Remanufacturing: a relational view perspective

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Abstract

This manuscript examines how do resource-sharing relationships occur and how are they preserved in remanufacturing. Using the relational rents can be generated from the joint efforts of alliance partners, concerning invest in relation-specific assets, share knowledge, combine complementary resources and use effective governance mechanisms. A systematic review was used to investigate in literature. The manuscript provides recent information on the current state to fill the gaps in the literature of the relational view and buyer-supplier relationships. Finally, the discussion also provides contributions to understand the collaborative processes of relational rents concerning to product recovery of remanufacturing industry.

Keywords: Relational views of strategy, Relational rent, Remanufacturing.

Introduction

The industrial development of the past two centuries led to unintended ecological deterioration (Paulraj et al., 2015). As a result, companies have been required to minimize their environmental impacts - voluntarily or by regulation (Du Tertre, 2011).

One way of responding to such demand is via remanufacturing. According to Östlin et al. (2009), remanufacturing is an industrial process whereby used/broken-down products or components - referred to as 'cores' - are restored to useful life. In remanufacturing, a product is reprocessed or upgraded in an industrial process. During this process, the core passes through a number of remanufacturing operations, such as inspection, cleaning, disassembly, part reprocessing, reassembly and testing, to ensure it meets the desired product standards (Sundin & Bras, 2005).

For Guidat et al. (2017), circular economy is a concept that aims at such changes, following nature's principle of decomposition and restoration. It also focuses on the knowledge about limited resources, including different sustainability strategies. The same author also suggests following the model of thinking through a product's life-cycle from beginning to end-of-life strategies (today's goods are tomorrow's resources). Lind et al. (2014) state that research on relationships in a closed-loop supply chain is a fairly new and interesting area within remanufacturing. According to Guide Jr. et al. (2003) the CLSC is defined as the design, control and operation of a system to maximize value creation over the entire life cycle of a product with dynamic recovery of value from different types and volumes of returns over time.

Theoretical debates and empirical studies have been intensified, attracting the attention of researchers Atasu et al. (2008) and Govindan et al. (2015) in order to provide

competitive advantages regarding remanufacturing and also as an important process in the recovery of products. Studies presenting empirical evidence of the environment for relationship building in dyads (buyer- supplier) and network types in remanufacturing are still scarce. In this way, the aspects of cooperation and communication between the various actors in the remanufactured reverse chain are important (Guidat et al., 2015). A remanufacturer typically has different supply channels and thus maintains different types of relationships with its suppliers (for a discussion of different relationships in remanufacturing, see Lind et al., 2008).

Firms in the buyer-supplier network can trigger the benefits of the relational view (Dyer & Singh, 1998) by investing in relation specific assets, knowledge-sharing routines or combining complementary resources and forming an idiosyncratic relationship. A shift in organizational behavior has changed the paradigms of procurement from a transaction-oriented to a relationship-oriented approach (Sheth & Sharma, 1997, p. 94). So, the research question is: How do resource sharing relationships occur and how are they preserved in remanufacturing?

By using this theory in a complementary way, for example with remanufacturing contracts with suppliers, the possibilities of understanding how the resources are preserved are increased as well as the chances of exploring the OEMs governance mechanisms at remanufacturing. Remanufacturing is the process of taking into account in decision making both the resources consumed and the environmental and health pressures associated with the full lifecycle of a product. The collaboration and interaction among the remanufacturer's reverse chain actors can change the other relationships for positive results achieved during the years of commercial transactions and are considered success factors in remanufacturing (Subramanian & Subramanyan, 2012).

In this article, the management acquisition cores are being explored as a potential way to understand how the resources occur at remanufacturing. Fleischmann et al. (2000), states that returns are dependent on the former user's requirements, and not the remanufacturer's. Geyer and Jackson (2004) argue that there is limited access to end-of-life products in the closed-loop supply chain (CLSC) and therefore also for remanufacturers. This, together with Wit and Meyer's (2004) argument that no firm can be autarchic and must collaborate with other firms, makes it interesting to study how remanufacturers, being a firm, collaborate with their suppliers of cores.

