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3-2015

Enhancing Dyadic Performance Through Boundary Spanners and Innovation: An Assessment of Service Provider–Customer Relationships

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Abstract

Firms recognize that working together through collaborative relationships offers potential benefits such as improving cooperation, information sharing, and overall performance. An additional and extremely valuable benefit of working together is the potential for creating innovative business approaches and solutions. Thus, developing external linkages has become a higher priority within many organizations. Boundary spanning employees offer one means of achieving closer cross-firm relationships. We investigate the roles of boundary spanners by examining service providers and their relationships with customers. More specifically, we examine boundary spanning employees that are physically on-site at customer facilities. Results provide strong support that boundary spanners perceiving higher levels of external organizational support from a client subsequently develop affective commitment to the customer. This, in turn, drives knowledge exchange and logistics innovation. A relationship between logistics innovation and performance (of service providers and of customers) was also found. Managerial implications of the research findings are discussed and suggestions presented covering future research.

Disciplines

Management Sciences and Quantitative Methods | Operations and Supply Chain Management | Organizational Behavior and Theory | Strategic Management Policy | Technology and Innovation

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An Assessment of Service Provider – Customer Relationships

ABSTRACT

Firms recognize that working together through collaborative relationships offers potential benefits such as improving cooperation, information sharing, and overall performance. An additional and extremely valuable benefit of working together is the potential for creating innovative business approaches and solutions. Thus, developing external linkages has become a higher priority within many organizations. Boundary spanning employees offer one means of achieving closer cross-firm relationships. We investigate the roles of boundary spanners by examining service providers and their relationships with customers. More specifically, we examine boundary spanning employees that are physically on-site at customer facilities. Results provide strong support that boundary spanners perceiving higher levels of external organizational support from a client subsequently develop affective commitment to the customer. This, in turn, drives knowledge exchange and logistics innovation. A relationship between logistics innovation and performance (of service providers and of customers) was also found. Managerial implications of the research findings are discussed and suggestions presented covering future research.

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Introduction

As noted by Autry and Griffis (2008), supply chain success is contingent on the optimization of inter-firm connections. Thus, many firms focus on creating closer relationships, developing collaborative arrangements, and generally working to leverage their individual resources to joint advantage. Collaboration has been referred to as the "driving force" behind effective supply chain management (Ellram and Cooper, 1990) and even the "ultimate core capability" (Sanders and Premus, 2005). It is generally believed that firms involved in collaboration should reap greater benefits from working together (Daugherty et al., 2006). However, there have also been indications that the reality falls short of meeting those expectations. In some situations, collaborative efforts – those involving a focus on sharing of information, joint development of strategies, and synchronizing operations – have not been successful to the degree anticipated (Fawcett et al., 2012).

Our research explores the idea of attaining advantage and enhanced performance through a certain type of collaborative arrangement – closer, more integrated relationships with customers through the placement of boundary spanning employees at customer facilities. Such employees are often referred to as implants or on-sites. The relational view of competitive advantage provides the theoretical justification for our proposed model. The relational view suggests that firms in a supply chain can develop relationships that result in interorganizational processes that allow them to systematically identify valuable know-how and subsequently integrate it across organizational boundaries (Dyer and Singh, 1998). Further, Sanders, Autry, and Gligor (2011) proposed that firms "can develop unique linkages with supply chain partners that facilitate information sharing . . . and thereby are useful for enhancing performance for the

overall network rather than simply the firm" (p. 182). We argue that the use of on-sites represents one such unique linkage. Collaboration may be a necessary condition for mutual gain, but it is not the only requirement. The *form* or structure of collaboration can make a difference particularly relating to the exchange of information. The use of boundary spanning employees provides a structure (cross-organizational) that facilitates information and knowledge exchange (Zhao and Anand, 2013). Boundary spanning on-site employees are in a position to facilitate such a transfer which can, ultimately, impact performance.

Specifically, we were motivated to investigate on-site employees and the relationship they develop with host organizations. The context selected for examination is employees of logistics service providers (LSPs) who work within a customer's facility. For example, this could involve LSP employees that are located at a customer's distribution center or truck terminal. Implanted employees are in a position to build relationships with customer firms. Caplice and Ryan (2011) noted, when on-site vendor teams/personnel are physically located on the client's premises, collaborative relationships can be taken to a higher level with closer coordination between the two firms. Our research uses matched dyadic survey data to extend work in the area and also assesses performance benefits resulting from the on-site location of employees. Additional issues that are explored include: 1) how the implanted employee/host firm relationship affects knowledge exchange and innovation (specifically logistics innovation) between the logistics service provider and the host firm and 2) the impact of logistics innovation, developed through the commitment of the implanted employee to the host firm and knowledge exchange, on the performance of both the logistics service provider firm and the customer.

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Literature Review and Hypotheses Development

Supply chain management is the coordination of the chain of events associated with the movement of goods from raw materials to the end consumer (Mentzer et al., 2001). Supply chains are comprised of a series of firms that come together to provide value to customers through efficient and effective processes that link their efforts to deliver the best products and services to market (Fawcett and Magnan, 2004; Richey et al., 2010). Some common benefits to developing supply chain relationships include reduced costs, process improvements, quality enhancements, and profit growth (Petersen et al., 2008). Supply chain relationships facilitate joint efforts which increases the likelihood that individual firm and supply chain goals are met (Corsten and Kumar, 2005; Heide, 1994).

The relational view provides an established foundation for examining cross-organizational interactions of supply chain members undertaken to enhance performance. Dyer and Singh (1998) noted that partners combining, exchanging, or investing in idiosyncratic assets through collaborative relationships have the potential to synergistically pair these resources to create competitive advantages. Collaborative relationships allow firms access to unique and valuable tools which can assist in creating value (Eisenhardt and Schoonhoven, 1996). Value is derived from these relationships not only due to the specific outcomes the firms work together towards, but also the inimitability of the processes and knowledge potentially created (Kogut, 2000).

