represented by the Department of Environment, green consumerism, which promotes a national environmental policy. This kind of consumer organizations and the media, government officials, through pressure groups that have indirect effects were seen. For example, complaints from the media and generally exert pressure on politicians to make changes through stimulating strong impact on companies. Now, companies from developed countries to embrace the principles of sustainable development and most of them in their declared that, environment so that they do not like to produce the greatest impact. Companies, especially listed, they are inline with the global trend of greenery and that they are not left behind to try to reflect the image of himself. Including the ancillary works for the company, they are environmentally conscious organizations that try to reflect [7, 215,137].

Green practices to perform the above statement that shows that Indian companies pushing drivers:

- Regulations: Rules of exporting countries (EU, U.S., and Japan) (more impressive) as well as green practices (eg tax cuts) regulations set by the Government of India to encourage offers.

- Customer Requirements: for suppliers to comply with environmental standards set by customer organizations, and features.

- Expected business benefits expected cost savings from green practices and opportunities for green products in the market.

- Social Responsibility: It is ongoing to fulfill its responsibility towards the society's moral obligation to include a company.

Regulations, customer requirements, expected business benefits, and social responsibility, it offers four major green supply chain driven Indian companies to undertake the drivers that means. Regulations, customer pressure, the expected business benefits, and social responsibility, these drivers are compatible with the top four drivers are identified from the literature. Findings from the literature review and the findings from interviews that
means a continuation. From a theoretical perspective, the effect of four drivers can be explained in terms of institutional theory. They form the basis for compliance with regulations, laws, and the regulations focus on the use of persuasion and customer pressure can be regarded as aggressive isomorphism. The organization must demonstrate appropriate or acceptable practices that are based on the expectations of society because social responsibility can be regarded as the standard isomorphism. The technical value to other organizations (trade gain) proved that a firm's rational desire to adopt the proposal is based on the expected business benefits can be considered as cultural cognitive isomorphism [7, 137].

1.3 Green supply chain management capability

Efficiency and synergy between environmental advocacy partners GSCM performance, minimize waste and cost savings facility operations and supply chain management practitioners and researchers and is attracting growing interest of GSCM [151, 168]. GSCM enhance their ecological efficiency while reducing their environmental risks and impacts and benefits, stock market enterprises to achieve the objectives of the archetype has emerged as an important new [222].

Various researchers out of concern for environmental supply chain management by businesses design, procurement, production, wholesale Dispatch, use, reutilization, and disposal policies and actions on issues such as consists of a series of arguments that for example, the natural environment of different definitions [227]. "Green" and so on production, processing, packaging, end-users, including shipping, handling, activities, and at the level of initial raw materials must include a link in the chain from manufacturer [172]. The combination of environmental and supply chain management thinking GSCM and product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumer, and end-of-life management of the product after its useful life as defines as including [168].

Capabilities enable the industry to coordinate activities and make use of their resources, organizational processes through the use of personal skills, assets and accumulated knowledge, the complex bundles. These are the major source of their competitive advantage. Green supply chain management capabilities therefore finance flow, logistics
flow, information flow, integration, relationships, and environmental management, and industry is an important source of competitive advantage. Business and academic community, the purpose of its use by offering different explanations of its scope [82]. Defined it by the following equation:

"Green Supply Chain Management Efficiency = Green Building + Green Purchasing / Materials Management + green Distribution / Marketing + Reverse Logistics"

Speak from the perspective of supply chain business, and green design, green procurement, green manufacturing / processing, green products, green marketing, green consumer, green, green value chain which includes such phenomena as proposed the concept of recycling process, and green materials, the sum of its parts inextricably incapable of existing without each other connected [154].

1.4 Green Supply Chain Management and Investigation Strategy

Flight development of human society in the world with such severely resource exhaustion of environmental pollution, biological unbalance is facing some problems. Development of the industry is in a dilemma. We all care about the use of limited resources to social problems and to gain as much as possible projects. Therefore, the economic benefits of the projects, environmental protection, and resource utilization unite and biological balance and sustainable development projects suitable environment to promote and society and seeking resources for green supply chain management theory and has great meaning in reality [137].

