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Sinkovics Rudolf R., Kuivalainen Olli, Roath Anthony S.

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Rudolf R. Sinkovics

The University of Manchester, Alliance Manchester Business School
Booth Street West, Manchester M15 6PB, UK.

Phone: +44 (161) 306 8980

Rudolf.Sinkovics@manchester.ac.uk

<http://www.manchester.ac.uk/research/rudolf.sinkovics>

<http://orcid.org/0000-0002-4471-5054>

and

Lappeenranta University of Technology

Skinnarilankatu 34, PL 20, 53851 Lappeenranta, Finland

and

Temple University, Fox School of Business, Department of Strategic Management
Philadelphia, Pennsylvania, U.S.A.

Olli Kuivalainen

Lappeenranta University of Technology

Skinnarilankatu 34, PL 20, 53851 Lappeenranta, Finland

Olli.Kuivalainen@lut.fi

<http://orcid.org/0000-0002-5291-2592>

Anthony S. Roath

University of Bath, School of Management

Bath BA2 7AY, UK

A.S.Roath@bath.ac.uk

<http://www.bath.ac.uk/management/faculty/anthony-roath.html>

Abstract

Purpose: The study explores value co-creation between manufacturing firms and third-party logistics providers (3PLs). The specific focus is on resources and value co-creation with the aim of examining a set of relationships among the 3PL's resource commitment, collaboration, and innovation, and their performance outcomes.

Design/methodology/approach: Survey data consisting of 142 U.K. manufacturing firms are used to study the 3PL and manufacturing customer's value co-creation. The confirmatory factor model (CFA) and subsequent structural equation model are tested using EQS 6.1.

Findings: The findings show that collaboration between the manufacturers and the 3PLs mediates the relationship between resource commitment and innovation, and performance. 3PLs are becoming much more of a collaborative partner, which supports the idea of value co-creation strategy.

Research limitations/implications: The study is cross-sectional; temporal evolution of value co-creation should be studied in the future.

Practical implications: When manufacturers and 3PLs collaborate to target efforts strategically, the 3PL's resource commitment can be directed towards the development of new innovative approaches.

Originality/value: The study contributes to the discussion of forms of co-creation and theoretical frameworks that will enable us to understand how customers and other actors engage with the companies in collaborative value creation activities.

Keywords

Value co-creation, Collaboration, Innovation, Outsourcing, Resource Commitment, Performance

Author note

Correspondence should be addressed to Rudolf Sinkovics, The University of Manchester, Alliance Manchester Business School, Booth Street West, Manchester M15 6PB, United Kingdom. Email: Rudolf.Sinkovics@manchester.ac.uk, Web: www.manchester.ac.uk/research/rudolf.sinkovics

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1 Introduction

During recent years value co-creation has become a key concept within service marketing, B2B marketing, and business management practices in general (Aarikka-Stenroos and Jaakkola, 2012; Grönroos, 2012; Pilon and Hadjielias, 2017; Saarijärvi, Kannan, and Kuusela, 2013). ‘Value co-creation’ can be defined as a “...process by which mutual value is expanded together” (Ramaswamy, 2011, p. 195). It has been noted, however, that value for one’s customer often cannot be created by a single firm alone (Normann and Ramirez, 1993); instead, value creation takes place between two or more parties in the business ecosystem (e.g. Ritala and Tidström, 2014; Saarijärvi, Kannan, and Kuusela, 2013).

In this paper, we see value creation as a process in which the interaction between the organization and the client is at best the center of value creation and there are collaborative and dialogic processes leading to co-creation (Lee, Olson, and Trimi, 2012). The collaboration may take place in one or more stages of the production/consumption/value delivery chain (Ranjan and Read, 2016). Consequently, managers must develop the “ability to shift resource utilization priorities” for other operators in their ecosystems, and the possession of this capability becomes a vital source of competitive advantage (cf e.g. Adner and Helfat, 2003), especially in a global environment that is offering fewer and more limited access to resources.

In fact, many manufacturers and suppliers with limited or scarce resources in tangible and intangible assets have turned to third-party logistics providers (3PLs) so as to be able to differentiate their distribution and deliver value to their customers. In this value co-creation constellation, firms using 3PL arrangements contract their logistics operations (e.g. transportation, customer deliveries) out to an external firm and become value co-producing customers of 3PL

firms. In this sense, 3PL arrangements reduce the need to maintain logistical operations that often lie outside the scope of the firm's core competencies, as well as the expenses incurred in offering these particular functions. The result is usually a cost-effective way of focusing a firm's efforts on performing the activity in which the firm is most competent. It also helps to reduce the need for the firm to employ personnel outside its core business.

As such, 3PL logistical outsourcing relationships can improve efficiency and profitability as well as providing a competitive differentiation (Lambert, Emmelhainz, and Gardner, 1999) through value co-creation. 3PLs can also offer creative, innovative approaches for manufacturers and increase distribution capabilities. However Frow, Payne, and Storbacka (2010; 2011) have argued that there is a lack of discussion of forms of co-creation, and of the theoretical frameworks that would enable us to understand how customers and other actors engage with the companies in collaborative value creation activities (cf. also Ranjan and Read, 2016; Saarijärvi, 2012).

Hence, our main research question is to explore, 'how does value co-creation take place between manufacturing firms and 3PL providers'? The paper addresses this theme and employs the resource-based view (RBV), as the theoretical foundation of 3PL relationships (Barney, 1991; Newbert, 2007) and value co-creation (e.g. Ranjan and Read, 2016), as an approach to explain the collaboration in these relationships. Second, we study performance consequences of this value co-creation.

A recent study focusing on value co-creation (Ranjan and Read, 2016) divides value co-creation into two main activities: 'co-production' and 'value-in-use'. Co-production can be seen as consisting of direct or indirect "co-working with customers" (Hu and McLoughlin, 2012), for example in product development, co-production, and co-promotion (Frow, Nenonen, Payne, and Storbacka, 2015; Storbacka, Brodie, Böhmman, Maglio, and Nenonen, 2016), and also includes

aspects such as knowledge sharing (Ranjan and Read, 2016; Zhang and Chen, 2008). Value-in-use activities can be seen as consisting of activities in which “actors engage in value-creating activities utilizing other actors' resources, without these actors being actively present” (Storbacka et al., 2016, p. 3013). Both of value co-creation types take often place in the B2B setting.

In the expanding value co-creation literature several other concepts – such as co-design of value and co-learning, the latter including for example joint organizational learning and co-innovation – have been discussed; these also relate very much to the collaboration that occurs in the B2B setting, “...where suppliers and buyers operate in close collaboration bundling products and services” (Kohtamäki and Rajala, 2016b, p. 4). The specific focus of this study is to draw on the RBV and value co-creation to examine a set of relationships among the 3PL's resource commitment, collaboration, and innovation; all three can be seen as value-creating activities and as fitting into the descriptions given above. The 3PL's innovation is a capability that the customer, here the manufacturer, leverages through inter-organizational collaboration so as to increase its overall performance. Through interaction, the firm may be able to provide exactly what its customers want, for example via mass customization (Pine, Peppers, and Rogers, 1995) and increased collaboration (Zhang and Chen, 2008). Effective collaboration between a manufacturer and a 3PL focuses resources and develops innovative capabilities that enhance the manufacturer's performance – the manufacturer also being a customer of the 3PL. Vargo and Lusch (2008) argue that service-dominant logic implies that all economies are service economies, which means that all businesses are services. Given that businesses are services, managers can innovate in different ways or at least explore innovation in different ways other than merely product innovation. In other words, innovation is not just a production phenomenon but is also defined in various ways in which a firm can produce better service by adding valuable and unique aspects to its offering. In

summary, firms can compete through service (Lusch, Vargo, and O'Brien, 2007) and this service is often, by default, co-created. **Manufacturers, which are customers of 3PL providers, can serve better their customers by tapping into resources and innovation of 3PL firms, and co-create value by collaborating closely with them.** By utilizing the RBV as a basic theory behind value creation, we follow, for example, Zhang, Jiang, Shabbir, and Du (2015), who found that innovation, marketing, and networking capability led to value co-creation in the Chinese B2B context.