Firms seek relationships with organizations possessing diverse abilities in order to improve competitive positioning (Ring and Van de Ven, 1992). Collaborative relationships may also negate the need to vertically integrate functions within firms (Heide, 1994; Weitz and Jap, 1995; Wathne and Heide, 2004). Rather, firms can focus on a subset of value adding activities

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for which they have expertise and rely on coordinated relationships with partners to complete the delivery process (Anderson et al., 1994; Fawcett et al., 2012). This corresponds to the growth of supply chain networks seeking to capitalize on better information sharing, complementary capabilities, and efficiencies to lower costs and/or increase performance (Cousins et al., 2011; Daugherty et al., 2006).

One method for creating a connection between supply chain partners is through the use of an organizational implant. An organizational implant is an employee of one organization who is placed or "physically housed" at another organization's location/ facility (referred to as the host firm) with the purpose of executing specific duties (Grawe et al., 2012). These boundary spanning employees "see the business through the client's eyes" (p. 9)(Caplice and Ryan, 2011), and also bring their own expertise to the work environment. Thus, there is an opportunity to enhance their contribution to the host firm. Host firms benefit from the proximity of the implanted employee because of easier, more frequent interaction (Kahn and McDonough, 1997) and potential access to new knowledge (previously unknown or unavailable) to the host firm (Caplice and Ryan, 2011; Grawe et al., 2012). However, the ability to derive dual benefits (to both the host and provider) from implanted relationships may require unique steps to assimilate boundary spanning employees who, in effect, work for multiple firms (Song et al., 2007). Recognition of the implant's value or worth by the host may be an effective way to build a stronger relationship which can ultimately yield greater benefits for both parties.

Socioeconomic value is often associated with belonging to a structure or organization (Kogut and Zander, 1996). Organizations can provide a sense of identification for their employees by establishing procedures for communication and coordinated effort (Nahapiet and Ghoshal, 1998). Norms can be created to govern the actions of individuals and maintain focus

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on goal achievement. Organizations also need to provide a conducive work environment in order to maximize the efforts of employees. Elements of a conducive work environment include compensation, the physical work environment, and (positive) impression management (Rhoades and Eisenberger, 2002). In other words, how the employee is supported by an organization.

Perceived organizational support is an employee's belief that an organization values his/her contributions and overall well-being (Hutchison et al., 1986). Perceptions develop over time through employees' experience-based attributions of firm actions (Eisenberger et al., 2001). When employees feel their contributions are recognized by the firm, perceived organizational support increases (Settoon et al., 1996).

Research has also applied the constructs of perceived organizational support and organizational commitment beyond the boundaries of firm and firm employees (McElroy et al., 2001). For example, organizations' critical resources may extend beyond firm boundaries and may be embedded in interfirm routines and processes (Dyer and Singh, 1998). Boundary spanning employees frequently develop relationships with external constituencies. In such instances, a member of one organization can develop a long-term relationship with members of another organization (Dwyer et al., 1987). Employees perceive support not only from their employer, but also externally from the client firm (within the current context, the host firm) (Siders et al., 2001).

Perceived external organizational support results in a stronger on-site relationship when a boundary spanning employee feels valued and appreciated by an external partner (McElroy et al., 2001). When a boundary spanning employee feels valued by a customer or partner organization, he or she is more likely to work harder for the success of that company (Coyle-Shapiro and Morrow, 2006). The external organizational support encourages the boundary spanner to

identify with the host firm. This can result in the boundary spanner wanting to remain on the job and being more engaged with the external host firm (Kinnie and Swart, 2012). The perception of support from the host firm by the implant can lead to the boundary spanner's affective commitment to the customer.

External organizational commitment refers to an employee's identification and involvement with a client organization (McElroy et al., 2001). A boundary spanning employee, because of the nature of the assignment, has the opportunity for increased communication and interaction with host firms (Caplice and Ryan, 2011). This frequency and quality of interaction provides an opportunity for influencing implants' perceptions of the host firm (McElroy et al., 2001). Boundary spanning employees often begin to identify with the host firm and appreciate the opportunities associated with a successful work assignment (Reichers, 1985). A commitment develops to the host firm (Tellefsen, 2002). Coyle-Shapiro and Morrow (2006) examined the relationship between perceived external organization support and increased external organizational commitment. They found support in the context of contracted employees of a private company providing public municipal services and called for extensions of their research to contracted workers with higher levels of responsibility and/or to more professional occupations.   Thus, we propose that if boundary spanning implanted employees perceive greater external organizational support, the boundary spanning employees will develop further commitment to the client organization. The following hypothesis is presented:

H1: *Perceived external organizational support leads to greater affective commitment from the boundary spanner to the customer.*

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A key tenet of the relational view is that relationships are only the beginning of possible value creation. Relationships are worthwhile when they lead to the development or combination of idiosyncratic resources and capabilities between firms (Dyer and Singh, 1998). Capabilities are defined as the ability to perform a productive task which relates either directly or indirectly to an organization's capacity for creating value through the transformation of inputs into outputs (Grant, 1996b). Using capabilities is the basis for organization success (Prahalad and Hamel, 1990; Barney, 1991). Capabilities paired in unique ways through idiosyncratic interfirm linkages can lead to competitive advantage (Dyer, 1996). One such interorganizational relational benefit is knowledge exchange between firms.

Knowledge is broadly defined as information organized in such a way as to provide value (Grawe et al., 2011). Knowledge offers the potential to enable firms to outperform competitors in dynamic markets (Grant, 1996a). Access to knowledge creates opportunity from new product development to the value of being aware of something others are not (i.e. knowledge of a potential strike at a supplier) (Collins and Smith, 2006). Knowledge is power in the sense that it aids in the ability to effectively deliver goods or services to end users. Firms should work to actively develop the ability to exchange knowledge internally within the firm and externally between partners because of the opportunity to combine knowledge for value creation (Dyer and Singh, 1998). However, finding the means to effectively exchange knowledge presents a challenge (Foss et al., 2010).

