VIEW POINT

CIRCULAR SUPPLY CHAIN AND SCOPE 3 EMISSIONS

Abstract

Scope 3 emissions are the Achille's heel of corporate sustainability - difficult to measure, harder to control and often responsible for more than 70% of a company's carbon footprint. Traditional linear supply chains exacerbate this challenge by promoting a take-make-waste model that locks businesses into high emissions from raw material extraction, production and end-of-life disposal. This paper explores how the circular economy offers a strategic shift that not only reduces environmental impact but also strengthens supply chain resilience, cost efficiency and regulatory compliance.

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Introduction

39 Mn Tons

of unwanted clothes are discarded annually in the Atacama Desert in Chile

55%

of global emissions are addressed by renewable energy and improving energy efficiency

45%

emissions are associated with the production of everyday products

The linear economy, characterized by the 'take-make-waste' model, is widely recognized as damaging to the environment and the planet. Iconic images, such as a seahorse carrying a plastic ear stick that went viral in 2016, the Atacama Desert in Chile where approximately 39 million tons of unwanted clothes are discarded annually, and the 2019 discovery of a plastic bag in the Mariana Trench, the deepest known point in the world's oceans, highlight the severe exploitation and devastation of natural resources through the current economic model.

This growing awareness has captured the attention of conscious consumers and political forces alike, leading to increased exploration and promotion of the circular economy.

Additionally, several other factors are driving the push towards a circular economy. Disruptions in supply chains, experienced during the pandemic, the war in Ukraine, and natural disasters such as floods, wildfires, and earthquakes, have significantly impacted the global economy. These events have underscored the lack of resilience in current supply chains, further emphasizing the need for a more sustainable and robust economic model.

At the same time, in the face of the urgent global need to mitigate climate change, businesses are increasingly being driven by various regulations to reduce greenhouse gas (GHG) emissions. While the primary focus has been on the use of renewable energy and improving energy efficiency, these measures alone can address only 55% of global emissions, according to the Ellen MacArthur Foundation. The remaining 45% of emissions are associated with the production of everyday products, including food, clothing, cars, and household appliances.

This is where circular supply chains can play a significant role. By fundamentally changing the way goods are produced and used, circular supply chains offer a promising approach to address these emissions. The shift towards circularity is becoming imperative as it provides a pathway to sustainability and resilience, ensuring that products, components, and materials remain in use for as long as possible, thereby minimizing waste and reducing the overall carbon footprint.

By adopting circular supply chain principles, businesses can make substantial progress in reducing their Scope 3 emissions, contributing to a more sustainable and resilient future. This article explores the significant impact that circular supply chains can have on reducing Scope 3 emissions.

Understanding Scope 3 emissions

Scope 3 emissions account for approximately 70-90% of total company emissions

Scope 3 emissions, often referred to as "value chain emissions" or "indirect emissions" are the most challenging type of emissions for organizations to manage. These alternative names highlight the complex and interconnected nature of Scope 3 emissions. By definition, Scope 3 emissions are all indirect emissions that occur in a company's value chain, both upstream and downstream. They are influenced by a wide range of external factors and are typically the largest contributor to company's overall GHG emissions. Depending on the industry and company activities, Scope 3 emissions account for approximately 70-90% of total company emissions. It is no wonder that companies are actively seeking solutions to reduce and control these emissions.

What is circular supply chain?

A circular supply chain model seeks to establish a closed-loop system that eliminates waste and continuously makes use of resources through recycling, reusing, and refurbishing. This approach ensures that products, components, and raw materials remain in use for as long as possible, rather than being discarded at the end of their life cycle.
By adopting circular supply chain practices, companies can significantly reduce their Scope 3 emissions, contributing to a more sustainable and resilient future.
Below circular supply chain practices could have a positive impact on lowering emissions associated with the production and disposal of goods:

1. New approach to designing products

Design for longevity

This is a significant change in the paradigm of product design. Product should be designed to be durable, and their construction should enable repairs or maintenance. This reduces frequent replacements, which leads to reduction of emissions related to production and transportation. A significant change of the current paradigm where products' life is intended to finish along with warranty expiry.

Shifting towards cradle-to-cradle design philosophy

A philosophy that is inspired by natural processes where nothing is wasted, or everything can be reused. This is a holistic approach aiming at designing products that are efficient and regenerative, where waste is minimized or fully eliminated, where materials are continuously recycled or can be safely returned to the environment. This approach could positively impact emissions related to production and waste disposal.

