sustainability

MDPI

Editorial

Advances in the Supply Chain and Circular Economy towards Sustainability

Swee Kuik

College of Business, School of Business and Law, Central Queensland University, Brisbane 4000, Australia; s.kuik@cqu.edu.au

1. The Role of the Supply Chain in Fostering Circular Economy

A transformational shift has occurred in the 21st century, with many enterprises in the manufacturing or service sectors adopting sustainable and circular approaches and abandoning linear and wasteful processes [1–3]. With the scarcity of resources becoming increasingly apparent, businesses are now taking swift action to implement supply chain technology and initiate circular economy strategies. The goal of these efforts is to improve their resource utilisation, diminish waste along supply chains, and mitigate their environmental impacts [4,5].

Considering the viewpoint of the enterprise, the circular economy has the potential to tackle wider social and environmental issues. The sustainable supply chain is a sophisticated system that enables the perpetual reuse, refurbishing, and redistribution of materials and resources [6–8]. Implementing a circular economy program involves an enterprise applying strategies to enhance the circularity of its production system and collaborating with other enterprises in the supply chain to achieve a more efficient production model [1,9,10]. Enterprises' endeavours to include supply chains in their circular initiatives are promising and worthwhile pursuits.

In this context, the intensification of global challenges elevates the advantages of the circular economy initiative, particularly its strategy to optimise tangible and intangible benefits and value across the biological and technological cycles of products, components, and/or materials. This can be achieved via a meticulous consideration of resource utilisation and recycling throughout the entire lifespan of the product, from inception to disposal.

2. Toward a Research Agenda for Circular Economy in Supply Chains

This editorial notes that advances in supply chains and circular economy are still emerging. There are several relevant publications that pertain to this topic, encompassing conceptual and mathematical models, empirical studies, and case analyses. These research areas are still in their formative stages. A greater emphasis is currently being placed on a diverse range of issues that relate to the connection between sustainable supply chains and circular economy. Some of these issues include value proposition, product and service enhancement, technological advancement, and development in a variety of industries. Despite the utilisation of both qualitative and quantitative research methodologies in the papers of this Special Issue, their primary emphasis lies on the current state of the association between sustainable supply chain development and circular economy. Hence, these papers provide an exceptional prospect for additional research exploration. It is our hope that this Special Issue will advance the research agenda concerning the relationship between supply chain management and circular economy.

Concerns regarding the capture and utilisation of CO_2 have intensified. In particular, the transformation of hazardous emissions into valuable chemical feedstock, such as formic acid products, is receiving greater attention. Migdadi, Khalifa, Al-Swidi, Amhamed, and El-Naas's scholarly work, titled "A conceptual framework of customer value proposition of Carbon Capture and Utilisation (CCU) Formic Acid Product", provides a detailed

Citation: Kuik, S. Advances in the Supply Chain and Circular Economy towards Sustainability. *Sustainability* **2023**, *15*, 12326. https://doi.org/10.3390/su151612326

Received: 3 August 2023
Accepted: 8 August 2023
Published: 13 August 2023

review and proposal of a comprehensive framework that is centred on customer value proposition. A process flow diagram is employed for the research methodology. The importance of customer value and its correlation with market knowledge dimensions have been underscored. The review bridges a gap in current research by exploring the intersection of market knowledge and customer value across multiple dimensions in support of sustainability.

Following this, Kuik, Kumar, Diong, and Ban provide a comprehensive review to develop a theoretical framework for transitioning towards a circular business model based on the four critical influences of technological, financial, societal, and institutional components. This review is titled "transition to circular business models for small and medium-sized enterprises". The developed framework seeks to promote sustainability by driving the transition to circular economy-oriented business models, which are deemed to be highly beneficial for small businesses.

