Reverse resource exchanges in service supply chains: The case of returnable transport packaging

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Abstract

Purpose – The paper seeks to understand how reverse resource exchanges and resource dependencies are managed in the service supply chain (SSC) of returnable transport packaging (RTP).

Design/methodology/approach – A single case study was conducted in the context of automotive logistics focusing on the RTP service supply chain. Data was collected through sixteen (16) interviews primarily with managers of a logistics service provider (LSP) and document analysis of contractual agreements with key customers of the packaging service.

Findings – Resource dependencies among actors in the SSC result from the importance of the RTP for the customer's production processes, the competition among users for RTP and the negative implications of the temporary unavailability of RTP for customers and the LSP (in terms of service performance). Amongst other things, the LSP is dependent on its customers and third party users (e.g., the customer's suppliers) for the timely return of package resources. The role of inter-firm integration and collaboration, formal contracts, as well as customers' power and influence over third party RTP users are stressed as key mechanisms for managing LSP's resource dependencies.

Research limitations/implications – A resource dependence theory (RDT) lens is used to analyse how reverse resource exchanges and associated resource dependencies in SSCs are managed, thus complementing the existing SSC literature emphasising the bi-directionality of resource flows. The study also extends the recent SSC literature stressing the role of contracting by empirically demonstrating how formal contracts can be mobilised to explicate resource dependencies and to specify, and regulate, reverse exchanges in the SSC.

Practical implications – The research suggests that logistics providers can effectively manage their resource dependencies and regulate reverse exchanges in the SSC by deploying contractual governance mechanisms and leveraging their customers' influence over third party RTP users.

Originality/value – The study is novel in its application of RDT, which enhances our understanding of the management of reverse exchanges and resource dependencies in SSCs.

Keywords: Service Supply Chain; Logistics Service Providers; Packaging; Case Studies.

Article Type: Research paper

1. Introduction

The aim of this paper is to empirically understand how reverse resource exchanges (RREs) and resource dependencies are managed among actors in service supply chains (SSCs). Unlike typical manufacturing supply chains where product returns have received significant literature attention (Blackburn et al. 2004; Prahinski and Kocabasoglu, 2006; Fergyson et al. 2006), in SSCs the management of RREs has received limited attention (Ho et al. 2002; Giannakis, 2011) despite the customers' active role in service production and delivery (Sampson and Froehle, 2006). Depending on the nature and characteristics of services, RREs may present themselves in several different forms and they are therefore influenced by sector-specific contingencies (Sampson and Spring, 2012a).

In this paper we explore RREs in the context of logistics service supply chains and, in particular, the management of returnable transport packaging (RTP) services. RTP includes non-disposable, multi-trip packaging mediums (e.g., pallets, containers, bins, boxes, trays, crates, dollies) used for the transport of material / components that enable production; herein we also focus on the RTP journey viewing it as an important resource of the SSC. RTP is more complex than "closed-loop" packaging systems as it requires increased sophistication (e.g., accurate forecasting), and cross-firm collaboration between suppliers and customers that have willingly, and jointly agreed to participate (Twede and Clarke, 2004).

This context is deemed appropriate for studying resource dependencies and RREs in SSCs since the nature of RTP service operations suggests that logistics service providers (LSPs) providing RTP services are dependent on their customers and other user firms for effective management of reverse resource flows to achieve required performance levels, notably in terms of packaging availability and on-time delivery of components / material to be fed into customers' production processes. The latter suggests that customers are also dependent on RTP as a valuable input into their operations. The global market for RPT is predicted to reach $6.75 billion by 2017 (Research and Markets, 2014) and certain industries (e.g., automotive) rely even more heavily on it due to the need for a continuous and steady flow from suppliers to OEMs and back to suppliers.

Although the management of RTP systems is both challenging and complex, their design has received interest in the literature, particularly in relation to comparisons of different systems in terms of their cost performance as well as the environmental implications (Kroon and Vrijens, 1995; Chan, 2007); however, little is known about the resource interdependencies between LSPs and service users the RTP creates, and the ways through which they can be managed.

In this paper we draw upon a single, embedded, case study to understand how resource dependencies and RRE are managed in the SSC of a Swedish LSP offering RTP solutions. In doing so, we employ a Resource Dependence Theory (RDT) perspective (Pfeffer and Salancik, 1978) which we argue is useful for studying SSCs since their members are constrained by, and dependent upon, other organisations to provide them with resources critical for service delivery (Lai et al. 2013; Sampson, 2000).

Our study contributes to the existing SSC literature by employing a RDT perspective to analyse how RREs in SSCs, and associated resource dependencies, are managed, thus complementing the literature emphasising the bi-directionality of resource flows. The study also extends the recent SSC literature stressing the role of contracting by empirically demonstrating how formal contracts can be mobilised to explicate resource dependencies and to specify and regulate RRE in the SSC. In addition, a RDT perspective stresses the factors contributing to the creation of resource dependencies in SSCs, an issue that has been underplayed in the extant literature.

The remainder of the paper is structured as follows. The next section critically reviews the literature on SSCs and outlines the empirical context of this study. Section 3 discusses the research method and design employed, while Section 4 presents and analyses the case study with an emphasis on the management of resource dependencies and RRE in the SSC of RTP. Section 5 concludes by discussing the research and managerial implications as well as identifying limitations and future research opportunities.

2. Literature Review

This section critically reviews the literature on SSCs and outlines the theoretical underpinnings of the study. In particular, it discusses the application of RDT to service supply chain management.

2.1 Service Supply Chains

The growing trend of servitization of manufacturing and the importance of service-based competitive strategies (Baines et al., 2009), in tandem with the realisation by OEMs that significant improvement opportunities exist in service supply chain operations (Price Waterhouse Cooper, 2014), has contributed to increasing interest in the management of SSCs (Baltacioglu et al., 2007; Sampson and Spring, 2012a). Consequently, SCM researchers have strived to understand how supply chains of services can be effectively designed and managed (e.g., Giannakis, 2011). The notion of SSCs has its origins in service operations management (Sampson, 2012) and attempts to address the limited explanatory power of manufacturing-oriented SCM frameworks when applied to service contexts (Baltacioglu et al., 2007).

Early research attempted to draw out the distinctive features of SSCs as compared to manufacturing supply chains, including the role of capacity management and service process quality control to manage demand amplification and order backlogs, in the absence of physical inventories (Akkermans and Vos, 2003; Ellram et al., 2004). More specifically, Akkerman and Vos (2003) provide evidence related to the impact of amplification effects on supply chain performance from the telecommunications industry analysing the relevant root causes and associated countermeasures. Ellram et al. (2004) explore the use of well-established product-based SCM models to the services sector concluding that the inherent differences in services creates a need for specific SCM tools. Similarly, Baltacioglu et al. (2007) developed a SSC model, based on SCOR, and applied to the healthcare industry, while Rahimnia and Moghadasian (2010) use the decoupling point concept in the healthcare delivery system. Giannakis (2011), also drawing on the SCOR model, developed a process reference model for service companies arguing that the process of value creation in SSCs is more complicated (as

compared to product supply chains) since multiple actors are involved in a non-linear fashion in service design, production and delivery.

Although the literature on SSCs is still relatively nascent (Sampson and Spring, 2012a), it appears to be underpinned by specific theoretical perspectives. In particular, a central theme is the customer's involvement and role in service delivery (e.g., Maul et al., 2012) and the attendant customer-induced variability (Akkermans and Voss, 2013; Sampson, 2000). The unified services theory suggests that SSCs entail bi-directional resource flows in that customers are simultaneously suppliers of resource inputs (e.g., their material possessions, information and bodies or minds) (Sampson and Froehle, 2006). Apart from providing resources and labour and abiding by service-related rules (e.g., returning provider's resources on time), customers can influence service design, manage the service production process, and assure service quality (Sampson and Spring, 2012b). As such, services are co-produced as customers are closely involved in actual service delivery (Sampson and Froehle, 2006). This view is congruent with the service-dominant logic suggesting that, in service settings, customer value is co-created (Vargo and Lusch, 2004). The implication of value co-creation for SSCs is that emphasis should be placed on managing customer-provider interactions and fostering collaboration, information sharing, and knowledge exchange to ensure successful service delivery (e.g., Randall et al. 2010; Ng et al., 2009).