In foreign countries, green supply chain, from research began purchasing green. A portion of the impact on the environment from production to research and he said we should choose the suitable raw materials according to environmental standards advised. At the same time, we should pay more attention to recycle, and he also proposed the definition of Green Purchasing [195]. They are "environmentally responsible manufacturing," it was called, was an item. In 1996, he proposed a definition of green supply chain, and green supply chain management has become an important material [77]. They drew environmental factors in the model, and life-cycle method used. They have a simple design pattern chain and put forward measures to implement. In a word, the research achievements were remarkable in the world in the last ten years. In our
country, green supply chain management is in the early stage of the research. Research
definition, integrated features, architecture, and emphasizes the introduction of main
content. Some articles about the strategy to implement without volume analysis and
systems analysis, Reproduction relative. Green supply chain management is of the
essence and meaning of article characteristics is concluded. Then, the next attempt is
made to explain the connotation and the ways to implement are put forward. In 1996, the
Association for Research in Construction at Michigan State University first put forward
the definition of green supply chain management. Broader definition and considers the
environmental impact of the construction industry to optimize the use of resources in the
supply chain. Green supply chain now no generally accepted definition of [137].

Green supply chain management, supply chain management can be called
environmentally conscious. We design production and exploitation of the design, raw
material procurement, production planning, supply and distribution, customer use and
recycling biologically mean new ideas. Project and every project, every department in a
series of external and internal environment management system to optimize the entire
supply chain, which is close cooperation [7].

Green supply chain management, which considers the environmental impact and
efficiency of the entire supply chain management, is a kind of modern management
model. The suppliers, manufacturers, vendors, and consumers should keep in touch with.
Extension materials include: green design, green production, green package, Green
Marketing and Green Recycling [88]. The main flow is as the following table:

<table>
<thead>
<tr>
<th>Flow of process</th>
<th>Green Supply Chain Management</th>
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<tbody>
<tr>
<td>Green Designing</td>
<td>Recycling Design</td>
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<td>Unloading Design</td>
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<td></td>
<td>Model Design</td>
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<td>Green Production</td>
<td>Green Techniques</td>
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<td>Green Suppliers</td>
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<td>Green Materials</td>
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<td>Green Package</td>
<td>Green Environment</td>
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<td>Green Ideas</td>
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<td>Recycling Package Materials</td>
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<td>Green Marketing</td>
<td>Green Information</td>
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<td>Green Products</td>
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<td>Green Selling</td>
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<tr>
<td>Green Recycling</td>
<td>Recovery processing</td>
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Table 1.1 Flow of Green Supply Chain Management

### 1.4.1 Green Designing

The whole process of design, green design will consider the impact on resources and the environment. It works, quality, development, cycling, and other costs, will optimize the relevant design factors. Affecting the production environment and the consumption of these goods can get to the lowest degree. Green design with the idea of sustainable development products' life cycle surveys. So that we can reduce the impact on the environment and at the beginning of the product development will be analyzed and evaluated systematically. Design phase of product development without waste, 3R (reduce, reuse, recycling less) should include.

### 1.4.2 Green Production

Green production, cleaner production methods to bring new technology, and raw materials and to reduce the resources required for projects, we invest less, can realize high output and low pollution. We have to eliminate environmental pollution in the production process should try our best. Projects such, without waste or low- waste technology and equipment to improve the use of technology, and as a place of toxic substances, should strengthen their management. In the beginning they can reduce waste and contamination.

### 1.4.3 Green Package

The package will have any use for consumers. It pollutes the environment, but it would also not waste package materials. Green Package, Green package structure design, implements, optimizes, and wants to reduce the package contents. At the same time, to deal with them and recycle them to put back to use material is added to the package.

### 1.4.4 Green Marketing

Green Marketing Green supply chain is very important. Market research, product development, product registration, marketing and sales promotion that is, to keep the
biological balance, and should pay more attention to environmental protection. Projects, consumers can and coordinated development of our society. Green marketing is present in every corner. It is a new marketing ideas and implementing sustainable development and a new way of biological balance [177].

1.4.5 Green Recycling

Green Recycling should be contained in a full green supply chain. We always recycle products and packages. Green Recycling, as a kind of physical distribution in the opposite direction, project development and environmental protection represents images. Green products and products dealing with recycling costs and have to think about certain parts. To get the highest value we should use the lowest cost.

1.5 Green supply chain management methods of investigation

1.5.1 Formulating relevant policies

Our country is a developing country, so we should pay more attention to protecting the environment. Compared with developed countries, is behind his plans for economic development of our country. Some of the projects are “green” policies have been formulated; can not satisfy us to implement. Right now we rarely green management policies in the series. Our country to achieve competitive advantage in supply chain management of projects to choose. Green supply chain management, it is very important to formulate policies related. If we evolved, we could not rush into mass action should.