Methodology

In order to conduct the present study, the objective of this section is to describe the research methodology and to explain how data was collected and how results were obtained and analysis were made. A systematic literature review is an explicit, comprehensive and reproducible method (Okoli & Schabram, 2010), to identify, appraise, and synthesize all available research relevant to a particular research question, or topic area, or phenomenon of interest, which may represent the best available evidence of a subject (Cruzes & Dyba, 2011), see Figure 1.

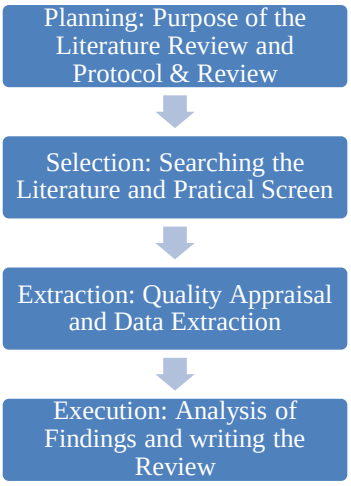

Figure 1 – A systematic guide to literature review development (Adopted: Okoli & Schabram, 2010)

The present study uses these keywords for data collection: "Supply Chain", "Strategies", "Core Management", "Relationship buyer-supplier ", Remanufacturing" and "Relational View Theory". The initial search attempts resulted in 1713 articles. According to the review literature and select, the articles are screened by reading the abstract part and a quick scan of the main body of articles. In selecting the papers included in our literature review inclusion/exclusion criteria, for example, these papers are short non-refereed papers and those published in commercial magazines, which may not be regarded as scientific contributions, and eliminating these duplications. Further refinement to eliminate the non-refereed articles, commercial magazine papers and those with unknown author names resulted in journals, articles, published during a 31-year period, between1986 and 2017. Around the most relevant articles reviewed in detail after the screening process. Scientific articles databases founded in the google scholar database were used to achieve the purpose of this research. For the research according to the literature, three combinations of these search query are present: (1) Relational View Theory AND Supply Chain resulting in 76 articles, (2) Supply Chain AND Remanufacturing AND Core Management that resulting in 75 articles, (3) Relational View Theory AND Supply Chain AND Relationalship buyer-supplier, resulting in 69 articles. In short, from the 220 articles, around the most relevant articles reviewed in detail after the screening process. Scientific articles databases found in the google scholar database were also used to achieve the purpose of this research. Further, 55 papers were identified in 30 journals being that they are concentrated in the following journals: Journal of Cleaner Production, European Journal of Operational Research, Academy of Management and Journal of Remanufacturing. The main research question is: How do resource-sharing relationships occur and how are they preserved in remanufacturing?

Remanufacturing

Remanufacturing is the process of restoring a non-functioning complex assembly to a "like-new" functional state by rebuilding and replacing its component parts (Ijomah et al., 1999). Later, Ijomah (2008) extended his definition to that of a process of bringing used products to at least original performance specification from the consumers' perspective and giving them warranties at least equal to that of their originals to be called remanufactured and being considered as a crucial strategy in waste management and and environmentally conscious manufacturing. Sorting, inspection, disassembly, cleaning,

reprocessing and reassembly, and parts which cannot be brought back to original quality, are replaced, meaning the final product is a combination of new and reused parts. The detailed description of the remanufacturing process can be found in (Ijomah, 2008; Seitz & Wells, 2006).

A company is a suitable candidate for remanufacturing when its products have certain issues: a reverse flow of used products (Ayres et al., 1997; Lund, 1984) there is customer demand for the remanufactured product (Ayres et al., 1997); high value and durable parts (Ayres et al., 1997). Further, technological stability (Gray & Charter, 2007; Lund, 1984); more sustainable production mode, bringing less damage to the environment (Ijomah et al., 2007); improving the company's image and promoting sales of new products or offering after-sales services (Östlin et al., 2008). The OEM must control the quality and the reliability of remanufactured products to protect brand-name capital and, therefore, the need for coordination and monitoring is high (Martin et al., 2010).