Bianchini, Guarnieri, and Rossi utilise social indicators from a circular economy perspective to examine a wide range of factors, including corporations, communities, consumers, suppliers, human rights, and human resources, in the context of supply chains. All these social indicators are in congruence with strategic, tactical, and operational approaches. By combining Keeney's value-focussed thinking approach with a comprehensive literature review, a framework for assessing social indicators is proposed and developed. The Italian luxury footwear industry is chosen as an example to demonstrate how the social indicators derived from the developed framework can assist enterprises to transition to a circular economy in a systematic manner. This study has developed a methodology that is well suited for measuring and assessing social indicators at strategic, tactical, and operational levels.

Qi and Kuik conducted a qualitative study titled "Effect of word-of-mouth communication and consumers' purchase decisions for remanufactured products: an exploratory study", in which the authors aimed to explore the correlation between social media influences and word-of-mouth communication. The study demonstrates that both communication channels hold the potential to influence consumers' purchase choices. The study's findings have provided insightful information regarding remanufacturing enterprises in China, which can be utilised to create effective word-of-mouth marketing strategies and to obtain a more detailed understanding of the purchasing habits of Chinese consumers.

There are three papers in this Special Issue that focus on technological development and implementation for sustainable supply chains and logistics. The first of these articles, "Green technology innovations on sustainable supply chain development" by Li and Li, explores the positive impact of green technology innovations on the transportation sector in China. The authors also develop a theoretical framework based on direct mechanisms (i.e., renewable energy use, fossil energy substitution, and intelligent logistics management technology) and indirect mechanisms (i.e., technology spillover, market competition, and social networks). The framework's recommendations can facilitate the evaluation of the effects of eco-friendly technology advancement and the establishment of a sustainable supply chain roadmap. Additionally, the framework is supported by practical facts from the industrial practitioners. The second of these articles, "Evaluation of green logistics efficiency in northwest China" by Qin and Qi, explores studies and developments related to green logistics. The authors employ a three-stage data envelopment analysis to assess the spatial and temporal efficiency of the green logistics industry in Northwestern China. The analysis is predicated upon empirical data captured from 2010 to 2019. The rationale behind the development of three-stage data envelopment analysis is the inability of traditional data envelopment analysis to distinguish efficiency based on value and rank. The third of these articles, "Synergistic inter-construction of the green development concepts in Chinese rural ecological agriculture" by Tan and Qi, examines the adoption of green development concepts using an entropy method. The goal is to explore the relationship between farmer income and food production in the agriculture industry in China. This novel approach contributes to the future development of ecological agriculture.

Given the widespread interest in quantitative analyses for sustainable development and circular economy, this Special Issue also includes three published papers featuring innovative mathematical models and solution methodologies: Yang, Lai, and Tang's "Pricing and contract coordination of buy online and pick up in store (BOPS) supply chain considering product returns"; Wu, Sun, Su, Chen, Zhao, and Li's "Which is the best supply chain policy: carbon tax, or a low-carbo subsidy"; and Chan, Liu, Huang, and Tang's "Pricing and service effort decision of book dual-channel supply chains with showroom effect based on cost-sharing contracts". By utilising optimisation approaches and employing mathematical modelling techniques, various case scenarios are presented to demonstrate the flexibility and effectiveness of the proposed models and their practical applications.

The research conducted by Yang, Lai, and Tang is centred on the BOPS model for a two-echelon supply chain, with special attention given to accounting for product return risk. The interaction between the producer or merchant and the customers served as the foundation for this optimisation model. A comprehensive analysis for a downstream supply chain is conducted to examine the impact of different integration modes on consumer loyalty, optimal pricing, service decision, and profit in the offline channel. Following this, Wu, Sun, Su, Chen, Zhao, and Li develop a supply chain decision-making model to study mixed carbon tax and low-carbon subsidy policies. Their findings demonstrate that the supply chain decision-making model, when dealing with a combination of a carbon tax and low-carbon subsidy policies, produces a one-of-a-kind Nash equilibrium solution in a non-cooperative game between the retailer subsidy rate and the manufacturer carbon reduction rate. In addition, Chen, Liu, Huang, and Tang direct their attention towards the concept of pricing differentiation and the application of effort in the context of dual-channel supply chains. A three-echelon supply chain in the publishing industry that operates via a dual-channel system is analysed in their research. For modelling, the supply chain comprises an author, an online publisher, and an offline store, and its formulations are examined in detail. By employing two copyright models and using Stackelberg game theory, they not only explore the best price solutions and the ideal retailer's service effort level but also evaluate showroom impacts based on either decentralised or centralised decision-making.