Despite stressing the resource dependencies of service providers on customers (Sengupta et al., 2006) and the bi-directionality of resource flows in SSCs (e.g. Sampson, 2000), existing SSC studies, underpinned by the unified services theory, do not offer a systematic understanding of how such dependencies are created other than arguing that, in service co-production situations, the service provider depends on customer inputs (Sampson and Froehle, 2006). Important issues related to the relative importance of resources for service delivery and their availability (or even scarcity) are not explicitly addressed. This literature stream also tends to focus on the customer's role in SSCs (e.g. Maull et al., 2012; Sampson and Spring, 2012b) and the dependencies on third parties (e.g., the customer's business partners) have received limited attention. Furthermore, existing studies appear to underplay the mechanisms used to manage such dependencies. More specifically, Sampson (2000) and Sampson and Froehle (2006) effectively argue for resource dependencies on customers and that these should be handled to reduce variability in service provision, but they stop short of providing any empirically-based mechanisms for managing reverse resource exchanges and dependencies.

A key mechanism that may be employed to manage such dependencies by sharing risks and aligning incentives in the SCC is the formal contract (see Lillrank and Särkkä, 2011). Contractual aspects are not, however, addressed by Sampson (2000) and Sampson and Froehle (2006) despite the fact that the authors rightfully suggest that service co-production implies that the resource inputs of customers in SSCs need to be specified and managed. Contracts may be useful tools for specifying and managing performance and, indeed, more recent SSC studies have employed agency theory (Eisenhardt, 1989a) to examine how contracting influences incentive alignment and risk sharing among SSC members (e.g., Datta and Roy, 2013; Kim et al., 2007). Specifically, the potential of performance (outcome)-based

contracts is stressed since this type of contractual arrangement ties provider payment to end customer performance and, in this sense, may help in aligning incentives across the SSC (Selviaridis and Norrman, 2014); however, these agency theory-informed studies appear to focus on contract design in relation to performance clauses and payment structures as incentives for service delivery (e.g. Selviaridis and Norrman, 2014) and they do not directly address the functionality of contracts in terms of specifying and managing reverse resource exchanges in SSCs.

The above theoretical perspectives on SSCs, albeit useful, appear to provide an incomplete understanding of SSCs in relation to the management of RREs and resource dependencies. In sum, the unified services theory view (e.g., Sampson and Froehle, 2006) tends to focus only on customer-induced dependencies, offers no systematic explanation of how resource dependencies are created, and underplays mechanisms to manage such dependencies including the role of formal contracts. SSC studies drawing on agency theory (e.g., Datta and Roy, 2013) stress the role of contracts but with an emphasis on performance management and incentive alignment rather than the actual management of reverse resource exchanges. In light of the above, we submit that a RDT lens is useful for offering a more complete understanding of RREs in SSCs. The relevance of RDT for the analysis of SSCs is discussed below.

2.2 A Resource Dependence Theory (RDT) View of Service Supply Chains

RDT views firms as embedded in a network of exchange relationships within an uncertain environment and dependent on other organisations for resource acquisition and survival (Paulraj and Chen, 2007; Fink et al., 2006). The level of firm dependence on resources possessed by external organisations is largely determined by three key factors: the overall importance of the resource to the firm, the scarcity of the resource, and the level of inter-firm competition for control of the particular resource (Pfeffer and Salancik, 1978). Unlike the Resource-Based View (RBV) of the firm (e.g., Barney, 1991) which takes an inward view of how organisations specify resource needs, RDT takes an externally driven perspective of how organisations obtain valuable resources from their network of relations (Hilman et al. 2009).

RDT centres on how firms seek to establish relationships with others in order to obtain the needed resources, often altering their dependence by minimising or increasing this in relation to other organisations (Ketchen and Hult, 2011). Resource dependencies can be managed in various ways including vertical integration to acquire access to complementary resources (Pfeffer and Salancik, 1978), the exercise of power and influence on other organisations, and the nurturing of collaborative inter-firm relationships to manage mutual dependencies among organisations (e.g. Hilman et al., 2009; Casciaro and Piskorski, 2005)

RDT is well suited to the study of supply chain relationships (Ketchen and Hult, 2007) since supply chain members need to manage their resource dependencies and coordinate their resource sets in order to achieve higher performance gains (e.g., Paulraj and Chen, 2007; Crook and Combs, 2007; Carter, 2011). Similarly, we argue that a RDT perspective on SSCs is useful in the sense that it focuses on resource interdependencies among service providers, customers and even third parties in SSCs and, in doing so, also helps to understand RREs (i.e.,

resource inputs flowing from the customer and potentially also third parties to the service provider) (Sampson and Froehle, 2006).

The bi-directionality of resource flows in SSCs suggests that customers may also play an active role in service production and delivery by supplying resources to the service provider (Sampson, 2000). For example, in the context of cleaning services, a train operator customer has the obligation to make the trains available to the cleaning service provider at the agreed time and geographical location so as to enable successful service delivery (i.e., clean trains) and contribute to end customer (passenger) satisfaction (van der Valk and Wynstra, 2014). In other words, the service provider is dependent on the timely availability of a customer's material resources (trains) to be able to optimise its service capacity and resources (e.g., employees and cleaning equipment) and deliver the required service to the contracted agreed standards.

To better understand RREs and resource dependencies in SSCs, we employ RDT in the context of the logistics services industry, and more specifically RTP services. The RTP service is deemed as an appropriate empirical context to study SSCs since the nature of service operations (RTP pool) suggest that LSPs are heavily dependent on their customers and other actors using the RTP for successful service delivery. For example, the timely return of empty packaging by service users to a large extent determines the stock levels in the pool and hence the availability of packaging and on time delivery of customer orders. At the same time, customers are also dependent on LSP packaging as a valuable resource input into their operations.

A RDT lens is useful in understanding resource dependencies in the context of RTP service supply chains. This is because RTP is not only an important resource to both LSP and their customers, but also because it can be scarce (i.e., can become temporarily unavailable) due to high demand and competition among multiple users in the packaging pool. As a result, relationship management between LSPs and their customers may be a means for managing resource dependencies, securing access to RTP and improving performance (e.g., Lai et al., 2013; Fugate et al., 2009). Under the RDT prism, Chu and Wang (2012, p.81) argue: *"*high-quality logistics outsourcing relationships can be used to control logistics resources in an attempt to manage uncertainty and dependence of logistics users, with higher levels of dependence leading to higher relationship quality".

3. Methodology and Research Design

3.1 Research Approach

For the purposes of this exploratory study we have adopted a qualitative approach which is well suited to service industry investigations (Ostrom et al. 2015; Subramony and Pugh, 2015) and well aligned to case-driven research approaches, especially when the phenomenon and the context under investigation are not easily separated (Yin, 2003). In line with the RDT focus on resource dependencies in inter-organisational relationships, a case-based research approach was deemed suitable (Dubois and Araujo, 2007) for mapping and studying the resource dependencies and the complex and multifaceted forward and reverse resource exchanges

among 3PL providers, their customers, other service users (e.g., customers' suppliers) and transport sub-contractors in the service supply chain of RTP. Case studies in particular are useful for providing rich data and in-depth understanding of complex and multi-faceted supply chain relationships (Ellram et al., 1996).