Östlin et al. (2008) there are three main activities for a remanufacturer: the collection of cores, the remanufacturing process and the redistribution of remanufacturing. These peculiarities are crucial for advancing the research debates about the problem and difficulty of planning that affect remanufacturing, which is the difficulty in obtaining used products (cores) suitable for reuse, with uncertainties regarding quality, volume and frequency in the acquisition of "cores" (Govindan et al., 2015; Guide Jr. & Jayaraman, 2000; Östlin et al., 2008). To reduce the uncertainties and their consequences on the remanufacturing system, the remanufacturer must manage the following information (Jacobsson, 2000): what products should be returned to the Remanufacturer? When will these products arrive? Where are these products located? How many of these products can be remanufactured?

Conversely, if product returns are highly variable, but operational assets do not increase transaction costs, the firm may choose to contract to remanufacture to its suppliers. In remanufacturing, the management of uncertainties is a possible way to achieve a better balance between return and demand. With the uncertainties, in terms of volume of return, time and quality of the core, core acquisition is a critical and challenging issue for remanufacturing (Thierry et al., 1995; Wei et al., 2015). Finally, the perception of inferior quality of remanufactured products, making the willingness to pay for them significantly less (Abbey & Guide Jr., 2017).

The availability of the returned products can result in a high amount of variance, depending on the type of product recovery practiced (Thierry et al., 1995). Specifically, we consider the effects of volume, technological, and condition uncertainty on a firm's organizational choices relative to the re-make versus buying decision (Guide Jr. & Van Wassenhove, 2001). As the uncertainty increases, the frequency of updating and renegotiating increases, and the firm seeks other means to coordinate these activities in order to minimize the associated costs. Matsumoto and Umeda (2011) point out three core necessities for successful remanufacturing: (1) developing systems of gathering for used products; (2) developing effective remanufacturing processes; and (3) promoting consumer demand for remanufactured products. Companies' efforts in order to realize these necessities may be as follows: (1) creating a new collection channel, (2) developing reverse logistics systems in order to gather used products, and (3) designing products for remanufacturing.

The central idea conveyed by (Östlin et al., 2008): is about the relationship between the remanufacturer and its suppliers and which were classified into seven types of transactions, regarding Figure 2.

Relationship	Description
1. Ownership-based	The manufacturer owns the product and leases it to a customer, the manufacturer often provides service for the product, including remanufacturing.
2. Service-contract	The customer owns the product but the manufacturer performs service on it.
3. Direct-order	One core is sent to remanufacturer, after it has been remanufactured, the exact same core is returned to the customer.
4. Deposit-based	The customer must return a similar core to be allowed to purchase a remanufactured one.
5. Credit-based	The customer receives a credit when returning a core to purchase a remanufacture one.
6. Buy-back	The remanufacturer simply buys the cores needed.
7. Voluntary-based	Cores are given to the remanufacturer.

Figure 2 – Seven types of transactions the relationship between the remanufacturer and its suppliers - Sourcing: Östlin et al. (2008).

Next, will be explored the characteristics of relational view perspective.

The Relational View

Dyer and Singh (1998) have systematically examined inter-organizational rent-generating processes. A relational rent is defined by Dyer and Singh (1998: p. 662) as: "A supernormal profit jointly generated in an exchange relationship that cannot be generated by either firm in isolation and can only be created through the joint idiosyncratic contributions of the specific alliance partners". Dyer and Singh (1998) identified four sources of relational rents: (i) investments in relation-specific assets; (ii) interfirm knowledge sharing routines; (iii) the combination of complementary resources, and; (iv) effective governance mechanisms. Table 1 presents the main authors who have developed studies dealing with sources of relational rents, as well as the key elements that characterize each of the sources.

