Unlocking Productivity in Green Supply Chain Management

Dr. Saman Yapa

Productivity *Insights*

Vol. 5–2

Asian Productivity Organization

The Asian Productivity Organization (APO) is an intergovernmental organization that promotes productivity as a key enabler for socioeconomic development and organizational and enterprise growth. It promotes productivity improvement tools, techniques, and methodologies; supports the National Productivity Organizations of its members; conducts research on productivity trends; and disseminates productivity information, analyses, and data. The APO was established in 1961 and comprises 21 members.

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SEPTEMBER 2024 | ASIAN PRODUCTIVITY ORGANIZATION

PRODUCTIVITY INSIGHTS Vol. 5-2
Unlocking Productivity in Green Supply Chain Management

Dr. Saman Yapa wrote this publication.

First edition published in Japan
by the Asian Productivity Organization
1-24-1 Hongo, Bunkyo-ku
Tokyo 113-0033, Japan
www.apo-tokyo.org

Designed by Convert To Curves Media

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PREFACE

The P-Insights, short for "Productivity Insights," is an extension of the Productivity Talk (P-Talk) series, which is a flagship program under the APO Secretariat's digital information initiative. Born out of both necessity and creativity under the prolonged COVID-19 pandemic, the interactive, livestreamed P-Talks bring practitioners, experts, policymakers, and ordinary citizens from all walks of life with a passion for productivity to share their experience, views, and practical tips on productivity improvement.

With speakers from every corner of the world, the P-Talks effectively convey productivity information to APO member countries and beyond. However, it was recognized that many of the P-Talk speakers had much more to offer beyond the 60-minute presentations and Q&A sessions that are the hallmarks of the series. To take full advantage of their broad knowledge and expertise, some were invited to elaborate on their P-Talks, resulting in this publication. It is hoped that the P-Insights will give readers a deeper understanding of the practices and applications of productivity as they are evolving during the pandemic and being adapted to meet different needs in the anticipated new normal.

INTRODUCTION

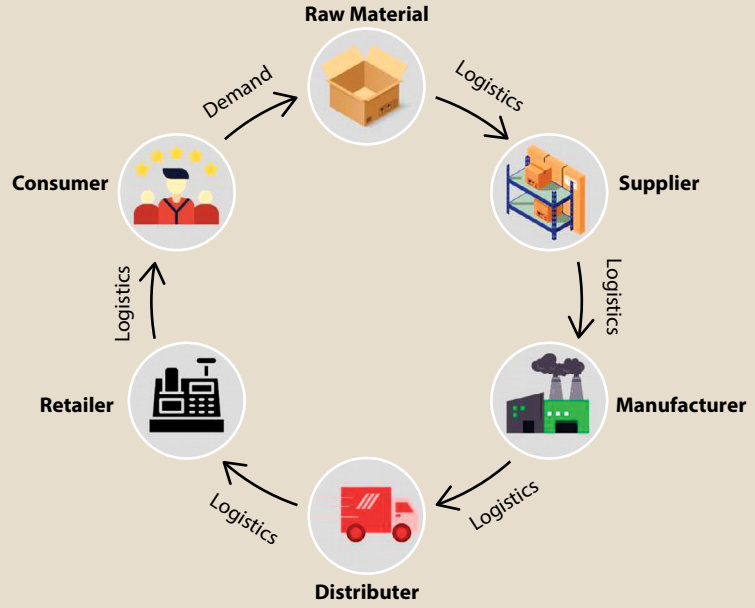
Business organizations prioritizing profit maximization have been compelled to reevaluate their supply chain management (SCM) strategies due to growing environmental challenges. The dual challenge faced by businesses today is minimizing the impact on the environment while ensuring economic success. Green supply chain management (GSCM) has emerged as a response to this challenge. There have been some isolated efforts to reduce the environmental impact of traditional supply chains. However, the essence of GSCM is minimizing the effects of activities of business organizations on the environment in every stage of the supply chain, from product design, to material sourcing and manufacturing processes, to final delivery and disposal, while maintaining or even enhancing productivity. This report explains the core principles of GSCM, its impact on the environment, the economic success of organizations through productivity improvement, and challenges and barriers to implementing GSCM in businesses.