1.5.2 Green resource database build actively

According to the structure and content of green supply chain management, green supply chain management is diverse. So with one or several series of research projects and technology is very difficult to implement. And projects with the development of our society, peace is to meet the requirements of external conditions. The Government and relevant organizations should actively build green resource database. Database Green manufacturing technology, green transportation, green product patents, green materials, and green technology should include management. Information and intellectual support for green supply chain management could buy.

1.5.3 Developing step by step “point” to “side”
Green adjusted and systematic design and management of supply chain management and needs to be assembled with unitary perspective. The green supply chain management is to implement a complex system. Chen and could not get in society for sustainable development projects. We step by step to succeed, “a series” of “a small chain” from “a small chain”, “a point”, every episode should start.

1.5.4 “win-win” set of assumptions Manufacturer

Manufacturers with suppliers and vendors should establish strategic association. Union benefits and protects the environment can save production costs, to recycle the package. Central projects, training and technical assistance to suppliers and vendors should be shared. Powerful force for environmental protection projects and a lot of money for research. Environments because they are restricted to manufacturers, suppliers and vendors are the same. A supplier is closed, then the law of environmental protection, to prevent the entire series. Training or technical supports from the central management improvement projects, and to ensure them safe.

1.5.5 Strengthen Green beliefs of all employees in the supply chain

Green supply chain management of key staff to be successful is to establish green beliefs. Supply chain leaders as part of the “Green” should take. Every staff work hard and “green image” setting and automatic “green brand” established corporate culture as a kind of “green” should take.

1.6 Green Supply Chain Management Implementation

To green their supply chain organizations over the years have found themselves under pressure. The pressure from clients, regulators and the supplier is competitive and strategic obligations. The green supply chain management has made important strategic tool.

Organizations operations or activities within the work environment have been known to have an effect [24]. Because of supply chain waste and emissions have become the main source of current environmental problems. The governments, regulators in environmental protection efforts to control the environmental impact of activities aimed at the business rules that have passed are because of this realization.
Many procurement professionals and their organizations are still unaware or unsure of the best way to approach it are struggling to find GSCM under-standing of the importance that despite the large number of businesses, the number of companies that engage in such behavior is significantly reduced. Implement green supply chain when applied to try to identify best practices[199].

Green supply chain is fairly new concept. It is based on two concepts; the supply chain management concept and the environmental management concept [110]. Explored these two concepts and liked them together. Green Supply Chain Management merges these two concepts together. Green supply chain management has variously is defined as “The purchasing function’s involvement in activities that include reduction, recycling, reuse and the substitution of materials” [36]. “The practice of monitoring and improving environmental performance in the supply chain” [68]. “The way in which innovations in supply chain management and purchasing may be considered in the context of the environment” [71]. Green supply chain management is thus the integration of environmental management into supply chain management.

Identify the waste streams → Measure or identify the opportunity cost of the waste → Create innovation vs. treatment bias toward waste reduction

Figure 1.1 Green Supply Chain Management

Green supply chain management will conserve energy and environment [199] in order to prevent the release of hazardous materials within the supply chain system is to limit waste.

1.6.1 Green Supply Chain Management Implementation Best Practices

GSCM practice a number of approaches to implement best practices identified four green supply chain execution has been proposed in the literature, As a green supply chain analysis using the same system as the life cycle assessment of supply chain, business goals align with the goals of green supply chain catalysts for innovation, waste to to reduce the focus on source reduction [86, 200].
1.6.2 Green supply chain goals with business goals align

Most businesses usually define green supply chain goals and business objectives separately. It may be contradictory goals, leading to conflicting communication among business case behind such targets without a proper understanding of the supply chain and value proposition to define goals can lead to business. For example, a business goal against the goal is to reduce the cost of the business which is more than the cost of conventional packaging to use eco-friendly packaging. The green supply chain goals with business goals do not support extracts [80].

A supply chain should support the goal is always the achievement of business objectives. So look at the overall business objectives of a company and a transition to a green supply chain can help to achieve those goals should identify. If a company wants to reduce its energy costs, For example, a reduction in the use of energy efficient and environmentally friendly tools can be done by whether the setting should start by evaluating their energy consumption [37].

1.6.3 A single life-cycle assessment of supply chain systems

A typical supply chain is all a process leading to a system with another; linked together in a network has a number of various business processes. Systems Thinking outputs serving as inputs for other activities and thus bring about change more effectively view the available paths at a deeper level in order to understand the system is to provide a means of making activities in the supply chain is seen as being [144, 199].