Table 1 – Summary of recommended determinants relations rents concepts

Sources of relational rents	Authors	Key elements of the relationship
(i) Investment in relation-specific assets	Doucette and William (1997); Jost et al. (2005); Schotanus et al. (2001)	Member commitment and Trust between members
(ii) Interfirm knowledge-sharing routines	Erridge and Greer (2002); Ritchie and Chadwick (2001)	Cooperation and communication
(iii) The combination of complementary resources and capabilities	Kale et al. (2002); Jost et al. (2005)	Appropriate resources (training, IT, etc.); Complementary expertise, skills, and resources; Standardized procedures and processes; Joint selection of goods and services
(iv) Effective governance mechanisms	Schotanus and Schotanus (2007); Cicimil and Marshall (2005); Nollet and Beaulieu (2003); Kuwabara and Sheldon (2012)	Agreed goals and performance measures, top management support and implementation of appropriate structures

Regarding investments in relation specific assets (Iten i), firms can achieve supernormal profits by developing an idiosyncratic relationship with their alliances through these processes. The aim is to move away from arm's length market relationships because there is nothing unique about the interactions between buyer and seller, which competitors can easily duplicate. Firms in forging a relationship beyond arm's length is that rents are jointly generated and owned by partnering firms.

The second source of relational rents is interfirm knowledge sharing routines: Knowledge transfer is particularly present in hotel chains, but not between unrelated hotels (Baum & Ingram, 1998). Know-how compared to information is more difficult to imitate and transfer, because of its tacit, sticky and complex to codify nature (Kogut &

Zander, 1992). When alliance partners succeed in transferring this type of knowledge, for Dyer and Singh (1998) they are more likely to achieve competitive advantages due to the incapability of competitors to imitate this process. Their second proposition highlights the importance of incentives alignment that encourages the partners to be transparent to transfer knowledge and to do this in a responsible and ethical way. Incentives should create an atmosphere where both parties are stimulated to openly engage in transferring know-how across the interfirm platform, since it can be costly to arrange a knowledge transfer, taking into account the cost of human resources, development programs, equipment costs, providing incentives is a good way for the transferring firm not to avoid these costs.

The third source of relational rents is relation-specific assets: A firm may want to differentiate itself creating specialized assets through partnership, which can create complex interfirm structures hard to mimic by competitors. This way, transportation costs are lower and the costs of coordination activities are likely to decrease (Dyer, 1996). However, Artz & Brush (2000) suggest asset specificity and environmental uncertainty directly increase the cost of conducting interfirm exchange under the conditions that there are weak relational norms. Relational norms such as collaboration, continuity of expectations and non-coercive communications effectively reduced the impact of asset specificity on negotiating costs (Artz & Brush, 2000). Walker et al. (2013) studies of collaborative procurement reveal that a lack of certain enablers (e.g., lack of member commitment, lack of standard routines, etc.) could also hinder collaboration. The investor wants a long-term partnership because it protects from opportunistic behavior from the partner who received the investment. Just as the effect of economies of scale, that increases productivity, a greater volume and scope of exchange activities between partners is likely to increase efficiency associated with interfirm exchanges (Dyer & Singh, 1998).

The fourth source of relational rents is effective governance mechanisms: the ability to minimize transaction costs and thereby enhance efficiency. Dyer and Singh (1998) support the latter by providing four primary reasons: 1) Contracting costs are avoided because informal safeguards ensure that both parties receive a fair distribution of payoffs. Contracts are less effective than self-enforcing mechanisms in controlling opportunism because they fail to anticipate all forms of cheating that may occur; 2) Monitoring costs are lower under self-enforcement because self-monitoring does not involve any third parties that bring high costs; 3) Exchange partners face less resistance in adapting to agreements to respond to unforeseen market changes. Under these conditions, self-enforcement allows partners to find flexible solutions, whereas legal contracts or third-party enforcement require complex adaption procedures, which can be very costly. 4) Contracts are expired over time and only provided protection for a limited amount of time. This is why contracts are subject to depreciation as they move towards expiration.