The rest of the paper is organized as follows: First, the paper provides a brief literature review to establish the basis for the conceptual framework. Second, the hypotheses are presented in a more detailed manner. Third, the methods are explained, followed by the empirical results. The paper concludes with a discussion of the findings, managerial implications, limitations, and areas for future research.

2 Literature review and the hypotheses

One of the basic tenets in B2B relationship and network studies is that value is created through relationships (Ulaga, 2001). **Service dominant logic (e.g. Vargo and Lusch, 2008) suggests that suppliers and customers co-create value by integrating resources and combining capabilities in their collaborations (Lusch, Vargo, and Tanniru, 2010; Zhang et al., 2015).** In the value co-creation process, the resources of the companies are combined, which facilitates the development of new combinations of resources and capabilities, which in turn enable the firms to develop something more than the parties could have gained independently (Zhang et al., 2015). According to the RBV, resources represent a source of performance differentiation among firms if they are unique to the firm and not readily available through the market (Barney, 1991; Hunt and Morgan, 1995). Resources also contribute to the achievement of a firm's strategic objectives and ultimately

to the firm's performance (Barney, 1991; Wernerfelt, 1984). These resources include distinctive capabilities available to the firm to support competitive objectives (Hunt and Morgan, 1995).

Figure 1 presents the conceptual model and hypothesized relationships. Resource commitment can be seen manifested in asset sharing and/or information sharing with one's customers. In addition to possessing valuable, rare, inimitable, and non-substitutable resources and capabilities (Barney, 1991; Barney, Wright, and Ketchen, 2001), firms looking for a competitive advantage also have to demonstrate the ability to alter them in such a way that their full potential is realized (Newbert, 2007). Collaboration refers to parties (in this case a manufacturer and a 3PL) working closely together "to create mutually beneficial outcomes for all participants" (Jap, 2001, p. 87). Predicated upon the RBV and competency-based conceptualization, the model incorporates the role of collaboration that, as a mediator between the 3PL's resource commitment and innovation, is an essential value co-creation dimension for the exploitation of 3PL capabilities in the manufacturer-3PL relationship. Innovation embodies an orientation towards learning and a willingness to incorporate new ideas. It represents "an idea, practice or material artifact perceived as new..." (Zaltman, Duncan, and Holbek, 1973, p.2); and in co-creation both parties are part of the innovation process. Hence, value creation takes place through co-creation, which includes resource commitment, collaboration, and innovation. In the end value co-creation is seen to have performance consequences to the customer, i.e. manufacturer in our setting – which would also benefit the service provider.

Insert Figure 1 about here

2.1 3PL resource commitment and performance

For customer experience resources committed by the provider are seen as one of the core issues (Lemke, Clark, and Wilson, 2011). Resources form a basis for activities that enable value co-creation (Grönroos, 2012). Resource commitment is considered essential to fostering a long-

term relationship perspective, as it represents a desire to instill continuity through a willingness to invest resources (Gundlach, Achrol, and Mentzer, 1995). Consequently, specialized knowledge and process activities are developed (Hamel, 1991; Lyles and Salk, 1996). This resource commitment has implications for the 3PL's and the manufacturer's outcomes, for example, operating, market, and relational outcomes (Cavusgil and Zou, 1994; Sarkar, Echambadi, and Harrison, 2001).

The *operating* performance of the manufacturer-3PL relationship represents the received service benefits. Cycle reductions, improved service levels, and a reduction in total costs are measures of operating-level performance. *Market-related* outcomes refer to the level of competitiveness that is achieved from the relationship. The market dimension highlights effectiveness in terms of relative competitiveness. *Relational* performance reflects the beneficial gains made from working together in the 3PL-manufacturer relationship.

Manufacturers may turn to 3PLs to compensate for a lack of particular internal resources or to avoid expending valuable resources. The interaction associated with 3PL resource commitment can also lead to greater efficiency, product or process innovation, flexibility, and enhanced responsiveness to customer and/or market trends (Collis, 1994; Kalwani and Narayandas, 1995). It has been discovered that, when suppliers have been engaged in the implementation of the solution, they have been able to help their customers utilize the solution in a way that provides greater value (Aarikka-Stenroos and Jaakkola, 2012). Specialized skills and knowledge developed from the 3PL's resource commitment contribute to competitive advantages that are difficult to imitate (Barney, 1995). As such, we hypothesize that:

H1: 3PL resource commitment has a positive effect on a manufacturer's overall performance (i.e., operating, market, and relational).

2.2 3PL resource commitment and collaboration

Rooted in the RBV, collaborative activities become the basis for a deeper relationship that eventually leads to opportunities tailored to the relationship's needs. Collaboration can create competitive advantages representing unique and inimitable competitive positions (Dyer and Singh, 1998; McEvily and Zaheer, 1999; Sarkar, Echambadi, and Harrison, 2001).

Resource commitment is a critical element of the collaborative relationship. Storbacka et al. (2016) write about 'resource integration patterns', which derive from various activities taking place between the firms in various engagement platforms. For example, investing in human and capital resources specific to the relationship is a tangible way to demonstrate dedication to the idea of achieving mutual benefits (Wilson, 1995). For the value co-creation to occur, a firm must be prepared to receive customer input and make use of it (e.g. Grönroos, 2012) and the processes of resource integration are seminal instruments in value co-creation (Storbacka et al., 2016). In the current context, the benefits of applying resources emerge when the 3PL is willing to work towards a common objective by sharing information and resources with the manufacturer (Stank, Keller, and Daugherty, 2001). Thus, we hypothesize that:

H2: 3PL resource commitment is positively related to collaboration.

2.3 3PL collaboration and innovation

Innovation is one element in which value-co creation can take place. It has also been described as the "successful implementation of creative ideas within an organization" (Amabile, Conti, Coon, Lazenby, and Herron, 1996, p.25). These innovative ideas and approaches can be acquired through partnerships or can result from interaction with external partners (Powell, Koput, and Smith-Doerr, 1996). In the context of the manufacturer-3PL relationship, innovation is

associated with the 3PL's capability to recognize and adapt resources to achieve customer satisfaction (i.e., for the manufacturer).

