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Evaluating barriers for reverse logistics implementation under a multiple stakeholders' perspective analysis using grey decision making approach

Marina Bouzon^{a,b}, Kannan Govindan^{a,*}, Carlos M. Taboada Rodriguez^b

^a Center for Engineering Operations Management, Department of Technology and Innovation, University of Southern Denmark, Denmark

^b Department of Production and Systems Engineering, Federal University of Santa Catarina, Brazil

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ABSTRACT

In the past few decades, an interest in reverse logistics has attracted the attention of industries and also has become a subject of interest for researchers. However, while reverse logistics is becoming a mandatory element of the supply chain in developed countries particularly due to legislation issues, the subject is still in a state of infancy in emerging economies such as Brazil. In these connections, impediments to reverse logistics implementation must be considered and analyzed, as well as the many different perspectives from the key stakeholders for their development. The objective of this research is to evaluate the interrelationship among reverse logistics barriers from the perspectives of the most important stakeholders in the Brazilian context. For this purpose, a Multi-Criteria Decision Making tool named grey-based Decision Making Trial and Evaluation Laboratory (grey-DEMATEL) was used to extract a multiple company-customer-government association perspective. Three respondents – one expert from each stakeholder – have been consulted to obtain the pair-wise comparison of barriers. Thus, both the net effect and the importance level of each impediment are provided by means of a Euclidean distance analysis, as well as the similarities and differences among stakeholders' opinions. The uniqueness of this paper relies on the fact that no previous work was found in the domain of multiple stakeholders' perspective for reverse logistics barriers. This research uncovers that most of the key barriers from the reverse logistics multiple perspectives framework are from the organizational point of view. This stakeholder holds 10 out of 13 key barriers for RL implementation; as such, it is an important outcome because it indicates that firms may begin product return implementation by first tackling key internal barriers. Moreover, knowing the influential factors in their environment may assist industry managers to better implement and manage reverse flows, and to see through current and future green solutions for reverse logistics.

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1. Introduction

Recently, interest in green supply chain management and reverse logistics has attracted not only the attention of companies but also of researchers (Flapper et al., 2012; Govindan et al., 2015; Nikolaou et al., 2013). Green Supply Chain Management (GSCM) is considered one of the major efforts aimed at integrating environmental requirements with the supply chain systems (Govindan et al., 2014a), including green purchasing, product life-cycle management through the supply chain, and closing the loop with Reverse Logistics (RL). Reverse logistics and product take back activities are ways of reducing the harm to the environment by managing the end-of-life (EOL) of products (Bouzon et al., 2015a).

In spite of this relevant contribution to the environment, RL might be considered one of the most difficult initiatives of GSCM to implement (Hsu et al., 2013). Generally, companies are more likely to invest in forward processes and to express uncertainty at implementing RL practices for the reason that their economic benefits are not clear (Khor et al., 2016). Besides, implementation problems do not exist wholly within the organization itself. Firms may experience issues with RL implementation from different stakeholders, including both internal or external entities (Abdulrahman et al., 2014) and it is not yet clear how external and internal factors interactively promote green practices such as RL (Sarkis et al., 2011). Drivers and barriers are relevant factors for decision-making on RL adoption and its efficient employment (Agrawal et al., 2015).

Additionally, although products gradually are being recycled and reused in developed countries, the most common practices in emerging economies continue to be sending used products to landfills, causing considerable costs and harm to the environ-

* Corresponding author.

E-mail address: kgov@iti.sdu.dk (K. Govindan).

ment (Hsu et al., 2013). Generally, “in the most economically developed countries, a more mature and widespread perception of environmental problems exists” (Nunes et al., 2009). By contrast, in developing countries RL seems to be an immature practice (Lau and Wang, 2009). Among the Brazil-Russia-India-China (BRIC) countries, Brazil is fifth in the world in population and in size, with about 200 million inhabitants. The country is the seventh largest world economy and the largest economy in Latin America (United Nations, 2012).

In this matter, research in Brazil on factors hindering RL implementation as well as on the stakeholders' influence becomes crucial. The following research questions have guided this work:

- What are the key RL barriers?
- How do they relate to each other?
- What are the causal impediments for RL implementation in Brazil?
- What are the perspectives of the most relevant stakeholders concerning these RL barriers?

Thus, the primary objective of this research is to evaluate the interrelationship among RL barriers under the perspectives of the most important RL stakeholders in the Brazilian context. RL barriers were evaluated through a strategic evaluation methodology using grey-scale mathematics and Decision Making Trial and Evaluation Laboratory (DEMATEL). The use of the DEMATEL approach is based on three main motives (Shaik and Abdul-Kader, 2014): (i) it provides mutual and effective relations of barriers, scoring the rate of each relation by a number; (ii) it uses a feedback of relations where each barrier can affect other barriers at all levels; and (iii) the relevance of each barrier is determined by all available barriers in the system.