SUPPLY CHAIN MANAGEMENT

Traditionally, organizations concentrated mainly on managing their internal operations and making profits individually. But now organizations face a growing challenge to reduce costs while improving quality due to stiff competition in the market. As a result, companies are increasingly compelled to oversee the entire supply chain, i.e., a network starting from suppliers to manufacturers, distributors, retailers, and ultimately, customers. One of the leading global associations for SCM professionals, the Council of Supply Chain Management Professionals (CSCMP), defines SCM as "the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers" (Figure 1) [1].

FIGURE 1

GRAPHIC REPRESENTATION OF A GENERIC SUPPLY CHAIN.

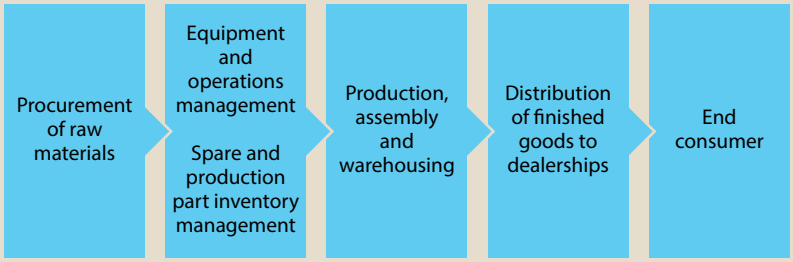


Source: Reproduced with permission from https://corporatefinanceinstitute.com/resources/management/supply-chain/.

Figure 2 depicts a simplified version of an automobile supply chain. Although it appears to be a straightforward linear flow, numerous organizations are involved in this supply chain. Tier 1 suppliers, numbering in the hundreds, provide parts such as radiators, tires, and seatbelts, while Tier 2 suppliers provide materials such as metal, rubber, and plastic to Tier 1 suppliers. Similarly, this chain continues with Tier 3 and Tier 4 suppliers and beyond. Logistics and transportation also play a major role in every stage of the supply chain. SCM aims to reduce costs and lead times, improve quality, and increase profit.

FIGURE 2

A SIMPLIFIED AUTOMOBILE SUPPLY CHAIN.



Source: Reproduced with permission from https://blog.fleetx.io/navigating-the-automotive-supply-chain-in-a-post-covid-era/.

TRIPLE BOTTOM LINE APPROACH

The concept of sustainability has been around for decades. However, it started to gain prominence with the introduction of the term "sustainable development" in the report of the World Commission on Environment and Development (also known as the Brundtland Report) in 1987 [2]. In that report, sustainable development was defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” [3].

The triple bottom line (TBL) approach, introduced by Elkington, shifted the focus of business organizations from maximizing profit to focusing on sustainability. Elkington introduced the term TBL and developed the 3P formula, i.e., “profits, people and planet,” in 1995 [4]. In conjunction with the 3Ps, the terms economic, social, and environmental are also used to refer to people, planet, and profits, respectively [2]. In a competitive business environment, profit, or the financial returns generated for investors, is crucial to a firm’s success. The second component of the triple bottom line, people, emphasizes a company’s impact on society and its commitment to individuals. The third pillar, the planet, focuses on having a positive impact on the environment [5]. The TBL framework emphasizes the need for balancing these elements. Businesses should find ways of making profits while contributing to society and minimizing the impact on the environment. For example, instead of focusing solely on shareholders, businesses should prioritize stakeholders, consumers, employees, and the community. Ethical sourcing, reduction of waste, conservation of natural resources, reduction of energy consumption, and optimization of transportation routes are some examples of environmentally friendly practices [5].