Discussion

The core suppliers are the clients that discard the product due to its end-of-service life or for reasons like the launch of a more modern product. In this case, there are some problems concerning the lack of motivation to get these customers to return used products to remanufacturing companies (King & Burguess, 2005). In this paper, the management acquisition cores are being exploring as a potential way to understanding how the resources occur at remanufacturing. With the uncertainties, in terms of volume of return, time and quality of the core, its acquisition is a critical and challenging issue for remanufacturing. The relational view shows that close collaboration with suppliers leads to success. Conversely, if product returns are highly variable, but operational assets do

not increase transaction costs, the firm may choose remanufacture suppliers (Martin et al., 2010). Remanufacturing OEMs are in control of both product development and product recovery while a remanufacturer receiving some OEM information, can provide the remanufactured product back to the OEM while an independent remanufacturer is a competitor, and often, treated as such (Palisaitiene et al., 2015). Unlike the usual competition, the OEM competes with another supplier not only to sell its products but also to collect the cores or returned products (Östlin et al., 2008).

In addition to the discussion of how are resource-sharing relationships occur, there is an urgent need to discuss is order how to preserve resource-sharing relationships at remanufacturing. Dyer and Singh (1998) present barriers to collaboration for those seeking to imitate successful collaborations. First the interorganizational assets interconnectedness is based on the accumulation of shared resources. The second is the partner scarceness suggests that there are likely to be few partners with complementary resources and relational capacities. Finally, the reasons of barriers are resource indivisibility because of coevolution of resources and institutional environment may not lend itself to cooperation.

Based on the criteria Dyer and Singh (1998) also highlight the importance of informal contracts in the relational view. They argue that absorptive capacity enables knowledge transfer but that in many cases this process is developed informally over time through interfirm interactions (Dyer & Singh, 1998). One of the major challenges establishing informal contracts is that they require substantial time to develop personal ties between alliance partners. One cannot easily gain a relationship status that services in setting up informal safeguards. A certain level of trust has to be reached to come to this point, which at the same time is the second drawback of informal safeguards. Abuse may arise due to the opportunistic behaviour of one of the exchange partners that sees a hole in the system to exploit one another. The paradox of trust is then a liability in the governance structure (Dyer & Singh, 1998).

Broadly speaking supplier strategy decisions are an important item for purchasing managers. According to Bakos and Brynjolfsson (1994) firms are able to increase profits by increasing their interdependence on a smaller number of suppliers, which encourages suppliers to share knowledge and make performance-enhancing investments in relation-specific assets. They will gain more ex-post bargaining power and therefore more incentives to make noncontractible investments in innovation, responsiveness and information sharing (Bakos & Brynjolfsson, 1994).

The trend identified Bajari et al. (2009) argues that negotiations are more effective than competitive bidding when ex-post changes are anticipated. A second argument as to why negotiations are preferred is that the knowledge and experience of a contractor are needed before the operation are complete. Under competitive bidding, suppliers have incentives to hide information about possible operation flaws, submit a low bid and recoup profits when changes are required (Bajari et al., 2009).

Conclusion

By analysing the purpose of this paper brought insight into how resources sharing relationships occur does and how they are preserved in remanufacturing, for both situations, the present study allows advance in the field of knowledge of how the different mechanisms of governance adopted in dyads can help in the construction of the relationship, for integration in the remanufactured reverse chain. The relational view analysis through different aspects of resource sharing. Firms in the buyer-supplier network can trigger the benefits of the relational view by investing in relation-specific assets, knowledge-sharing routines or combining complementary resources and forming

an idiosyncratic relationship. Finally, there are several promising avenues for future research.There could be a greater understanding of the adoption of social and environmental criteria for selecting suppliers according to the purchasing situation and the kind of relationship between buyer and supplier at remanufacturing.

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