Interorganizational knowledge-sharing routines represent a consistent pattern of interfirm interactions that allows for the transfer, recombination, or creation of specialized knowledge (Grant, 1996b). Specific knowledge held separately by the partners can be harmonized across inter-organizational boundaries (Zahra and Nielsen, 2002). Knowledge exchange can be further

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enhanced through physical proximity. Boundary spanning employees facilitate interfirm knowledge exchange contributing to enhanced coordination, flexibility, shared understanding, and performance (Collins and Smith, 2006; Dwyer et al., 1987; Dyer and Singh, 1998; Grawe et al., 2011; Nahapiet and Ghoshal, 1998). However, this knowledge exchange may be contingent upon the relationship and level of commitment between the on-site employee and the host firm.

Employees' perceptions of firms can affect employees' abilities, motivations, and opportunities to exchange and combine individual and organizational knowledge (Kogut and Zander, 1992; Collins and Smith, 2006). Correspondingly, commitment increases opportunities for knowledge exchange as employees look to strengthen their position (i.e. add value) within organizations they like (Kogut and Zander, 1996). This can happen internally (Inkpen and Tsang, 2005) as well as externally (Collins and Smith, 2006; McElroy et al., 2001). Knowledge drives successful supply chain partnerships as the access to information can lead to greater efficiencies, an understanding of market requirements, and performance enhancement (Ellinger et al., 2011;Nahapiet and Ghoshal, 1998). When boundary spanning employees and client/host firms are committed to one another, the exchange of valuable and unique information increases (Collins and Smith, 2006). As commitment grows, employees put forth more effort to effectively transfer knowledge due to vested interests (Nahapiet and Ghoshal, 1998). Therefore, a critical benefit associated with affective commitment to the customer may be the enhanced knowledge exchange between firms. Thus, the following hypothesis is proposed:

H2: *A boundary spanner's affective commitment to the customer leads to greater knowledge exchange between organizations.*

Boundary spanning employees work to assist the client organization and identify ways to improve operational functioning (Tellefsen, 2002). Enhanced commitment by organizational

implants to hosts can yield supply chain benefits. One such benefit is the involvement and engagement in new product, service, or process development, i.e. innovation (Germain et al., 2011).

The specific innovation of interest in our research is logistics innovation. Logistics innovation can be represented in any logistics related service from the basic to the complex that is seen as new and helpful to a particular focal audience (Flint et al., 2005). Logistics innovations provide new options and opportunities for firms to serve customers (Grawe et al., 2011). Customer expectations grow over time; therefore, companies must continually seek innovative new offerings (Chapman et al., 2003). Logistics innovation can provide a competitive advantage (Germain, 1996; Grawe, 2009).

Interorganizational structures can facilitate logistics innovation (Chapman et al., 2003). Boundary spanning employees of LSPs play a unique role in the innovation process because of the associations they share with the provider and client. Ideally, boundary spanning employees should work to proactively deliver solutions to a client even before the client recognizes a need (Wallenburg, 2009). Additionally, client/host identified challenges also have the potential to lead to innovation through joint efforts. Employees who are committed to an organization are typically willing to exert extra effort (Kemp et al., 2013). These boundary spanners who are committed to their host firms are likely to actively seek ways to improve logistics processes between the firms through the identification and development of innovative approaches. As such, the following hypothesis is presented:

H3: *A boundary spanner's affective commitment to the customer leads to greater levels of logistics innovation.*

Pfohl and Buse (2000) noted that while firms can create capabilities autonomously, the potential to develop capabilities which achieve competitive advantages is increased when information and knowledge is exchanged across partners. New knowledge, especially knowledge from outside the firm, can stimulate improvement and organizational change (Inkpen and Tsang, 2005).   Further, relationships between partners are often the source of knowledge that drives performance enhancing innovation (Dyer and Singh, 1998).

Logistics innovation occurs through integrated knowledge sharing routines that span organizational boundaries (Flint et al., 2008). However, an established process to manage the knowledge associated with logistics innovation is required to create successful innovations (Oke, 2008). Von Hippel (1988) advocated that supply chains with superior knowledge exchange would be able to "out-innovate" supply chains with less efficient knowledge sharing. Additionally, the effectiveness of innovation can be enhanced with the frequency, quality, and timing of knowledge exchange (Cousins et al., 2011).

Boundary spanners intensify exchange by serving as the bridge between firms and provide an immediate conduit of information and knowledge. Additionally, the boundary spanning employees' roles allow them to identify host needs which they can match to the skills of the LSP (Song and Di Benedetto, 2008). The ability to create new knowledge is predicated on exchanging and combining existing knowledge (Collins and Smith, 2006; Grant, 1996a; Nahapiet and Ghoshal, 1998).   Building upon the existing knowledge, new knowledge can provide the impetus for change and improvement (Inkpen and Tsang, 2005). Through an understanding of host and LSP capabilities, boundary spanners facilitate an exchange of knowledge to potentially create unique logistics innovations (Hult et al., 2007). Thus, the following hypothesis is offered:

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H4: *Knowledge exchange leads to greater levels of logistics innovation.*

Firms must continually develop new or improved capabilities to respond to changing customer demand (Sirmon et al., 2007). Creating innovative logistics processes, whether developed in-house or adopted from another organization, adds to the range of options available to the firm to serve both internal and external customers (Grawe et al., 2011). It is through innovative processes that new competitive advantages can be formed and service offerings improved. Grawe (2009) proposed that logistics innovation could improve performance for a logistics service provider through reduced costs and/or improved delivery solutions. Additionally, logistics innovation improves performance for customers (in this case, host firms) by providing solutions that may not be immediately imitable by competitors (Flint et al., 2005). Firms are able to extend core competencies by working together to develop logistics innovations. Cross-firm partnerships can focus on value-creating activities (Chapman et al., 2003). Therefore, the following hypotheses are proposed:

H5: *Logistics innovation leads to better performance for LSPs.*
H6: *Logistics innovation leads to better logistics performance for customers.*

RESEARCH METHODOLOGY

Data collection

The collection of data included two components. First, survey data were collected from logistics service providers. In this phase, 18 logistics service providers were contacted by telephone to discuss the research project. The service providers represented a variety of logistics

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services and all were included in the *Inbound Logistics* list of the top 100 logistics service providers. Collectively, the service providers included ocean carriers, airfreight forwarders, and truckload carriers. Asset-based and non-asset-based providers were represented. After speaking with senior-level (Director and above) executives at each of the firms, 15 logistics service providers agreed to participate in the research project.