The Brundtland Report and the Earth Summit, a UN conference held in Rio de Janeiro in 1992, influenced businesses to integrate environmental responsibility into all facets of social, political, and economic activities. A new trend in the business world known as “corporate environmentalism” [6] emerged as a result

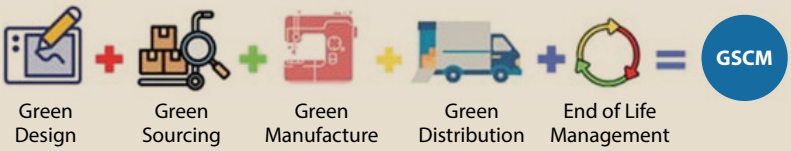
of the introduction of sustainable development policies at the national level, coupled with disasters like the Bhopal accident in India, a disastrous industrial accident that exposed more than 500,000 people to lethal methyl isocyanate leaked from a Union Carbide pesticide factory and caused thousands of immediate deaths and long-term environmental and health repercussions.

GREEN SUPPLY CHAIN MANAGEMENT

GSCM was the response of the business world to the environmental consciousness or "greening" of the marketplace. GSCM (Figure 3) is defined as "integrating environmental thinking into supply chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product after its useful life" [7].

FIGURE 3

ELEMENTS OF GSCM.



Source: Reproduced with permission from https://www.onlineclothingstudy.com/2020/03/5-steps-for-sustainable-apparel-supply.html.

GSCM involves incorporating environmentally friendly practices throughout an organization's supply chain and thereby minimizing the environmental impact of its activities. Some of these practices in the three main elements of supply chains, i.e., procurement, manufacturing, and distribution, are described below.

Green Procurement

Green procurement or green sourcing is a key aspect of GSCM. Organizations adopting GSCM consider eco-friendly commitment when selecting suppliers. By selecting such suppliers, these organizations spread green supply chain practices upstream in the supply chain as well. Some green practices they may consider are the use of sustainable materials (recycled, renewable, or biodegradable) and adopting manufacturing processes that generate minimum

waste, consume less energy, and emit minimum amounts of greenhouse gases (GHGs). Additionally, they may consider suppliers' adherence to all relevant local and international environmental regulations. Organizations collaborate with suppliers to actively minimize waste generation and create closed-loop systems to use materials from returned products in the production system to significantly reduce the need for new materials. They may also support suppliers in investing in R&D to create more sustainable products and processes. Organizations can significantly reduce environmental impacts along supply chains by extending green initiatives to their suppliers as well.

Green Manufacturing

Green manufacturing reduces the damage to the environment during production processes by adopting environmentally friendly practices. It helps business organizations lower their carbon footprints, i.e., total GHG emissions, mainly carbon dioxide and methane, by regular measurement and monitoring. Organizations adopting green manufacturing use materials purchased from local suppliers to reduce carbon footprints in transportation. They adhere to established environmental standards like ISO 14001, which provide instructions for implementing effective environmental management systems.

One key aspect of green manufacturing is the reduction of waste generation and material usage. Organizations can achieve this by designing operations to produce no or less scrap and by-products and applying lean principles to eliminate nonvalue-added activities. Instead of using virgin materials for production, recycled waste and materials and parts from used products can be utilized.

Green manufacturing promotes energy conservation through the use of energy from renewable sources like solar, wind, or biomass. Energy consumption can be reduced by using energy-efficient machines and equipment in the production process. Modern IoT devices like smart sensors optimize energy use in real time. For example, the use of LED lighting and sensor-controlled smart lighting systems significantly increases energy efficiency in manufacturing facilities. These green manufacturing practices not only reduce the effect on the environment but also improve operational efficiencies and long-term profitability of organizations.