![Environmental life cycle](image)

Figure 1.2 Environmental life cycle
A life cycle from raw material extraction to final disposal of the content supply chain allows for a holistic approach. The visibility of the entire supply chain and green supply chain management programs under the influence of end-to-end stand. In this way, it improves the competitive advantages such as low cost or identify opportunities to deliver business value to the program is to easy [72, 200].

1.6.4 As a catalyst for innovation in the use of green supply chain analysis

Green supply chain analysis processes, materials, and provides an opportunity to review operational concepts. This material wasted, wasted energy or effort at goal and use the resources to make a transition to a green supply chain would for businesses to adopt a green outlook can really improve your business where all their business processes to identify areas should review the inspection [37, 200].

![Figure 1.3 Green Process Improvement Approaches](image)

Pollution and waste of resources, incomplete, ineffective or inefficient use represents supply chain processes in a more environmentally sound approach for businesses to see if the waste will drive to identify the sources in the supply chain should review each process. This will ensure continuous improvement in all of their supply chain operations [72, 143].

1.6.5 Focus on source reduction to reduce waste

Since it is designed to recycle and reuse waste management program focuses on the management of waste. On the other hand, source reduction, prevention or reduction of wastage during production, instead of conducting business efficiently it is arising from the use of resources aimed at examining how it focuses on the management, how materials are used, and what products are purchased [159].
Since it is designed to recycle and reuse waste management program focuses on the management of waste. On the other hand, source reduction, prevention or reduction of wastage during production, instead of conducting business efficiently it is arising from the use of resources aimed at examining how it focuses on the management, how materials are used, and what products are purchased [48, 200].

**1.6.6 Challenges in Implementing Green Supply Chain Management:**

Like any other business investment, green supply chain management is new to many businesses, especially without challenges. Business to become a reality in their green efforts is needed in order to overcome these challenges. Trying to green their supply chains, while the three main challenges facing companies; (a) the absence of appropriate technology in place to support companies and their efforts to go green, (b) appropriate data capture business processes in the supply chain and therefore need to make great use of their existing technology and (c) Between the requirements of green and lean practices the trade-off [147].

A more favorable impact on the environment is technology that provides energy efficient solutions. Information technology required to support the business by optimizing resources and to create a greener supply chain, thereby reducing resource requirements, more effective supply chain planning, execution and collaboration can enable. [57] Green supply chain technologies can not operate independently of business processes in the supply chain. Green supply chain and supply chain to complement each other. A supply chain is provided by technology business processes, which can not work without. Such data indicates that a process is therefore needed.
Lean and green waste minimization strategies often because of their shared focus is seen as compatible. Diligently to reduce the negative environmental impact of the supply chain through the supply chain to reduce the amount of inventory is emphasized. However, the adequacy of the green approach, which opposed the increase in emissions increased transportation, packaging, handling and repair of small batch sizes, which can require just-in-time (JIT) delivery lean strategies to employ [120].

Outsourcing also requires the additional transport for the next part of the supply chain process to be transported back to products on the other side of the world is being transferred to plants to incorporate parts of the manufacturing process and thus may increase emissions to incorporate parts of the manufacturing process and thus may increase emissions [169].

Most firms actually implement green supply chain practices in their supply chain management process is integrated Environmental Considerations. Their approach is usually green or an existing process is driven by a need for a piece of chain. Can have a positive impact on the environment a business people responsible for the overall supply chain performance review changes in the supply chain; environmental aspects are often not considered. It is far implemented only after they Their impact on the environment and greening the supply chain have the opportunity to consideration of their impact on the environment and greening the supply chain has the opportunity to emerge [199].

Supply chain management has emerged in the last few years and is quickly gaining in popularity is a business and educational terms. Supply chain of goods to their attendant sources of information to end users, including flows associated with the flow of goods and services change and refers to all activities defined in the supply chain. Even the supply chain processes need certain capabilities and resources [7]. The signal earth is limited, expensive energy, drained and polluted a world of abundant, fresh, affordable energy to point out that the world is changing. The most important thing was that anterior transportation or production costs, while enterprises now have to take into account environmental factors inadequate resources. Supply chain design problem in a number of production facilities and includes decisions about location, each feature the work of one or more locations in each market segment, and sub-assemblies, components and materials
on supplier selection for the amount of capacity [122]. The GSCM design extends this definition by including:

1. Waste of all processes,
2. Using efficient energy resources,
3. Greenhouse gas emissions,
4. Using capacities and resources efficiently,
5. Considering legal environmental factors.