Each of the participating firms received an introductory email with an overview of the project and assurance of confidentiality. A letter with a link to the boundary spanner version of the survey was sent to a single contact at each of the LSPs. The single contact then distributed the letter to boundary spanners working at customer facilities. This process resulted in the dissemination of 750 surveys. During the ten-week data collection process, a total of 344 surveys were received, representing an initial response rate of 46%. Two questions were included in the survey to further qualify each participant: "I had enough information to answer all of the questions" (1 = strongly disagree, 4 = neutral, 7 = strongly agree) and "The questions in this survey are relevant to my firm" (1 = strongly disagree, 4 = neutral, 7 = strongly agree). Responses of 4 or lower were discarded from the sample, resulting in a final monadic sample of 312 respondents (42% response rate).

The second phase of the data collection was aimed at creating matching dyads. Our research was designed to examine relationships between LSPs and their customers, using the dyad as the unit of analysis to focus on key constructs from the perspective of *both* sides of the buyer-seller relationship. Inclusion of both buyers and sellers is considered critical in inter-organizational research (Chen and Paulraj, 2004; Fang et al., 2008; John and Reve, 1982; Palmatier et al., 2007). In addition to providing both buyer and seller perspectives, the approach helps to eliminate many concerns related to common method bias.

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Due to confidentiality concerns regarding the sharing of customer-specific information, LSP customer lists were not given to the research team. Instead, all 750 LSP participants were asked to forward a customer version of the letter to a key contact at their customer organizations. Of the 312 remaining LSP responses, 95 had corresponding customer responses – submitted independently – representing 28% of the potential dyadic pairs and 13% of the intended sample. Of the 95, 14 were eliminated due to responses of 4 or lower on the check questions, excessive missing data, all neutral responses, or no matching LSP respondent. The final data for analysis included 81 dyads.

Demographic characteristics of the dyads can be found in Table 1.

Insert Table 1 Here

Non-response bias

Non-response bias was tested on each group of responses – boundary spanners and customers. Each group was tested for non-response bias by comparing late responders and early responders to the survey. ANOVA was used to compare the responses from the final one-third of respondents to the first two-thirds of the respondents (Armstrong and Overton, 1977). No significant differences were found between the groups ($p < 0.05$). Additional non-response testing was performed on the group of boundary spanners. (Non-respondents from customer firms were not identifiable, eliminating the opportunity to perform further analysis of the customer group.) A group of 28 randomly-selected non-respondents were asked a series of non-demographic questions from the original survey (Mentzer and Flint, 1997). Each question represented a single item from each construct in the study. As with the previous test of non-

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response bias, T-tests and MANOVA revealed no significant differences between the groups at p < 0.05, indicating that non-response bias could be considered to be minimized within the sample.

Common Method bias

Common method bias was assessed in two ways. First, it was assessed using Harman's single factor test (Podsakoff and Organ, 1986). An unrotated principle components analysis yielded eight factors with eigenvalues greater than 1, accounting for 74% of the variance. The first factor accounted for only 35% of the variance. Since no single factor accounted for a strong majority of the variance, the threat to validity associated with common method bias was minimized for the boundary spanner responses. The same process for the customer responses resulted in twelve factors with eigenvalues greater than 1, accounting for 80% of the variance. The first factor using customer responses accounted for only 20% of the variance, indicating that common method bias from the customer responses was also minimized.

Common method bias was also assessed on the LSP responses by re-estimating the monadic structural model. In the re-estimation, each indicator variable was loaded onto a common, unmeasured latent method factor (Conger et al., 2000; Podsakoff et al., 2003). The results of the model estimation show that the new model does not fit the data as well as the proposed theoretical model (RMSEA = 0.071; CFI = 0.95; χ^2/df = 2.56). Eight of the 24 indicators loaded significantly on the latent method factor. Although the fit is acceptable, the theoretical model provides a better fit and the majority of the measurement items do not load significantly on the method factor. This indicates that while there may be some level of common method bias, the findings are still valid (Conger et al., 2000). Additionally, the dyadic sample serves to further reduce the effect of common method bias (Podsakoff et al., 2003).

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Measurement development

Each of the latent variables in the study was evaluated using multi-item reflective measures. Existing scales from previous research were utilized and adapted as determined to be appropriate by the research team. A preliminary draft of the survey instrument was reviewed by five academic researchers and two industry experts who were familiar with the topics covered in the study. Input from each expert was used to create a revised survey, which was distributed to 37 boundary spanners and 31 customers for pretesting. Results from the pretest were used to create the final version of the survey. All measurement items used Likert-type scales. Tables 2 and 3 show all constructs and measurement items.

Insert Tables 2 and 3 Here

Perceived external organizational support was measured from the perspective of the boundary spanners. The five-item scale was adapted from a scale previously developed by Piercy et al. (2006) to measure perceived organizational support. The items assess the boundary spanner's perception of the level of support that he or she receives from the customer. All items were anchored at 1 = strongly disagree, 4 = neutral, and 7 = strongly agree. Respondents were also given the option to select "N/A" for items not applicable to them.

Measurement of the boundary spanner's affective commitment to the customer was also adapted from Piercy et al. (2006). The original scale was developed to measure employees' affective commitment toward their employers. The current scale assesses the LSP representative's affective commitment toward an external organization – the customer. As with perceived external organizational support, all items were anchored at 1 = strongly disagree, 4 = neutral, and 7 = strongly agree.