Green Distribution

Green distribution aims to streamline operations, improve delivery times, and reduce the carbon footprint of transportation activities. Businesses can use eco-friendly vehicles that run on fuel from renewable sources, such as biodiesel and ethanol, derived from organic materials that emit fewer GHGs than conventional fossil fuels. Another option for reducing carbon footprints is using electric vehicles (EVs) that use energy from renewable sources like solar and wind. Adherence to emission standards such as Euro 6 and Euro VI reduces the harmful emissions of nitrogen oxides (NOx), a family of poisonous gases, and particulate matter from traditional internal combustion engines. The design of vehicles also has an impact on fuel efficiency and emissions. Aerodynamic designs effectively reduce resistance and allow vehicles to move efficiently through the air. The use of lightweight materials such as carbon fiber and aluminum and low-resistance tires also increases fuel efficiency and thereby reduces emissions. Even simple actions like driver training can improve fuel efficiency and reduce emissions. Analyzing usage patterns and redistributing resources as needed ensure the optimal use of vehicles. This reduces idle time and unnecessary trips, further enhancing efficiency. By making data-driven decisions about vehicle deployment, companies can maximize productivity and minimize carbon emissions.

Green distribution aims to reduce environmental impacts through the minimum use of vehicles. GPS technology helps managers to analyze real-time data such as traffic, road, and weather conditions and to select the most efficient routes avoiding congestion and delays. Consolidation of multiple small shipments into one large vehicle reduces not only the impact on the environment but also the cost of fuel and vehicle maintenance. The total distance travelled by vehicles is reduced by consolidating and distributing shipments from a central hub. This model streamlines operations, improves delivery times, and reduces the carbon footprint of transportation activities. Combining different modes of transportation can further optimize fuel use and minimize emissions. For long-distance shipments, rail and sea transport are more fuel efficient than road transport. By leveraging the strengths of each mode, overall fuel consumption and emissions can be significantly reduced.

Warehouses are also an important element of the distribution chain. Green warehousing is a sustainable approach to reducing the environmental impact of warehouse operations. It involves designing warehouses according to

Leadership in Energy and Environmental Design (LEED) certification standards (a standard developed by the US Green Building Council) and implementing energy-efficient practices such as using electric forklifts and optimizing heating and cooling systems. Warehouses can install solar panels on their rooftops or use wind turbines to generate electricity, reducing reliance on fossil fuels and lowering carbon footprints.

Life Cycle Assessment

Life cycle assessment (LCA) is a crucial tool in GSCM for analyzing the environmental impacts of products or services throughout their entire life cycles, from the design of products to the extraction of raw materials required for products, production, use, and disposal. Green design considers the impact of a product's environmental impact throughout its entire life. It considers not only factors such as energy requirements and material usage during the production process, storage, and distribution but also energy consumption during usage and methods of disposal at the end of useful life. Green design aims to minimize space in transportation and storage. For example, designs such as flat-packed or modular packaging can reduce the volume and weight of shipments, leading to lower transportation emissions and costs.

Green design emphasizes the use of environmentally friendly materials, such as decomposable materials. The use of recycled product components significantly reduces plastic waste, a global environmental concern. Modern electronic equipment like washing machines and refrigerators are designed to use less energy and water during their lifetimes and to be produced with recycled and recyclable materials.

Packaging is important for the protection, functionality, and appearance of products but also poses environmental risks. Therefore, a fundamental aspect of sustainable packaging design is a reduction in material use. This includes utilizing lighter materials, smaller packaging sizes, and eliminating excessive components. Such practices not only reduce the environmental impact but also save costs for materials and transportation.

Implementing systems for returnable containers is another impactful strategy in green design. Encouraging customers to reuse returnable packaging, such as glass bottles, plastic crates, or durable containers, reduces the need for single-

use packaging. Egg cartons are an example of such reusable packaging. Multipurpose packaging that can be repurposed by consumers, such as jars that can be used for storage or boxes that can be folded into other useful items, extends the life of the packaging and reduces the need for additional products. This practice minimizes waste while fostering a culture of reuse and recycling among consumers.

