

Supply Chain in a Circular Economy: a Multidimensional Research Agenda

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Purpose:

This paper focuses on analysing and synthesising the extant research published on supply chains in the context of circular economy. Circular supply chain (CSC) broadly relates to remanufacturing, reusing and recycling processes in the circular economy in which at every stage of a product's lifecycle consideration is given to the most efficient use of resources (Genovese *et al.*, 2015). The Circular Economy promoted by the European Commission includes industrial systems that are restorative by purpose, shifting production patterns from linear ('take-make-consume-dispose') to circular (closed-loop) models of material flows. Many industries have recently moved toward a circular model of operations to extend the life cycle of products, and notably where organisations from diverse sectors can play a collaborative role (Geng *et al.*, 2012). Other significant factors under scrutiny where closed-loop architectures can have a positive effect are rising costs and environmental impacts of raw materials acquisition, by-products handling and disposal processes (Su *et al.*, 2013). Given that this is a new area, it is timely to examine the development of research and innovative actions that provide industry and commerce with both the strategy and the necessary tools to move towards a circular supply chain model effectively (Govindan, Soleimani and Kannan, 2015). In this context, we aim to answer the following questions:

1. How a "circular supply chain" has been conceptualized in the literature and how it is interrelated to other similar concepts?
2. Which management theory/theories underpin and are used to explain "circular supply chain"?
3. What are the drivers and barriers that influence circular supply chain implementation?

Methodology:

Given the fact that this is an emerging research area, this study will help researchers to identify the conceptual content of the field and to guide them toward theory development.

Thus, to trace the implementation of CSC practices, a profiling approach is used to analyse 57 articles published in peer-reviewed journals and relevant reports. The focus of this paper is to analyze and extract relevant literature from journals and relevant reports that cater mainly to social and applied sciences. The paper focusses on the tactical and the operational aspect of circular supply chains. The findings can help both academics and practitioners to formulate responses – theoretical or practical - tailored to business needs.

Findings:

A careful review of literature identified the following four key areas which require a deeper understanding in the context of circular supply chain:

1. Conceptual confusion:

Literature identified several related terms/concepts such as ‘sustainable supply chain’, ‘green supply chain’, ‘closed loop supply chain’, ‘reverse supply chain’ and ‘circular supply chain’. There is an ambiguity among these terms yet researchers use them interchangeably (Genovese *et al.*, 2015; Govindan, Soleimani and Kannan, 2015; Zhu, Geng and Lai, 2010; Wells and Seitz, 2005). There is a clear need to properly define these concepts and to show how they are related, connected or different from each other (Pan *et al.*, 2015; Rizos *et al.*, 2015; Guide and Wassenhove, 2006; Guide, Harrison and Van Wassenhove, 2003).

2. Theoretical lenses:

Literature reveals that institutional theory is employed in many instances to identify the drivers of circular supply chains (Zhu, Geng and Lai, 2010). Other studies suggest organisational theory and/or ecological modernization theory to explain the operational issues related to circular supply chains (Sarkis, Zhu and Lai, 2011). However, empirical work based on these theories is, to date, very limited.

3. From the literature and reports we identified a recurring question, namely “what drives organisations to integrate circular economy principles in their supply chains?” Table 1 summarises the main drivers for a circular supply chain identified through the existing body of literature. A striking feature that the table reveals is the lack of empirical research identifying the influence of suppliers as a driving force for circular supply chain management.

Table 1 Drivers of circular supply chain

Drivers	Reference
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Good business opportunity	(Govindan, Soleimani and Kannan, 2015; Mathews and Tan, 2011; Desrochers, 2008)
Regulatory compliance	Zhu & Geng (2013), (Jørgensen et al., 2010), (Yin and Ma, 2009) (Geng <i>et al.</i> , 2012)
Requirement from customer	Zhu & Geng (2013), Govindan et al (2015) (Christmann and Taylor, 2001)
Gaining competitive advantage	Zhu & Geng (2013), (Zhu and Liu, 2010), (Liu and Buck, 2007)
Improve firm performance	Govindan et al (2015) Geng, Y., & Doberstein, B. (2008).
Collaborate with customers	Geng, Y., & Doberstein, B. (2008). Govindan et al (2015)
Green Business strategy	Zhu & Geng (2013) Geng, Y., & Doberstein, B. (2008).

4. Further, we identified key barriers to circular supply chain practices from the extant literature, as presented in table 2.

Table 2 Barriers to circular supply chain

Barriers	Reference
Technological - Linear technologies are deeply rooted	Mathews & Tan (2011) Kok, Wurpel & Ten Wolde (2013) Park and Chertow 2014
Financial	Mathews & Tan (2011), t (van Hemel and Cramer, 2002) (Presley et al., 2007) (D'Amato and Roome, 2009)
Institutional Challenges of SMEs	Mathews & Tan (2011) Rizos, V., Behrens, A., Kafyeke, T., Hirschnitz-Garbers, M., & Ioannou, A. (2015) Ye, Zhao, Prahinski, and Li (2013)
Lack of human resource capabilities	(del Brio et al., 2008) (Sarkis et al., 2010)
Exchange of materials is limited by capacity of reverse logistics	Kok, Wurpel & Ten Wolde (2013). Geng, Y., & Doberstein, B. (2008). Figge et al., 2014
Resistance from powerful stakeholders with large interests in status quo	Kok, Wurpel & Ten Wolde (2013). Govindan et al (2015)
Lack of practical tool kit	(Guide and Wassenhove, 2006; Guide, Harrison and Van Wassenhove, 2003)
Lack of appropriate business model Collaborative business models	(Govindan, Soleimani and Kannan, 2015; Guide and Wassenhove, 2006; Guide, Harrison and Van Wassenhove, 2003)
Design for disassembly, reuse, recycling Regulatory challenges	Wrinkler 2011; Ellen MacArthur Foundation 2012; Bakker et al., 2014 Pan, Shu-Yuan, et al. (2015) Govindan et al (2015)

Contribution:

This paper presents an inclusive literature review of recent papers and reports on supply chain in the context of circular economy. The gaps in the literature are identified and discussed to clarify important future research opportunities. A clear conceptualization of different terms and their interrelations will help future researchers to distinctly define their research focus. Classification and profiling of different drivers of, and barriers to, a circular supply chain, will help researchers in their empirical investigations and tests.

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