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Knowledge exchange and innovation performance were assessed with measurement items from the perspectives of both the LSP representative and the customer representative. Knowledge exchange items were adapted from Collins and Smith (2006). Logistics innovation was measured using a new scale in which respondents from the LSP and the customer were asked to indicate their level of agreement with statements regarding innovation within the customer's logistics operation. The knowledge exchange and logistics innovation measurement items were used to derive degree-symmetric constructs as outlined by Straub et al. (2004). This technique assesses both the degree and dyadic symmetry of each construct. Klein et al. (2007, p.617) provide a brief description of the process:

> *First, (i) summing all measures for a given construct and standardizing to a value between 0 and 1 yields the magnitude for the LSP representative, C_L, and customer, C_C. Next, (ii) the mean of the value of the LSP representative and customer magnitudes, CL and CC, yields the degree value, C_D. Conversely, (iii) dividing the lesser magnitude by the greater yields a standardized value between 0 and 1, reflecting the symmetric value of the construct, C_S. Ultimately, (iv) the mean of C_D and C_S yields the degree-symmetric value for the construct, C_{DS}.*

Degree-symmetric constructs allow us to assess the degree to which a variable is present. While many studies of organizational relationships assess the relationship from the perspective of one party, dyadic studies can benefit from the use of degree-symmetric constructs to measure the presence of the variable (such as knowledge exchange) from the perspective of both parties. In the current study, we are concerned with the impact of a boundary spanner's affective commitment to the customer on knowledge exchange and innovation. However, the customer and LSP representative may not agree on the degree to which each variable is present in the relationship. Therefore, instead of discarding the responses or selecting one party to represent the dyad, we can combine the responses to account for both perceptions. Knowledge exchange and logistics innovation are observable from either side of the dyad, which warrants input from both

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sides of the dyad to create a value for analysis. For example, consider a single dyad consisting of one LSP representative and the corresponding customer representative. Assume that the LSP representative indicates very low levels of innovation within the operation (i.e. 1-2 on the Likert scale). Also, assume that the customer representative indicated low levels of innovation within the operation. An assessment of the dyadic symmetry yields high results as each member of the dyad is in agreement regarding the level of innovation within the operation. However, our primary concern is not symmetry, but the degree of innovation. In order to effectively assess whether there is a relationship between knowledge exchange and firm innovativeness (as proposed in H5), we need to know the level of innovation within that dyad. A detailed description of the development of degree-symmetric constructs is shown in Table 4.

Insert Table 4 Here

The customer is not in a position to assess the degree to which the LSP representative perceives support from the customer, nor is the customer able to adequately assess the degree to which the LSP representative feels committed to the customer. Therefore, these constructs were measured only from the perspective of the LSP representative. Similarly, performance was measured separately from the perspective of the respective member of the dyad.

Knowledge exchange and logistics innovation were measured from the perspective of the LSP representative and the customer using scales anchored at 1 = strongly disagree, 4 = neutral, and 7 = strongly agree.

Customer logistics performance and LSP performance were measured using items adapted from previous research. The two constructs were measured using items adapted from Ellinger et al. (2000), Fawcett and Smith (1995), and Germain et al. (1994).

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RESULTS

As mentioned, the research included the collection of data from customers of the LSP representatives to gain a more complete picture of how knowledge exchange, logistics innovation, and performance are impacted by the commitment of LSP representatives to their customers. The examination of both perspectives of the dyad allows us to assess the level of agreement between the parties.

Construct validity was tested for the customer responses to ensure that the items used for measurement were appropriate for both sides of the dyad. Convergent validity was demonstrated as the t-values associated with the standardized factor loadings for each of the measurement items ranged from 6.60 to 11.36, indicating that all factor loadings are significant ($p < 0.001$). The average variance extracted (AVE) estimates for each construct measured from the customer's perspective exceeded the recommended value of 0.5, providing evidence of convergent validity (Fornell and Larcker, 1981). Divergent validity of the customer constructs is shown as the AVE of each individual construct is greater than the squared correlations between any pair of constructs (Hair et al., 2006).   Reliability is also demonstrated as the composite reliabilities of each construct all exceeded 0.7 (0.95, 0.90, and 0.87). Variance extracted estimates, composite reliabilities, and factor loadings can also be found in Tables 2 and 3. Correlations and squared correlations for the LSP and customer responses can be found in Tables 5 and 6, respectively.

Insert Tables 5 & 6 Here

The testing of the dyadic model presented in Figure 1 was performed via non-parametric path analysis using SmartPLS (Ringle et al., 2005). Partial least squares structural equation

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modeling (PLS-SEM) generally achieves high levels of statistical power with minimal sample size demands (Reinartz et al., 2009). The more common covariance-based structural equation modeling requires larger sample sizes and more observations, which often leads to biased test statistics (Hu and Bentler, 1999). Therefore, "PLS-SEM is suitable for applications where strong assumptions cannot be fully met," (Hair et al., 2012, p. 416). Because of the differences in their statistical concepts, many researchers consider the SEM approaches to be complementary as the strengths of one method are the weaknesses of the other and vice versa (Hair et al., 2012; Jorskog and Wold, 1982).

Using SmartPLS, all six hypotheses were tested using four control variables: number of LSP representatives located at each customer facility, the tenure of the LSP representative, the industry of the customer, and the type of LSP (asset-based or non-asset-based). The model was estimated using a bootstrapping procedure consisting of 5,000 resamples and 81 cases. The results of the hypothesis testing indicate that each of the hypotheses is supported. The results are shown in Table 7.

Insert Table 7 Here

The control variables did not significantly explain any of the variance associated with the endogenous variables in the study. As such, the relationship between the LSP representative and the customer's logistics operation seems to be influenced much more by the operation-specific factors (support, commitment, knowledge, and innovation), and less by general influences such as industry type and presence of other representatives.

The utility of the model can be measured by considering the amount of variance explained for each construct (R^2 values). The results show that approximately 68% of the variance in affective commitment to the customer can be explained by the LSP representative's

perception of support from the customer. The LSP representative's commitment to the customer, in turn, explains nearly 31% of the variance in knowledge exchange and, together with knowledge exchange, explains more than 36% of the variance in logistics innovation. Logistics innovation can help explain nearly 8% of the variance in customer logistics performance and nearly 14% of the variance in LSP performance.