Green disposal, a key aspect of LCA, aims to minimize environmental impact at the end of a product's useful life through recycling, reusing, and responsible disposal. This process starts at the design stage by focusing on design for easy disassembly, use of biodegradable materials like plant-based plastics or compostable materials, and designing products for longevity. Companies can also implement take/buy-back programs for recycling or refurbishing used goods, promoting a circular economy.

GREEN SUPPLY CHAIN MANAGEMENT IN PRACTICE

Globally, GSCM methods are being adopted by businesses of all sizes in manufacturing and service sectors. Corporate entities implement these practices not only to minimize their environmental impact but also to comply with regulatory requirements. This widespread adoption is driven by the growing recognition of environmental sustainability as a vital component in long-term business success and corporate responsibility. Two of these organizations' practices are described below.

GSCM Practices at IKEA, the Swedish Multinational Furniture and Home Goods Retailer

IKEA's GSCM approach encompasses a comprehensive range of practices designed to minimize environmental impact across all stages of its global supply chain, from sourcing raw materials to product disposal [8]. IKEA suppliers all over the world must adhere to the supplier code of conduct called IWAY. IKEA suppliers must use either recycled wood or wood certified by the Forest Stewardship Council (FSC), an independent third-party agency. IKEA partners with the Better Cotton Initiative (BCI), a global nonprofit organization that aims to make cotton farming more sustainable in 22 countries by reducing pesticide, fertilizer, and water usage, while ensuring good working conditions [9].

Every item of IKEA furniture is designed for flat-packing, minimizing packaging waste and reducing transportation costs and emissions. IKEA offers a range of energy-efficient products, including LED lighting, which consumes less energy and has a longer lifespan compared with traditional lighting solutions. IKEA uses renewable, recyclable, and recycled raw materials such as bamboo, wood, wood–plastic composites, and recycled PET plastic in its products. IKEA plans to phase out plastic packaging for new items by 2025 and eliminate it from all of its current products by 2028.

IKEA continuously improves the energy efficiency of its operations, including stores, warehouses, and transportation networks, to reduce its carbon footprint. IKEA is committed to becoming climate positive by 2030 by using 100% renewable electricity across its value chain. To achieve this objective, IKEA provides financial support to suppliers to convert to renewable energy sources like solar panels installed on rooftops of factories.

IKEA encourages product longevity through repair and refurbishment. It designs products that can be repaired, upgraded, and adapted to suit the different stages of users' lives. The company offers spare parts to customers to repair furniture and to extend its useful lifetime. In several markets, IKEA has made it easier for customers to sell their used goods by introducing the Buy Back Program. When a product reaches the end of its useful life, IKEA collaborates with customers on recycling and responsible disposal.

IKEA aims to reduce the carbon footprint of transport by 70% on average and achieve an 80% reduction in logistics operations by 2040 using a 3R (Reduce, Replace, and Rethink) approach to sustainable logistics. Reduce is working with suppliers to lower fuel and energy consumption. Replace is switching to more sustainable/zero-emission fuels and renewable energy from fossil fuels. Rethink is the integration of innovations and new technologies into the value chain.

Green Supply Chain Management Practices at Nike

Nike, a global leader in athletic footwear and apparel, is committed to sustainability through GSCM practices [10]. By integrating environmental responsibility into its core operations, Nike ensures that sustainability is a key component of its business strategy. All suppliers must value water, minimize air emissions and waste, handle waste properly, and manage chemicals as specified in the Nike Code of Conduct. Similar to IKEA, Nike also participates in the BCI to support sustainable cotton farming. Nike uses polyester recycled from plastic bottles to reduce the need for virgin materials.