Jap (1999) found support for the idea that collaboration between partners can lead to the achievement of their respective goals. One of the advantages of collaboration is its ability to address and highlight knowledge gaps that exist between the organizations. Hence, focused information sharing can be applied to deal with shortcomings. Cooperation, a foundation of collaboration, provides benefits when partners pool complementary resources and strengths. One area of value co-creation has arisen within the new product and service development stream of literature – and in many cases active customers involve their partners in their new product/service development processes (Saarijärvi, Kannan, and Kuusela, 2013). Inputs from the partner have been found to elevate co-production practices, which increases innovation, such as the development of new products and services (Chen, Tsou, and Ching, 2011). The openness and spirit of cooperation reflect a collaborative atmosphere of information sharing and learning that facilitates the development of knowledge and, ultimately, creativity, these being core dimensions of value co-production (Kohtamäki and Partanen, 2016; Ranjan and Read, 2016). It has even been suggested that service innovation can only occur as a result of cooperation (Agarwal and Selen, 2009). Thus:

H3: Collaboration is positively related to 3PL innovation.

2.4 3PL innovation and performance

The link between innovation and performance has been extensively addressed in the strategic management and marketing literatures (see e.g. Damanpour and Evan, 1984; Manu and Sriram, 1996; Soni, Lilien, and Wilson, 1993). Innovation reflects the 3PL's capability to recognize and adapt resources so as to achieve satisfaction for the manufacturer, with the understanding that the manufacturer will be successful if it meets the needs of the retailer in the

value chain. As such, the 3PL's innovation can serve as a competitive advantage for the manufacturer, affecting the latter's performance achievement (Agarwal and Selen, 2009). Thus:

H4: 3PL innovation is positively related to manufacturer performance.

2.5 Mediating role of 3PL collaboration

The operational and strategic outcomes (i.e., market and relational dimensions) reflect enhanced performance that the manufacturer-3PL relationship creates, given an innovative 3PL that enables value co-creation. Collaborative interaction increases the partners' operational skills and resource efficiency, eventually contributing to operating-level performance. Furthermore, in a sense, when collaborating with the customers, innovative 3PLs develop creative new ideas and practices that can differentiate the relationship's strategic approach and operations, and contribute to enhanced performance. These jointly developed processes can become competitive advantages that eventually increase the potential for generating higher profits (Lorenzoni and Lipparini, 1999). Collaboration – being the key dimension in value co-creation (e.g. Zhang et al., 2015) – focuses the 3PL's innovation to positively influence the performance of both value co-creation partners. The complexity of this mediating role of 3PL collaboration can be formally stated in hypothesis form as:

*H5: Manufacturer collaboration mediates the relationship between 3PL resource commitment and 3PL innovation, such that manufacturer collaboration **positively contributes to** the manufacturer's overall performance (i.e., operating, market, and relational).*

3 Methods

Data were collected via surveys administered to key informants defined as the logistics managers or owners and/or managers of manufacturing companies involved in outsourcing activities using 3PLs, i.e. outsourcing and logistics service companies in the U.K., as their

suppliers. The U.K. context was a deliberate choice for the research context, because of its heavy reliance on logistical/distribution-related outsourcing arrangements. These U.K.-based arrangements typically involve a corporate logistics expenditure of over 50% on 3PL activities, which is significantly above the level among U.S. companies (Langley, Allen, and Tyndall, 2001).^a In our data collection, depending on the firm size, the type of respondent varied: In the smaller firms, the questionnaire was often handled by the owner or manager. In the larger firms, the respondent was often the logistics manager.

3.1 Sample

The addresses for these U.K. manufacturing companies were gathered from a broker mailing list and public listings of industry reports. The survey package, which included a signed cover letter, a self-addressed stamped return envelope, and background information about the project, was sent to 1,907 logistics managers in the U.K. Online survey response was not offered, because anecdotal interviews with key informants suggested that the excessive use of email questionnaires from various sources may have numbed potential respondents' appetite to react to any online questionnaires. Participation was encouraged through the offer of an executive summary and access to a web page with the latest findings, reports, and working papers related to the study. Responses were solicited through two rounds of data collection. In the first round, 95 usable questionnaires were obtained. Three weeks after the initial posting, a second mailing was sent to non-respondents. Two hundred companies, randomly selected from among the non-respondents, were also contacted via telephone. In total, approximately one-third of the companies

^a According to a recent Capgemini report (Langley and Capgemini consulting, 2017), 3PLs continue to move away from primarily transactional relationships and toward meaningful partnerships. The 2017 3PL Study showed that 75% of those that use logistics services (shippers) and 93% of 3PLs stated that the use of 3PL services had contributed to overall logistics cost reductions, and 86% of shippers and 98% of 3PLs stated that the use of 3PLs had contributed to improvements in their service.

contacted in the follow-up (31.31%) promised to respond. These efforts together produced a total of 142 usable responses, for a final response rate of 9%. The largest group of companies in the sample (50%) represent food/beverage manufacturers, followed by chemicals/chemical products (28%) (see Table 2). The average annual company sales ranged between £1,404K and £30 billion, and the average number of employees was 6,158. On average, the respondent companies generated 60% of their total sales outside the U.K., although the sample's percentage of sales abroad ranged from 0% to 100%. Half of the responding managers indicated that at least 60% of their sales were made outside the U.K. (see Table 1).

Insert Tables 1 and 2 approx. here

Response bias was checked by means of the comparison of early and late respondents, as suggested by Armstrong and Overton (1977). Independent sample t-tests demonstrated that there were no systematic differences in respondent characteristics between the first and second mailings, with respect to annual company sales or number of company employees. In addition, to check non-response bias, 30% of the remaining non-respondents were contacted by phone. In these calls, their reasons for not participating were discussed. We also checked non-response bias and detected no significant differences.

To examine the likelihood that our findings were due to common method bias, Harman's (1967) one-factor test was performed on the full set of 23 items. The greater the number of dimensions extracted, the less likely it is that common method bias is the source of systematic variance within a data set (Podsakoff and Organ, 1986). The eigenvalue-greater-than-one criterion indicated that the data included multiple dimensions, showing it to be unlikely that common method bias had confounded our results (see Table 4).

3.2 Measures and analyses

As a pilot study, in-depth interviews were carried out with manufacturers and 3PLs, which facilitated the identification of relevant dimensions of innovative and collaborative outsourcing relationships. To enable a survey instrument to be built, insights from the interviews were augmented with an extensive review of the supply chain management literature. Through this process, measures for 3PL resource commitment, collaboration, innovation, and performance were identified. Existing measures were adapted for this study (Table 3). All of the responses are from the perspective of the manufacturer, situated in a particular sector, with reference to their 3PLs.

Insert Table 3 about here

A complete list of the items (each using a seven-point Likert-type scale), sources, psychometric properties, factor loadings, and t-values is presented in Table 3. All measures were modified and adapted to the logistics context of this study. With the set of items we have, we are able to tap into 'co-production' dimension of value co-creation; e.g. collaboration construct taps into 'working together', but 'also into value-in-use' as 'information sharing' means that other party can use the information later. Measures for resource commitment were sourced from Daugherty, Autry, and Ellinger (2001). These measures reflect the commitment to share financial resources, physical assets, technological and managerial resources in the focal relationship. Collaboration, which is a key dimension in value co-creation (e.g. Zhang et al., 2015), was conceptualized as parties working together to create mutually beneficial outcomes Jap (Jap, 1999). The 3PL innovation dimension was based on Hurley and Hult (1998). These items address the 3PL's ability to introduce technology that is new to the industry and new to the firm, as well as the service's perceived uniqueness and innovativeness. Operating-level performance was developed as a new

construct, while market performance was adapted from Cavusgil and Zou (1994). Finally, relational performance was adapted from Jap (1999; 2001).

