

# Sustainable Supply Chain Management for a Circular Economy

Subjects: **Engineering, Environmental**

Contributor: Jorge Cerqueira-Streit

Sustainable supply chain management (SSCM) can implement ecological innovations that would collaborate to preserve the environment. Even more broadly, the circular economy (CE) emerges as a component for sustainable development, as it involves activities such as repair, reuse, refurbishment, and recycling. Thus, we conducted an integrative review of the international articles that relate the SSCM with CE.

circular economy

sustainable supply chain management

integrative literature review

## 1. Circular Economy (CE)

Circular economy (CE) is an alternative to the traditional economic model that has proved highly polluting and degrading for natural resources and has negative consequences for society. This alternative would seek the reinsertion in the productive chain of those products that have reached the end of their useful life [1]. By denying the concept of waste, the CE aims to close loops in industrial ecosystems by applying at least the “3Rs” of environmental management: Reduce, Reuse, and Recycle [2].

Basically, by seeking to ‘Reduce’, companies reduce raw materials and energy consumption. According to the principle of ‘Reuse’, organizations aim to develop products that are more durable and capable of repair. Finally, ‘Recycling’ ensures that the material returns to the production process for remanufacturing or other components used. Thus, each of the “3R” contributes to waste generation prevention and reduction [3].

To extend the life of products beyond these three basic strategies, authors expand to “6R” and even “10R”. For instance, [4] studied the Eco-Industrial Parks as an organization of companies capable of sharing raw materials, energy, and waste. According to the authors, during the construction of an industrial ecology model, “6Rs” must be respected, adding to the first three the logic of ‘Recovery’, ‘Redesign’, and ‘Remanufacture’ [4].

‘Recovery’ would come through reverse logistics bringing used products back into the supply chain, helping companies to reduce waste and add value to the product again. ‘Redesign’, in turn, can be either at the product level, aiming to facilitate recycling, for example, or in a broader sense, to obtain a systemic approach of actors and flows redesigning the supply chain for the circular economy [5]. The process of dismantling the product for reuse of components and resale in the secondary market, known as ‘Remanufacture’, is considered essential for closing the loop in the supply chain, as it creates businesses and integrates actors [6].

Even with product recovery rates around 93% and recycling rates reaching 79%, the Dutch Ministry of Infrastructure and Environment warns that the consumption of natural resources remains high [7]. One of their reports emphasizes that, in addition to technological innovations, socio-institutional innovations are necessary to reach the “10Rs” that the transition to Circular Economy requires. In addition to the six mentioned above, the report includes ‘Rethinking’, ‘Repairing’, ‘Refurbish’, and ‘Repurpose’. By ‘Rethinking’, multifunctional or sharable products would be put on the market, while ‘Repair’ would re-establish its original function, rather than being swapped for a new one. When ‘Refurbishment’, there would be product updates overcoming the obsolescence issue, and ‘Repurpose’ gives new functions to the products (or parts of it) that would be discarded [7].

Although the concept of circular economy is not necessarily new, it has gained increasing visibility since China sanctioned public policies that include targets for CE and the European Union presented guidelines for all countries of the economic bloc [8]. Based on the pioneering spirit of China and Europe, several countries around the world are already studying this paradigm as a way to foster innovations in the sectors of public and private administration. From the circular economic perspective, the article [5] investigated the implementation of reverse packaging logistics in Brazil. The authors emphasized the importance of the government demanding integration of the actors in the fulfilment of the sectoral agreements. In addition, they stated that there is little applicability of the principle of shared responsibility and little effective integration of waste pickers [5].

In short, organizations align themselves with the Circular Economy by seeking to remove as much value as possible from products and their components through a restorative and regenerative system from the design [9]. The adoption of six principles can serve as a guide for public or private organizations to eliminate the concept of waste and maximize the usefulness of products by transferring the material as input in another chain. The ReSOLVE method provides primary and secondary metrics for adopting practices that emphasize Regeneration, Sharing, Optimization, Looping, Virtualization, and Exchange [10]. Companies such as Nespresso, Dell, Toyota, Airbnb, and Netflix have already adopted part of these principles and are transforming their customers' lives positively, minimizing social and environmental impacts [10].