A single case design was adopted, which is appropriate when the selected case is typical of a more generic phenomenon (Yin, 2003). Herein, the case of RTP represents a SSC where there is a need to manage reverse resource exchanges and related resource dependencies to ensure service delivery. In addition, a single case was considered a suitable approach since our focus was on the service supply chain as our analytical unit thus availing the opportunity to map and study in detail reverse resource exchanges among key actors in the logistics service supply chain. RTP service performance, for instance in terms of packaging availability and on time delivery of packages, relies not only on the logistics provider and supporting transport sub-contractors, but also on the resource inputs of service users (Hartmann and de Grahl, 2012) (i.e., customers and their supply chain partners also using the packaging). Such in-depth understanding is a key strength of case study research since it often produces findings of high managerial relevance (Voss et al., 2002) which can increase the ability of organisational actors to undertake better decisions regarding the phenomenon under investigation, and therefore, contribute to improved overall performance (Rendtorff, 2015).

3.2 Case Study Data Collection and Analysis

A Swedish based 3PL provider (henceforth called LogCo) offering RTP services was selected for this case study. LogCo has more than 40 operating terminals across Europe, the U.S., and Asia, employing a workforce of more than 1,300 employees. It mainly specialises in the automotive industry offering "one-stop shop" customer solutions and service offerings including: inbound transportation (e.g., to production plants) and outbound distribution services (e.g., to car dealers), freight forwarding and customs management, risk management and insurance services, logistics consulting, and a RTP management solution for industrial customers. The company faced challenges in relation to mitigating financial risks resulting from resource interdependencies with customers and other service users. Managing reverse exchanges (e.g., the timely return of packaging resources) was of critical importance for service performance achievement and business success. It should also be noted that the particular case study included two embedded cases (Yin, 2003) of customer relationships, namely an automotive OEM customer (Customer 1) and a first-tier powertrain equipment supplier of OEMs (Customer 2).

Primary data was collected through sixteen (16) semi-structured interviews and also included the collection and analysis of relevant organisational documents such as customer and user contracts and operating procedures describing how the packaging pool should work. The semi-structured interview method responds to the needs of the exploratory mode, adopted by this study, by providing explanations of why and how events happened (Creswell, 2003). Interviewees were selected following a purposive sampling approach (Patton 1990). Specifically, fifteen interviews were conducted within LogCo and one with a transport sub-contractor used by the logistics provider to pick-up and deliver packages from/to users. LogCo

managers from different, but relevant, functional areas were interviewed in order to provide cross-sectional (departmental) views and perspectives. The study drew on the expertise of different functions such as Business Development and Key Account Managers (close to customers), Operations (people familiar with the package pool), and Purchasing (people buying the package resources) and Legal (contract design) (a full participants list can be found in Appendix 1). Beyond the investigation of managers within LogCo, an interview with the Managing Director of a transport sub-contractor (supplier to LogCo) was conducted in order to explore the sub-contractor's view and role in achieving SSC performance.

The interview guide employed (see Appendix 2) covered a variety of different issues such as key service performance aspects and how they are measured and dependencies among the LSP, users, and transport sub-contractors. The open-ended questions allowed participants to develop their own views (Denscombe, 2003) on issues related to resource dependencies between the LSP, customers, and other service users and third parties such as the transport sub-contractors. The interview guide developed reflected the key concepts under study and theoretical perspective taken (i.e., SSCs and RDT). More specifically, the section in the interview guide *"Returnable packaging services"* helped in mapping and understanding the SSC of RTP and offered insights into the factors affecting resource dependence. Similarly, the intention with the last two sections, *"Managing resource dependencies"* and *"Managing relationships",* was focused on understanding the mechanisms to manage resource dependencies; however, the semi-structured interview design allowed following up emergent themes too (Voss et al., 2002), such as the importance of service delivery KPIs (e.g., packaging availability), the contribution of customers and their supply chain partners in attaining such KPIs, and the role of the user agreements as a means for specifying and regulating the RREs required. At the start of each interview participants were introduced to the study and its motivation and were given confidentiality and anonymity reassurances (Seidman, 1998). All the interviews were recorded and fully transcribed shortly after to increase reliability (Eisenhardt, 1989b).

The semi-structured interviews were complemented by analysing a number of critical organisational documents. Contracts, packaging user agreements, standard operating procedures of the RTP, and performance records were collected and analysed. The rationale was to triangulate the data collected through interviews to increase validity (Marshall and Rossman, 1999). In particular, access was granted by LogCo managers to master contracts, service level agreements, assignment specification schedules (e.g., KPIs), and associated user agreements for both Customer 1 and Customer 2. The user agreements were particularly useful since they dictated the rules and regulations underpinning the RTP service and specified the key reverse exchanges. Access to these documents prompted additional clarification questions during interviews with LogCo managers. The collected records of LogCo service performance (against KPI targets) were also useful in terms of triangulating LogCo managerial accounts of what the customers valued as key aspects of performance. In addition, these records included comments regarding the causes of service failures (per KPI), some of which referred to customer actions or the customers' suppliers. In this sense, the performance records provided

unique insights into the role of customers and third parties in successful service deliveries which were subsequently raised and discussed during interviews with LogCo managers.

Within-case analysis was conducted manually, in parallel with data collection, to understand the main types of resource interdependencies and RREs among actors in the RTP service supply chain. Within-case analysis tables (Tables 3 and 4 respectively) were used to help make sense of the data and identify key themes, following a pattern matching approach (Yin, 2003). Content analysis of interview transcripts and documents contributed toward this end. In particular, analysing and annotating each of the interview transcripts as, well as the user packaging agreements and documents describing the operational procedures of the RTP, helped to construct the SSC, identify the main actors involved, and map the key forward and RREs (see Figure 1).

The data was coded to facilitate analysis, in accordance with recommended practices (Miles and Huberman, 1994; Krippendorff, 1980). Open and axial coding procedures were utilised (Strauss and Corbin, 1990), with the aim of deriving the key themes of the study, also taking into consideration the literature on SSCs and RDT as the theoretical lens adopted. Key themes identified through coding interview transcripts and documents (e.g., user agreements and contracts) included 'service supply chain', 'service co-production', 'managing resource dependencies', and 'types of reverse resource exchanges'. These codes and their interrelations were subsequently adjusted considering the themes emerging from the data analysis. For example, analysis of interviews with LogCo managers and reviews of user packaging agreements emphasised the role of contracts in specifying key types of RREs in the RTP service supply chain. Open codes were successively grouped into higher level categories. For instance, codes relating to contracting (e.g., 'user agreements', 'conditions of return of packaging resource' and 'rules imposed on packaging users') were grouped into the super-code the 'role of contractual governance mechanisms'. In the same vein, codes relating to RREs ('return of empty packaging', return of damaged packaging', 'return at contract termination date', and 'timely and accurate information supply') were grouped into the super-code 'types of reverse resource exchanges'. For a complete overview of key themes and associated codes see Table 1.

[Insert Table 1 about Here]

In line with recommendations provided by Barratt et al. (2011) and Voss et al. (2002), four criteria for evaluating case study research were employed: internal validity, construct validity, external validity and reliability. Table 2 presents the measures taken to address each criterion to ensure methodological rigour.

[Insert Table 2 about Here]

4. The Case Study

In this section the case study of a SSC in the context of RTP is analysed. We first describe in Section 4.1, the key actors involved, and drawing on RDT's three main factors that affect resource dependence (i.e., overall importance of the resource, scarcity of the resource, and level of inter-firm competition for control of the particular resource) we explore dependencies in RTP service operations. In Section 4.2 we begin by presenting the different types of RREs in the SSC and using RDT we then analyse and discuss the mechanisms used to manage resource dependencies and RREs. Finally, in Section 4.3, the findings are discussed against the existing literature.