![Greenhouse gas emissions by sectors](image)

**Figure 1.5 Greenhouse gas emissions by sectors**

This is a supply chain network of industrial / distribution processes and these processes need to realize that is a fact of transportation fuels. When we designed our study GSCM factor to consider greenhouse gas emissions and recyclable products. Seen in Figure 1.5, these supply chain activities detrimental effect on health, leading to living and creating global warming, greenhouse gas emissions and air pollution (totally 30.8 %) are important sources. International organizations or governments to limit their
environmental impacts through measures to increase the aforementioned damages would encourage decision makers. Indeed, the global level (Kyoto, social responsibility, local governments, etc.) in an era with more environmentally conscience, enterprises and service providers environmental costs now indefinitely on the community and will refuse all in prospect, under heavy environmental tax in the next few years [4]. These restrictions reduce the negative impact on the green world have raised concerns. In this regard, local or global supply chain network, including enterprises, building a green structure is set strict targets. For example, companies presenting these results highlight key [86]:

- In 2007, $92B computer manufacturer HP business inkjet printer, with its 30,000 cubic feet of polystyrene packaging computer and eliminate PVC packaging report more than £6,000,000. The company will reduce its carbon footprint by 20 percent by 2010.
- Its 500,000 farmers a living wage to secure and maintain a skilled labor pool, Starbucks Arabica coffee beans, being 42% more than the price of commodity pays its farmers.
- $1.5B by 2010 Timberland footwear and apparel manufacturer in all of its retail and production facilities will achieve carbon neutrality says. The company, convert to renewable sources of energy, green building techniques, and carbon is more easily absorbed by vegetation in equatorial areas where planting has been selected for the installation of carbon offsets.
- Through its Zero Waste Initiative, $312B retailer Wal-Mart now 478.1 million gallons of water, 20.7 million gallons of diesel fuel, and has saved millions of pounds of solid waste. Through its 100% renewable energy program, the company seven years in all of its new stores to reduce energy consumption by 30% is expected.

Fully 35% of transport greenhouse gas emissions ratio is commonly used in the transport supply chain which is actualized through heavy and light trucks that shows 1.6. The first job of a green transport to replace the existing network to accommodate gas emissions is clear. The new model, diesel motors, inter-modal transport [4], alternative energy
resources, etc., will choose the solution for harmful gas emissions. According to Figure 1.7, CO₂ CH₄ 18% of total gas emissions and NO₃ 9% to 72%.

Figure 1.6 Transportation greenhouse gas emissions

Waste gas emissions in the supply chain are another serious issue. It once was seen as waste into useful materials as you answer converts, recycling is attracting attention. Thus, the production, use and end of life, through resource extraction products from the “content” loop closure to help improve supply chain management.
Figure 1.7 Greenhouse gas emission distributions
Recyclable and recycled materials to further develop the supply chain, the recyclable materials that they can compete with virgin materials of sufficient quality to allow reprocessed. So of recycled materials, recycling technologies required to improve will be of recycled materials, recycling technologies required to improve will be [3]. Enterprises more energy efficient, less toxic and less hazardous to the environment that is trying to develop products. GSCM has introduced the concept of product design manufacturers are turning to green. Product design change and to improve its products, recycled materials, recycled materials and recycled parts enterprises to work with suppliers. Therefore, enterprises, suppliers of recycled materials and recycled in a closed loop with the need to develop relationships.

In this study, we CO2 gas emissions by trucks options and recyclable products is considered to be a mirror of greenness, Network optimization problem where one of GSCM are motivated to study. Truck rental fees and recyclable products because of the cost of purchasing an existing model of a trade-off can affect the environmental indicators. With such a concern, we transport costs and lack of capacity allocation to optimize the network.

Additionally, the public's environmental awareness through formal and informal environmental education programs has increased. Given this social and political change-makers such as cleaner production and ISO 14001 certification has implemented environmental practices. Such as RoHS (Restriction of use of Hazardous Substances) Directive rules as recent environmental practices of their suppliers and customers to expand their organizations require. Consequently, a systematic approach to integrate environmental concerns into the green supply chain management, supply chain management (GSCM), has been increasingly accepted and practiced by forward-thinking organizations [216,217].

Experiencing increased pollution arising from decades of economic development, India is now a leading country seeking to reduction, reuse and recycling among manufacturers (ME, 2005). In recent years, the Indian manufacturers exporting products have further GSCM as an effort to comply with the RoHS directive and to subsequently gain a competitive position in the Asian market. With higher pressure and more resources, larger manufacturers are more active in environmental practice such as participating in
voluntary programs and these larger firms typically performed better on environmental performance [104,151].