Additionally, we tested the predictive relevance (Q^2) of each of the endogenous constructs (Geisser, 1974; Stone, 1974). PLS demonstrates predictive relevance if it can accurately predict data points of endogenous variables measured with reflective or single-item constructs (Hair et al., 2012). The predictive relevance was assessed using the blindfolding procedure in which the omission distance was set to 6 for each endogenous construct. As shown in Table 7, the Q^2 of each of the endogenous constructs is greater than 0, demonstrating that the model has predictive relevance for each construct.

Our analysis also included an assessment of the potential mediating effect of knowledge exchange on the relationship between affective commitment to the customer and logistics innovation. Mediation assessment was conducted using the Preacher and Hayes bootstrapping method (Preacher and Hayes, 2008). The first step in assessing mediation was to show that there is a direct relationship between the representative's affective commitment to the customer and logistics innovation. In this case, there is a significant direct effect ($\beta = 0.552$; $p < 0.01$). We then added the mediator, knowledge exchange, and ran a bootstrapping analysis (1,000 samples and 81 cases) to assess the indirect effect. The indirect effect is 0.126, and the t-value of the indirect relationship is 1.68, indicating significance at $p < 0.10$. To determine the size of the indirect effect, the variance accounted for (VAF) was calculated by dividing the indirect effect (0.126) by the total effect (0.589). The resulting VAF is 0.214, indicating that 21.4% of the effect

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of affective commitment to the customer on logistics innovation is explained by the indirect relationship through knowledge exchange. Since the VAF falls between the range of 20% and 80%, we can say that there is support for partial mediation in the model.

DISCUSSION AND IMPLICATIONS

Boundary spanning employees (at least initially) operate in a foreign environment. They are asked to fulfill their jobs outside of the normal domain. This could result in discomfort and less-than-optimal results. However, the right interpersonal environment can create a situation for mutual organizational gain -- for the boundary spanner and his/her employer and for the customer firm.

It's human nature to want to be appreciated and recognized. If the boundary spanner's contributions and expertise are recognized and valued, the boundary spanner is likely to be positively disposed towards working with the customer/customer employees. The knowledge base expands as knowledge is exchanged and synthesized across the two organizations. The LSP representative brings the expertise of a specialist in the area; the customer organization brings "institutional memory" in terms of intimate knowledge of their company's history and culture as well as working knowledge of day-to-day operations. The exchange of knowledge along with the specialized insights can create a breeding ground for new ideas/innovations.

Why is this the case? The cross-firm collaboration and joining of resources means the firms are positioned to gain an advantage. Closeness means it's easy to exchange ideas. Decision-making is faster -- and based on better inputs. Issues, problems, and opportunities are more likely to be considered a priority and examined. It's more difficult to ignore an "on-site partner" than someone communicating from a distance. Proximity facilitates the exchange of information. In effect, the LSP representative can affect the transformation of information into usable form. Being on-site also helps to identify mutually valuable outcomes and focus efforts on value-creating

activities. The presence of the boundary spanner may also help to move the mindset from intra-organizational thinking (what's in it for our company) to more of an inter-organizational or even supply chain-wide perspective.

In fact, our results indicate that employees actively engaged in the operations of business partners can have a direct impact on the performance of the business partner. Our research extends organizational behavior literature to provide empirical support for the notion that the affective commitment of individual employees permeates organizational boundaries to reach other members of the supply chain.

In spite of the fact that co-location and the use of boundary spanning employees represent common business practices, little academic research in our area has focused on the topics. However, there are important theoretical and managerial implications of our findings that should be considered.

We framed our research within a relational view perspective to better understand the interactions and the environment created between co-located boundary spanners and the organizations in which they are placed. Because of the availability of an extended range of resources (i.e. the boundary spanning employees, their skill levels and experience base, etc.), firms can expand their own capabilities and competences. New solutions and innovative approaches can result.

From a theoretical and managerial perspective, how can the extended relationships be developed and managed to gain the greatest rewards? Boundary spanning employees must be able to fit into a new environment; the cultures of the two organizations need to be compatible. Thus, matching of co-located boundary spanning employees to the appropriate external organization becomes important. More needs to be known about what factors (personality,

experiences, skill base, etc.) are the best predictors of successful boundary spanning relationships.

For years, businesspeople and academic researchers have noted the potential advantage to closer relationships. The general idea was that by working together and removing traditional barriers, greater things could be achieved. The assignment of boundary spanning employees to work at customer/supplier facilities may be the ultimate example of supplanting barriers with a focused, united goal of improving performance for both the buyer and seller side of the dyad. Our research provides a specific example, LSP employees placed within their customer facilities. When such arrangements are successful, a stronger relationship emerges based on commitment and open exchange of critical information. It truly is a win/win situation.

Our research highlights the potential to be gained from boundary spanning on-site assignments at customer/host facilities. How can firms reap the greatest rewards from such arrangements? Recognition of the potential value to be gained is a starting point. Then, both sides must consider how to facilitate and build the cross-firm relationship. This should involve the establishment of guidelines and boundaries regarding information exchange. In many organizations, a prevailing culture of protecting proprietary information and releasing information of a very limited, prescribed basis is still the norm. Developing cross-organizational affective commitment and a culture of breeding success is necessary. Further, cultural changes may be required to develop an environment where employees (on-site and host firm) actively work to develop new, innovative approaches to business processes. We believe that creating a conducive organizational environment is critical – one in which the boundary spanning LSP employee recognizes and values the support provided by the host and also feels a commitment to

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the host organization. Such an environment can help to create the breeding ground for changes and mutual gains.

LIMITATIONS AND CONCLUSIONS

As with any empirical study, there are limitations associated with the current research. The first limitation is related to the research context. The study focused on the relationships between LSP boundary spanners and their customers. In order to improve the generalizability of the findings, further research using other boundary spanners in areas such as manufacturing and information technology should be performed. Future research should also consider the impact of other types of individual behavior on key operational activities such as knowledge exchange and innovation.

