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GREEN SUPPLY CHAIN MANAGEMENT: CONTEMPORARY PRACTICES AND ISSUES IN MANUFACTURING INDUSTRIES IN BANGALORE

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ABSTRACT

Green Supply chain Management is a recent inclination and imminent opportunities for sustainability in India economy because the concept of Green supply chain management is an innovative in the field of "Marketing". As the term describes marketing is a broad range of channel of distribution for environment orientation technologies, projects, industries or businesses for economic development. Green Growth approaches will induce the required transformation process towards low-carbon and resource-efficient economies and that can tap substantial progression potential in developing and newly industrialized in Bangalore to sustain for long run. The issues like global warming, changing biodiversity and economic crisis, which comprises of conceptual development, drivers and barriers, collaboration with supply chain partners. The Green Supply chain management ranged from green purchasing to integrated supply chains flowing from supplier, to manufacturer, to customer and reverse logistics, which is closing the loop. GSCM improves environmental performances as measured by reductions in air emissions, sewage waste, solid waste, and the consumption of toxic materials. In a nutshell, unlike traditional environmental management, green supply chain assumes full responsibility of a firm towards its products from the extraction or acquisition of raw materials up to final use and disposal of products.es. This paper incriminates the contemporary practices and issues of manufacturing industries. From the results, it can be concluded that the manufacturing companies are aware of green practices but are not able to implement it out in each of the supply chain key processes.

Keywords*: Green Supply chain management, Green Management, Green Supply, Green Waste management, Green Manufacturing. Sustainable development*

1. INTRODUCTION

Realizing that sustainability can drive the improvement of the company's bottom line through cost savings, improved market share, and stronger brand images, a growing number of firms have begun to take ''greening'' (environmentally friendly) initiatives as their strategic weapons. Following this industry trend, the interest of academia on sustainability has also begun to increase substantially in the late 1990s. This growing interest sparked a series of new lines of research dealing with various supply chain activities that have important environmental implications. These activities include sourcing that involves acquiring, storing, handling, and recovering virgin or recycled materials. In sourcing, for example, the failure to reduce the obsolescence and waste of maintenance, repair, and operating (MRO) supplies or scrap materials can contribute to environmental problems. In manufacturing, for example, the irresponsible disposal of defective products or unwanted manufacturing by-products can adversely impact the environment. Likewise, logistics reliance on transportation modes such as trucks and airplanes using fossil burning fuels and the subsequent emission of CO2 can pollute the living environment such as air, water, and ground. One of the first attempts to consider the environmental implications of supply chain activities. To elaborate, Sarkis identified potential research agenda by linking environmentally conscious manufacturing to supply chain management. Based on the in-depth of manufacturing companies, we can discover that environmentally friendly supply chain practices could help the company lower cost and better serve its customers.

OBJECTIVES OF THE STUDY

- To study the green supply chain management issues and challenges in manufacturing industries.
- To Endeavors a suggestion on some green supply chain management concept for economic development.
- To study the Green supply chain management aspect in terms of process.

METHODOLOGY

The study mainly includes literature review from secondary data. The secondary data sources include different databases, websites and other obtainable sources were collected and since this topic has been studied through macro- level approach; and for that the purpose of the study is exploratory method has been used and also a systematic review of collected literature was done on available data. Adaptation of forest dependent local communities in the face of climatic variability

BACKGROUND OF GREEN SUPPLY CHAIN MANAGEMENT

In fact, the cognizance of climate has expanded for last a few decades. More individuals know about ecological issues on the planet, like a dangerous atmospheric deviation, utilization of harmful substance, and diminishing in non-renew assets.

Besides, the public authority has let out missions to propel this issue on individuals. Applying the green standards to their industries, like utilization of natural well-disposed unrefined components, lessening utilization of the oil petrol power, and utilizing reuse papers for bundling in manufacturing industries. Green standards have been extended to numerous divisions inside the association, including arrangement of conveyances.