3. Conclusions

This Special Issue's research papers demonstrate that there is a vast number of research opportunities for qualitative and quantitative analyses that can be explored in relation to the significance of supply chain management and advancements in the circular economy. It is also designed to foster a better comprehension of sustainable supply chain and circular economy practices in industries and establish a solid foundation for future research in this field of study. Circular economy's growing implementation in supply chain practices in many enterprises presents a clear opportunity for academics and researchers to generate new knowledge and promote the value agenda.

Finally, we would like to acknowledge all the authors who have presented remarkable works in this Special Issue. We also appreciate the reviewers' comments and dedication to this journal. Society's swift progress necessitates the appraisal of a circular economy's integration into sustainable supply chain management. All the papers published in this Special Issue concentrate on exploring the diverse intersections between circular economy and supply chain practices via formal models and applications, potentially bringing a novel viewpoint to the existing literature.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Eisenreich, A.; Füller, J.; Stuchtey, M.; Gimenez-Jimenez, D. Toward a circular value chain: Impact of the circular economy on a company's value chain processes. *J. Clean. Prod.* **2022**, *378*, 134375. [CrossRef]
2. Woo, S.M.; Whale, J. A mini-review of end-of-life management of wind turbines: Current practices and closing the circular economy gap. *Waste Manag. Res.* **2022**, *40*, 1730–1744. [CrossRef] [PubMed]
3. Islam, M.T.; Iyer-Raniga, U.; Trewick, S. Recycling Perspectives of Circular Business Models: A Review. *Recycling* **2022**, *7*, 79. [CrossRef]
4. Aarikka-Stenroos, L.; Chiaroni, D.; Kaipainen, J.; Urbinati, A. Companies' circular business models enabled by supply chain collaborations: An empirical-based framework, synthesis, and research agenda. *Ind. Mark. Manag.* **2022**, *105*, 322–339. [CrossRef]
5. Trancho, A.I.; Meyer, C.M. Supply chain redesign for the circular economy. *Int. J. Integr. Supply Manag.* **2022**, *15*, 349–380. [CrossRef]
6. Zhang, D.; Huang, X.; Wen, Y.; Pooja, T.; Shanmugan, J. Sustainable circular business model for transparency and uncertainty reduction in supply chain management. *J. Theor. Appl. Electron. Commer. Res.* **2021**, *16*, 959–975. [CrossRef]
7. Barros, M.V.; Salvador, R.; do Prado, G.F.; de Francisco, A.C.; Piekarski, C.M. Circular economy as a driver to sustainable businesses. *Clean. Environ. Syst.* **2021**, *2*, 100006. [CrossRef]
8. Kuik, S.; Kumar, A.; Diong, L.; Ban, J. A Systematic Literature Review on the Transition to Circular Business Models for Small and Medium-Sized Enterprises (SMEs). *Sustainability* **2023**, *15*, 9352. [CrossRef]
9. Kuik, S.; Diong, L. A model-driven decision approach to collaborative planning and obsolescence for manufacturing operations. *Ind. Manag. Data Syst.* **2019**, *119*, 1926–1946. [CrossRef]
10. Dokter, G.; Thuvander, L.; Rahe, U. How circular is current design practice? Investigating perspectives across industrial design and architecture in the transition towards a circular economy. *Sustain. Prod. Consum.* **2021**, *26*, 692–708. [CrossRef]