4.1 The Service Supply Chain of Returnable Transport Packaging

Based on the interviews and analysis of contracts a flow diagram was developed to aid in depicting the SSC in focus, and a typical forward and reverse flow of the packaging resource within it (Figure 1). The customer's suppliers and / or customers, as users of the RTP service, take part in SSC operations and they have a significant impact on the efficiency and effectiveness of reverse service exchanges and the packaging availability performance of the SSC as a whole. The RTP service that LogCo manages is a pool of standard packaging owned by LogCo but used by its customers and other approved users (e.g., the customer's suppliers). LogCo's customers range from automotive OEMs to system (first-tier) and automotive parts (second-tier) suppliers. In this study we specifically focus on two customers and their respective supply chains - one automotive OEM (Customer 1) and one automotive systems supplier (Customer 2). In both cases the suppliers of Customer 1 and 2 also use RTP to feed the production lines of their customers with components and parts. LogCo does not perform the transportation service itself but instead contracts with road transport companies which pick-up and deliver empty and filled packages from / to various user locations. LogCo is responsible for monitoring and reporting to its customers transport service performance which is measured mainly in terms of on-time pick-up / delivery of packages from / to user sites.

[Insert Figure 1 about Here]

As aforementioned, RTP is used to transport and deliver automotive components and parts to customer plants and feed the production process. According to the user agreement which specifies the operational procedures to be used, as well as interviews with BD managers responsible for returnable packaging services, the resource flow is activated when a packaging order is placed by a user (typically the customer's supplier) which is registered into LogCo's information system. Empty packaging is then delivered by the contracted carrier to the user's (e.g., the customer's supplier) facility. The packages are filled with the parts requested by LogCo's customer (e.g., automotive OEM Customer 1) and then transported and delivered to the customer's plant. Empty packaging that is not used has to be returned to LogCo's terminal within three weeks, either at the cost of LogCo's customer or its suppliers.

In Table 3 we provide empirical evidence, in the form of quotations from our interviews, regarding the factors affecting the resource dependence in relation to specific RTP service elements. A description of these dependencies is provided below. Regarding the importance of

the resource, Customers 1 and 2 depend on the LSP for the RTP which is crucial in terms of enabling the timely supply of components into their production processes. LogCo is responsible for planning and managing the packaging pool as well as monitoring its performance as a whole to ensure that the RTP is available to all users (i.e., customers and their supply chain partners) at the right time and place. The cost of RTP primarily refers to the rental cost, although in our research design we also consider the capital costs involved.

[Insert Table 3 about Here]

As for the scarcity of the resource, the term in the RTP context refers to the fact that the RTP resource can become temporarily unavailable. Availability of packaging is the key performance objective of managing the packaging pool since it can directly influence the effectiveness and efficiency of each customer's production process. In RDT terms, the customer and its suppliers (as service users) are dependent on the RTP in order to fulfil their production operations. For instance, failure to make the right quantity of packaging available at the right time and place may cause delays in the automotive production process (especially for Customer 1 - an OEM) which primarily operates on a just-in-time basis.

The level of inter-firm competition for possession of the resource in the RTP service supply chain context translates into the fact that multiple users often have pressing needs for RTP resources and hence are in 'competition' with each other. According to LogCo interviewees, in practice this means that third party users (the customer's suppliers) either order: a) more packages than they actually need in order to have a 'safety stock' in place, or b) packaging that they use to supply components to their other customers, rather than the customer of LogCo. In addition, such third party users may fail to return the packaging within the specified time 21-day period. This manifests itself in terms of imbalances of flow of packaging among users, with some customers / users having unnecessarily high packaging stock levels compared to others. This behaviour tends to affect packaging availability and, in this sense, it also creates dependencies of LogCo to customers and third party RTP users. The LSP attempts to address such imbalances by explicating rules for the timely return of empty RTP and imposing extra charges in situations where users violate the three-week usage limit or lose / damage packaging.

4.2 Reverse Resource Exchanges in RTP Services and Resource Dependencies

4.2.1 Types of reverse resource exchanges

The above suggest that the LSP is dependent on customers and other users supplying the package resources on time, and in full, to enable service performance in the pool. The return flow of empty packaging, as a facilitating resource used for logistics service provision in this case, represents a RRE in the SSC among service users (customers and their suppliers and / or customers) and LogCo. Transport companies contracted by LogCo are often used to execute such reverse resource flows.

There appear to be three main types of RREs in the RTP service supply chain. Firstly, there is a 'business as usual' reverse exchange of unused, empty packaging from service users to LogCo. Empty packaging is returned to LogCo's terminals at the user's' expense. According to Customer 2's user agreement, the LSP depends on the users to manage the resources since they have the responsibility to audit packaging stock levels and ensure that they do not hold excess stock that would affect packaging availability within the pool. In consultation with LogCo, any excess packaging stock is reported, and returned, to the service provider. A reverse exchange of empty packaging directly between users is typically not permitted unless otherwise agreed to.

Secondly, any faulty or damaged packages have to be returned to LogCo terminals for repair and / or replacement. It is the user's responsibility (customer or its suppliers / customers) to inspect the packages upon receipt by the transport carriers and report any damage directly to LogCo. The service provider then jointly arranges with the user and the transport sub-contractor for the collection of the faulty resource (at the provider's expense).

Thirdly, at the date of termination of the service contract between LogCo and the customer (as well as the associated user agreement), the package resource is returned to the service provider. LogCo owns the packages, but clearly depends on its customers and their connected users (e.g., the customer's suppliers) for the timely return of packaging to its terminals.

The management of the RREs requires the supply of timely and accurate information to the LSP by Customers 1 and 2 and their suppliers / customers. More specifically, customers have to provide LogCo and transport sub-contractors with monthly, quarterly, and annual production volume forecasts to ensure that customer packaging needs can be met and to plan and optimize resource package and transportation capacity accordingly. Any damaged or lost packages must also be reported to the LSP by the user. In addition, users are responsible for stock taking and reporting any package volume deviations in advance of contract termination – induced returns. The above suggests that the LSP depends on RTP users for critical information that in turn enables successful service delivery (i.e., providing packaging resource at the right time and place to enable the customer's production process).

4.2.2 Mechanisms to manage resource dependencies

In addition to reverse exchanges of physical resources (packages) owned by the service provider, the case study explores the mechanisms employed by LogCo to deal with the dependencies (see Table 4). Traditionally in the RDT literature, vertical integration and inter-organizational relationships have been two of the mechanisms employed to manage resource dependencies with the latter leading only to partial abortion of dependencies (Pfeffer and Salancik, 1978; Hilman et al. 2009). In this paper, given that the focus is on RTP, we consider inter-firm integration as an additional mechanism to the management of inter-organisational relationships. This approach is aligned with the recent SCM / logistics literature (e.g., Paulraj and Chen, 2007; Lai et al. 2013) that has employed RDT to study inter-firm integration as a key mechanism of resource coordination in supply chains.

[Insert Table 4 about Here]

The first observed mechanism to manage RTP dependencies is integration among firms in the SSC. One of the ways to achieve inter-firm integration is through investments in information technologies. Our case study shows that LogCo owns and manages a 'designed for purpose' information system deployed to keep track of forward and reverse package resource flows and to monitor the stock levels of all the different user groups. LogCo provides access to the information available in the system (e.g., quantity of packages kept by each user, transaction records, pick-up and deliveries data) to its customers and connected users for coordination purposes.

Integration can also be achieved by standardising and/or redesigning the exchange processes. For example, all service users, including the customers of LogCo, have to agree to, and abide by, the standards underpinning the packaging service operations. Such standards define the way returnable packaging should be ordered by users and how it is to be transported, delivered, handled, stored, inspected, and monitored in terms of stock levels. They also stipulate how and when packaging resource should be returned to LogCo and how it should be paid for. Each of these service aspects are codified in a standardised 'user agreement' which every user of packaging has to sign in order to gain access to the packaging pool resources. Customers 1 and 2, and their respective suppliers / customers using the packaging, are regarded as 'users' under the terms and conditions of the service.