A second limitation is related to the sample size of the current study. Although the sample size is consistent with previous inter-organizational dyadic studies (Dyer, 1996; Klein et al., 2007), future research should expand on this research by seeking larger samples and employing a variety of analytical techniques. The LSPs included in the research are all members of the *Inbound Logistics* list of the top 100 3PLs. Since this list is not inclusive of all logistics service providers, future research should be aimed at including LSPs that are not included in this listing. The results of our analysis did not show any significance from our control variables. Future research should consider other control variables that might provide additional guidance regarding the context in which external organization commitment can lead to greater levels of knowledge exchange and innovation.

We focused on the potential benefits associated with the affective commitment of boundary spanners toward supply chain partners. An area of potential concern to managers,

which is not addressed in the study, is the possibility of boundary spanners becoming more loyal to the supply chain partner than to their own employers. Future research should consider this potential downside to affective commitment, along with key variables that can lead to greater commitment to one organization over another.

We set out to assess the innovation and performance effects of boundary spanner commitment to an external organization. The findings of the research demonstrate the potential value associated with putting employees in a position to develop strong relationships with customers. Specifically, the ability for service providers and their customers to improve knowledge exchange and operational performance can improve through committed personal relationships. Therefore, we encourage others to continue to investigate the impact of individual commitment on various aspects of supply chain relationships and performance.

Our research indicates that the relationship that develops between the LSP boundary spanner and the customer employees is critical to achieving enhanced performance. Building the most effective type of cross-firm relationship requires that the boundary spanner believe the external (customer in this instance) organization values his/her contributions and overall well-being. Such recognition is likely to encourage a commitment from the boundary spanner to the external organization/customer. Simply stated, it can create a reciprocity-oriented working environment conducive to positive actions including exchanging and synthesizing knowledge to support operations and even extending to the development of innovative approaches to standard operating practices.

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Table 1: Demographic information

	Percentage of Respondents
Retail	54%
Manufacturing	42%
Other	4%
Asset-based	84%
Non-asset-based	16%
1 LSP rep on site	42%
2 LSP reps on site	15%
3+ LSP reps on site	43%
0-<1 year on site	26%
1-3 years on site	17%
3+ years on site	57%

Table 2: Constructs and items: LSP responses

Constructs and Indicators	Std. Weight	t-value	Mean	S.D.	Composite Reliability	Var. Extracted
*Perceived External Organizational Support**					0.96	0.840
My host firm values my contribution to its well-being.	0.91	19.91	5.93	1.40		
Help is available from my host firm when I have a problem.	0.94	18.73	5.96	1.29		
My host firm is willing to help me when I have a special favor	0.89	18.67	5.63	1.54		
My host firm cares about my opinions.	0.95	21.91	5.79	1.52		
My host firm cares about my general satisfaction at work.	0.89	17.90	5.32	1.62		
Boundary Spanner Affective Commitment to Cust.					0.93	0.730
I am willing to put in a great deal of effort beyond that normally expected in order to help my host firm be successful.	0.74	13.74	6.43	1.14		
I praise my host firm to my friends as a great place to work.	0.90	18.67	5.63	1.48		
My values and my host firm's values are very similar.	0.89	19.38	5.74	1.45		
I am proud to tell others I am part of my host firm.	0.90	22.33	5.88	1.36		
I really care about the future of my host firm.	0.83	15.82	6.44	1.15		
*Knowledge Exchange**					0.94	0.764
I move projects forward by exchanging ideas with members of my host firm.	0.87	18.30	5.75	1.34		
I learn from my colleagues by exchanging ideas.	0.92	18.64	5.85	1.31		
I exchange ideas with members of my host firm to find solutions to problems.	0.93	20.24	5.95	1.28		
I share my expertise to make projects successful.	0.76	18.50	6.24	1.03		
Members of my host firm share their expertise with me to make projects successful.	0.88	17.48	5.69	1.40		
*Logistics Innovation**					0.93	0.720
We are developing new processes within the logistics operation at my host firm.	0.80	18.00	6.07	1.09		
We are developing new services within the logistics operation at my host firm.	0.81	16.37	5.69	1.26		
We seek out new ways to do things in the logistics operation at my host firm.	0.88	21.00	6.37	0.97		
The logistics operation has been changed to meet new business needs at my host firm.	0.96	18.55	6.42	1.00		
We have identified opportunities to expand processes to new applications at my host firm.	0.78	17.87	5.95	1.13		
*LSP Performance***					0.85	0.596
Number of logistics-related complaints	0.59	12.76	5.62	1.17		
On-time delivery performance	0.82	15.22	5.54	1.13		
Ability to handle shipping exceptions	0.92	14.61	5.95	1.00		
Overall customer satisfaction	0.72	14.70	5.88	1.00		

*Items were measured using a 7-point Likert-type scale (1 = Strongly Disagree; 7 = Strongly Agree).

**Items were measured using a 7-point Likert-type scale (1 = Significantly Worse ; 7 = Significantly better) comparing relationship performance to other relationships.

Table 3: Constructs and items: Customer responses

Constructs and Indicators	Std. Weight	t-value	Mean	S.D.	Composite Reliability	Var. Extracted
Knowledge Exchange*			5.77	1.16	0.96	0.810
Move projects forward through idea exchange	0.87	9.69	5.65			
Learn from LSP through idea exchange	0.86	9.60	5.59			
Exchange ideas to solve problems	0.94	11.07	5.91			
Share our expertise	0.95	11.36	5.90			
LSP shares expertise with us	0.89	10.10	5.82			
Logistics Innovation*			6.10	1.09	0.90	0.637
Developing new processes in the logistics operation	0.69	6.85	5.74			
Developing new services in the logistics operation	0.71	7.13	5.49			
Seek new ways of doing things	0.91	10.29	5.93			
Logistics operation has changed to meet needs	0.84	9.02	6.17			
Expand processes to new applications	0.82	8.68	5.91			
Customer Logistics Performance**			5.75	1.08	0.88	0.657
Logistics performance matches expectations	0.67	6.60	5.54			
Ability to meet quoted delivery dates consistently	0.96	11.07	5.95			
Ability to provide right quantities consistently	0.73	7.36	5.88			
On-time delivery	0.86	9.27	6.08			

*Items were measured using a 7-point Likert-type scale (1 = Strongly Disagree; 7 = Strongly Agree).

