Supply Chain Management, Industry 4.0, and the Circular Economy

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Sustainable development is dependent on significant improvement in supply chain resource utilization and efficiency. It requires a holistic global life cycle perspective from producer to end consumer, especially in a closed loop fashion (Ghadimi et al., 2019). Concequently, communities, governmental and business organisations have sought methods for product and materials reuse to extend their useful life. This resulting paradigm shift has been popularly and broadly termed the circular economy (CE).

Another emergent megatrend in services and manufacturing industries is the pervasive adoption of information and communication technology in supply chains. Supply chain functions including procurement, manufacturing, and distribution have increasingly become automated, leading to another paradigmtic shift known as Industry 4.0. The Industry 4.0 environment includes digitization and computer-controlled machines connected via the Internet. Real time information aiding precise and accurate management of operations and production processes is also core. These advancements offer immense opportunities for supply chain intelligence and autonomy establishing stepping stones for Industry 4.0 supply chains (Kamble et al., 2018).

Industry 4.0 principles such as decentralization, information readiness, and prompt information exchange channels can help achieve optimized sustainable supply chain solutions including reduced resource utilization and enviromental impacts. Industry 4.0 and CE together have motivated business organizations to evolve towards effective and prompt sustainable

supply chain management (Jabbour *et al.* 2018). Businesses have initiated design efforts for Industry 4.0 to help achieve CE principles (Kumar *et al*. 2018).

Industry 4.0 and CE integration can help industrial practitioners transform traditional linear supply chains to closed-loop, circular, ones while minimising resource use and waste generation along their supply chains. Industry 4.0-based manufacturing and supply chains can also enhance the reduction, reuse, and recycling philosophy, furthering CE advancement. This evolving context provides opportunities and calls for additional investigation into possibilities and challenges that Industry 4.0 supply chains have in CE environments. The focus of this Virtual Special Issue is to build a clearer picture for managing supply chains in the Industry 4.0-CE environment. Thus we welcome and encourage submission of high-quality manuscripts and studies on the following topics:

- Risks and challenges for managing supply chains in an Industry 4.0 environment for a circular economy
- Technological innovations for managing Industry 4.0 supply chains for a circular economy
- Strategic, ethical, and legal issues in managing Industry 4.0 supply chains for a circular economy
- Optimisation of supply chain operations using Industry 4.0 enabling technologies for a circular economy
- Applications of Industry 4.0 and circular economy principles for enhancing competitiveness of supply chains
- Managing supply chain disruptions in an Industry 4.0 environment for the circular economy
- Adopting sustainable consumption and production patterns and practices in Industry 4.0 supply chains across various services and manufacturing industries
- Designing facilities planning in line with the integrated Industry 4.0 and circular economy context
- Developing international manufacturing network using Industry 4.0 to attain a global circular ecomony.

A Virtual Special Issue (VSI) is an online-only grouping of Special Issue articles traditionally assigned to a single Special Issue. The articles in a VSI will be assigned a unique identifier and published in a regular journal issue. The unique identifier allows to simultaneously adding the article to a VSI in ScienceDirect.com. Articles grouped together in a VSI retain their original citation details. A VSI speeds up the publication of individual articles

as, unlike the publication process for conventional Special Issue articles, a VSI does not need to wait for the final article to be ready before publication.

All submitted papers should address issues related to the theme of the SI and be within the scope of thejournal. A detailed submission guideline is available as "Guide for Authors" at: http://www.journals.elsevier.com/resources-conservation-and-recycling. All manuscripts and any supplementary material should be submitted through Elsevier Editorial System (http://ees.elsevier.com/recycl). The authors must select "SI: Industry 4.0" in the submission process.

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