As we probably are aware, the Green Supply Chain Management (GSCM) has showed up in the last a few years. This thought covers each stage in assembling in front to last phase of lifecycle, for instance: from the item configuration to reuse. Assembling, yet in addition and GSCM can get utilized likewise to the next business areas, like an administration, schooling besides benefits.

EVOLUTION OF GREEN SUPPLY CHAIN MANAGEMENT

Decade	Events
1960's and 1970's	Companies said they did not cause negative impacts to the environment (Georgiadis and Besiou 2008)
	Proliferation of corporate social responsibility (especially in the 1970's) (Carroll 1999)
1980's	Beginning of attention on environmental issues related to logistics and evolution of this emphasis only in transportation (Chunguang et al. 2008)
	Publication of the Brundtland Report (WCED, 1987)
	Change from local optimization to chain optimization (Linton et al. 2007)
1990's	Environmental impact drives green logistics (Chunguang et al. 2008)
	The concept of Green SC is defined (Srivastava 2007 and Zhou 2009)
	CLM publishes its first definition of reverse logistics (Brito and Dekker 2003)
2000's	Logistics is seen as a competitive tool (Rutner and Langley Jr 2000)
	Early work is published from 2002 covering the triple bottom line sustainability in SC (Seuring and Müller 2008)
2010's	Sustainability is included into business management (Wittstruck and Teuteberg 2010)

Sources: researchgate.net/figure/Evolution-of-the-Sustainable-Supply-Chain-concept

2. INDUSTRIAL REVOLUTION

The Industrial Revolution showed up when innovation worked with a change from a specialty-based society to a modern one (Skinner, 1985). During this period the foundation of high-volume creation with capital-escalated utilization of hardware and mechanical production systems

using order and control rationale occurred (Nahm and Vonderembse, 2002). Geographic locales moved from agrarian to modern. A relating development in the homegrown market empowered firms to efficiently manufacture normalized items at a lower cost, flourishing in a homogeneous public market where all contenders approached comparative assets and supplies. As the stockpile of made merchandise extended, there was a relating expansion sought after from purchasers. Notwithstanding, item determination was marked down in scope (Nahm and Vonderembse, 2002), with a more noteworthy accentuation on cost and item accessibility. Market fragments were enormous and stable.

Driving assembling firms zeroed in on economies of scale, effectiveness, and the decrease of working expenses, while gaining practical experience in each item in turn, which brought about the utilization of standard stockpile chains.

These organizations normally had vertical chains of importance, with set up inorganic (robotic) structures (Skinner, 1985). Makers ordinarily created normalized items in mass volume with to some degree limited product offerings, long creation runs, and more noteworthy time spans needed for hardware changeover for new items. Minimization of waste depended on financial matters with nearly nothing/no endeavor to diminish ecological contamination coming about because of assembling (Sarkis et al, 2011). Providers were considered non-indispensable and numerous provider sources were tried to keep rivalry solid and edges low. Faced with quickly changing economic situations from both client and provider points of view, firms confronted a worldview change from modern frameworks (zeroing in on large scale manufacturing and diminished expense) to post-modern frameworks (zeroing in on speedy reaction for an assortment of excellent items, with differing client requests).

Post-Industrial Revolution As the economy moved from modern to present modern due on upgrades in innovation, the extent of items extended and the man As the Post-Industrial Revolution advanced, improved purchaser information worked with relating expansions in both choppiness and intricacy on the lookout (Huber, 1984).

Social orders turned out to be more prosperous and modernized and purchasers turned out to be really segregating and requesting (Doll and Vonderembse, 1991), looking for lower cost, better quality, upgraded accessibility, and more noteworthy item assortment. Thusly, level and vertical joining, alongside adaptable assembling innovation (FMT), and lean/time sensitive assembling rehearses developed (Tu et al, 2001). Proficiency as of now not ruled the endeavors of contending firms and buyer assumptions stretched out past cost, quality, and responsiveness (Duclos et al, 2003; Moore and Babu, 2008; Pagell and Wu, 2009). Inventory network intricacy expanded where rivalry as of now not happened between huge individual firms, yet among supply chains themselves (Li et al, 2005). Changes empowered firms to alter their cycles to oblige changes, including short life cycles, and separated items (Moore and Babu, 2008; Nemetz and Fry, 1988; Vonderembse et al. 1997).