**Items were measured using a 7-point Likert-type scale (1 = Significantly Worse ; 7 = Significantly better) comparing relationship performance to other relationships.

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Table 4: Degree and degree-symmetric construct derivations [a]

	Derivations	Definition	Formula	Assumptions
(i)	LSP Rep. or Customer Value: C_L or C_C	Summated index of the level, l, of each item, x_i, that belongs to the set of items $\{x_1, x_2, \dots x_n\}$ used to measure construct a for the LSP rep. or customer.	$(\sum^n_{i=1} x_i * l_i)/(n*L)$ where $0 \le l^i \le L$	a. $C_L \ge 0$ and $C_C \ge 0$ b. $C_L \le 1$ and $C_C \le 1$
(ii)	Degree Value: C_D	Summated index of the LSP Rep. and customer values of construct a.	$(C_L + C_C)/2$	$0 < C_D \le 1$
(iii)	Symmetry Value: C_S	Symmetry index of construct a within the relationship.	If $C_L \ge C_C$ then $C_S = C_C/C_L$; If $C_L < C_C$ then $C_S = C_L/C_C$	$0 < C_S \le 1$
(iv)	Degree-Symmetry Value: C_{DS}	The index of both symmetry and value of construct a within the relationship.	$(C_D + C_S)/2$	$0 < C_{DS} \le 1$

[a] The definitions, formulas, and assumptions were originally developed by Straub, Rai, and Klein (2004).

Table 5: Variance extracted estimates, correlations and squared correlations: LSP responses[a]

	Perc. Ext. Org. Support	Affective Commit. To Cust.	Knowledge Exchange	Logistics Innovation	LSP Performance
Perc. Ext. Org. Support	-	0.62	0.56	0.40	0.08
Affective Commit. To Cust.	0.79	-	0.38	0.38	0.07
Knowledge Exchange	0.75	0.62	-	0.50	0.03
Logistics Innovation	0.63	0.62	0.71	-	0.03
LSP Performance	0.28	0.26	0.16	0.17	-

[a] Correlations below the diagonal and squared correlations above the diagonal.

Table 6: Variance extracted estimates, correlations, and squared correlations: Customer responses[a]

	Knowledge Exchange	Logistics Innovation	LSP Performance
Knowledge Exchange	-	0.03	0.01
Logistics Innovation	0.18	-	0.01
LSP Performance	-0.08	0.08	-

[a] Correlations below the diagonal and squared correlations above the diagonal.
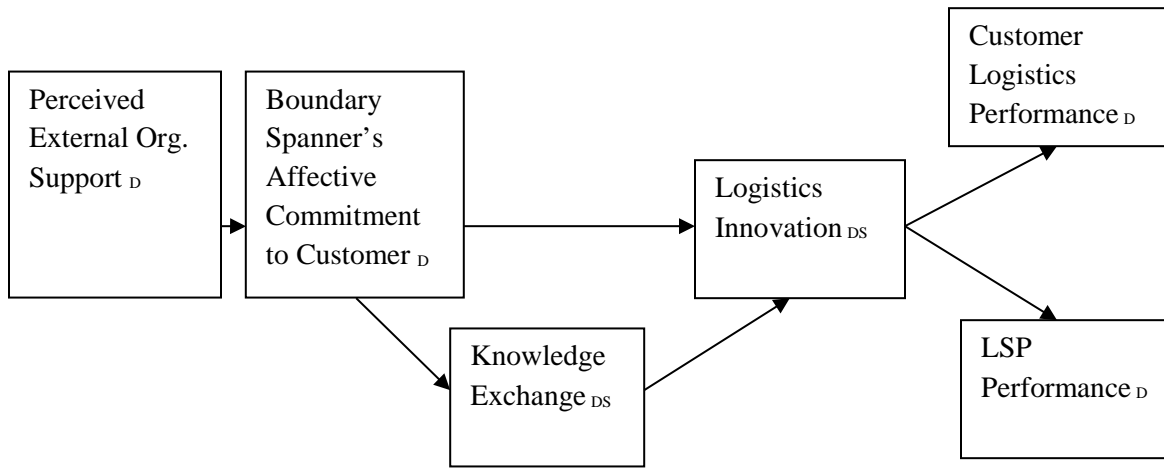
Table 7: PLS analysis results

Hypothesis	Relationship	Direction	Standardized Beta	t-Value	Result
H₁	Perc. Ext. Org. Support → Affective Comm. To Cust.	Positive	0.804**	13.13	Supported
H₂	Affective Comm. To Cust. → Knowledge Exchange	Positive	0.552**	4.55	Supported
H₃	Affective Commit. To Cust. → Logistics Innovation	Positive	0.463**	3.72	Supported
H₄	Knowledge Exchange → Logistics Innovation	Positive	0.228*	1.97	Supported
H₅	Logistics Innovation → Cust. Logistics Perf.	Positive	0.228*	1.96	Supported
H₆	Logistics Innovation → LSP Performance	Positive	0.225*	2.09	Supported

Endogenous Construct	R^2	Q^2			
Boundary Spanner's Affective Commitment to the Customer	0.667	0.672			
Knowledge Exchange	0.306	0.207			
Logistics Innovation	0.364	0.399			
Customer Logistics Performance	0.078	0.077			
LSP Performance	0.137	0.146			

* Significant at .05 level; ** Significant at .001 level

Controls	Affective Commit. To Customer	Knowledge Exchange	Logistics Innovation	Cust. Log. Performance	LSP Performance
Number of LSP Reps	-0.132	0.249	0.236	-0.078	0.186
Tenure of LSP Rep.	0.020	-0.064	-0.022	-0.115	-0.061
LSP Type (Asset or Non-Asset Based)	-0.015	-0.001	0.082	0.046	0.050
Industry Type	-0.108	0.180	0.222	-0.118	-0.086

* Significant at $p<0.05$; ** Significant at $p<0.001$

Figure 1: Dyadic research model

D = Degree; DS = Degree-Symmetric

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