Modularity and standardization

This approach makes it easier to repair or replace components of the product, allowing to extend life of the product.

2. Reverse Logistics

Circular supply chain cannot exist without optimized reverse logistics processes which play a critical role not only in collecting customer returns but also in inspecting and sorting used products and materials that will be subject to:

- Refurbishing
- Component recovery
- Material recycling
- Packaging re-use
- Environmental disposal

Thanks to reverse logistics a need for new raw materials can be reduced alongside the emissions associated with extraction and processing of those materials.

3. Resource Optimization

This is another critical element of the circular supply chains which aims to limit usage of the virgin raw materials and maximize the usage of the already existing materials in the supply chain. There are several strategies that reduce dependency on the raw materials:

- Use of recycled materials e.g., recycled plastic, metals, paper
- Improving resource efficiency by enhanced technology and process management e.g. application of techniques such as lightweighting (a process of reducing the weight of the product without compromising its functionalities and quality) can significantly reduce number of raw materials needed
- Use of bio-based materials that can replace some of the traditional virgin materials. This can be applied especially in the packaging where there is a need to replace plastic packaging and that can be done with e.g. bioplastics made from corn starch or sugarcane
- Involvement in Industrial Symbiosis, a concept which assumes collaboration between different industries whereby products or wastes of one company becomes a raw material for another company. By these resources can be utilized in a more efficient manner and wastes can be significantly reduced.

For example, Australia aims to boosts its economy by $26 billion over the next decade and divert 26 million tons of waste from landfills annually by doubling its circularity. This initiative focuses on enhancing the reuse, repair and recycling of materials to minimize waste and environmental impact.

Challenges

While circular supply chains offer substantial benefits in achieving sustainability goals, their implementation faces several significant challenges, limiting their current presence.

Entry Barriers

Transitioning from a linear to a circular supply chain is complex and entails high upfront costs. Companies need to redesign processes, develop new products, and adopt new supply chain management practices. This requires substantial investments in new technologies and infrastructure, which can be particularly challenging for small and medium-sized enterprises.

Collaboration and partnerships

Creating circular supply chains necessitates changes in collaboration and partnerships among various stakeholders. On one hand, it involves engaging new, small, local partners; on the other, it can foster collaboration among sectors that previously did not work together. Finding partners with the right skills can also be a challenge.

Reverse logistics

Efficiently managing reverse logistics is crucial to avoid additional energy consumption and waste generation. This complex process requires coordination among different stakeholders, robust data tracking, and technology.

Regulatory challenges

Regulatory frameworks vary across countries and are not always aligned with circular supply chains, complicating cross-border movement and resource management. For example, the definition of waste differs among countries and materials recycled in one country may still be treated as waste in another, imposing import restrictions. Additionally, customs systems are not adapted to circular supply chains, leading to higher tariffs on remanufactured goods.

Technological limitations

Recycling technology is currently limited to certain materials, and low demand coupled with a lack of regulations discourages further investments. Recycled materials may not meet quality standards or replicate aesthetic features. Moreover, recycling technologies themselves need to be evaluated for their environmental impact as all methods have some level of negative effect. Continuous innovation and improvement are essential to minimize these impacts.

Consumer behavior and perception

Transitioning to a circular economy also faces challenges due to current consumer behavior and perceptions. Many consumers have misperceptions about the quality of remanufactured, refurbished, or recycled goods, negatively impacting demand. Consumers often prioritize low prices and convenience over sustainability, favoring disposable products that are cheaper and more readily available. This preference hinders the adoption of circular products or services, which may be more expensive or require additional effort to access or maintain.

Conclusions

Circular supply chains offer immense potential benefits, particularly in reducing Scope 3 emissions and contributing to global sustainability goals. Beyond environmental impact, implementing circular practices can enhance resilience and competitiveness for organizations. However, despite the concept's long-standing presence, fully adopting circular supply chains remains challenging, and current implementations are often fragmented.

Organizations face various barriers and challenges across different countries, indicating that there is no one-size-fits-all solution. Therefore, the circular supply chain model should not be viewed as a utopian, single best approach. Instead, it should be seen as a flexible model that requires deep cooperation, expertise, and greater harmonization. This approach will enable companies to define appropriate strategies tailored to their specific contexts and needs.

By fostering collaboration and leveraging expertise, companies can overcome these challenges and unlock the full potential of circular supply chains, driving both sustainability and business success.

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