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Opportunities and challenges in the implementation of a closed-loop supply chain

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Abstract
As the world continues to grapple with the environmental impact of industrialization, businesses are seeking ways to lower their carbon footprint and encourage sustainable practices. One such approach is implementing a closed-loop supply chain. Closed-loop supply chain (CLSC) is an innovative approach that integrates forward and reverse logistics to create a closed-loop system of material flows, thus reducing waste and improving sustainability. It emerged as an important strategy for businesses to minimize the environmental effects, reduce the use of natural resources, conserve resources, and cut down the expenses. CLSCs have gained increasing popularity in recent years due to their potential to improve sustainability and maximize the value of products throughout their lifecycle. While many countries have adopted closed-loop supply chain practices, some have been particularly active in promoting and implementing them. This review highlights the opportunities and challenges associated with implementing a closed-loop supply chain.
Keywords: closed-loop supply chain, sustainable production, sustainable supply chain management, sustainable manufacturing, review

Introduction
The level of carbon dioxide (CO_2) present in the atmosphere has risen from approximately 280 ppm before industrialization to 391 ppm in 2011 [1]. By 2014, the concentration surpassed 400 ppm. Thankfully, several nations have established ambitious carbon emission reduction goals for the long term. For example, the United States is working towards reducing all carbon emissions from power plants that provide energy to American homes and businesses by the year 2035. This is an initial action toward the larger objective of completely eliminating greenhouse gas emissions throughout the economy by the middle of this century in order to control the effects of atmospheric changes [3]. The UK has become the first major economy worldwide to pass laws that by 2050 they will completely eliminate its contribution to global warming, necessitating the achievement of net zero greenhouse gas emissions by 2050, surpassing the earlier level of reducing emissions by at least 80% from 1990 levels [4].

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In March 2018, the Chinese government made a declaration of successfully meeting its 2020 Copenhagen emission-lowering targets, encompassing a 40 to 45 percent reduction in carbon intensity [5] while India has recently pledged to reduce its GDP's emissions intensity by 45 percent, by the year 2030 [6]. Brazil has also set targets to reduce its GHG emissions, relative to 2005 levels [7]. The production processes that occur all over the globe, generate waste and emissions that significantly contribute to environmental problems. To address these issues, pollution prevention is viewed as a critical approach [8]. In concern with environmental problems, to adopt practices such as remanufacturing, recycling, etc., numerous organizations have introduced closed-loop supply chain (CLSC) systems [9].

There are numerous definitions available for a supply chain. According to Beamon B. [10], a SC is a ordered process of manufacturing in which raw resources are converted into finished products, then transported to end customers. According to Pienaar W. [11], a supply chain is the process of integrating multiple organizations to convert raw materials into finished products and deliver them to the end user. According to Trevor et al. [12], “a supply chain is a network of producers, suppliers, distributors, retailers, as well as transportation, information system, and other logistics providers”. This network includes both external and internal partners of the company. The forward supply chain consists of a sequence of actions that are involved in converting basic raw materials into finished products whereas the reverse supply chain encompasses the various steps needed to recover a product from a customer to dispose it or extract its residual value [13].

According to Guide Jr. et al. [14] CLSC management refers to the process of designing, managing, and operating a system that aims to maximize the value generated throughout a product's entire lifecycle, by dynamically extracting value from different kinds and quantities of returns throughout a period of time. The primary objective of CLSC is centered on retrieving products from end user and obtaining additional value by repurposing the complete product or certain parts, components or modules of it [15]. Hence, the CLSC involves the recovery of products at the end of their use, followed by the processes such as remanufacturing, refurbishing, or recycling to create new products. This not only minimizes waste and environmental impact but also reduces the need for raw materials and saves energy [16]. To create an effective CLSC, a collaboration between stakeholders in the supply chain is crucial, including manufacturers, distributors, retailers, and recycling or disposal companies [17]. By adopting a CLSC, companies can improve their sustainability efforts, reduce costs, and enhance their brand image [18]. Various companies including Nike [19], Dell [20], IKEA [21], Coca-Cola [22], H&M, Zara, Prenatal, Oviesse [23], Hewlett-Packard, and Toyota [24] have already adopted CLSC. Table 1 shows more companies that have adopted CLSC. The current study investigates the benefits of implementing CLSC and the challenges in its implementation.