Nike is implementing many sustainable practices in its manufacturing processes. Flyknit is a lightweight fabric developed by Nike that produces 60% less waste on average than traditional uppers for footwear. Six to seven plastic

bottles are contained in each Flyknit shoe upper. Nike plans to use 50% environmentally friendly materials for all main materials and recycle at least 80% of waste back into products, thereby cutting GHG emissions by 0.5 million tons by 2025 as a part of its Move to Zero Program. The company aims to reduce freshwater usage in textile dyeing and finishing by 25% and operate its factories with 100% renewable energy by 2025. Moreover, Nike's target is to reduce global supply chain GHG emissions by 30% by 2030.

Since single-use plastic cannot be recycled, Nike uses fully recyclable packaging materials such as glassine, a pulp-based semi-transparent material. One Box, an innovative packaging design, eliminates the need for using an outer box for online delivery. Compared with conventional packing, One Box reduces waste by 51% for single online orders. Nike eliminated almost 9.5 million kilograms of waste by removing toe stuffing and dunnage from 84% of distribution centers during FY2021.

Nike has developed the Supply Chain Sustainability Index (SCSI) to set minimum sustainability requirements for its logistics service providers. The company optimizes shipping routes, consolidates shipments, and uses fuel-efficient transportation modes to minimize its carbon footprint. Nike has collaborated with the French shipping company CMA-CGM to use biofuel for 36% of its shipping volume, reducing CO_2 emissions by 25,000 tons within a year. Nike's European Logistics Campus in Belgium is fully powered by renewable energy from wind, solar, geothermal, hydroelectric, and biomass sources.

Nike has introduced several circular options under the Move to Zero initiative. Nike's Reuse-a-shoe Program allows customers to return used products for recycling and donation. Nike Grind is a material created from recycled shoes and surplus manufacturing materials. Its Refurbished Program identifies products that cannot be sold as new, refurbishes them, and sells them at discounted prices.

Nike collaborates with governments, NGOs, and industry groups to achieve sustainability goals. It supports the UN 2050 Net-zero Emissions Initiative, signed the UN Sustainable Fashion Charter for Climate Action, and is a pioneer member of both the BCI and Sustainable Apparel Coalition.

Similar to these two organizations, GSCM practices are being adopted by thousands of companies worldwide to reduce their environmental impact.

Figures 4, 5, and 6 illustrate some GSCM practices employed by organizations in PR China and Sri Lanka. Eco Spindles, the biggest plastic recycler in Sri Lanka (Figure 4), collects used plastic bottles and converts them into polyester yarn and other products, reducing waste and promoting a circular economy [11]. MAS Holdings, a large Sri Lankan clothing supplier to well-known global fashion companies, employs GSCM techniques such as sustainable sourcing, clean production, sustainable sampling, and recycled packaging. Its commitment to eco-friendly practices is shown in Figure 5. It has built an LEED-certified green manufacturing facility [12]. MAS Active used recycled polyester made of discarded PET waste produced by its partner Eco Spindles to produce the International Cricket Council (ICC) Men's T-20 World Cup Cricket Jersey for team Sri Lanka in 2022 [13].

GEM China, founded on the idea of "green eco-manufacture," focuses on minimizing waste and pollution by recycling electronic waste and used batteries. GEM extracts valuable minerals from old electronics, scrap vehicles, and batteries to create new products or reuse them in part manufacturing (Figure 6). GEM is listed in the Forbes China Sustainable Development Industrial Enterprises TOP50 [14].

FIGURE 4

CONVERSION OF WASTE TO VALUABLE PRODUCTS AT ECO SPINDLES SRI LANKA.