In India, environmental practices such as solid waste management have shifted to material circulation for energy and resource substitution since the late 1990s. Given these evolving corporate environmental issues in India, this paper aims to introduce experiences from eleven Indian Pharmaceutical manufacturers and their GSCM practice with a focus on their solid waste. To further understand the situation, we examine if performance improvements are achieved through GSCM, as well as their drivers and barriers for GSCM investigation.

To complete this investigation, we first introduce GSCM drivers, practice and performance with a focus on Indian manufacturers. We then describe our research methodology. Our focus is to present survey results and findings. Finally, we make our conclusion and raise directions for future research.

During the past years environmental policy strategies with a focus on product regulation have gained substantial importance. Integrated Product Policies (IPP) or Sustainable Consumption and Production (SCP) have become keywords in a changing debate about how to deal with hard-to-manage, “persistent” environmental problems. Since knowledge about the environmental damages of certain product groups has also grown [181]. Product regulations are considered a promising approach for integrated policy measures. By focusing on products these strategies hope to adopt an all-encompassing approach without shifting the burden from one environmental medium to another. Products are seen as control points for the struggle against negative externalities along all phases of the life cycle [52].

Such considerations about product-oriented environmental policy are taking place against the background of an intense discussion about new steering modes for policy under the heading “governance instead of government” [24, 164]. It is assumed that the multitude of challenges for the problem-solving capacity of traditional, centralist environmental regulation necessitates the mobilization of helpers’ interests in order to solve those problems which cannot be addressed via traditional steering logics [144].
Given completely globalize material flows, supplier and customer relations this problem becomes especially virulent in the field of product regulation. Therefore, different conceptions of a modern “regulatory state” claim that the state ought to withdraw from certain tasks because an authoritative societal fine tuning does not correspond to the changing perception of how the state should fulfill its regulatory tasks [112]. Proponents of a lean state regard the government’s lack of detailed knowledge as hallmark and at the same time core problem of its capacity problems. In other words: If the state wants to organize an overall environmental modernization, it must gain sufficient knowledge about production processes, technological trajectories and behavioral logics along the entire supply chain. Since such a universally informed regulator is hardly realistic, less interventionist steering modes are regarded as suitable in the context of new governance. These in turn to take regulatory action emission data itself, Marginal cost reduction or permanent policy of technological options to provide important information to the willingness of private actors, and highly dependent on their willingness to [31]. “As an institution, the free market is not an area of freedom from state but encouraged by the state to allow a system to manage it.” The role of non-state actors, thus regulating a net change from one actor at a distance of about co-regulation “is a complex process that can not directly control” [165]. This idea of the state having developed to a primarily cooperating actor and of governance taking place in almost post-hierarchical spheres should not be uncritically shared [185]. However, this research is based on the assumption that, not only in product-oriented environmental policies, economic actors along the supply chain must play a decisive role for the redefinition of governmental activities. Consequently, modern environmental policies should “harness these third parties as surrogate regulators” [73]. A number of strategies in environmental policy in the sense of “smart regulation” XL initiative aim at better relationships between agency and regulated companies [60]. The assumption underlying this work is therefore not that of a „semi-sovereign state [103]. Quite the contrary: The state can and should play a crucial role in order to instigate green corporate activities along the supply chain.

This Green Supply Chain Management (GSCM), its practical examples and its drivers have been investigated by a number of empirical and theoretical contributions [110,161,224]. However, given the aforementioned discussion about changing modes of
governance we can hitherto detect a twofold deficit in environmental research. First, this research design presumes that political science research has not yet old enough to examine the policy and between GSCM. Second it is argued that also on an empirical level this applies primarily to management science literature corporate GSCM has been insufficient research on the impact of policies. Those studies that did indeed Investigation these interlink ages were mostly restricted to a rather aggregated level [217]. The design sketched here aims at closing this gap. Taking the example of waste management two general questions will be answered:

1. GSCM impact on the policy objectives of the waste management strategy is being defined as and the resulting measures are related?

2. GSCM measures in response to the political initiatives are implemented at a corporate level?

Analyzing the subject from two angles regulator and regulates intends on the one hand to find evidence for the actually perceivable policy effects on GSCM from an ex post perspective. It will furthermore contribute to the control of political goals by contrasting the actual effects with actors’ original intentions. Methodologically I propose a qualitative comparative design, carrying out expert interviews with actors from waste management in three jurisdictions: EU, India and the U.S. A major part of the empirical research will be to detect causalities between policies and GSCM through direct contact with relevant actors in the supply chain and on agency level. Here a standardized questionnaire design with a large number of cases could be prone to create misunderstandings in certain cases or fall short from reality because certain actors lack specific knowledge. There would, e.g., be no guaranty that the responsible purchasing manager in a company has actually initiated certain GSCM practices with a supplier, or whether he is only managing practices that were started in the past by someone else. A qualitative design allows correcting mistakes in data gathering at an early point in time.