The descriptive statistics and correlations among the constructs are reported in Table . The measures' unidimensionality, convergent validity, and discriminant validity were assessed according to Anderson and Gerbing (1988). Coefficient alpha scores ranged from 0.80 to 0.94 (Table). Additionally, construct reliabilities were calculated, per the guidelines provided by Fornell and Larcker (1981), and were found to be similar to the coefficient alpha scores. The confirmatory factor model (CFA) and subsequent structural equation model were tested using EQS 6.1 (Bentler and Wu, 1995). To overcome problems of non-normality in the data, EQS's robust method was employed and the resulting model fits were evaluated using the comparative fit index (CFI) (Jöreskog and Sörbom, 1993), the Bentler-Bonett non-normed fit index (BBNFI) (Bentler, 1995), the Bollen (IFI) fit index (Bollen, 1996), and the root mean square error of approximation (RMSEA). All constructs examined in the CFA demonstrate factor loadings (λ -values) greater than 0.5. Thus, the constructs indicate solid and appropriate content validity (Bollen, 1989).

Insert Table 4 about here

The results show that all inter-factor correlations are positive and significantly different from zero. Discriminant validity was assessed by referencing the confidence intervals ($p < 0.05$) around the inter-factor correlations of the first-order factors. To the extent that the intervals do not include 1.0, the constructs demonstrate discriminant validity (see Anderson and Gerbing, 1988). The exception is the correlation between the operating and market outcomes. However, considering that these constructs were operationalized as higher-order (second-order) constructs of performance, a relatively high shared variance is warranted and therefore not considered a problem in this particular study. As a further test of discriminant validity, the procedure suggested

by Bagozzi, Yi, and Phillips (1991) was employed to evaluate pairs of constructs to check for significant χ^2 changes when constraining and freeing the correlations between the parameters. The χ^2 values are significantly lower for the unconstrained models. Hence, discriminant validity was established for all measures using this procedure.

4 Results

The model in Figure 1 was tested using covariance-based structural equation modeling (CB-SEM). In this model, collaboration is positioned in a mediating role between 3PL resource commitment and 3PL innovation, in the manufacturer-3PL interaction. The results of the analysis are shown in Table 5. The hypothesized model demonstrates a good fit to the data. The standardized path coefficient also exemplifies strong effects, and all of the hypothesized relationships are significant ($p < 0.05$).

Insert Table 5 about here

As posited in H1, the relationship between resource commitment and overall performance is positive and significant. The standardized path coefficient suggests that performance is enhanced if the 3PL commits resources to the relationship. The level of the 3PL's resource commitment is also significantly and positively associated with the degree of collaboration between the partners. Increasing levels of financial, technological, and managerial resources committed to the relationship facilitate a collaborative working environment between manufacturers and 3PLs as the two seek to exploit opportunities together – which indicates value co-creation.

Collaboration has a direct positive relationship with the innovativeness of the 3PL. An increasingly collaborative work environment between the manufacturers and their 3PLs drives the service providers to deliver superior levels of innovative services that are unique to the industry

and the manufacturer. This innovativeness further enables the manufacturer to achieve higher levels of performance. In addition, H5 is supported. We tested H5 with two models, both shown in Table 5. The first model examined the full mediating role of collaboration, between 3PL resource commitment and 3PL innovativeness, whereas the second model allowed for both direct and indirect effects (mediated through collaboration) of 3PL resource commitment on 3PL innovation. The partial mediator model is not statistically significantly better than the more parsimonious model ($\Delta\chi^2(1)=1.073, p>0.05$) and hence the interpretation of the result is that collaboration fully mediates the relationship between 3PL resource commitment and 3PL innovativeness. Committing resources to the relationship and working together in a collaborative environment enable manufacturers to leverage 3PLs' innovative capability and enhance operating, market, and relational performance.

5 Discussion

Value creation can be seen as “the core purpose and central process of economic exchange” (Vargo, Maglio, and Akaka, 2008, p. 145) and this value is often co-created by a manufacturer and other stakeholders in its business ecosystem. A primary objective of this study was to investigate value co-creation which takes place between manufacturing firms and 3PL providers. Here we studied the role that collaboration plays in the context of a partner's resource commitment and innovation abilities involving manufacturer-3PL relationships. The second objective was to study the performance consequences of the value co-creation. Essentially, the management of the relationship is the key to enhancing the partner's capability. Empirical evidence is provided indicating that the manufacturer's collaboration efforts facilitate its partner's innovation capability, which in turn enhances the manufacturer's relational and market performance. As higher returns can be gained, the results provide support for the importance of value co-creation between

manufacturers and 3PLs in general (Lambert, Emmelhainz, and Gardner, 1999). Since relational performance is also measured, our results support the idea that value is generated for both parties in the relationship in the context where the supplier innovates and the buyer collaborates in the value co-creation.

As we have framed our study as taking place in the RBV setting, by seeing value co-creation as based on the resources and capabilities of the supplier, it makes sense to point out the value of the RBV literature for studies on value co-creation. The RBV has been criticized as presenting tautological assertions that are true by definition and thus not subject to empirical tests (Priem and Butler, 2001a). It has also been argued to contain “a theory of sustainability but not a theory of competitive advantage” (Priem and Butler, 2001b, p.64), thus limiting its usefulness for describing how firms succeed in the marketplace. Contrary to this perspective, we empirically test conduits for firms’ potential to develop or exploit capabilities that ultimately filter through to enhanced performance. Hence, we agree with (Kohtamäki and Rajala, 2016a), for example, who conducted a literature review focusing on value co-creation in a B2B context and concluded that RBV seemed a promising approach for studying the resources and capabilities needed for value co-creation.

The context of our study was chosen to aid the exploration of relationships and because, in this context, there is an assumption that partners will work together to produce mutual benefits. In addition, in this context, relationships are increasingly relied upon to achieve operational and strategic objectives. Because the context is a manufacturer-3PL relationship, the tangible elements of cooperation are more easily identifiable (e.g., information is shared, the 3PL commits assets and resources, and the manufacturer perceives evidence of innovation application). Thus, partner contributions can be better identified as salient factors that contribute to increased market

performance. Theoretically, our findings contribute to the RBV's proposition that resources are used to co-create value that leads to overall performance.

Resource commitment by the 3PL and its innovative abilities influenced the manufacturers' performance. If the 3PL commits resources to the relationship, engages in a collaboration-based relationship with the manufacturer, and is innovative, the results are better performance at the operating, market, and relationship levels. The role of collaboration is crucial in the relationship. Collaboration facilitates and focuses the innovativeness of the 3PL service provider and thus channels the manufacturers' performance. As such, engaging in a collaborative relationship with an innovative 3PL can take a manufacturer 'out of the pack' of standard suppliers by helping them to provide a better service. As one of the respondent managers put it, "*You need flexibility above all to innovate and respond to new circumstances*", whereas another stated "*Our 3PL provides the best service and is easily accessible and flexible in approaching*". The caveat is that if there is no collaboration resource commitment does not lead into 3PL innovation – and in this sense value co-creation may not take place.