CONVERTING WASTE TO VALUABLE PRODUCTS

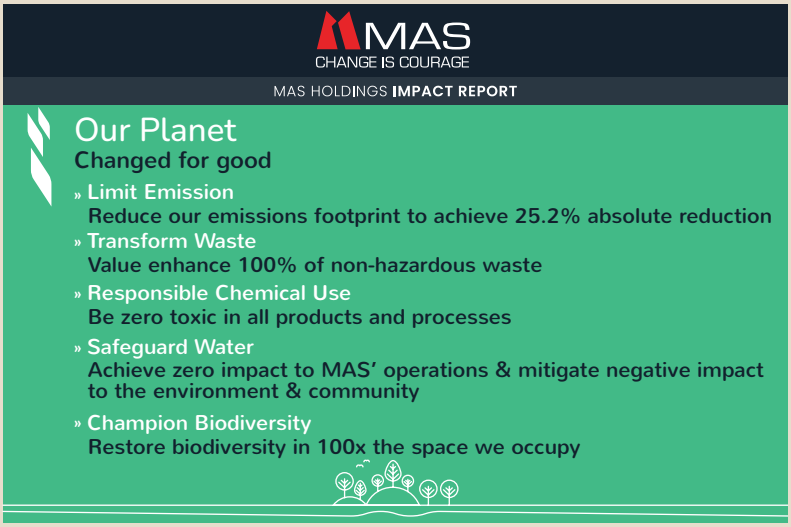
We give plastic waste a second life efficiently by using cutting edge recycling technology. This reduces environmental impact and results in high quality products.

Monofilaments **Yarn**

Source: Reproduced with permission from the Eco-spindles website [11].

FIGURE 5

MAS HOLDINGS, SRI LANKA, IMPACT REPORT.



Source: Reproduced with permission from MAS Holdings [15].

FIGURE 6

RESOURCE RECYCLING IN LIEU OF RAW ORE MINING IN GEM CO., LTD., PR CHINA (G-GREEN E-ECO M-MANUFACTURE).

Source: Reproduced with permission from GEM Urban Mine Business [16].

IMPACT OF GREEN SUPPLY CHAIN MANAGEMENT PRACTICES ON PRODUCTIVITY

One of the most widely used definitions of productivity is the ratio between input and output. The following section describes how the previously explained GSCM practices can enhance productivity in organizations.

Increased Sales

In a very competitive market, a company can differentiate itself by demonstrating its commitment to sustainability. The number of environmentally conscious customers is increasing worldwide. A survey conducted by IBM in 2020 revealed that nearly 70% of consumers in North America and Europe were willing to pay a premium for sustainable, eco-friendly products [17]. Businesses using GSCM can increase sales by attracting this customer group by highlighting eco-friendly practices such as sustainable sourcing, green manufacturing, carbon footprint reduction, and waste minimization. Since society has a positive image of companies adopting GSCM, they will be able to garner a reputation and brand image not only among environment-friendly customers but also among the general public. This strong brand identity attracts new customers and fosters loyalty among existing ones, ultimately increasing sales through positive word-of-mouth recommendations from loyal customers.

Cost Reduction

Two main elements of GSCM are the reduction of waste and the use of renewable energy. The first not only lowers disposal costs but also reduces raw material consumption and energy usage, and the second protects businesses from volatile conventional fuel prices and regulatory burdens. Further, the decreasing price of solar panels has reduced in-house energy-generation costs.

Traditionally, organizations adopted the cradle-to-grave, i.e., take-make-dump, approach. But businesses implementing GSCM adopt the cradle-to-cradle

approach, i.e., adding materials back to the production process when products reach their end of life, creating a closed loop. Nowadays, waste disposal has become expensive due to regulatory requirements. The use of recycled materials contributes to reductions in the cost of waste disposal and lowers potential fines and penalties. Not only does it decrease dependency on costly raw materials but also allows companies to earn extra revenue by selling recyclable materials such as scrap metal, plastics, and paper.

Regulatory Compliance and Incentives

Governments in both developed and developing countries are promoting policies to support sustainable practices and heavily punishing environmental damage. In some cases, management may face criminal charges. Organizations adopting GSCM practices have a low risk of facing potential fines or penalties. On the positive side, these organizations may be eligible for various incentives like tax concessions and grants offered for companies to adopt green initiatives. These financial benefits can be reinvested in the company, resulting in additional expansion and more sales.