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Table 1 Companies that have adopted CLSC

Company	Website
Nike	https://www.nike.com/in/sustainability
Dell	https://www.dell.com/en-us/dt/corporate/social-impact/advancing-sustainability/accelerating-the-circular-economy.htm#tabo=0
Unilever	https://www.unilever.com/sustainable-living/the-sustainable-living-plan/reducing-environmental-impact/waste-and-packaging/closed-loop-packaging.html
IKEA	https://about.ikea.com/en/sustainability
Interface	https://www.interface.com/US/en-US/sustainability/product-transparency.html
Patagonia	https://www.patagonia.com/worn-wear.html
Nestle	https://www.nestle.com/sustainability/sustainable-sourcing/coffee
H&M	https://www2.hm.com/en_in/sustainability-at-hm.html
Toyota	https://www.toyota-global.com/sustainability/sdgs/challenge_2050/circular_economy/
Coca-Cola	https://www.coca-colacompany.com/news/moving-toward-a-circular-economy
Apple	https://www.apple.com/supplier-responsibility/pdf/Apple_SR_2021_Progress_Report.pdf
Levi Strauss & Co.	https://www.levistrauss.com/2021/03/22/circularity-comes-to-life-through-water-recycling/
Adidas	https://www.adidas-group.com/en/sustainability/environmental-impacts/more-sustainable-materials-and-circular-services/
Procter & Gamble	https://us.pg.com/blogs/accelerating-recycling-and-sustainable-packaging/
HP Inc.	https://www.hp.com/us-en/hp-information/sustainable-impact/planet-product-recycling.html

Benefits of CLSC

Implementation of CLSC can provide several benefits to businesses, such as reducing waste, conserving resources, improving customer satisfaction, and increasing profitability. Several other benefits of CLSC are given below.

Environmental Sustainability

One of the most significant benefits of CLSC is its potential to reduce the environmental impact of manufacturing and supply chain operations. Each product that is created, transported, utilized, and disposed of within a supply chain has a certain level of environmental impact. This impact is determined by the materials and energy used, as well as the waste produced throughout the product's life cycle [25]. Researchers have taken an interest in incorporating recovery processes into the existing supply chain to promote its environmental sustainability due to alarming global warming issue and the increasing amount of e-waste. Minimizing the negative effects of the activities of the supply chains on the environment should be a key objective of a Green Supply Chain [26]. Integrating inter-organizational information and strategies, such as product recovery to avoid waste material dissipation, can help organizations promote themselves as environmentally and socially responsible by generating efficient flow in their networks [27]. The CLSC offers multiple methods for recovery and disposal, which include reuse, repair, refurbishing, and recycling, and are of a high value [28].

Cost Savings

To achieve a closed-loop supply chain, products must be retrieved from the end-user and transported back to the OEM for final disposal, which can include repair, remanufacturing, or recycling [29]. This can significantly reduce their raw material costs. By implementing CLSC, companies can reduce costs by extending the lifespan of their products [30]. Guide Jr. et al. [15] discuss how closed-loop supply chains can lead to cost savings by reducing waste, improving resource efficiency, and enhancing customer satisfaction. Zailani et al. [30] have examined that companies that implement CLSC practices such as product recovery and recycling can reduce costs associated with waste disposal and raw material procurement.

Resource Conservation

One of the critical aspect of sustainable supply chain management is resource conservation and CLSC is an effective way to achieve it. In a CLSC, the products are designed and manufactured to be reused, remanufactured, or recycled at the end of their life cycle. By keeping materials and products in use for longer, CLSC can reduce the need for raw materials, minimize waste, and mitigate environmental impacts. Asif et al. [31] have explained the concept of Resource Conservative Manufacturing (ResCoM) which deals with resource conservation through multiple life cycles of the product. Bell et al. [32] have emphasized the necessity for advanced closed-loop capabilities that can address the issue of limited natural resources.