These far reaching changes set up the establishment for progress of assembling towards green stockpile chains. Manufacturing base stretched out from public/close to shore to worldwide.

Firms contended in heterogeneous worldwide business sectors while contenders approached an assortment of assets and techniques (Vonderembse et al. 1997). Market portions were both tight and continually changing because of expanded vulnerability. New items were presented with more prominent speed notwithstanding similarly more limited item life cycles. To upgrade steadiness, driving organizations zeroed in on widening their portfolios by looking for more broad scopes of items, alongside short creation runs and moderately speedy change-after some time needed for item switches (Nahm&Vonderembse, 2002). During this period Lean, Agile, and Hybrid stock chains arose (Moore and Babu, 2008; Sarkis et al 2011). To oblige expanded intricacy, lean/time sensitive assembling rehearses (TBMP) happened empowering firms to dispense with squander, speed up and improve adaptability setting up the establishment for customization of responsiveness, cost-adequacy, and request volume change (Tu et al, 2001).

Economies of scale took an optional position, while those of extension became one of the primary drivers for assembling a wide assortment of items, rapidly and monetarily to fulfill client needs. Firms had more leveled orders with natural designs. The perspective on providers changed from one of an expense troubles need to an expansion of the assembling system and basic maintainability part.

3. GREEN SUPPLY CHAIN (GSC)

As indicated by Sean Gilbert (2001), greening the store network is the most common way of consolidating ecological models or worries into hierarchical buying choices and long-haul associations with providers.

A few organizations didn't take note of the advantages from ecological administration frameworks (EMS); the market will push them to work on their natural exhibition. (Sarkis, 2003) says that private associations, for example, Hewlett-Packard, IBM, Xerox, and Digital Equipment Corporation have presented some type of drive for greening their stockpile chains including the mix of providers, merchants, and recovery offices.

Associations are remembering ecological issues for their exchange with providers to keep up with their portion of the overall industry and some of the time to try and just to endure (HWA, 2001).

(Gilbert, 2001) upholds the possibility of two kinds of classifications of drives to invigorate the greening store network. The first includes further developing coordination with provider on natural endeavors to work with the improvement of greener or all the more harmless to the ecosystem

items. The subsequent kind is requesting worked on ecological execution at provider's working offices, for example, expecting provider to get ISO 14000 affirmation or accomplish a set norm of execution.

At long last, almost certainly, one maker, which one may be the end maker, in an inventory network begins to require better natural execution of its providers to go to its client's cravings through the production network that it is embedded.

The end maker has generally higher overall revenue in the production network, so it is as often as possible confirmed initially. The other point that demonstrates the craving of the end maker to begin a GSC is a result of its immediate contact with clients. Other little and medium organizations that make a piece of the inventory network do have just an aberrant contact, and afterward they do languish less strain over great natural execution from popular assessment. In similar level, unrefined substance endeavors don't go about as right on time as the end makers.

For Gilbert (2001), store network greening drives have benefits fair and square of the singular firm just as on the public level, on the grounds that for individual firms, production network greening programs get particular upper hands terms of lower costs, greener items, and better incorporation with providers.

Past that, on the public level, greening of store network can animate business sectors for green items, while additionally making motivating forces for little and medium measured endeavors (SMEs) to take on better ecological practices. As well as bringing down costs, Gilbert (2001) still refers to that the GSC can likewise open new business sectors for organizations.

Issues for greening supply chains are the decrease of adaptability by the utilization of less providers and association's way of life. The previous isn't actually a GSC issue. It is a market peculiarity to work on the inventory network the board.