In summary, manufacturers are being challenged more than ever in their attempts to cope with demands from retailers and downstream customers. Expectations of precisely timed and friction-free deliveries are daunting. The delivery of a 'perfect order' has become the expectation, and problems with shipments are not readily tolerated. This increasingly dynamic and competitive marketplace implies that manufacturers need to provide innovative services to supplement their core business offerings. Innovations in distribution and logistics services, as provided by 3PLs through technology and equipment, can help manufacturers to achieve perfect orders. As industry consolidations are likely to continue, key distributors in various industries (e.g. food products, beverages, chemical products, automobiles, and others) will exert even more pressure on

manufacturers to deliver innovative logistics and distribution services. The manufacturers can turn to 3PLs to ensure customer satisfaction through collaborative efforts that emphasize innovation.

There are several avenues for further research. First, for the 3PLs, the value co-creation is of importance as the perceptions of the pursued value can impact parties' further collaboration (cf. e.g. Aarikka-Stenroos and Jaakkola, 2012 for another context) and consequently the temporal evolution of value co-creation should be studied. Value co-creation could also be studied from wider perspectives; we focused on resource sharing, collaboration, and innovation but flexibility, for example, has often been listed as a dimension of value co-creation (Pimentel Claro and Oliveira Claro, 2010; Zhang et al., 2015). In the B2C setting there are also more dimensions that have been studied, such as value experience, empathy, and benefits (Ranjan and Read, 2016), which we did not focus on. Their applicability in the B2B setting could also be explored further.

Furthermore, our study has emphasized the need to focus not only on value co-creation between the manufacturer and the end customer but also on a larger constellation of value co-creation (cf. also e.g. Saarijärvi, Kannan, and Kuusela, 2013; Storbacka et al., 2016)– which is evident even in our terminology, as manufacturers are not end customers in the value chain even though they are customers of the 3PL service providers. A future approach may be to study the relationship from different perspectives, especially given the idea that the development and management of the relationship is mainly dependent upon satisfying a third party – the retailer. For example, the manufacturer and the 3PL must understand their respective roles in meeting the retailer's needs, yet they must also ensure that their relationship guarantees mutual satisfaction if they are to remain competitive and survive. This 'network' approach should reveal interesting and complex relationship dynamics. The differences between the perspectives of the manufacturer and the retailer could be examined, revealing potential areas that might impact upon the ability to

achieve competitive capability; this type of research, which would examine the relationships from dyadic viewpoints, would also involve an amendment to our approach (i.e. it would require the perspective of the U.K. third-party service providers, which would need to be asked to analyze their relationships with manufacturers). In the current study, we collected data from just one side of the value co-creation relationship and naturally this is a limitation that should be addressed in the future. All in all applying the value concept to business relationships is not straightforward and parties may see value very differently (Corsaro and Snehota, 2010), and hence, the view of the all participants of the value co-creation process should be studied.

In addition, previous research suggests that the levels of collaboration, approach to innovation, and relational aspects of performance may vary according to country or region. This is another set of inquiries requiring future examination. Hopefully, the current study will lead to these issues and similar ones relating to dynamic manufacturer-3PL relationships being addressed.

6 Conclusion

Resource commitment by the 3PL is vital to its relationships with manufacturer trading partners and the ability to achieve high performance. Collaboration fully mediates the relationship between 3PL resource commitment and 3PL innovativeness. Committing resources to the relationship and working together in a collaborative environment enable manufacturers to leverage 3PLs' innovative capability and enable value co-creation process to happen. These conditions combine to contribute to the ability of the manufacturer to gain a competitive presence in the market, which they do in part by responding to market opportunities.

7 References

- Aarikka-Stenroos, L. and Jaakkola, E. (2012), "Value co-creation in knowledge intensive business services: A dyadic perspective on the joint problem solving process", *Industrial Marketing Management*, Vol. 41 No. 1, pp. 15-26.
- Adner, R. and Helfat, C.E. (2003), "Corporate effects and dynamic managerial capabilities", *Strategic Management Journal*, Vol. 24 No. 10, pp. 1011-25.
- Agarwal, R. and Selen, W. (2009), "Dynamic capability building in service value networks for achieving service innovation", *Decision sciences*, Vol. 40 No. 3, pp. 431-75.
- Amabile, T.M., Conti, R., Coon, H., Lazenby, J., and Herron, M. (1996), "Assessing the work environment for creativity", *Academy of Management Journal*, Vol. 39 No. 5, pp. 1154-84.
- Anderson, J.C. and Gerbing, D.W. (1988), "Structural equation modeling in practice: A review and recommended two-step approach", *Psychological Bulletin*, Vol. 103 No. 3, pp. 411-23.
- Armstrong, J.S. and Overton, T.S. (1977), "Estimating nonresponse bias in mail surveys", *Journal of Marketing Research*, Vol. 14 No. 3, pp. 396-402.
- Bagozzi, R.P., Yi, Y., and Phillips, L.W. (1991), "Assessing construct validity in organizational research", *Administrative Science Quarterly*, Vol. 36 No. 3, pp. 421-58.
- Barney, J. (1991), "Firm resources and sustained competitive advantage", *Journal of Management*, Vol. 17 No. 1, pp. 99-121.
- Barney, J., Wright, M., and Ketchen, J., David J. (2001), "The resource-based view of the firm: Ten years after 1991", *Journal of Management*, Vol. 27 No. 6, pp. 625-41.
- Barney, J.B. (1995), "Looking inside for competitive advantage", *The Academy of Management Executive*, Vol. 9 No. 4, pp. 49-61.
- Bentler, P.M. (1995), *EQS structural equations program manual*, Multivariate Software Inc., Encino, CA.
- Bentler, P.M. and Wu, E.J.C. (1995), *EQS for windows user's guide*, Multivariate Software Inc., Encino, CA.
- Bollen, K.A. (1989), *Structural equations with latent variables*, John Wiley & Sons, New York, NY.
- Bollen, K.A. (1996), "An alternative two stage least squares (2sls) estimator for latent variable equations", *Psychometrika*, Vol. 61 No. 1, pp. 109-21.
- Cavusgil, S.T. and Zou, S. (1994), "Marketing strategy-performance relationship: An investigation of the empirical link in export market ventures", *Journal of Marketing*, Vol. 58 No. 1, pp. 1-21.
- Chen, J.-S., Tsou, H.-T., and Ching, R.K.H. (2011), "Co-production and its effects on service innovation", *Industrial Marketing Management*, Vol. 40 No. 8, pp. 1331-46.
- Collis, D.J. (1994), "Research note: How valuable are organizational capabilities?", *Strategic Management Journal*, Vol. 15 No. Special Issue, pp. 143-52.
- Corsaro, D. and Snehota, I. (2010), "Searching for relationship value in business markets: Are we missing something?", *Industrial Marketing Management*, Vol. 39 No. 6, pp. 986-95.
- Damanpour, F. and Evan, W.M. (1984), "Organizational innovation and performance: The problem of 'organizational lag'", *Administrative Science Quarterly*, Vol. 29 No. 3, pp. 392-409.
- Daugherty, P.J., Autry, C.W., and Ellinger, A.E. (2001), "Reverse logistics: The relationship between resource commitment and program performance", *Journal of Business Logistics*, Vol. 22 No. 1, pp. 107-23.