Improved Customer Satisfaction

By the adoption of CLSC, the companies can gain greater control over their products throughout their entire life cycle, from production to disposal. This enables companies to ensure that their products meet the needs of their customers and maintain their quality over time. Additionally, closed-loop supply chains allow companies to offer customers additional services such as repair and recycling, which can further enhance customer satisfaction. Tracht et al. [33] have emphasized on customer satisfaction in closed-loop supply chains. Companies can enhance customer satisfaction by identifying the reasons for returns and determining the sources of returns, which can assist in uncovering the possible advantages of creating reverse chains that are more effective [34].

Countries that have adopted CLSC

One of the countries that have taken a leading role in the adoption of CLSC is the Netherlands. Circular economy is being aggressively implemented in the Netherlands by an increasing number of businesses, government, people, and research organisations, which has led to the creation of several intriguing new initiatives [35]. The National Circular Economy Program outlines the Netherlands government's aim. Its objective is to achieve sustainable economic expansion through the integration of ecological and economics after moving through circular economy [36].

Another country that has made strides in closed-loop supply chain adoption is Japan. Japan has long been known for its resource-efficient production practices, and in recent years, the country has made significant investments in circular economy initiatives. For example, manufacturers and importers are required by Japanese e-waste legislation to return used devices for recycling and trash management [37]. Japanese businesses have also taken an active role in developing closed-loop supply chains, with companies like Toyota leading the way in adopting circular economy principles [38].

Germany is another country that has been active in promoting closed-loop supply chain practices. The battery decree lays out detailed guidelines for collecting and recycling used batteries in Germany. Manufacturers and importers have the option to collaborate and establish a collective system, or they can individually organize and manage their own distinct systems to collect and recycle. The individual takeback systems are required to achieve a return rate that is equivalent to, or greater than, the return rate of the joint system. The take-back system in the country that is most frequently used was founded as the joint take-back system. This system is mostly used by the majority of producers and importers of portable batteries in Germany [39]. Germany has a long-standing end-of-life vehicle (ELV) recycling infrastructure that has been growing [40].

In addition to these countries, many others have adopted closed-loop supply chains to varying degrees. According to several research, the emergence of environmentally friendly manufacturing has made CLSC management an opportunity to increase organisational competitiveness and adhere to environmental regulations set forth by various regulatory agencies. In the past ten years, particularly in the European Union, legislation that is focused on products has exacerbated this tendency [40-42]. China has also implemented the CLSC practices. China has implemented a number of rules and subsidies to help the battery recycling sector for electric vehicle’s battery recycling [43].

Challenges of implementing CLSC

Complex Logistics

Closed-loop supply chains require the management of multiple flows of products, including forward and reverse logistics, which can be complex and difficult to coordinate. Different stages of the chain supply are possible showstoppers since reverse supply chains and their settings are yet not firmly established. The activities are intertwined, reinforce one another, and are frequently dependent on corporate operations outside the supply chain, such as product development and marketing [44]. The integration of forward and reverse transportation in a closed-loop network is highly complex, particularly when uncertainties and the overall system's dynamics are taken into account. A significant portion of research in the field of remanufacturing, as well as the hybrid context, focuses on either the strategic creation of a closed-loop system or the practical and operational planning of production and inventory management, typically over discrete periods of time. This complexity arises due to the interdependence of various factors, such as product quality, consumer behavior, supply chain visibility, and technological advancements, which can impact the efficiency, cost-effectiveness, and sustainability of CLSC [45]. The number of nonlinear interactions may increase due to the systematic linkage between forward and reverse supply chain activities [46].

Lack of infrastructure

Closed-loop supply chains require specialized infrastructure, such as collection and sorting facilities, processing centers, and recycling plants. However, such infrastructure may not be readily available or cost-effective in certain locations. Lapko et al. [47], highlight the importance of investing in infrastructure development to establish CLSC for critical raw materials. The manner in which recycling is carried out can be significantly influenced by the availability of well-established industrial infrastructure.

Cost and profitability

CLSC implementation can be expensive, especially in the initial stages. Moreover, closed-loop supply chains would not always be financially successful because the value of returned goods might be less than the expense of handling and recycling them. Taking the case of photovoltaics (PV), the cost of recycling PV waste is too high. Recycling is in competition with landfills and low-value recycling because of its high cost [48]. Making sustainable items and handling return costs more than producing regular products is another red flag for businesses. As a result, funding innovation-led lean programmes within CLSC might have a beneficial or negative impact on process innovation [49].