Finally, inter-firm integration can be achieved by engaging in cooperative actions to synchronise operations and optimise packaging flows to improve cost efficiency and resource availability. More specifically, there are instances where it makes sense from an efficiency point of view to allow the reverse flow of unused packaging between two users (e.g., LogCo's customers and its own suppliers/customers). A RRE directly between two users, rather than a reverse flow via the LSP terminal ('hub and spoke'), is also catered for in Customer 2's service level agreement.

The second mechanism to manage resource dependencies draws on inter-organisational relationships. This is achieved through the formal contracts which specify and regulate the required behaviour of service users and the RRE. The user agreement documents (referred to as the 'User Contract' in the service level agreement for Customer 2 above) for both Customers 1 and 2 regulate how the package resource must be loaded, bundled, sorted, stored, and returned to avoid damage or loss. Inspection upon package receipt and administrative instructions (e.g., dispatch documentation) are other examples of how LogCo attempts to regulate the use of the packaging resource by its customers and their supply chain partners. Moreover, according to the master contracts and user agreements examined, customers have to keep LogCo informed about the structure of its supply chain and report any changes with regard to supplier and / or customer locations, supply volumes, terminated supplier contracts, new suppliers / customers, and so on. Such changes affect the planning of forward and reverse packaging flows as well as the efficiency of sub-contracted transport operations. In a similar vein, the customer's suppliers / customers must provide accurate and timely information to transport sub-contractors regarding the accessibility of the site and any special requirements for

pick-up / delivery of packages. Users, in conjunction with LogCo, jointly audit package stock to optimise the levels required and increase package availability within the pool as a whole (inventory control). Deviations between quantities registered in LogCo's systems and actual physical quantities are reported by the user. Surplus (unused) packaging is returned to terminals assigned by LogCo to ensure availability performance is met.

The enforceability of formal / contractual mechanisms (e.g., user agreements) that control and regulate user behaviour is often questionable, in which case the LSP leverages its customers' power and influence over service users (e.g., the customer's suppliers). This becomes an important means for managing its dependencies on other actors in the SSC. Customers are expected to positively influence, or apply pressure, on their suppliers to comply with all the rules and regulations underscoring the RTP service. This expectation is also stated in Customer 2's service level agreement. The role of power and influence was mentioned by LogCo interviewees who stressed that the customers need to follow the standard rules and instructions and they often impose these on their suppliers (i.e., other users) by exerting their influence on them. LogCo interviewees suggested that packaging availability KPIs were, in many cases, negatively affected by the inappropriate behaviour of the customer's suppliers in terms of excessive ordering of packages to hedge against potential volume increases, delays in empty package returns, and prioritisation of their other customers (as opposed to the LogCo's Customers 1 and 2). LogCo managers suggested they had limited control over such behaviour and hence they needed assistance from their customers to influence their supply chain partners to abide by the RTP service rules.

4.3. Discussion of Findings

RDT helps explain the main factors of customer dependence on LSP resources (e.g., Lai et al., 2013; Chu and Wang, 2012) and, in this particular case, the RTP. Customer dependence mainly results from the importance of the RTP for the customer's production process and its relative temporary scarcity (i.e., temporary unavailability) which can have negative implications for production processes and costs.

The empirical findings, however, suggest that the LSP also depends on customers and third party users for the timely return of packaging resources, the appropriate handling of packaging and the provision of timely and accurate information. Such dependencies, resulting primarily from competition among users for RTP, need to be managed in the LSP-customer relationship since the temporary unavailability of the (packaging) resource translates into poor service performance and may have severe consequences for specific customers. As stressed by interviewees, the unavailability of packaging affects the delivery of components and parts and can cause delays in, or even grind to a halt, customers' production processes. This case study, though, demonstrates that the RTP creates resource dependencies beyond the customer-LSP dyad since other users of the packaging (e.g., the customer's suppliers) have temporary possession of the packaging and can both positively and negatively influence service delivery.

The emerging SSC management literature stresses bi-directional resource flows as customers also serve as suppliers of input resources and can affect successful service delivery (Sampson

and Froehle, 2006). In other words, customers-as-suppliers play an active role in co-producing and co-managing services and often they have to do their part in service delivery (Sampson and Spring, 2012). In this particular case of RTP, customers and other users (e.g., the customers' suppliers) do not own the packages but they are using them as a facilitating resource to enable parts and components to be moved around and enable effective production processes.

To date there has been scant empirical evidence related to how such RREs and associated resource dependencies can be effectively managed especially when considering the indirect effects of the involvement of parties external to the SSC (e.g., the customer's suppliers). Our research shows that there are two main mechanisms employed by the LSP to manage dependence on customer and third party packaging users.

The first one, inter-firm integration, refers to the uptake of specific practices at the operational level. The findings suggest that LSP investments in information technologies can help to improve integration through information sharing. For example, the users (both Customers 1 and 2 of LogCo and third parties using the packages) are required to notify the LSP about forecast volumes and changes in their supply chains as well as inform the transport sub-contractors about potential restrictions with regards to package pick-up / delivery. The above demonstrates how the LSP, and to a certain extent the transport sub-contractors, also depend on customers and other RTP users for accurate and the timely reverse supply of resources, both physical (empty, unused packages) and intangible (information).

Moreover, dependence is managed by regulating the use of the packaging resource according to the standards and operating routines of the packaging pool. The key operating processes specified also include package order placement and receipt, pick-up and deliveries, transportation, physical handling / treatment of packaging, administration, payment terms, returns, and stock audits. The standardisation of the exchange processes ensures that the LSP keeps track of the quantities held by each user as well as the stock locations. Such information is valuable for planning and optimising reverse flows since, as was pointed out by LogCo interviewees, it might be more cost efficient for the LSP to allow empty packaging to be exchanged directly between two users rather than being returned to the LSP terminal and dispatched to another user shortly afterwards. Finally, the users engage in cooperative actions to synchronise operations; this is particularly the case in the return of empty packages to the LSP in a timely manner where customers or users try to fill up this capacity.

The second mechanism, inter-organisational relationships, builds on two practices: a) the contractual governance of relationships; and, b) power / influence. Regarding the former, RDT suggests that one way to manage this dependency is through the implementation of safeguarding practices (Heide and John, 1988) and, indeed, our case study illustrates that the service level agreements (SLAs) between the LSP and its customers stipulate the responsibilities of each customer in terms of returning unused packaging and supplying important information (e.g., with regards to their supply chain structure and volume forecasts).

Such SLAs, however, are inherently dyadic and are not enforceable on other users of packaging connected to the LSP's customers. In response to this, the LSP requires that all users, including the customers' suppliers and/or customers, sign an additional contract (i.e. 'user agreement'). According to Worren (2012), detailed contracts are one way to reduce ambiguity and to manage commitment interdependencies. Indeed, in our case study, all customer contracts / SLAs also refer to the user agreements. These findings add to the recent SSC literature stressing the role of contracting as a means of managing performance and aligning incentives (e.g., Selviaridis and Norrman, 2014; Lillrank and Särkkä, 2011). Beyond helping to align incentives and share risks, the empirical evidence suggests that formal contracts explicate resource dependencies among all the actors and also specify and regulate reverse RTP exchanges (e.g., the requirements for packaging users to return empty packaging on time and in full). Contracts may also cater for such direct reverse exchanges between users, as in the case of Customer 2. Given the dependencies of the LSP on the customers' suppliers to ensure packaging availability and on time delivery performance, the user agreement performs a pivotal role in managing these dependencies and regulating reverse package flows.