The last option is more mind boggling in light of the fact that GSC includes the transaction of information, innovation and natural practices through the inventory network. It is important to pick a provider and include it into a program with preparing and incorporate a similar natural way of thinking in the entire chain.

WHY CHANGE TO GREEN SUPPLY CHAIN MANAGEMENT?

There are different variables of inspiration for the organizations to turn on "green" in their production network. Albeit a portion of the inspirations are very muddled, Wu and Dunn (1995) recommend that a few associations are just doing this since it is the right thing to accomplish for the climate.

Maybe some are more revolutionary to ecological change; however others may not (Wu and Dunn, 1995). Studies, notwithstanding, have shown that benefit and cost decrease are a portion of the primary inspirations for organizations to turn into "green" in the inventory network (Srivastava and Srivastava, 2006; Srivastava, 2007; Darnall et al., 2008).

Johnson (1998) contends that converse coordination’s were spurred essentially by monetary factors and doesn't worry about ensuring the eco-framework. Tibben-Lembke (2002) and Van Hock and Erasmus (2000) recommend that converse coordination’s can just achieve benefit, decrease of waste and, publicizing. Zhu and Sarkis (2004) took this thought further and contended that greater part of the organizations partook in the GSCM, and all concurred that GSCM rehearses are just with regards to shared benefit connections on natural and monetary execution.

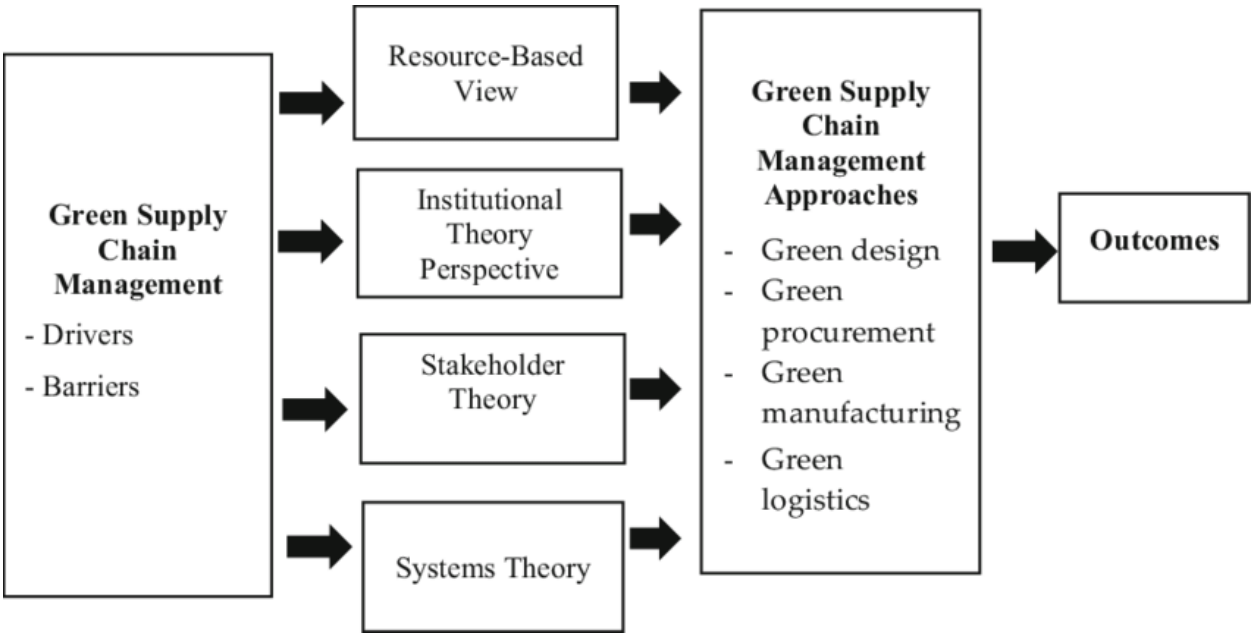
The organizations, nonetheless, need to recognize that there are covered up qualities to invert coordination’s (Mollenkopf and Closs, 2005). (Overall, return around 6% of the items which they purchase.