Stakeholder Collaboration

Closed-loop supply chains require collaboration between multiple stakeholders, including manufacturers, retailers, consumers, and recycling companies. However, stakeholders may have different priorities, goals, and incentives, which can make collaboration challenging. Value is produced for an organisation when its primary stakeholders join together with a stated shared sense of value and an understanding of its purpose [50]. Koppius et al. [51] in a study have emphasized that although implementing information systems in CLSCs can yield significant benefits, stakeholder participation is essential to maximize these benefits.

Conclusion

In this paper, we have reviewed the advantages and disadvantages of CLSCs. The implementation of the CLSC in various countries has also been highlighted. Given the growing environmental issues, it is critical to implement sustainable practices to recycle and reuse materials. As one of the best ways to contribute to a reduction in environmental problems, CLSC has become popular and extremely well-liked among researchers. Owing to its capabilities for material reuse and recycling, it considerably aids in the preservation of diverse natural resources. In addition to environmental sustainability, it provides multiple benefits to businesses such as cost savings and increased consumer satisfaction. The implementation of it, however, is also hampered by a number of challenges and limitations. Forward SC and CLSC are substantially different from one another in a number of ways. As a very complicated management process, CLSC is challenging to put into practice. Its implementation is being emphasized by a number of nations considering its benefits to the environment. Many companies, including those in the automotive and battery sectors, have implemented CLSC in different nations. Even though many nations have implemented CLSC, it is a challenge for several nations to implement it. In order to enable such countries to implement CLSC, this still has to be researched.

References

[1] Hegerl, Gabriele, and Peter Stott. "Detection and Attribution of Climate Change (from global to regional)." In *EGU General Assembly Conference Abstracts*, p. 4378. 2014.
[2] Huisingh, Donald, Zhihua Zhang, John C. Moore, Qi Qiao, and Qi Li. "Recent advances in carbon emissions reduction: policies, technologies, monitoring, assessment and modeling." *Journal of cleaner production* 103 (2015): 1-12.
[3] https://www.npr.org/2022/12/05/1139401121/the-u-s-wants-to-slash-carbon-emissions-from-power-plants-natural-gas-is-in-the-#:~:text=Under%20President%20Joe%20Biden%2C%20the,to%20rein%20in%20climate%20change.
[4] https://www.gov.uk/government/news/uk-becomes-first-major-economy-to-pass-net-zero-emissions-law
[5] https://chinapower.csis.org/china-greenhouse-gas-emissions/
[6] https://pib.gov.in/PressReleseDetail.aspx?PRID=1885731
[7] https://www.enerdata.net/publications/daily-energy-news/brazil-updates-its-ndc-again-2030-emission-target-higher-2015.html
[8] Min, Hokey, and William P. Galle. "Green purchasing strategies: trends and implications." *International Journal of Purchasing and Materials Management* 33, no.

