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Antecedents of closed-loop supply chain in emerging economies: A conceptual framework using stakeholder's perspective

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ABSTRACT

More recently, firms embark on many initiatives for sustainability. Closed-loop supply chain (CLSC) is an initiative that extends the scope of value creation through product reconstruction activity. The process of product reconstruction includes acquisition of the used products from customers, recovering their residual value, and remarketing them. The aim of this research is to propose a conceptual framework, discussing the major threats and opportunities for business firms engaged in a CLSC operation. For this, a structured literature review was conducted, followed by content analysis to identify different themes and patterns in the literature. Our results suggest that there are seven driving forces for closed-loop supply chain. The proposed conceptual framework serves as a decision making tool and intends to help both academicians and practitioners as it highlights major research issues in this field. Finally, managerial implications and future research directions are outlined.

1. Introduction

Closed-loop Supply Chain (CLSC) has been an area of research interest for the past few years. CLSC requires, along with the traditional supply chain activities, acquiring used products from customers, recovering their residual value, and remarketing them (Guide and Van Wassenhove, 2006). The focus of CLSC consists of two activities: 1) product returns, and 2) value recovery.

According to Guide and Van Wassenhove (2009), product returns are further categorized into three groups: a) commercial returns, b) end-of-use returns, and c) end-of-life returns. Commercial returns are those returns that customers return within a stipulated time limit for any reason. Customers may return the product claiming it to be defective despite the fact that nothing is physically wrong with it (Tibben-Lembke, 2002). End-of-use and End-of-life returns are characteristically different (Kleindorfer et al., 2005). End-of-use returns are those used products that are available for second life through refurbishing or remanufacturing, when a consumer wishes to upgrade to newer version of the product. End-of-life returns contains no utility for the current user and firms may recover the residual value by recycling.

Value recovery activities involve acquisition of used product, product disposition (sort, test, disassemble), reprocessing, and remarketing (Thierry et al., 1995; Guide and Van Wassenhove, 2002; Flapper et al., 2005). There are mainly five recovery options: repair, refurbishing, remanufacturing, cannibalization, and recycling (Thierry et al., 1995). In repair, specified faults in a product are corrected. Refurbishing requires rebuilding or replacing of major components or parts and has a lower performance specification and associated warranty than the equivalent new product. In remanufacturing, worn-out products are restored to 'like-new' condition and remanufactured products carry equal warranty to those of equivalent new products (King and Burgess, 2005; Lund and Hauser, 2010). Cannibalization reuses a small proportion of used product in repair, refurbishing, or remanufacturing of other products (Thierry et al., 1995). Recycling is the process of breaking down the used product to part level, which are then available for use for manufacturing of new or recycled products (Beamon, 1999; Devika et al., 2014).

One of the major features of CLSC is economic sustainability, in addition to environment sustainability. For instance, remanufacturing cost is generally between 40–60% of the manufacturing cost and only consumes 20% of a firm effort (Dowlatshahi, 2000, 2005, 2012). Remanufacturing is a worthy proposition at various levels, individual firm, industries and national economy (Ferrer, 1997a, b; Ferrer and Ayres, 2000). In USA, there are more than 70,000 firms engaged in remanufacturing, employing 480,000 people with cumulative annual sales of $53 billion (Lund and Hauser, 2010). As per the latest reports by the United States International Trade Commission (USITC), the overall production volume of the remanufacturing industry in the

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United States of America (USA) alone has increased by 15% during the period between 2009 and 2011. USA is the leader of the global remanufacturing industry with a net worth of $43 billion. The European Union (EU) countries also have significant remanufacturing operations, especially in the aerospace, motor vehicles and electronic goods industry. Remanufacturers have an average of annual profit margin of 20 percent, in case of predictable product returns volumes (Atasu et al., 2010).

There have been a number of attempts to review literature on reverse logistics or CLSC. For instance, Fleischmann et al. (1997) review various quantitative models for reverse logistics (RL) networks. Fleischmann et al. (2000) present a review of case studies on product recovery logistics network in different industries. Others provide an overview of reverse supply chain (Guide and Van Wassenhove, 2002). Prahinski and Kocabasoglu (2006) propose 10 empirical research propositions based on review conducted on reverse supply chain. Rubio et al (2008) present a review of articles on reverse logistics within the period 1995-2005. Similar literature review by Srivastava (2007) provides a state-of-the-art literature on green supply chain management. Atasu et al. (2008) provide a critical review of CLSC analytic research that is inspired from industry practice and has business economics focus. Similarly, Akçali (2009) present an annotated bibliography of research in the field of reverse and CLSC. Others systematically organize the research in reverse supply chain using two classification schemes: content related issues and solution methodology (Sasikumar and Kannan, 2009). Guide and Van Wassenhove (2009) present evolution of CLSC research from business perspective. Other reviews provide literature on environmentally conscious manufacturing and product recovery area (Ilgin and Gupta, 2010).

Although these reviews provide a better understanding of reverse supply chain or green supply chain field, but reviews on CLSC research have limited focus and few in quantity. Therefore, the main objectives of our study are twofold: (a) provide a review of the current status of the CLSC literature and identify factors and forces currently shaping the CLSC area; and (b) propose a conceptual framework, serving firms with a set of guidelines to improve CLSC management decision-making process and provide academicians with research opportunities. The framework developed in this study also presents opportunities requiring further academic and applied research.