Contractual governance mechanisms may not be adequate, however, as interviews with LogCo managers indicated. Indeed, LSP interviewees stressed the challenges they are facing in terms of their limited control over the behaviour of Customer 1 and 2's suppliers and other associated partners. The fact that the enforceability of the user agreements requires the customer's consent also reveals the limits of formal contractual mechanisms in terms of managing the reverse exchanges of packaging. In addition to using contracts, the LSP also seems to leverage Customer 1 and 2's power and influence over their suppliers to ensure that all third party RTP users comply with the rules and regulations underpinning the RTP service. From an RDT viewpoint, the LSP's resource dependencies on third party users are managed via the customer's exertion of power and influence over them (Hilman et al., 2009; Casciaro and Piskorski, 2005).

5. Conclusions and Implications

Drawing on the RDT literature as a foundation, this paper contributes to an improved understanding of the resource dependencies and RREs among actors in the SSC of RTP (i.e., the LSP, its customers and third party service users). Three main types of RREs in the SSC were observed: a) reverse exchanges of empty packaging for reuse for another purpose; b) reverse exchanges of damaged or faulty packages to be replaced; and, c) reverse exchanges of package resources at the contract termination date. In each of the above cases the LSP is dependent on its customers and third party users (e.g., the customer's suppliers) for the provision of RTP to perform the service to the required standards. In other words, the customer and other service users play an important role in co-producing the service and, in this sense, these types of RREs resonate with the more generic view of SSCs entailing bi-directional resource exchanges. What is also critical for the management of RREs is the supply of timely and accurate information to the LSP by customers and their customers / suppliers.

The findings also stress two key mechanisms and their related practices for managing resource dependencies in SSCs (see Table 4). 'Inter-firm integration' (e.g., IT-enabled information

sharing) appears to be a rather typical mechanism for managing RREs and resource dependencies in several types of SSCs. For instance, the above practices are crucial in recycling SSCs where the recycling provider needs to integrate their operations closely with manufacturers (customers), material recovery centers, and transportation companies (Kumar and Putnam, 2008). In terms of 'inter-organizational relationships', the inherently dyadic (service provider-customer) nature of contracts and SLAs may limit their functionality in terms of regulating RREs. In this case this limitation of contractual governance was overcome by establishing additional service user agreements that all third parties (e.g., the customer's suppliers / customers) abide by; this might, however, not be the case in other types of SSCs. In transportation service supply chains, for instance, contracts between the service provider and the customer typically do not specify the responsibilities of the customers and its customers / suppliers as co-producers of the service (Selviaridis and Norrman, 2014).

On the basis of the above, these mechanisms are only to some extent transferable to other SSC settings. The structure and functionality of contracts may depend on service features in focus and hence they are less likely to be a generic mechanism to manage RREs and related dependencies in SSCs. In addition, RDT refers to the possibility of mitigating resource dependencies through the vertical integration of production activities (Pfeffer and Salancik, 1978). This mechanism was clearly not used by LogCo and it seems to be less relevant in the context of RTP; however, vertical (forward) integration appears to be employed in other types of SSCs such as after-sales product support whereby solution providers taking over from their customers service activities (e.g., maintenance and repairs) in order to achieve higher levels of coordination and efficiency across the SSC (Baines et al., 2011).

5.1 Research Implications

The study contributes to existing research on SSCs in multiple ways. Firstly, it employs a RDT lens with the aim of gaining an in-depth understanding of RREs in SSCs and the associated resource dependencies, and how such dependencies can be managed. To the best of our knowledge this is the first study to apply a RDT perspective on SSC research. We submit that this perspective is useful in that it complements the unified services theory view of the bi-directionality of resource flows (Sampson and Froehle, 2006) by analysing the mechanisms through which service providers can manage their dependencies on customers and other service users. In addition, a RDT perspective also emphasises the factors contributing to the creation of resource dependencies in SSCs, an issue that has not yet been systematically studied in the extant literature.

Secondly, the empirical findings contribute to the recent SSC literature drawing on agency theory and stressing the role of contracting as a means of managing performance and aligning incentives in SSCs (e.g., Selviaridis and Norrman, 2014; Kim et al., 2007). Beyond helping to align incentives and share risks, the empirical evidence suggests that formal contracts (SLAs and associated user agreements) help explicate and manage the resource dependencies among the LSP, its customers and third party users. Formal contracts also appear to contribute to the effective management of RREs by specifying and regulating, amongst other things, the return flows of package resources and related information exchanges. Drawing on RDT, the

present study extends the existing literature by empirically demonstrating how contracts can be mobilised to manage provider resource dependencies with customers and other firms which have a bearing on SSC performance.

Thirdly, the study draws attention to the mechanisms available to service providers for managing dependencies with SSC actors other than customers (e.g., the customer's suppliers). The existing SSC literature has focused on the role of customers as co-producers of the service (Maull et al., 2012; Sampson and Spring, 2012) and largely underplayed provider dependencies on third parties. RDT suggests that resource interdependencies can be addressed either through closely managing relationships or through exerting power over other organisations (Hilman et al., 2009; Casciaro and Piskorski, 2005). The empirical findings suggest the LSP attempts to manage its dependencies on third party users of RTP by leveraging the customer's power and influence over these users (third-party influence), rather than relying exclusively on contractual regulation and enforcement.

5.2 Managerial Implications

A significant amount of capital is often locked in automotive parts packaging which, in the case of inbound parts, may cost 2%–4% of the total value of the part (Deloitte, 2012). Further to the economic implications, the timely management of packaging affects the overall quality of service. It is therefore in the interest of all the involved members of the SSC (e.g., LSPs, OEMs) to manage RTP as efficiently as possible; however, due to the competition among users for RTP, dependencies between LSPs, customers, and third party users are created. These relate to the timely return of packaging resources, the timely provision of the required information, and the appropriate handling of empty packaging. Our research demonstrates that for LSPs one of the key ways to manage such dependencies is through emphasising the role of contracts. These contracts aid in regulating the behaviour of service users at the operational level (e.g., loading, sorting, storing), but require significant effort in terms of inspection (e.g., dispatch documentation). LSPs need to ensure that they are informed by their customers about the structure of the supply chain (supplier and / or customer locations, supply volumes). In other words, in addition to the flow of RTP, LSPs need to ensure that information is communicated at the same pace. Our findings suggest that, further to the use of well-defined contracts and SLA between LSP and users of the service, LSPs must also, in parallel, try to manage dependence by leveraging the power and influence of their customers (i.e., OEMs) over other RTP users (e.g., the customer's suppliers).

5.3 Limitations and Future Research

Despite its contributions, the study presents some limitations which can be addressed through further research. Firstly, our exploratory single case study approach presents limitations in terms of external validity (generalisability) of the findings and conclusions drawn. Having said this, the single case allowed for the development of an in-depth understanding of how resources dependencies in the particular context of the RTP service supply chain can be managed, hence producing managerially relevant findings that can potentially enhance decision making (Rendtorff, 2015; Voss et al., 2002). Future research should, nevertheless, employ a multiple case design approach across a variety of service industries in order to provide a more refined

understanding of the mechanisms deployed to manage RREs and resource dependencies in SSCs.

Secondly, the study was mainly based on data collected from LogCo as the purpose was to understand the key issues from the service provider's viewpoint. Although access to contracts and SLAs helped to complement and corroborate to some extent missing customer data (since customers were aware of, and contributed to, the writing of contracts), our interviews were focused on service provider managers and a key service sub-contractor. Further research should explicitly consider and integrate the views and perceptions of customers and their suppliers regarding resource dependencies in SSCs. Such an approach would help improve our understanding of the mechanisms put in place primarily from a user perspective, rather than from that of a provider.