These items can be from plastic jugs to boxes. The associations can cost if they can catch this 6% return from the shoppers. Doing this, be that as it may, in any case stays being referred to.

Moreover, Srivastava and Srivastava (2006) proposed a model to oversee item returns. The review used normal life pattern of item information; past deals conjecture requests to help their investigation. Semi-organized meetings to 84 partners were utilized to locate the discoveries of the model.

Clearly, the discoveries show that opposite coordination’s can cost provided that done accurately. Saying this implies that associations should have a center vision to support Environmental Management prior to going any further to green coordination’s.

GREEN SUPPLY CHAIN FRAMEWORK



In this framework, key to extracting business value lies within establishing the long-term green supply chain plan that aligned with corporate strategy and approached top-down with strong sponsorship. It also requires a strong business case for the green supply chain that highlights a prioritized catalog of targeted opportunities and a phased adoption roadmap. Finally, the initiatives need to be incorporated with other company wide projects to ensure that one does not compromise another.

In order to effectively implement a Green Supply Chain, the strategy should be embedded in the company's Supply Chain and Operations organization, as well as part of Marketing and Sales. Corporate Communications have to connect with sustainability initiatives to guarantee, that initiative influence is informed clients, shareholders, and general public.

GREEN SUPPLY CHAIN MANAGEMENT ISSUES

Issues in Sourcing	**Environmentally friendly process** **Packaging** **Certification** **Control emission**
Issues in disposal and recycling	**Transportation** **Handling and storage** **Closed -loop supply chain** **Recovery portion of materials and components**
Issues in Transportation	**Infrastructure** **Better maintenance** **Outsourcing to nearest supplier**

GREEN PRACTICES IN THE CATEGORIES

Green Practices	Activities
Environmental plans and goals	Environmental plans and objective towards assess monitor and migration of risk.
Environmental certification—ISO 14001	ISO 14001 supports the reduction of the consumption of raw material and waste and improves the quality of the products/services produced for customers
Eco-labeling	Eco-labeling for the identification of environmentally friendly products
Green packaging	Actions that facilitate the recycling, reuse, and/or return of packaging.
Process design	Designing processes that minimize or eliminate unnecessary movements, waste, and scrap
Energy use	Using energy-efficient equipment and developing new processes, materials, and technologies
Commitment of senior managers	Leadership, commitment, and understanding of managers concerning the importance of GSCM to the organization and the chain.

4. THE BASIC CONTENT OF GREEN SUPPLY CHAIN MANAGEMENT (GSCM)

So, the content material of the inexperienced deliver chain control could be very rich, concerning numerous segments of the deliver chain. Its contents include: inexperienced design, inexperienced materials, assessment and choice of the inexperienced suppliers, inexperienced manufacturing, inexperienced logistics, inexperienced packaging, inexperienced marketing, and inexperienced recycling.

The cause of "Green" covers the complete product lifestyles cycle, in place of partial stages. That consists of now no longer simplest manufacturing however additionally and the shipping of uncooked materials, product sale, product use, and waste disposal and so on. It requires, that any element in a cycle of a lifestyles of a product assured them "the inexperienced nature", otherwise, no person can guarantee, that end-products – surroundings pleasant products.

Green Design

The Green layout is defined, that effect of merchandise on sources and environment, has given whole examination, optimizing layout factors, thinking about in widespread feature of merchandise, quality, a cycle of improvement and fee to reap useful resource intake as a minimum and the best environmental friendliness in all factors of the product lifestyles cycle.

Selection of Green Materials

Green substances – substances with excellent paintings of use, intake of energy, low aid intake rate, a re- use and not- polluting at the surroundings during the product lifestyles cycle. The predominant idea of inexperienced substances consists of the superior nature of a fabric directly, protection of method of production, and reasonableness of the substances use.