The remainder of the paper is organized as follows: in Section 2, literature review is presented. Next, we explain research methodology used for literature review in section 3. Section 4 presents categorization and description of CLSC literature. In Section 5, conceptual framework is presented followed by conclusions, and managerial implications. Finally, future research opportunities are discussed in the last Section.

2. Background literature

CLSC research has become a full-fledged sub area of supply chain management in the past few years (Guide and Van Wassenhove, 2009). The focus of CLSC is on integration of forward supply chain (FSC) and reverse supply chain (RSC) activities. FSC activities include sourcing of raw materials, manufacturing, distribution, and delivery of final product to end customer. RSC activities start with acquisition of used products from customers followed by value recovery and remarketing (Souza, 2013). Below, we discuss key focused areas of CLSC literature along with main findings.

A set of researchers studied inventory policies in a CLSC setting, for example, Van der Laan et al. (1999); Teunter et al.(2000); Toktay et al. (2000); Inderfurth and Van der Laan (2001); Teunter et al. (2004); Nenes et al. (2010); Ahiska and King (2010); Hsueh (2011); Diabat et al. (2015); Cobb (2016); Dev et al. (2017) and Mawandiya et al. (2018). The major focus of these studies was on comparison of push and pull strategy, return flow, demand rate, lead-time significance, product life-cycle effects, and other inventory policies. These studies conclude that an optimum inventory policy depends on product type, life of the product, market structure, etc. A number of other studies in CLSC literature focused on network structure issues. Among those, a set of studies focused on reverse loop structure (for example, Wang et al., 1995; Barros et al., 1998; Jayaraman et al., 1999, 2003; Schultmann et al., 2003; Realff et al., 2004; Min et al., 2006; Lieckens and Vandaele, 2007). Other studies on closed-loop structure for example (Marín and Pelegrín, 1998; Fleischmann et al., 2001; Beamon and Fernandes, 2004; Salema et al., 2006, 2007; Listes, 2007; Sahyouni et al., 2007; Srivastava, 2008a; Francas and Minner, 2009; Easwaran and Üster, 2010; Krikke, 2011; Amin and Zhang, 2012, 2013; Özceylan and Paksoy, 2014; Moghaddam, 2015; Kaya and Urek, 2016; Gaur et al., 2017a) conclude that other than cost, quality, quantity of cores, product life cycle, and market structure determine an optimum network structure.

Further studies highlight the issues including acquisition, management, and return rate of used products (for example, Guide, 1997; Guide et al., 1997; Klausner and Hendrickson, 2000; Ferrer, 2001; Stock et al., 2002; Savaskan et al., 2004; Guide et al., 2005; Morana and Seuring, 2007; Östlin et al., 2008; Teunter and Flapper, 2011; Balmus, 2014; Fleischmann et al., 2016; Gaur et al., 2017b). They conclude that uncertainties related to timing, quality, and quantity of cores are biggest challenge for a successful CLSC management. However, these uncertainties can be minimized if firms incentivize customers for returning the cores. Other stream of CLSC literature discusses strategic issues that include competition, pricing, market segment, remake or buy, and cannibalization of new product's sales (for example, Majumder and Groenevelt, 2001; Debo et al., 2005; Ferguson and Toktay, 2006; Ferrer and Swaminathan, 2006; Debo et al., 2006; Atasu et al., 2008; Mitra and Webster, 2008; Martin et al., 2010; Jena and Sarmah, 2014; Qiang, 2015; Gao et al., 2016; Abbey and Guide, 2017; Xu and Wang, 2018). These studies suggest that remanufacturing is not only a cost saving tool but also can serve as an effective marketing strategy.

A group of studies investigated consumer's behavior towards remanufactured or refurbished products (for example, Guide and Li, 2010; Atasu et al., 2010; Michaud and Llerena, 2011; Hazen et al., 2012; Wang et al., 2013; Gaur et al., 2015; Khor and Hazen, 2016; Matsumoto et al., 2017; Wang et al., 2018). These studies demonstrate that consumers have positive attitude towards remanufactured products but they perceive remanufactured products as lower quality products and, therefore, willing-to-pay relatively lower than new products. However, a consumer segment, known as green consumers, is willing-to-pay more than new products, as they believe that remanufactured products save environment. In emerging economies, firms and governments are confronted with severe challenges in CLSC implementation (Oliveira and França, 2018; Singh et al., 2018; Delmonico et al., 2018; Conke, 2018; Bhatia and Srivastava, 2018), however, these studies suggest that CLSC is considered to be a profitable opportunities in emerging economies.

Extant literature suggest that majority of studies focused on specific issue or actors of CLSC. However, a firm needs to consider all actors (stakeholder) involved in CLSC management in order to gain competitive advantage. We, in this study, attempt to fill this gap and develop a framework that considers all the stakeholders in a CLSC management.

2.1. Theoretical background: stakeholder theory

Stakeholder theory suggests that a focal firm or a corporation has groups of individuals and persons who can affect or are affected by focal firm's activities and objectives (Freeman, 1984). These group of individuals are known as "Stakeholders". A stakeholder can be primary or secondary stakeholder (Clarkson, 1995). A primary stakeholder is the one who is directly involved with firm in some or other activities (for example, suppliers, customers, employee, management, etc.). A secondary stakeholder is not directly associated with the firm but can influence or is influenced by firm's activities (for example, government,