- Dyer, J.H. and Singh, H. (1998), "The relational view: Cooperative strategy and sources of interorganizational competitive advantage", *The Academy of Management Review*, Vol. 23 No. 4, pp. 660-79.
- Fornell, C. and Larcker, D.F. (1981), "Evaluating structural equation models with unobservable variables and measurement error", *Journal of Marketing Research*, Vol. 18 No. 1, pp. 39-50.
- Frow, P., Nenonen, S., Payne, A., and Storbacka, K. (2015), "Managing co-creation design: A strategic approach to innovation", *British Journal of Management*, Vol. 26 No. 3, pp. 463-83.
- Frow, P., Payne, A., and Storbacka, K. (2010), "Co-creation: A framework for collaborative engagement", Proceedings of 18th International Colloquium in Relationship Marketing, Henley Business School, UK, 27-30 September: Sage
- Frow, P., Payne, A., and Storbacka, K. (2011), "Co-creation: A typology and conceptual framework", Proceedings of the 2011 Anzmac conference, 28-30.
- Grönroos, C. (2012), "Conceptualising value co-creation: A journey to the 1970s and back to the future", *Journal of Marketing Management*, Vol. 28 No. 13/14, pp. 1520-34.
- Gundlach, G.T., Achrol, R.S., and Mentzer, J.T. (1995), "The structure of commitment in exchange", *Journal of Marketing*, Vol. 59 No. 1, pp. 78-92.
- Hamel, G. (1991), "Competition for competence and inter-partner learning within international strategic alliances", *Strategic Management Journal*, Vol. 12, pp. 83-103.
- Harman, H.H. (1967), *Modern factor analysis* (2nd ed.), University of Chicago Press, Chicago.
- Hu, Y. and McLoughlin, D. (2012), "Creating new market for industrial services in nascent fields", *Journal of Services Marketing*, Vol. 26 No. 5, pp. 322-31.
- Hunt, S.D. and Morgan, R.M. (1995), "The comparative advantage theory of competition", *Journal of Marketing*, Vol. 59 No. 2, pp. 1-15.
- Hurley, R.F. and Hult, G.T.M. (1998), "Innovation, market orientation, and organizational learning: An integration and empirical examination", *Journal of Marketing*, Vol. 62 No. 3, pp. 42-54.
- Jap, S.D. (1999), "Pie-expansion efforts: Collaboration processes in buyer-supplier relationships", *Journal of Marketing Research*, Vol. 36 No. 4, pp. 461-75.
- Jap, S.D. (2001), "'Pie sharing' in complex collaboration contexts", *Journal of Marketing Research*, Vol. 38 No. 1, pp. 86-99.
- Jöreskog, K. and Sörbom, D. (1993), *Lisrel viii: User's reference guide*, Scientific Software Inc., Chicago.
- Kalwani, M.U. and Narayandas, N. (1995), "Long-term manufacturer-supplier relationships: Do they pay off for supplier firms?", *Journal of Marketing*, Vol. 59 No. 1, pp. 1-16.
- Kohtamäki, M. and Partanen, J. (2016), "Co-creating value from knowledge-intensive business services in manufacturing firms: The moderating role of relationship learning in supplier-customer interactions", *Journal of Business Research*, Vol. 69 No. 7, pp. 2498-506.
- Kohtamäki, M. and Rajala, R. (2016a), "Theory and practice of value co-creation in B2B systems", *Industrial Marketing Management*, Vol. 56 No. Supplement C, pp. 4-13.
- Kohtamäki, M. and Rajala, R. (2016b), "Theory and practice of value co-creation in B2B systems", *Industrial Marketing Management*, Vol. 56, pp. 4-13.
- Lambert, D.M., Emmelhainz, M., and Gardner, J.T. (1999), "Building successful logistics partnerships", *Journal of Business Logistics*, Vol. 20 No. 1, pp. 165-81.

- Langley, C.J.J., Allen, G.R., and Tyndall, G.R. (2001), "Third-party logistics study: Results and findings of the 2001 sixth annual logistics study", in. University of Tennessee, Memphis.
- Langley, J.J. and Caggemini consulting (2017), *2017 third-party logistics study - the state of logistics outsourcing, results and findings of the 21st annual study*, [Online], Penn State University, Available (2017, August 30)
http://www.3plstudy.com/media/downloads/2016/10/2017-report_new.pdf.
- Lee, S.M., Olson, D.L., and Trimi, S. (2012), "Innovative collaboration for value creation", *Organizational Dynamics*, Vol. 41 No. 1, pp. 7-12.
- Lemke, F., Clark, M., and Wilson, H. (2011), "Customer experience quality: An exploration in business and consumer contexts using repertory grid technique", *Journal of the Academy of Marketing Science*, Vol. 39 No. 6, pp. 846-69.
- Lorenzoni, G. and Lipparini, A. (1999), "The leveraging of interfirm relationships as a distinctive organizational capability: A longitudinal study", *Strategic Management Journal*, Vol. 20 No. 4, pp. 317-38.
- Lusch, R.F., Vargo, S.L., and O'Brien, M. (2007), "Competing through service: Insights from service-dominant logic", *Journal of retailing*, Vol. 83 No. 1, pp. 5-18.
- Lusch, R.F., Vargo, S.L., and Tanniru, M. (2010), "Service, value networks and learning", *Journal of the Academy of Marketing Science*, Vol. 38 No. 1, pp. 19-31.
- Lyles, M.A. and Salk, J.E. (1996), "Knowledge acquisition from foreign parents in international joint ventures: An empirical examination in the Hungarian context", *Journal of International Business Studies*, Vol. 27 No. 5, pp. 877-903.
- Manu, F.A. and Sriram, V. (1996), "Innovation, marketing strategy, environment, and performance", *Journal of Business Research*, Vol. 35 No. 1, pp. 79-91.
- McEvily, B. and Zaheer, A. (1999), "Bridging ties: A source of firm heterogeneity in competitive capabilities", *Strategic Management Journal*, Vol. 20 No. 12, pp. 1133-56.
- Newbert, S.L. (2007), "Empirical research on the resource-based view of the firm: An assessment and suggestions for future research", *Strategic management journal*, Vol. 28 No. 2, pp. 121-46.
- Normann, R. and Ramirez, R. (1993), "Designing interactive strategy", *Harvard business review*, Vol. 71 No. 4, pp. 65-77.
- Pilon, F. and Hadjielias, E. (2017), "Strategic account management as a value co-creation selling model in the pharmaceutical industry", *Journal of Business & Industrial Marketing*, Vol. 32 No. 2, pp. 310-25.
- Pimentel Claro, D. and Oliveira Claro, P.B. (2010), "Collaborative buyer-supplier relationships and downstream information in marketing channels", *Industrial Marketing Management*, Vol. 39 No. 2, pp. 221-28.
- Pine, B.J., Peppers, D., and Rogers, M. (1995), *Do you want to keep your customers forever?*, Harvard Business Press.
- Podsakoff, P.M. and Organ, D.W. (1986), "Self-reports in organizational research: Problems and prospects", *Journal of Management*, Vol. 12 No. 4, pp. 531-44.
- Powell, W.W., Koput, K.W., and Smith-Doerr, L. (1996), "Interorganizational collaboration and the locus of innovation: Networks of learning in biotechnology", *Administrative Science Quarterly*, Vol. 41 No. 1, pp. 116-45.
- Priem, R.L. and Butler, J.E. (2001a), "Is the resource-based "view" a useful perspective for strategic management research?", *Academy of Management Review*, Vol. 26 No. 1, pp. 22-40.