Selection of Green Suppliers

Green substances – substances with appropriate paintings of use, intake of energy, low aid intake rate, a re- use and not- polluting at the surroundings at some stage in the product lifestyles cycle. The important idea of inexperienced substances consists of the superior nature of a cloth directly, protection of method of production, and reasonableness of the substances use.

Green Production

In accordance with fact of the producing system, inexperienced manufacturing plan and undertake the manufacturing era application and system path with fewer assets and strength consumption, little environmental pollutants as a long way as possible. The requirements to attain inexperienced production consist of no capacity protection problems, no fitness threats at the operators and product users, now no longer the environmental pollutants, waste recycling, waste disposal at some stage in the manufacturing system as plenty as possible.

Green Logistics

Green logistics is described as evaluation of the terrible effect on surroundings within side the manner of shipping, storage, handling, packaging, distribution processing. Evaluation signs are as follows: Transportation terrible effect at the surroundings is particularly expressed in shipping gasoline consumption, dangerous gases emissions and others.

Green Packaging

After clients sold products, their applications aren't commonly useful. If arbitrary discarded, that reasons each the surroundings pollutants and waste of packaging material. Green packaging is particularly the implementation of inexperienced packaging design, optimization of the packaging structure, and discount of packaging substances, packaging substances recycling, remedy and recycling and so on.

Green Marketing

Green control is carried out at some stage in the product advertising and marketing. And it calls for firms shield the ecological stability and takes the inexperienced philosophy of environmental safety as manual for the duration of the advertising and marketing procedure from marketplace research, product improvement, and product pricing to promotional activities.

Green Recycling

Green recycling is a critical a part of the inexperienced deliver chain management. After the quilt of product existence cycle, if there may be no the restoration remedy, it is going to be sources waste and cause environmental pollution.

What Drive Company to Adopt GSCM?

The **Government**

Actually, there's a sizeable amount of the authority's businesses working a line of the manual within side the world, law and the law. Some businesses are federal the authorities whilst a few seek advice from handiest in neighborhood area.

Market and Competitor

In today's commercial enterprise world, the aggressive amongst organization could be very high. To make consumer impress, the organization desires to make themselves status out from others. Being environmentally pleasant is one manner to distinguish them from the competition. As a result, the organization desires to adjust cause them to fulfill and live with them. Some papers studied approximately the connection among making use of GSCM with consumer's requirement such as (Simpson, Power, & Samson, 2007). In these studies, they investigated the decreased have an impact on of family members among customers each its providers and performance of ecological necessities of customers.

Company

Also, there are different reasons, including performance of increase, cast off expenditure and pollution, and make popularity of mark. In phrases of human resources, in Duber- Smith (2005), he mentioned, that greater balance will increase morals of the worker from a few inexperienced applications, including applications of top health, ergonomic surroundings of work. Moreover, there are a few researches approximately elements or blessings which pressure the corporation to use GSCM. In the Chinese industry, (Zhu & Sarkis, The Moderating Effects of Institutional Pressures on Emergent Green Supply Chain Practices and a Performance, 2007) evolved the overview to 341 Chinese producers to research members of the family among exercise GSCM, environmental and monetary concert, consisting of three reduced markets of things regulating, and the aggressive set up stress. They broaden some of crucial elements of techniques GSCM which can be utilized by managers.

5. IMPLEMENTATION OF GREEN

From a product lifecycle the concept, a cycle starts at product designing. According to (Srivastara, 2007), the literatures associated with the inexperienced design; underline each environmentally aware assignment and the evaluation of a cycle of a life. As an instance of an inexperienced product – the hybrid car. Because of the growing requirement and lowering quantity of petroleum, vehicle producers ought to redecorate the engine which does now no longer eat any or much less gas.