Overall, our study is novel in its application of RDT to SSCs and provides in-depth empirical insights into the management of RREs and resource dependencies in SSCs, albeit in the particular context of RTP. Despite the growing interest in SSCs there exists a scarcity of literature in RREs as also reflected in recent calls for research in this field (e.g., Kumar et al. 2013). Previous research on RTP, more broadly, has explored the importance of reverse exchanges from a cost/ waste reduction perspective (Xie and Breen, 2012) or from a value perspective where returned products can be exploited as valuable resources (Fleischmann et al., 2005; Jayaraman, 2007; Mollenkopf et al. 2011). These efforts, however, take a product-centred view of reverse exchanges ignoring other material flows and resources as, for example, the returns of transport packaging, and they do not provide explanations on how these resources, and the dependencies on them, are managed. Our research appears to be one of the first efforts to address these issues, but clearly further empirical research across service industries is needed in order to refine our understanding and contribute towards theory building on the management of SSCs.

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Appendix 1: List of interviewees

Interview Participants in LogCo	Sub-Contractor Interviewees
1. Vice President, Global BD 2. BD General Manager, Inbound transport 3. BD General Manager, Outbound transport 4. BD General Manager, Packaging 5. Key Account Manager (Customer 1), BD 6. Key Account Manager (Customer 2), BD 7. Key Account Manager, BD 8. Internal Control Manager, BD 9. Internal Control Manager, BD 10. Operations Manager, Distribution Planning & Control 11. Operations Manager & Traffic Coordinator, Operations 12. Legal Counsel, Legal 13. Insurance Purchaser & Damage Prevention & Claims Handling, Risk Management 14. Financial & Control Manager, Finance 15. Vice President, Purchasing	16. Managing Director, Transport Sub-contractor

Appendix 2: The Interview Guide

BACKGROUND INFORMATION

- Organization information (industry, core business, products/services, annual turnover and market share, key customers/suppliers)
- What is your position/role in relation to the company's organizational structure?
- What does your job entail?

THE CUSTOMER'S SUPPLY CHAIN

- What is the structure/mapping of the customer's supply chain?
- What is the key material and information flows in the customer's supply chain?
- What is the scope of the provided logistics service(s)?

RETURNABLE PACKAGING SERVICES

- How does the returnable packaging service work?
- Can you briefly describe the service supply chain in terms of the key actors and their roles?
- What are the main forward and reverse flows and exchanges in the service supply chain?
- How is the service specified in the contract (service specifications)?
- How is performance defined in the LSP-customer contract in terms of KPIs and service level targets?
- Are there any extra-contractual performance measures (e.g. operational KPIs)?
- How service performance and KPIs are measured and managed?

MANAGING RESOURCE DEPENDENCIES

- What are the main resource dependencies between your organization and your customers?
- What is the role and input of key parties (LSP, customer, any sub-contractors) in service performance achievement?
- To what extent do you depend on customer and 3rd party resources and inputs for service delivery?
- How are such dependencies managed?

MANAGING RELATIONSHIPS

- Can you briefly provide an overview of customer relationship in focus?
- Can you provide a brief account of the customer relationship history and evolution over time (if applicable)?
- What are the main challenges you face regarding the management of the customer? (e.g. critical events)
- What is the role of collaboration and trust in managing the customer relationship?
- What is the role of formal contracts in managing relationships with customers and other parties in the service supply chain?
- What is the role and rationale of the 'packaging user agreements'?
- How LSP-sub-contractor relations are managed and what are the key challenges in managing the relationships?

Core themes / axial codes	Open codes
1. Service supply chain of RTP	“prime service provider”, “Sub-contractors for package transport”, “customers as RTP users”, customer’s suppliers / customers as RTP users”
2. Service co-production in RTP	“Customer returns RTP on time and in full”, “other users return RTP on time and in full”, “user influence on package availability”
3. Performance in the service supply chain	“packaging availability KPI”, “on-time delivery of packaging KPI”, “RTP stock levels per user”, “RTP service costs”
4. Customer dependence on LSP	“RTP use in production process”, “temporary unavailability of RTP” “production process stops” “cost and service implications of production stops”
5. Third party user dependence on LSP	“RTP use to supply customers”, “temporary unavailability of RTP”, “customer service implications of unavailability”
6. LSP dependence on customer	“RTP resource dependence”, “timely return of RTP resource”, “customer behaviour influence on availability”
7. LSP dependence on third party users	“RTP resource dependence”, “timely return of RTP resource”, “limited control over user behaviour”, “user RTP order pattern”, “user stock levels”, “user prioritization of its customers”
8. Types of reverse resource exchanges	“return of empty packaging”, “return of damaged packaging”, “return at contract termination date”, “timely and accurate information supply”
9. Managing resource dependencies	“LSP role as coordinator”, “customer role”, “formal rules and regulations of RTP use” “mechanisms for managing dependencies”
10. Inter-firm integration	“information sharing / integration”, investment in information technology”, “standardisation”, “operational collaboration”
11. Role of contractual governance mechanisms	“service level agreements“, “user agreements”, “conditions of return of packaging resource”, “rules imposed on packaging users”, “penalties for user delayed returns”
12. Power/influence exertion	“enforceability limits of contracts”, “customer influence over its suppliers” “LSP leverage of customer power/influence” “user conformance to RTP regulations”, “contract reference to customer contribution”

Table 1. Key themes and associated open codes derived during the data analysis process.

Case study quality criteria	Actions taken
Internal validity	- Explicating the interrelations among resource dependencies and reverse resource exchanges in the service supply chain. - Drawing on different literatures and theoretical frames (e.g., SSC literature, resource dependency theory) to discuss findings. - Representing the data in tables to facilitate analysis (e.g. Table 3 and 4).
Construct validity	- Triangulating interview data with documents (e.g., master contracts, packaging user agreements). - Conducting interviews with LSP managers from various functions to gain insights into reverse resource exchanges from their multiple perspectives (e.g., operational versus contractual aspects). - Presenting preliminary findings and conclusions LSP main contacts and interviewees to get feedback and check the validity of interpretations. - Presenting the mapping and analysis of the RTP system and associated resource dependencies to key LSP contacts to ensure validity.
External validity	- Collecting rich data from multiple sources (interviews and documents that are often difficult to obtain (e.g., service contracts). - Writing up and presenting detailed within-case descriptions and analyses so that managers and researchers could potentially relate to and transfer findings to other SSC contexts.
Reliability	- Developing a database of interviewed managers (Appendix 1). - Developing and using an interview guide (Appendix 2). - Developing and updating a database with within-case data including interview transcripts, documents, field notes and codes. - Documenting the data coding and analysis procedure (see Table 1).

Table 2. Case study validity and reliability criteria and measures taken

Factors affecting dependence (Pfeffer and Salancik, 1978)	RTP service elements	Representative quotations	Informant
Importance of the resource	Pool packaging	"When the package is used by these suppliers to serve the customer, then this becomes also part of the inbound flow to customer plants...And when the customer gets the material, then we have a return flow of empty packaging back to our terminals, we sort them and make sure we have the capacity when suppliers request packages next time".	LogCo's Internal Control Manager (BD)
	Cost	"In this transaction, each user is allowed to have the packages for 'free' for 21 days and if they need it for more, they need to pay a rental cost per day. So the usage cost is always there, but the rental cost is optional".	LogCo's Key Account Manager KAM of Customer 2
Scarcity of the resource	Packaging availability	"Another one [KPI] is packaging availability...what percentage, if it is 95% availability of packaging. These are really crucial for Customer 1. If we don't have packaging available, then Customer 1 might have very serious production failures".	LogCo's KAM of Customer 1
	Timeliness	"We have of course a set of KPIs for each product [category], and the most highlighted and difficult one is precision of delivery. Because in all the contracts we are buying a product that has some sort of timeline to it, whether is it time of supplying packaging or transport lead time or things like that. So precision is something recurring and it can be problematic if it doesn't work. So basically we define the precision levels, for instance arrival at the plant within 15 minutes...But we require 95% of precision as a minimum level of performance".	LogCo's Purchasing Vice President
Level of inter-firm competition for the resource	Imbalance of package flows	So this is a pool of packaging...if they [customer's suppliers] have too much packaging, then we ask them to pay a rent for packaging or if they have too little, then we charge them for missing packaging".	LogCo's Internal Control Manager (BD)
		"Our mechanism there is that if they have too much packaging, then we ask them to pay a rent for packaging or if they have too little as compared to what they should have, then we charge them for missing packaging".	LogCo's Internal Control Manager (BD)
	RTP user ordering patterns	"I know last year we had some issues with packaging availability and then it was a dialogue....all the users ended up ordering more to secure availability and have safety stock and then it's worse for the system". "If we have a supplier [customer's supplier], it orders the packaging from us and then it uses it for deliveries to all its customers, it could be to ten plants and it could be to [Customer 2], but of course it orders all of its packaging and then of course we cannot steer how it uses the packaging. If it says I need 1000 plastic boxes of this type, and may be 80% is for [its other customers] and 20% is [Customer 2], we cannot know how it deals with that [...]. Some suppliers are [Customer 2] only, some are supplying its other customers, so they have to keep this in mind".	LogCo's KAM of Customer 2 (BD)