Attracting Investors

Nowadays, sustainability is a major investment criterion, and therefore business organizations need to prioritize green initiatives if they wish to attract investors to secure capital for growth and operational performance improvements. A study conducted by Morgan Stanley in 2020 revealed that 85% of individual investors and 95% of millennials preferred sustainable investments [18]. Organizations adopting GSCM practices are attractive to these investors due to their compliance with environmental regulations, optimal resource utilization, and ability to attract the increasing eco-conscious customer base. These investments translate into increased sales and financial performance.

CHALLENGES AND BARRIERS IN IMPLEMENTING GSCM

Although GSCM contributes to the improvement of sustainability and productivity, there are many challenges in implementing it. While the benefits of GSCM are well documented, there are questions about the effectiveness of GSCM practices. One issue highlighted is the impact of GSCM practices on the economies and livelihoods of developing countries.

Companies are very particular about their suppliers' green credentials due to ever-growing stringent regulatory requirements, especially because noncompliance may lead to hefty penalties and reputational damage. Meeting these regulatory requirements by suppliers needs substantial investments to upgrade processes, introduce new technologies, reduce carbon footprints, introduce renewable energy sources, and train employees. These costs may diminish the competitive advantage enjoyed by companies, especially SMEs in developing countries due to low costs.

Another issue faced by developing countries is the relocation of manufacturing facilities at locations closer to end markets by companies in developed countries to reduce their carbon footprints. This practice, known as nearshoring, can reduce the demand for goods manufactured in countries such as Bangladesh, Indonesia, and Sri Lanka, which are currently major garment manufacturers but located far from major markets such as Europe and North America, leading to potential economic downturns, job losses, and decreased foreign investment. To mitigate these effects, government agencies and international organizations should work with private companies to provide financial support, technology, and training for companies in vulnerable countries to adopt green practices.

Greenwashing

Businesses are often accused of "greenwashing," where they overstate the benefits of green initiatives, such as using GSCM in marketing campaigns instead of adopting it. For example, a label of a product states "50% more recycled content than before" when the manufacturer has increased the

recycled content only to 3% from 2%. It has been reported that companies deceive environmentally conscious customers by creating false impressions about their products.

Sometimes green practices can have unintended negative environmental impacts. For example, electronic documents are considered as an eco-friendly alternative to paper. However, data centers where these electronic data are stored consume large amounts of electricity, often derived from nonrenewable sources. Similarly, expected benefits are not realized if EVs are charged with electricity generated from fossil fuels. In the case of solar power, it is cost-effective to replace solar panels after about 25–30 years [19]. However, incorrect disposal of products like solar panels and EV batteries owing to a lack of infrastructure may contaminate soil and water, undercutting the intended environmental benefits of green technologies. Biofuels, while eco-friendlier than fossil fuels, may increase food prices and aggravate food insecurity among vulnerable people if agricultural lands are used for farming biofuel crops.

Another green practice commonly adopted now is use of paper-based straws in the hospitality industry due to pressure from customers [20]. Although this will reduce plastic waste, it may increase deforestation. These examples demonstrate how well-intentioned green initiatives may sometimes create unintended negative environmental impacts. Hence, it is important to consider the overall benefits of GSCM practices in measuring their effectiveness.

CONCLUSION

A growing group of environment-friendly customers and investors and stringent regulatory frameworks introduced by governments have made GSCM a necessity rather than an option for businesses today. GSCM not only conserves the planet but also improves the productivity of organizations by increasing sales and decreasing costs. However, businesses in developing countries face challenges due to the implementation of GSCM. Another criticism against GSCM is that companies use GSCM only as a marketing tool to enhance their brand image. Therefore, a holistic approach is required in measuring the effectiveness of GSCM practices. Governments, international organizations, and businesses must support GSCM initiatives as they will contribute to creating a healthier planet as well as promoting economic prosperity.

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LIST OF FIGURES

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Watch the Productivity Talk on
Unlocking Productivity in Green Supply Chain Management