The hybrid vehicles were growing from day to day. One articles approximately the auto design (McAuley, 2003), the writer mentioned the inexperienced plan of the automobile which generally tend to alternate at the superior clean substances and much less substances within side the car design.

In designing of a product in a manufacturing industries, the firm- producer calls for excessive stage of cooperation with their suppliers. As an instance for studies regarding cooperation of the supplier- producer in EcoDesign (Stevels, 2002). He additionally has supplied examples of the success inexperienced deliver time table among the producer and suppliers. In production, the organization can deal with inexperienced through numerous strategies to lessen intake of a useful resource and energy. It is wherein a reuse and recycling are carried. Some papers have furnished inexperienced strategies which includes (Duber-Smith, 2005). As cited earlier, now no longer best the producer, different roles of machine of deliveries has acquired affect from GSCM additionally. Obviously, there are 4 simple steps to use inexperienced deliver chain. The following model – the shape of decision-making presented (EPA, 2000), and it's miles primarily based totally at the high-quality strategies of the numerous groups that have efficiently began and feature applied environmental exercise of the accounting. Ideally, the groups will regulate this method this is higher to meet to their very own organizational necessities and culture. Four steps: (1) Identify expenses, (2) Determine opportunities, (3) Calculate the benefits, and (4) Decide, enforce and monitor. • Identify Costs • Determine Opportunities • Decide, Implement and Monitor • Calculate Benefits

1. First Step: Identify Costs. This is vital the ordinary evaluation of facility or strategies is performed to decide and wherein vital environmental charges occur. The exam permits crew to later awareness wherein the possibility for large improvement is best.

2. Second step: Determine Opportunities. The subsequent step is to decide which regions provide the best possibilities for development after which expand precise answer that reduces charges and bad impacts.

3. Third Step: Calculating Benefits. The analytical exercising of calculating the charges and advantages of the numerous alternatives begins. One technique to the calculation method is to behavior quantitative evaluations, which depend on empirical data, such as: Internal Rate of Return (IRR) and Economic Order Quantity calculations.

4. Forth Step: Decide, Implement and reveal. The 4th and very last step is to determine put into effect the changes, and reveal progress.

6. CONCLUSION

At present, the environmental issues in our global have come to be main social and financial issues; constructing the inexperienced deliver chain gadget is call for of the sustainable improvement of human society, and is of exceptional social blessings. Implementation of inexperienced deliver chain control overall performance assessment maximizes aid usage and decreases aid consumption, decrease production costs; this isn't simplest an environmental advantage extensive act however additionally a powerful manner to advantage social and financial blessings for suppliers. Clearly, greening the deliver chain has a exceptional significance in environmental and economic overall performance, because of the affects of the herbal surroundings organizational selections will now no longer simplest impact the employer that makes the decision, however its clients and suppliers, as well. If the inexperienced deliver chain is efficaciously carried out the blessings becomes seen both in a brief and lengthy term. Traditionally, organizations most customarily regarded to adopt environmental projects to enhance their company photograph and to “do the proper component.” However, adopting environmentally sustainable enterprise practices additionally yields measurable economic blessings. Becoming inexperienced is not a result in and of itself, however the byproduct of optimizing a deliver chain.

Transitioning to a Green Supply Chain at the same time as additionally maximizing performance isn't a clean reduce technique, and possibilities to put into effect inexperienced projects require a complete information of the complete deliver chain. Ultimately, every inexperienced possibility ought to undoubtedly make contributions to the price of the company and surroundings. While the technique of imposing inexperienced projects into deliver chains keeps to evolve, one component is clean: a Green Supply Chain gives possibilities for growing shareholder price; it's miles extra than absolutely exact company citizenship. Finally, the growing focus in this issue, coupled with continuously converting legislation, has created a panorama that is right for acting. By performing now, with a holistic inexperienced approach sponsored through robust enterprise case and execution governance, an organization will assist blaze the path that ends in sustainable, bottom-line blessings at the side of eco-compliance.

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