The concept of circular economy has received attention from public policymakers, managers, and scientists [5], mainly because it helps undo the idea that economic growth implies damages of the environment. This comprehension represents a minimum condition for achieving sustainability [11]. The circular economy principles are ambitious in going beyond sustainable practices in the supply chain. Still, the constant pursuit of these practices is essential for the transition toward the circular economy [12].

## 2. Sustainable Supply Chain Management (SSCM) and Circular Economy (CE)

Supply chain management is defined as the grouping of three or more organizations, which may be suppliers or final customers interconnected by means of products or services and information. Efficient coordination is necessary, mainly if these organizations are located in different locations around the world. With proper long-term management, performance tends to improve for all supply chain participants [13].

In recent years, supply chain managers have had to worry about issues related to sustainability. As stakeholders are demanding that organizations pay attention to their operations' environmental and social issues, these managers occupy a position that may positively or negatively impact operations [14]. The search for introducing the concept of sustainability into the supply chain led [15] to carry out a literature review to understand how economic, environmental, and social performance takes place in the context of the supply chain. The supply chain's participants themselves can take actions to reduce packaging, improve the conditions of employees in warehouses, use transport more efficiently, and demand that suppliers carry out environmental and social programs [15].

According to [16], researchers often confuse sustainable supply chain management (SSCM) with green supply chain management (GSCM). The author explains the mistake by explaining that many economies have already overcome social issues such as forced labour, analogous to slavery or child labour, which is why they focus on environmental issues. However, it is noteworthy that there are still countries with social problems (mainly in the southern hemisphere of the planet), and therefore, it is worth explaining GSCM as a step toward reaching SSCM, which incorporates the balance between the economic, environmental, and social pillars [16].

Sustainable supply chain management seeks to break the barrier that only monetary targets related to operational efficiency and cost reduction [17]. Environmental and social issues should also be included. After all, experts state that this model contributes to acting in a scenario of the scarcity of natural resources and helps stakeholders enhance their performance in other areas, which are being increasingly charged [12].

Regarding the advancement of supply chain management and research, [18] point out that after the pandemic, supply chains will undergo changes, more regional consumers, seeking shorter chains and even participating directly in production, opening space for government interference. Therefore, it is understood that the SSCM will have to face several post-pandemic challenges, mainly from the perspective of sustainable consumption.

The idea of making a supply chain more circular would therefore be the construction of a complex system of relationships that is determined to make the production cycle slower, narrower, and closed [19]. The systematic literature review carried out by these authors highlights that it is necessary to create, capture, and transfer value between the agents in the chain to have positive managerial implications. Waste management, post-sale and post-consumption reverse logistics, as well as product upgrades and promotion actions, are fundamental instruments in this more circular model [19].

In the review carried out by [20], the authors discuss each of the eight main supply chain management processes, relating them to the five principles of circular economy identified in the literature. According to this paper, Circular Economy has not yet achieved the deserved prominence in journals in operations and logistics, which indicates a pioneering spirit for those who publish works that relate the theme to supply chain management. In the opinion of these authors, literature reviews that work at the intersection of themes would be helpful to understand the way scientists are trying to provide solutions to the challenges that organizations currently face [20].

As a scientific contribution, this work provides a list of further research to inspire researchers to advance in scientific knowledge, suggestions contained in the main papers on the subject. Additionally, for academics, this work is relevant because it demonstrates a new search protocol, already tested, but not yet used in reviews that relate to the themes studied. Finally, even though this is a theoretical discussion, there are still no studies that discuss the opportunities and challenges of implementing the CE in the supply chain in this context of the post-pandemic of COVID-19.

