

CIRCULAR ECONOMY, SUSTAINABLE SUPPLY CHAIN AND GREEN MANAGEMENT

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ABSTRACT

In recent years, environmental concerns such as global warming, ozone layer depletion, pollution, waste management problems, resource depletion, etc., have increased significantly. These challenges are problems that threaten nature, human health, and future development. Businesses and governments are adopting new approaches to reduce environmental damage and promote economic growth with the protection of the environment and sustainable development. For achieving environmental sustainability and long-term economic growth, various initiatives have been adopted by nations. Important among them are the concepts of the circular economy, sustainable supply chain management, and green management.

KEYWORDS: *Circular Economy, Sustainable Supply Chain Management, and Green Management*

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Circular Economy:

We can consider our current economy as a “linear economy” built on the concept of a “take-make-dispose” model. Currently, only 7.2 percent of used materials are recycled into our economies after use. This has a significant burden on the environment and contributes to the climate, biodiversity, and pollution crises. The circular economy, on the other hand, is an economic system designed to eliminate waste and keep resources in use for as long as possible. It focuses on closing the loop. The concept of 3Rs is successfully getting implemented in the circular economy, where products and materials are reused, repaired, refurbished, and recycled rather than thrown away.

The concept of the circular economy can be explained with a simple example as follows:

- Linear economy: Buy a phone, use, and throw away.
- Circular economy: Buy a phone - repair - upgrade - resell - recycle parts.

Importance of Circular Economy:

In the past two decades, resource consumption has risen by over 65 percent globally. It reached 95.1 billion metric tons in 2019. Over 500 billion tons of materials were consumed in just the last five years leading to 2024. Only about 7.2% of materials in the global economy came from recycled sources. Meaning over 90% are virgin materials (newly extracted materials). The amount of electronic waste reached 7.3 kilograms per capita in 2019, and the majority is not managed in a sound way, harming the environment and our health. For the survival and well-being of the people and the planet, these statistics show us the importance of transforming the way we use and respect our finite resources. To return to safe limits of consumption, we need to reduce global material extraction and consumption by a third.

Green Supply Chain Management (GSCM) Green Supply Chain Management means making the entire supply chain environmentally friendly from raw material extraction to production, packaging, transportation, distribution, and recycling.

Key Components of Green Supply Chain Management:

- **Green purchasing:** That is buying eco-friendly raw materials. Example: using recycled paper instead of fresh paper.
- **Green manufacturing:** It means reducing waste and pollution during production, using renewable energy, etc.
- **Green packaging:** It includes using biodegradable or recyclable packaging and avoiding the use of plastic in packaging.
- **Green distribution:** It includes fuel-efficient transport, electric delivery vehicles, route optimization, etc.
- **Reverse logistics:** i.e., recycling, reusing, and returning products.

Various organizations adopt GSCM practices to drive sustainability through resource efficiency and environmental responsibility. For example, Apple's iPhone Recycling, IKEA's Buy Back and Resell policy with a focus on eco-friendly packaging and sourcing sustainable raw materials, and Patagonia's Repair and Reuse policy. Dell promotes GSCM through product take-back programs, recycling old electronics to reduce e-waste while ensuring sustainable material sourcing. Walmart has implemented sustainable sourcing for seafood, working with suppliers to meet environmental standards, thereby reducing its carbon footprint. Toyota, through its just-in-time and lean manufacturing, minimizes waste and emissions by optimizing production processes and sustainability. Unilever adopts GSCM by cutting greenhouse gas emissions and water usage across its supply chain through energy-efficient technologies and waste reduction.

GSCM offers numerous benefits, viz., it (i) minimizes waste, (ii) lowers carbon footprints, and (iii) enhances resource efficiency and environmental performance, thereby contributing to global sustainability goals. This also drives long-term organizational sustainability and competitive advantage.

Sustainable Supply Chain Management (SSCM): Sustainable supply chain management (SSCM) addresses external pressures and incentives set by different stakeholder groups (e.g., government regulators, environmental and social movements, community members, and consumers) with respect to the production and

consumption activities of companies and societies. It involves the integration of environmental considerations into supply chain processes, ensuring that all stages from raw material extraction to the disposal of a product are managed in a way that reduces ecological impact. Green Management practices are part of SSCM, focusing on reducing waste, conserving resources, and minimizing harmful emissions.