*Figure 1* gives a preliminary overview of the underlying logic. Five different actors along the supply chain are identified, focusing on those that seem relevant for the proposed research and are subject to waste policy strategies [73]. Institutional investors, financial institutions, industrial companies, insurances companies and environmental consultants.
Direct effects are expected to act upon these chosen actors. It is also expected that these actors will take GSCM measures under the regulatory framework being set up by the direct effects. These measures (indirect effects in the figure) act upon further actors in the supply chain, here indicated as company B, C and D.

Figure 1.8 Schematic Depiction of the Investigation of effects

The remainder of this paper is organized as follows. The following chapter will discuss the term GSCM and reasons for its applications on a corporate level. The next chapter
briefly describes the theoretical framework forming the research’s background by deriving the complex of environmental governance and taking into account the connections between policy and GSCM. The methodological considerations are then discussed together with the selection of cases.

Community becomes aware of environmental issues and global warming, the customers about the products they are buying will be asking more questions. Pharmaceutical companies are manufacturing and supply chain processes, questions about how green their carbon footprint and how they hope to recycle, and reuse. Environmental initiatives such as strategic sourcing environment improve an organization's competitive position and reduce risk [179].

Companies saw their supply chain and improve the way they work is seen in areas where profits can produce. Companies to reduce the environmental impact of their business processes can achieve cost savings. This means better environmental performance of official reduces waste disposal and power consumption, reduces lower material costs are still unaware that appears. Economic issues become more important as expected by the public interest in green issues and environmental concerns will not decrease. The trend towards the development of a green supply chain is becoming popular. For years the business supply chain visibility, improve the solvency and is focusing on reducing costs. Focus moving towards a green supply chain visibility, though, efficiency and cost reduction targets need not be dismissed. Already a green supply chain efforts have by examining the companies, we can begin to see some best practices. Has something to do with your business creating a green supply chain that his company will not help in achieving their business goals.

A company is 25% higher than conventional packaging The cost of using biodegradable packaging for their products decides, For example, reducing the cost goes against the goals of businesses. A business is an overall goal to reduce the cost of then move to a green supply chain should dovetail with business goals. If a business wants to reduce its energy costs, so, for example, more energy efficient and greener this reduction can be made by using the tool to see if you should start by looking at consumption. The number
of companies to improve environmental performance and is an evidence of the link between financial benefit that is revealed.

Companies often do not change their business processes and it is this attitude unnecessary waste and pollution caused by inefficient processes allows continuing unabated. The transition to a green supply chain would adopting a greener business outlook that really can improve your business to identify areas where you should take the opportunity to review business processes. Companies are a more environmentally sound approach Cure that will help you to identify inefficiencies in the supply chain should review each process. Through this exercise was that many companies were wasted raw materials, where the procedures identified, underutilized resources and equipment used for disabled unnecessary energy. Review their business processes, companies should look beyond the factory walls. Purchase any company to review the processes, the transition to a green supply chain are looking for. Their product quality or reducing their environmental impact without increasing costs significantly less than what should be done to find suppliers. Any material before accessing your site by purchasing products from green suppliers can then start their green supply chain. At the opposite end of the supply chain businesses should focus on the process of their return. Many businesses have been returned or exchanged that their products have not developed a successful refurbishment program. Refurbished purchase options for our customers by offering items that can increase and improve the environmental impact of its products, whilst widening their customer base. Organizations worldwide to constantly improve their competitiveness are trying to develop new and innovative ways. Some environmental organizations to address the concerns of our customers, to comply with increasing environmental regulations. And reduce the environmental impact of their production and service activities to improve their environmental performance are increasing their competitiveness through shows that [15,151]

All the amenities of a supply chain, and production activities and supplier of a product or service, delivery included (and their suppliers) to customers (and their customers) involved [154]. The planning and management of supply and demand, obtaining material, planning and product or service, warehousing, inventory control, and distribution and delivery, including scheduling and customer service [37]. In turn, successful SCM
company can provide competitive advantage. From traditional manufacturing activities in the supply chain activities such lack of virgin resources.