2 (1997): 10-17.
[9] Panda, Shibaji, Nikunja Mohan Modak, and Leopoldo Eduardo Cárdenas-Barrón. "Coordinating a socially responsible closed-loop supply chain with product recycling." *International Journal of Production Economics* 188 (2017): 11-21.
[10] Beamon, Benita M. "Supply chain design and analysis: Models and methods." *International journal of production economics* 55, no. 3 (1998): 281-294.
[11] Pienaar, W. "Introduction to business logistics." *Southern Africa: Oxford University* (2009).
[12] Heaver, Trevor, and Garland Chow. "Logistics strategies for North." *Global Logistics and Distribution Planning: Strategies for Management* (2003): 413.
[13] Kocabasoglu, Canan, Carol Prahinski, and Robert D. Klassen. "Linking forward and reverse supply chain investments: The role of business uncertainty." *Journal of Operations Management* 25, no. 6 (2007): 1141-1160.
[14] Guide Jr, V. Daniel R., and Luk N. Van Wassenhove. "OR FORUM—The evolution of closed-loop supply chain research." *Operations research* 57, no. 1 (2009): 10-18.
[15] Pedram, Ali, Nukman Bin Yusoff, Olugu Ezutah Udoncy, Abu Bakar Mahat, Payam Pedram, and Ayo Babalola. "Integrated forward and reverse supply chain: A tire case study." *Waste Management* 60 (2017): 460-470.
[16] Schenkel, Maren, Harold Krikke, Marjolein CJ Caniëls, and Erwin van der Laan. "Creating integral value for stakeholders in closed loop supply chains." *Journal of Purchasing and Supply Management* 21, no. 3 (2015): 155-166.
[17] Shaharudin, Mohd Rizaimy, Keah Choon Tan, Vijay Kannan, and Suhaiza Zailani. "The mediating effects of product returns on the relationship between green capabilities and closed-loop supply chain adoption." *Journal of cleaner production* 211 (2019): 233-246.
[18] Hagoort, Sander. "Evaluating the impact of closed loop supply chains on Nike's environmental performance and costs." PhD diss., MSc Thesis, Operations Management and Logistics, Eindhoven University of Technology, Eindhoven, 2013.
[19] Jalali, Hamed, Amir Ansaripoor, Vinay Ramani, and Pietro De Giovanni. "Closed-loop supply chain models with coopetition options." *International Journal of Production Research* 60, no. 10 (2022): 3078-3106.
[20] Jia, Fu, Yu Gong, and Steve Brown. "Multi-tier sustainable supply chain management: The role of supply chain leadership." *International Journal of Production Economics* 217 (2019): 44-63.
[21] Liu, Ying, Lin Ma, and Yankui Liu. "A novel robust fuzzy mean-UPM model for green closed-loop supply chain network design under distribution ambiguity." *Applied Mathematical Modelling* 92 (2021): 99-135.
[22] Genc, Talat S., and Pietro De Giovanni. "Closed-loop supply chain games with innovation-led lean programs and sustainability." *International Journal of Production Economics* 219 (2020): 440-456.
[23] Tsao, Yu-Chung, Vu-Thuy Linh, and Jye-Chyi Lu. "Closed-loop supply chain network designs considering RFID adoption." *Computers & Industrial Engineering* 113 (2017): 716-726.

[24] Tsoulfas, Giannis T., and Costas P. Pappis. "Environmental principles applicable to supply chains design and operation." *Journal of Cleaner production* 14, no. 18 (2006): 1593-1602.
[25] Garg, Kiran, Devika Kannan, Ali Diabat, and P. C. Jha. "A multi-criteria optimization approach to manage environmental issues in closed loop supply chain network design." *Journal of Cleaner Production* 100 (2015): 297-314.
[26] Govindan, Kannan, Prakash C. Jha, and Kiran Garg. "Product recovery optimization in closed-loop supply chain to improve sustainability in manufacturing." *International Journal of Production Research* 54, no. 5 (2016): 1463-1486.
[27] Kumar, Sameer, and P. Malegeant. "Strategic alliance in a closed-loop supply chain, a case of manufacturer and eco-non-profit organization." *Technovation* 26, no. 10 (2006): 1127-1135.
[28] Jayaraman, Vaidyanathan. "Production planning for closed-loop supply chains with product recovery and reuse: an analytical approach." *International Journal of Production Research* 44, no. 5 (2006): 981-998.
[29] Samuel, Christian N., Claver Diallo, Uday Venkatadri, and Sima Ghayebloo. "Multicomponent multiproduct closed-loop supply chain design with transshipment and economies of scale considerations." *Computers & Industrial Engineering* 153 (2021): 107073.
[30] Zailani, Suhaiza, Krishnaswamy Jeyaraman, G. Vengadasan, and Rajagopal Premkumar. "Sustainable supply chain management (SSCM) in Malaysia: A survey." *International journal of production economics* 140, no. 1 (2012): 330-340.
[31] Asif, Farazee MA, Carmine Bianchi, Amir Rashid, and Cornel Mihai Nicolescu. "Performance analysis of the closed loop supply chain." *Journal of Remanufacturing* 2 (2012): 1-21.
[32] Bell, John E., Diane A. Mollenkopf, and Hannah J. Stolze. "Natural resource scarcity and the closed-loop supply chain: a resource-advantage view." *International Journal of Physical Distribution & Logistics Management* (2013).
[33] Tracht, K., A. Niestegge, and P. Schuh. "Demand planning based on performance measurement systems in closed loop supply chains." *Procedia CIRP* 12 (2013): 324-329.
[34] Özkır, Vildan, and Hüseyin Başlıgıl. "Modelling product-recovery processes in closed-loop supply-chain network design." *International Journal of Production Research* 50, no. 8 (2012): 2218-2233.
[35] Van Buren, Nicole, Marjolein Demmers, Rob Van der Heijden, and Frank Witlox. "Towards a circular economy: The role of Dutch logistics industries and governments." *Sustainability* 8, no. 7 (2016): 647.
[36] van Leeuwen, Kees, Eli de Vries, Stef Koop, and Kees Roest. "The energy & raw materials factory: role and potential contribution to the circular economy of the Netherlands." *Environmental management* 61 (2018): 786-795.
[37] Wath, Sushant B., Atul N. Vaidya, P. S. Dutt, and Tapan Chakrabarti. "A roadmap for development of sustainable E-waste management system in India." *Science of the Total Environment* 409, no. 1 (2010): 19-32.