## References

1. Stahel, W.R. The circular economy. *Nature* 2016, 531, 435–438.
2. Su, B.; Heshmati, A.; Geng, Y.; Yu, X. A review of the circular economy in China: Moving from rhetoric to implementation. *J. Clean. Prod.* 2013, 42, 215–227.
3. Kuo, T.-C.; Chiu, M.-C.; Chung, W.-H.; Yang, T.-I. The circular economy of LCD panel shipping in a packaging logistics system. *Resour. Conserv. Recycl.* 2019, 149, 435–444.
4. Castiglione, C.; Alfieri, A. Supply chain and eco-industrial park concurrent design. *IFAC-PapersOnLine* 2019, 52, 1313–1318.
5. Bressanelli, G.; Perona, M.; Saccani, N. Challenges in supply chain redesign for the Circular Economy: A literature review and a multiple case study. *Int. J. Prod. Res.* 2018, 57, 7395–7422.
6. Raza, S.A. A systematic literature review of closed-loop supply chains. *Benchmarking Int. J.* 2020, 27, 1765–1798.
7. Potting, J.; Hekkert, M.; Worrell, E.; Hanemaaijer, A. Circular Economy: Measuring Innovation in the Product Chain; PBL Netherlands Environmental Assessment Agency: The Hague, The Netherlands, 2017.
8. Boesen, S.; Bey, N.; Niero, M. Environmental sustainability of liquid food packaging: Is there a gap between Danish consumers' perception and learnings from life cycle assessment? *J. Clean. Prod.* 2018, 210, 1193–1206.
9. Guarnieri, P.; Streit, J.A.C.; Batista, L.C. Reverse logistics and the sectoral agreement of packaging industry in Brazil towards a transition to circular economy. *Resour. Conserv. Recycl.* 2019, 153, 104541.
10. Batista, L.; Gong, Y.; Pereira, S.; Jia, F.; Bittar, A. Circular supply chains in emerging economies—A comparative study of packaging recovery ecosystems in China and Brazil. *Int. J. Prod. Res.* 2018, 57, 7248–7268.
11. EMF, Ellen MacArthur Foundation. Growth Within: A Circular Economy Vision for a Competitive Europe; Ellen MacArthur Foundation: London, UK, 2015.

12. Lopes de Sousa Jabbour, A.B.; Rojas Luiz, J.V.; Rojas Luiz, O.; Jabbour, C.J.C.; Ndubisi, N.O.; Caldeira de Oliveira, J.H.; Junior, F. H Circular economy business models and operations management. *J. Clean. Prod.* 2019, 235, 1525–1539.
13. Genovese, A.; Acquaye, A.A.; Figueroa, A.; Koh, S.L. Sustainable supply chain management and the transition towards a circular economy: Evidence and some applications. *Omega* 2017, 66, 344–357.
14. Pishchulov, G.V.; Richter, K.K.; Pakhomova, N.V.; Tsenzharik, M.K. A circular economy perspective on sustainable supply chain management: An updated survey. *St Petersburg Univ. J. Econ. Stud.* 2018, 34, 267–297.
15. Carter, C.R.; Easton, P.L. Sustainable supply chain management: Evolution and future directions. *Int. J. Phys. Distrib. Logist. Manag.* 2011, 41, 46–62.
16. Carter, C.R.; Rogers, D.S. A framework of sustainable supply chain management: Moving toward new theory. *Int. J. Phys. Distrib. Logist. Manag.* 2008, 38, 360–387.
17. Fritz, M. Sustainable supply chain management. In *Responsible Consumption and Production. Encyclopedia of the UN Sustainable Development Goals*; Leal, F.W., Azul, A., Brandli, L., Özuyar, P., Wall, T., Eds.; Springer: Berlin/Heidelberg, Germany, 2019; pp. 1–14.
18. Mosteanu, N.R.; Faccia, A.; Ansari, A.; Shamout, M.D.; Capitanio, F. Sustainability integration in supply chain management through systematic literature review. *Qual.-Access Success* 2020, 21, 117–123.
19. Jabbour, C.; Jabbour, A. COVID-19 is Contaminating the Sustainability of Supply Chains. *Supply Chain Manag. Rev.* 2020, 1–2. Available online: [https://www.scmr.com/article/covid\\_19\\_is\\_contaminating\\_the\\_sustainability\\_of\\_supply\\_chains](https://www.scmr.com/article/covid_19_is_contaminating_the_sustainability_of_supply_chains) (accessed on 16 November 2021).
20. Centobelli, P.; Cerchione, R.; Chiaroni, D.; Del Vecchio, P.; Urbinati, A. Designing business models in circular economy: A systematic literature review and research agenda. *Bus. Strat. Environ.* 2020, 29, 1734–1749.
21. Hazen, B.T.; Russo, I.; Confente, I.; Pellathy, D. Supply chain management for circular economy: Conceptual framework and research agenda. *Int. J. Logist. Manag.* 2020, 32, 510–537.

Retrieved from <https://encyclopedia.pub/entry/history/show/40716>