A sustainable supply chain integrates environmentally and socially responsible practices throughout the production and distribution processes. It prioritizes energy efficiency, ethical sourcing, waste reduction, and the use of eco-friendly materials. These practices not only minimize environmental impacts but also promote fair labor, community well-being, and compliance with environmental regulations. Sustainable supply chains enhance corporate reputations, attract eco-conscious consumers, and reduce operational risks, driving long-term financial performance.

Difference Between Circular Economy, Sustainable Supply Chain Management, and Green Supply Chain Management:

- **Circular economy:** It focuses on eliminating waste and maximizing resource use. It aims to create a system where materials are reused, remanufactured, and recycled, promoting a continuous flow of resources without waste.
- **Sustainable supply chain management (SSCM):** It emphasizes the integration of sustainability principles across all stages of the supply chain, including sourcing, production, and waste management. It aims to reduce environmental impact while balancing economic growth.
- **Green supply chain management (GSCM):** It involves eco-friendly practices throughout the supply chain, focusing on reducing resource consumption and minimizing environmental harm. It integrates sustainable sourcing, production, and logistics to optimize resource use and reduce pollution.

Measures Adopted to Ensure Sustainability in the Economy Through Circular Economy, Sustainable Supply Chain Management, and Green Management:

- **Technological Innovations:** Blockchain technology enhances

transparency and accountability by creating an immutable ledger of transactions, which helps organizations trace the origins of raw materials and verify their sustainability credentials. Technologies such as the IoT, AI, and big data analytics play crucial roles in optimizing sustainable sourcing. IoT provides real-time monitoring and data collection. AI leverages data analysis to enhance procurement strategies and identify sustainable suppliers. Big data analytics offers insights into supplier sustainability and market demand. This allows organizations to forecast accurately and adjust sourcing strategies accordingly.

- **Use of Innovative Sustainable Materials:** Innovations in materials science are introducing eco-friendly alternatives that significantly reduce environmental impacts compared to traditional materials. For instance, bioplastics made from renewable sources such as corn starch or sugarcane provide a sustainable alternative to petroleum-based plastics, minimizing reliance on fossil fuels (Coppola et al., 2021). Materials such as bamboo, which grows rapidly and requires minimal resources, are increasingly used as substitutes for conventional timber, supporting sustainable forestry practices.
- **Green Logistics and Energy-Efficient Warehouses:** Implementing green logistics practices and energy-efficient warehouses is crucial for minimizing the environmental impact of logistics operations. Green logistics practices include sustainable transportation and packaging. Innovations in sustainable distribution increasingly focus on adopting green transportation solutions, such as electric vehicles (EVs), alternative fuels, and optimized routing systems. Electric vehicles, powered by batteries, are gaining popularity for their ability to reduce greenhouse gas emissions and reliance on fossil fuels. Organizations are integrating EVs into their logistics fleets, particularly for last-mile delivery, where short distances and frequent stops are ideal for electric-powered transport. Alongside EVs, alternative fuels like biodiesel, hydrogen, and compressed natural gas offer greener options for larger, long-haul vehicles. These fuels produce fewer pollutants and can be sourced from renewable resources. This further enhances

sustainability.

Countries Leading in Green Management, Circular Economy, and SSCM:

- Kosovo is supporting innovative solutions and has developed a mobile app for identifying environmental pollution and misconduct in urban areas.
- Ghana is working to improve waste management by supporting entrepreneurs who are building houses made of recycled plastic waste.
- The Philippines has enacted a bill that requires large manufacturers to limit the use of plastic packaging and pay for the cost of managing plastic waste.
- Mexico is working to better connect circular economy solutions with its climate action plans. It is also developing and implementing training programs for subnational authorities to adopt sustainable development action plans.

Conclusion:

In conclusion, these three approaches together help organizations to reduce environmental degradation, conserve natural resources, lower operational costs, and improve corporate reputation. They also encourage innovations, efficient resource utilization, and sustainable development in the world economy. Conflicts among nations (Palestine-Israel war of 2025, Iran-US war of 2026) are playing a crucial role in damaging the world's natural resources as well as causing environmental pollution, and threatening the world economy, human health, and well-being. Therefore, adopting such measures by all the nations of the world in such times may create balance in the ecosystem to some extent and will help in achieving sustainable development during such a critical phase of the economy as well.

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