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THE JOURNAL OF EUROPEAN ECONOMIC HISTORY

[38] Kumar, Sameer, and Teruyuki Yamaoka. "System dynamics study of the Japanese automotive industry closed loop supply chain." *Journal of Manufacturing Technology Management* 18, no. 2 (2007): 115-138.
[39] Schultmann, Frank, Bernd Engels, and Otto Rentz. "Closed-loop supply chains for spent batteries." *Interfaces* 33, no. 6 (2003): 57-71.
[40] Schultmann, Frank, Moritz Zumkeller, and Otto Rentz. "Modeling reverse logistic tasks within closed-loop supply chains: An example from the automotive industry." *European journal of operational research* 171, no. 3 (2006): 1033-1050.
[41] von Ahsen, Anette. "Environmental management in automotive supply chains: an empirical analysis." *Greening the supply chain* (2006): 293-306.
[42] Östlin, Johan, Erik Sundin, and Mats Björkman. "Importance of closed-loop supply chain relationships for product remanufacturing." *International Journal of Production Economics* 115, no. 2 (2008): 336-348.
[43] Chai, Junwu, Zhifeng Qian, Feng Wang, and Jing Zhu. "Process innovation for green product in a closed loop supply chain with remanufacturing." *Annals of Operations Research* (2021): 1-25.
[44] Guide, V. Daniel R., Terry P. Harrison, and Luk N. Van Wassenhove. "The challenge of closed-loop supply chains." *Interfaces* 33, no. 6 (2003): 3-6.
[45] Kenné, Jean-Pierre, Pierre Dejax, and Ali Gharbi. "Production planning of a hybrid manufacturing–remanufacturing system under uncertainty within a closed-loop supply chain." *International Journal of Production Economics* 135, no. 1 (2012): 81-93.
[46] Coenen, Jannie, Rob ECM van Der Heijden, and Allard CR van Riel. "Understanding approaches to complexity and uncertainty in closed-loop supply chain management: Past findings and future directions." *Journal of Cleaner Production* 201 (2018): 1-13.
[47] Lapko, Yulia, Andrea Trianni, Cali Nuur, and Donato Masi. "In pursuit of closed-loop supply chains for critical materials: An exploratory study in the green energy sector." *Journal of Industrial Ecology* 23, no. 1 (2019): 182-196.
[48] Besiou, Maria, and Luk N. Van Wassenhove. "Closed-loop supply chains for photovoltaic panels: A case-based approach." *Journal of Industrial Ecology* 20, no. 4 (2016): 929-937.
[49] Genc, Talat S., and Pietro De Giovanni. "Closed-loop supply chain games with innovation-led lean programs and sustainability." *International Journal of Production Economics* 219 (2020): 440-456.
[50] Freeman, R. Edward. *Strategic management: A stakeholder approach*. Cambridge university press, 2010.
[51] Koppius, Otto, Öznur Özdemir-Akyıldırım, and E. V. D. Laan. "Business value from closed-loop supply chains." *International Journal of Supply Chain Management* 3, no. 4 (2014): 107-120.