- Priem, R.L. and Butler, J.E. (2001b), "Tautology in the resource-based view and the implications of externally determined resource value: Further comments", *Academy of Management Review*, Vol. 26 No. 1, pp. 57-66.
- Ramaswamy, V. (2011), "It's about human experiences... and beyond, to co-creation", *Industrial Marketing Management*, Vol. 40 No. 2, pp. 195-96.
- Ranjan, K.R. and Read, S. (2016), "Value co-creation: Concept and measurement", *Journal of the Academy of Marketing Science*, Vol. 44 No. 3, pp. 290-315.
- Ritala, P. and Tidström, A. (2014), "Untangling the value-creation and value-appropriation elements of co-competition strategy: A longitudinal analysis on the firm and relational levels", *Scandinavian Journal of Management*, Vol. 30 No. 4, pp. 498-515.
- Saarijärvi, H. (2012), "The mechanisms of value co-creation", *Journal of Strategic Marketing*, Vol. 20 No. 5, pp. 381-91.
- Saarijärvi, H., Kannan, P., and Kuusela, H. (2013), "Value co-creation: Theoretical approaches and practical implications", *European Business Review*, Vol. 25 No. 1, pp. 6-19.
- Sarkar, M.B., Echambadi, R., and Harrison, J.S. (2001), "Alliance entrepreneurship and firm market performance", *Strategic Management Journal*, Vol. 22 No. 6/7, pp. 701-11.
- Soni, P.K., Lilien, G.L., and Wilson, D.T. (1993), "Industrial innovation and firm performance: A re-conceptualization and exploratory structural equation analysis", *International Journal of Research in Marketing*, Vol. 10 No. 4, pp. 365-80.
- Stank, T.P., Keller, S.B., and Daugherty, P.J. (2001), "Supply chain collaboration and logistical service performance", *Journal of Business Logistics*, Vol. 22 No. 1, pp. 29-48.
- Storbacka, K., Brodie, R.J., Böhmman, T., Maglio, P.P., and Nenonen, S. (2016), "Actor engagement as a microfoundation for value co-creation", *Journal of Business Research*, Vol. 69 No. 8, pp. 3008-17.
- Uлага, W. (2001), "Customer value in business markets: An agenda for inquiry", *Industrial Marketing Management*, Vol. 30 No. 4, pp. 315-19.
- Vargo, S.L. and Lusch, R.F. (2008), "Service-dominant logic: Continuing the evolution", *Journal of the Academy of Marketing Science*, Vol. 36 No. 1, pp. 1-10.
- Vargo, S.L., Maglio, P.P., and Akaka, M.A. (2008), "On value and value co-creation: A service systems and service logic perspective", *European Management Journal*, Vol. 26 No. 3, pp. 145-52.
- Wernerfelt, B. (1984), "A resource-based view of the firm", *Strategic Management Journal*, Vol. 5 No. 2, pp. 171-81.
- Wilson, D.T. (1995), "An integrated model of buyer-seller relationships", *Journal of the Academy of Marketing Science*, Vol. 23 No. 4, pp. 335-45.
- Zhang, J., Jiang, Y., Shabbir, R., and Du, M. (2015), "Building industrial brand equity by leveraging firm capabilities and co-creating value with customers", *Industrial Marketing Management*, Vol. 51, pp. 47-58.
- Zhang, X. and Chen, R. (2008), "Examining the mechanism of the value co-creation with customers", *International Journal of Production Economics*, Vol. 116 No. 2, pp. 242-50.

8 Appendix – figures and tables

Table 1
Additional outsourcing statistics and international dimension

a.	Approximate share of your total outsourced logistics that your primary 3PL receives is	Mean = 63% Median = 65%
b.	Does your company have a written, formal contract with the primary 3PL?	Yes=71.7% No=28.3%
c.	If yes , for how many years have you had a formal contract with the primary 3PL?	Mean = 4.9 Median = 3.0 years
d.	You use your primary 3PL for (please select all applicable) ...	
	• Activities only in the UK	56.3%
	• Activities only outside the UK (international sales)	5.6%
	• Both activities in the UK and outside the UK	36.3%
e.	Your sales outside the UK (international sales) in relation to total sales are	Mean = 49.25% Median = 50.00%
f.	You use your primary 3PL for approx. __ % of the non-UK countries you operate in.	Mean = 59.57% Median = 60%

Table 2
Primary industry of manufacturer respondents

<i>Company information</i>	<i>Valid</i>
Food products and/or beverages	50%
Chemicals and/or chemical products	28%
Motor vehicles, trailers, and/or semi-trailers	8.5%
Radio, television, and/or communication equipment apparatus, telecommunication	8.5%
Office machinery and/or computers	3.4%
Electrical domestic appliances	1.7%
	100%

Table 3
Measurement items and properties

Id	Item	μ	σ	$\lambda_{i,j}$	t-value
	Resource commitment – taken from Daugherty, Autry and Ellinger (2001) - $\alpha=0.80$, $\rho=0.80$, AVE=0.50				
rescom1	Financial resources	4.73	1.32	0.62	*
rescom2	Physical assets (equipment, facilities)	5.36	1.27	0.68	5.45
rescom3	Technological resources	4.54	1.46	0.83	5.87
rescom4	Managerial resources (assignment of personnel to the client company/account)	4.97	1.57	0.68	4.39
	Collaboration – based on Jap (1999) - $\alpha =0.88$, $\rho=0.91$, AVE=0.71				
Coll1	Our company and the service provider work together to exploit unique opportunities in the market.	4.53	1.46	0.80	*
Coll2	Both companies look for synergistic ways to do business together.	5.01	1.35	0.89	10.31
Coll3	Our companies work together to develop new ideas.	4.91	1.34	0.91	10.75
Coll4	We continually share proprietary information with each other.	4.35	1.59	0.75	9.12
	Innovation – own scale, based on Hurley and Hult (1998) - $\alpha =0.90$, $\rho=0.91$, AVE=0.72				
inno1	This service provider introduces technology that is new to the industry.	3.78	1.50	0.92	*
inno2	This service provider introduces technology that is new to our company.	3.87	1.49	0.87	16.70
inno3	This service provider is highly innovative.	3.76	1.45	0.88	16.79
inno4	Compared to other 3PL service providers, this service provider offers some unique services.	4.08	1.51	0.73	8.15
	Operating-level performance – new scale - $\alpha =0.88$, $\rho=0.88$, AVE=0.65				
superf1	Improved service levels	5.18	1.10	0.85	*
superf2	Reduced cycle time	4.67	1.26	0.75	8.37
superf3	More efficient handling of exceptions	4.89	1.31	0.77	11.35
superf4	Improved end-customer satisfaction	5.16	1.29	0.84	11.54