Regarding its originality and academic contribution, this research focuses on the field of RL and stakeholders' influence where concerns have quickly increased but in which little investigation has been exhibited. Moreover, the uniqueness of this work relies on the fact that no previous study was found in the domain of multiple stakeholders' perspective for barriers for RL. Furthermore, to the best of the authors' knowledge, no research has yet addressed analysis of influential factors under a multifaceted view of the key stakeholders for RL in Brazil. Concerning the practical implications of this manuscript, knowledge on RL barriers may help industries to understand their corporate responsibility towards environmental conservation. Additionally, awareness on the causal barriers allows manufacturers to develop a priority list of actions towards RL implementation.

This paper is structured as follows. Section 2 highlights the research gaps by providing a theoretical background on RL barriers and stakeholders and a picture of RL and decision-making tools. Section 3 builds the research methods, while Section 4 presents the research results. Finally, Section 5 discusses the findings, and Section 6 depicts the concluding remarks, research implications, and future research paths.

2. Theoretical background

Reverse logistics is one of the many relevant topics discussed in research on logistics and supply chain management (Govindan et al., 2016). While RL has recently received a lot of attention, it remains a relatively new concept (Van Der Wiel et al., 2012). RL is the process of moving products from their typical final destination with the purpose of revalorization or proper disposal (Rogers and Tibben-Lembke, 1999). Thus, it comprises activities involved in managing, processing, reducing, and disposing of waste from

production, packaging, and use of products (Govindan et al., 2013; Sharma et al., 2016).

2.1. RL barriers and stakeholder analysis

There are many definitions of stakeholders (Mitchell et al., 1997), but all share their roots in the definition from Freeman (1984, p. 46): “any group or individual who can affect or is affected by the achievement of the organization's objectives” (Crane and Ruebottom, 2011). Stakeholder theory is the main theoretical foundation of this research. Stakeholder theory has been used extensively in green research (Shaharudin et al., 2014). It suggests that “companies produce externalities that affect many parties (stakeholders) which are both internal and external to the firm” (Sarkis et al., 2011). In the Green Supply Chain Management (GSCM) domain, previous studies (Abdullah et al., 2012; Aitken and Harrison, 2013; Alvarez-Gil et al., 2007; González-Torre et al., 2010; Hsu et al., 2013; Mathiyazhagan and Haq, 2013; Sarkis et al., 2011; Shaik and Abdul-Kader, 2013) have suggested several groups of interest, taken as possible RL stakeholders (name and description):

- Government: governmental and legislation agencies.
- Customers: clients and consumers.
- Society/NGOs: society, community and non-governmental organization representing the societal interests.
- Market/Competitors: market and competitors.
- Suppliers: upstream side of the supply chain.
- Organization: focal company including interest of shareholders.
- Employees : manpower from the focal company.
- Media: including traditional media and social media.

Although there might be environmental, social and economic causes to get involved in returning and recovery initiatives, concurrently, many barriers can withhold firms from implementing RL (Kapetanopoulou and Tagaras, 2011; Srivastava, 2013). RL barriers can be both internal or external (Srivastava, 2013). Internal barriers are the obstacles that exist in the firm itself that impede the adoption of environmental efforts, whereas external barriers involve hindrances from outside of companies that disrupt the adoption of green practices (Hillary, 2004).

RL is considered by firms as an undervalued part of the SC in general due to a variety of reasons, such as uncertain profitability, lack of personnel technical skills, difficulties with supply chain members, and so forth (Abdulrahman et al., 2014). Fundamentally, RL is not a symmetric picture of forward distribution (Srivastava, 2008). Different authors have discussed the multiple barriers for RL implementation, and Table 1 summarizes the most common ones. Barriers noted here were classified according to internal and/or external perspectives and related to one or more of the previously-defined stakeholders.

Pressures from stakeholders are considered one of the most relevant elements influencing a firm's environmental initiative (Kim and Lee, 2012). This research considers mostly the influence of definitive stakeholders, as business managers have to pay attention to the interests of the most relevant stakeholders (Kim and Lee, 2012). Considering the classification of stakeholders based on power, legitimacy and urgency from Mitchell et al. (1997), the definitive stakeholders for RL implementation are the government and customers. Taking this definition into account and the information from Table 1, Fig. 1 presents a multi-perspective framework for RL barriers.

The goals and objectives of stakeholders are not necessarily the same as that of the company; many times, they may be quite different (Wassenhove and Besiou, 2013). The next section sums up

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