Table 3. Factors affecting dependence of RTP resources

Mechanisms to manage dependence	Practices	Representative quotations	Informant
Inter-firm integration	Invest in information technologies	"Information sharing is important...sitting down and discussing what last week looked like around all markets to see whether we achieved the 95% target and what was the error, ask the carrier why they failed...So we have to specify all shipments all the time and follow up failures and also specify corrective actions to avoid that happening in the future. On a monthly basis we also discuss volume forecasts".	LogCo's Operations Manager
	Standardise and/or redesign exchange processes	"It's about the conditions of the system because today we have 4,000 users in the system and in order to be able to manage it we need to have rules and standards in the way we execute operations. You need to order that way and report that way...it's nothing strange, it is about the conditions of using the system. We need to have authorised users. They also regulate – if you misused or lost it you need to pay for that. It's the same for everybody; it is just the conditions of usage".	LogCo's KAM of Customer 2
		"The packaging will be used in the Customer's 2 supply chain. After use, the empty packaging will be returned to one of the terminals or depots assigned by LogCo or the packaging will be reused for other filled shipments to other authorised "Users" whether part of the Customer 2 corporate entity or not".	Customer 2's SLA
		"We say that they [customers and users] should sort it according to our instructions since each packaging type has specific bundle, panels of packages".	LogCo's KAM of Customer 2
	Engage in cooperative actions to synchronise operations	"Normally we have an imbalance in the flows...lots of packaging ends up in China and we need to bring it back to Europe empty. So then we are looking for customers or users that could fill up this capacity, like Customer 2".	LogCo's Internal Control Manager
Inter-organisational relationships	Contractual governance of relationships	"I want to have a link with the contract and the payer so I can put pressure on the [customer's] suppliers, otherwise they have no incentives. I want clear responsibility".	LogCo's BD Managers
		"The packaging system is based on the routines and regulations in the 'User Contract' which must be signed by every user. Customer 2 will follow the requirements of the User Contract and will assist in the enforcement of its terms against users supplying components to Customer 2".	SLA for Customer 2
		"We have a customer, who is the one paying the transaction cost to us, and the customer gives us a list of its suppliers which will be using the packaging. So then we go to these suppliers and ask them to sign the user agreement which regulates and controls their behaviour within the system".	LogCo's Internal Control Manager (BD)
	Power/ influence	"In the event of LogCo intending to exclude a user as a member of the packaging system, the provider will inform Customer 2 before any action is taken. Customer 2 will then have the possibility to influence the user to solve the situation".	Customer's 2 SLA
		"If we have big problems with one of the supplier [of Customer 2], then [Customer 2] also have a problem with this supplier, it is a supplier in a black list, according to my experience. It is important for suppliers [third party RTP users] to understand how the system works"	LogCo's KAM of Customer 2

Table 4. Mechanisms and practices to manage dependence for RTP resources

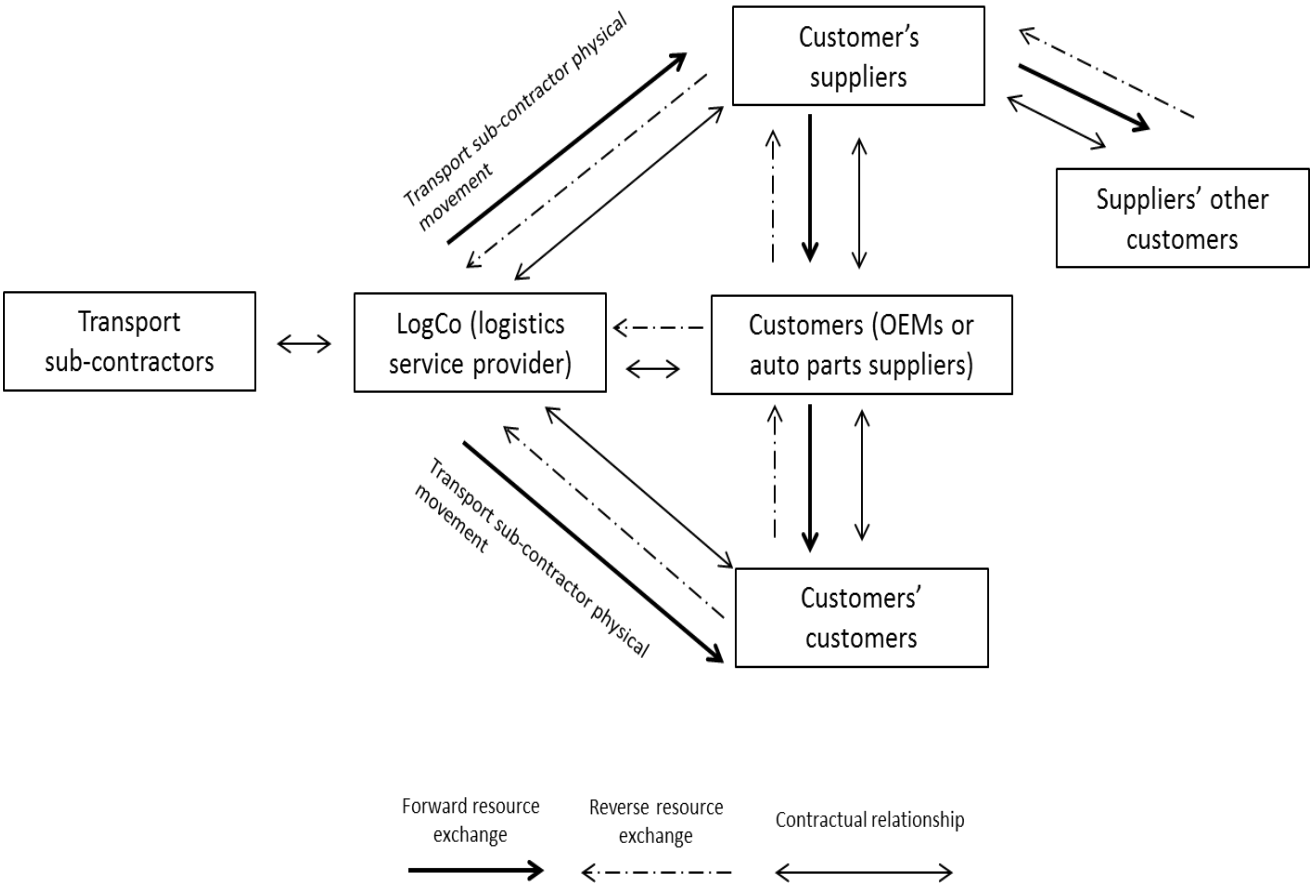

Figure 1. The Service Supply Chain of Returnable Transport Packaging