Supply chains contain the retailers in the lowest level, and the suppliers of raw material at the highest level. The chain of activities gets initiated by the customer demand at the lowest level. The orders from the lowest level flow to the higher levels in one direction. The successive echelons in the upstream will process the orders received and place their orders to the higher level. The flow of materials happens in the down stream of the chain from the suppliers to the customers through different echelons in the chain. This is referred to as the forward supply chain. The conventional supply chain activities focus on the ways to optimize the supply chain performance such as the service level, responsiveness, bullwhip effect, etc. [37]. Lowest level of the supply chain, retailers and suppliers of raw materials are of the highest level. Activities by customer demand at the lowest level in the series starts. The low level to high level order flow in one direction. Upstream process orders received consistently high level leaders will place your order. Material flow chain from suppliers to customers through various leaders of the chain is in the down stream. This is known as the supply chain. Traditional supply chain activities the level of service, responsiveness, bullwhip effect, the supply chain, focusing on ways to optimize the performance etc [37]. Some of the options parameter rebuilds existing supply chain activities were before. They were used to extend product life. Product life extension that identifies nine different types. Remember, repair, preventive maintenance, predictive maintenance, upgrades, direct product reuse, re-manufacture, recycle and reuse part. Life extension, unlike other modes of inheritance, reuses and recycles materials in product identification and product removes only [95].

It also extends the product life in a wide range of applications and industries, economic and environmental benefits, has been observed that [95].

Most of the products at the client end of the products useful life due to problems in the settlement. Products to the end-of-life (EOL), the products are a threat to the environment from hazardous emissions and waste as well as the users become. Thus, the environmental impact of the products' life cycle, including traditional manufacturing supply chain need to be re-made product [17]. Traditionally consumers dispose of
products at the end of their life cycle, the Government introduced legislation to take the product back from consumers to producers shifted the responsibility of disposal. As a result, manufacturers assemble products at EOL and their recovery or disposal is to control [99]. EOL environmental impact of its products on the manufacturer's responsibility to think about the changing nature of reverse logistics applies firms Explain their research. Reverse logistics is mainly reuse or part of the re-use of materials recovery is the value of the equipment. Cost recovery is a recovery option, although well-designed products EOL can reduce dangerous emissions. This value system can be fed back to recovery, be assumed as a virtual list any product in the market enables [125,153]. An overview of previous research conducted by the reverse flow of product into the environment and to society because of the amount of obligation can increase [99]. Specific manufacturer's product collections recovery and reuse maintain market awareness that the term "green image" effect defines. He also acquires the firm's market green image effect when the factor that can affect product demand observe. Reverse logistics and supply chain activities in a market re-usable products include all kind of products used by the user required. The words ‘reverse' back out of range of any manufacturer or end user of the products used for intermediate players including physical transportation. Therefore, a reverse flow of products in the supply chain is the opposite of that in the supply chain. Re-build step in re-usable products by manufacturer takes care of returned products change [24].

Materials, money and information flows effectively to meet the needs of business can be successful so a supply chain (SC), through manufacturing and services, from the supplier to the customer, a network for connecting various institutions can be described as [117]. Currently SCM companies should instead have the impression that there is competition [42], SCM success is mainly determined by the market. Therefore, Supply Chain Management (SCM) such as enhanced competitiveness, better customer service and increased profitability as a key factor for the achievement of organizational goals is considered better [73]. However, to ensure a better SCM SCM display it properly reflects the real to develop a performance measurement system that is important. SCM to evaluate its performance for most companies need to realize not only But also that the
SCM processes must be well defined and controlled perspective view of a SC, and performance measurement is also necessary strategic [69].

1.7 Layout of the Thesis

Subsequent chapters of the present dissertation have been organized in the following manner: Chapter-2 of the thesis provides an extensive review of the literature in the field of green supply chain management by the investigation of pharmaceuticals industry. Research methodology techniques for investigation of green supply chain management are also discussed in Chapter-3. The operation strategic and pharmaceutical community is explained in Chapter-4. The complete details regarding the operation, governing, environment conditions. Chapter-5 presents the survey performance characteristics of the pharmaceutical green supply chain management (PGSCM) as well as the associated with waste minimization and results are analyzed for chart. Chapter-6 provides the results for the case of Decision-Making Trial and Evaluation Laboratory (DEFATEL) the performance of green supply chain management for the three cases (a) PGSCM practices (b) PGSCM performance (c) PGSCM pressure. Chapter-7 present the AHP method of solution used to obtain the numerical solution is given here. Chapter-8 presents the green supply chain management closing loop method and obtains solution for implementation. Chapter-Analyzed with respect to green supply chain management practices and performance drivers presents. Finally Chapter-10 contains the conclusions of the present work besides scope for future work in the same area.