Table 3 continued
Measurement items and properties

	Market performance – adapted from Cavusgil and Zou (1994) - $\alpha = 0.94$, $\rho = 0.94$, AVE=0.80				
comperf1	The service provider has helped increase our company's overall performance in this market.	4.74	1.21	0.79	*
comperf2	The service provider has helped make our company more competitive relative to our competition in terms of customer responsiveness.	4.61	1.42	0.92	10.14
comperf3	The service provider has helped make our company more competitive relative to our competition in responding to changing conditions.	4.53	1.37	0.93	9.86
comperf4	The service provider has helped make our company more competitive relative to our competition in responding to market opportunities.	4.35	1.29	0.93	10.28
	Relational performance – adapted from Jap (1999; 2001) - $\alpha = 0.91$, $\rho = 0.93$, AVE=0.81				
relperf1	We share the outcomes of the partnership equally between us.	3.56	1.44	0.91	*
relperf2	Each party receives its equitable share of all benefits from our mutual efforts.	3.72	1.51	0.88	12.96
relperf3	The gains from the joint effort are equally shared between the service provider and us.	3.46	1.47	0.92	14.39
	Performance – second-order factor - $\rho = 0.79$, AVE=0.57				
p1	Performance -> Operating-level performance			0.79	7.16
p2	Performance -> Market performance			0.96	8.81
p3	Performance -> Relational performance			0.42	3.83

Note: Collaboration, innovation, market performance, and relational performance items stated as Likert-type attitudinal measures, anchored on a seven-point scale (endpoints: 1=strongly disagree and 7=strongly agree). Resource commitment instructions: “Please indicate the level of resource commitment the primary service provider has made to the relationship.”, Likert-type response scale from 1=not at all adequate to 7=highly adequate. Operating-level performance instructions: “Please indicate the level of success your company has experienced from the relationship (with the primary 3PL)”, Likert-type response scale from 1=strongly disagree to 7=strongly agree.

μ =mean, σ =standard deviation, λ =factor-loading lambda, t =t-value, α =Cronbach's alpha, ρ =Jöreskog's rho, AVE=average variance extracted, * denotes initial factor loading fixed to 1 to set the scale of the construct. Measurement fit: X^2 (df) = 416.43 (221); $p < 0.001$; comparative fit index (CFI) = 0.938; Bentler-Bonnet non-normed fit index (BBNFI) = 0.929; Bollen (IFI) fit index = 0.939; root mean square error of approximation (RMSEA) = 0.06.

Table 4
Descriptive statistics and correlations among constructs

	μ	σ	α	ρ	AVE	(1)	(2)	(3)	(4)	(5)	(6)
(1) Resource commitment	4.61	1.24	0.80	0.80	0.50						
(2) Collaboration	4.70	1.22	0.88	0.91	0.71	0.59 (0.14)					
(3) Innovation	3.87	1.30	0.90	0.91	0.72	0.49 (0.15)	0.64 (0.18)				
(4) Operating-level performance	4.98	1.03	0.88	0.89	0.65	0.48 (0.11)	0.47 (0.12)	0.42 (0.13)			
(5) Market performance	4.56	1.21	0.94	0.94	0.80	0.59 (0.13)	0.64 (0.14)	0.54 (0.15)	0.76 (0.15)		
(6) Relational performance	3.57	1.36	0.91	0.93	0.81	0.39 (0.14)	0.39 (0.16)	0.46 (0.18)	0.30 (0.13)	0.38 (0.14)	

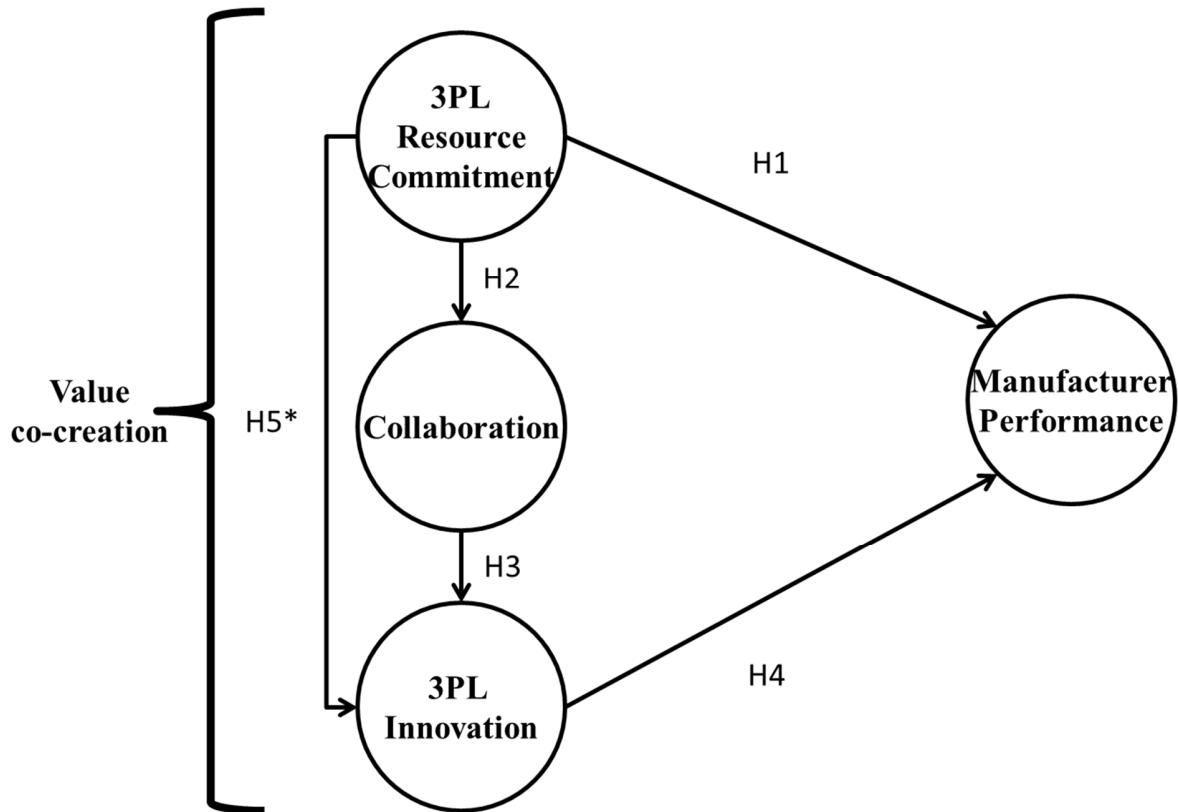
Note: μ =mean, σ =standard deviation, α =Cronbach's alpha, ρ =Jöreskog's rho, AVE=average variance extracted; all correlations are significant at $p<0.05$; correlations among independent variables reported in the lower diagonal; standard errors reported in ().

Table 5
Results of structural equation analyses for full and partial mediation models

Path	Full mediation		Partial mediation	
	Standardized path coefficient	t-value	Standardized path coefficient	t-value
Structural paths				
Resource commitment → Performance	0.514	2.872*	0.504	2.641*
Resource commitment → Collaboration	0.636	3.559**	0.628	3.582**
Resource commitment → Innovation			0.134	n.s.
Collaboration → Innovation	0.647	6.921**	0.559	3.509**
Innovation → Performance	0.359	3.135**	0.348	2.692*
Model fit statistics				
χ^2 (d.f.)	425.030 (223)		423.957 (222)	
Satorra-Bentler scaled χ^2 (d.f.)	335.224 (223)		334.342 (222)	
RMSEA	0.068		0.068	
BBNFI	0.925		0.925	
CFI	0.934		0.934	
Bollen IFI	0.935		0.935	

Note: significant at *= $p<0.05$; **= $p<0.01$

Figure 1
Model of Collaboration and the
Resource Commitment – Innovation – Performance Relationship



*Note: *H5 is a mediator hypothesis and the direct control path from 3PL Resource Commitment to 3PL Innovation denotes this relationship*