

1-2019

Intra-organizational communication, understanding, and process diffusion in logistics service providers

Scott J. Grawe

Iowa State University, sgrawe@iastate.edu

Peter M. Ralston

Iowa State University, pralston@iastate.edu

Follow this and additional works at: https://lib.dr.iastate.edu/scm_pubs

Part of the [Management Information Systems Commons](#), [Operations and Supply Chain Management Commons](#), [Strategic Management Policy Commons](#), and the [Technology and Innovation Commons](#)

The complete bibliographic information for this item can be found at https://lib.dr.iastate.edu/scm_pubs/45. For information on how to cite this item, please visit <http://lib.dr.iastate.edu/howtocite.html>.

This Article is brought to you for free and open access by the Supply Chain and Information Systems at Iowa State University Digital Repository. It has been accepted for inclusion in Supply Chain and Information Systems Publications by an authorized administrator of Iowa State University Digital Repository. For more information, please contact digirep@iastate.edu.

Intra-organizational communication, understanding, and process diffusion in logistics service providers

Abstract

Purpose – The purpose of this paper is to investigate, using survey data, how a firm may be able to leverage innovation or processes specifically developed for one customer across its entire customer network using onsite, or implanted, employees.

Design/methodology/approach – Data collected from a survey of 309 implanted logistics service provider (LSP) representatives are analyzed using structural equation modeling.

Findings – The findings show that intra-organizational task interdependence and face-to-face communication can lead to a greater understanding of firm processes developed for specific customers and greater diffusion of these new processes to other customers. Rather than separating customers that require implanted employees, these implants can be a conduit of valuable information and process enhancements that can positively impact a firm's customer network.

Originality/value – The current research shows how LSPs can effectively use their customer networks to provide process improvements for multiple customers. Specifically, transferring processes between customers can lead to efficiencies and contribute to supply chain robustness not possible without process diffusion.

Keywords

Logistics service providers, Organizational implants, Process diffusion, Intra-organizational, LSP performance, Cognitive congruence

Disciplines

Management Information Systems | Operations and Supply Chain Management | Strategic Management Policy | Technology and Innovation

Comments

This article is published as Grawe, S.J., Ralston, P.M. Intra-organizational communication, understanding, and process diffusion in logistics service providers. *International Journal of Physical Distribution & Logistics Management*, 2019. Doi: [10.1108/IJPDLM-03-2018-0118](https://doi.org/10.1108/IJPDLM-03-2018-0118). Posted with permission.

Intra-Organizational Communication, understanding, and process diffusion in logistics service providers

Abstract

Purpose – The current research investigates, using survey data, how a firm may be able to leverage innovation or processes specifically developed for one customer across its entire customer network using on-site, or implanted, employees.

Methodology/approach – Data collected from a survey of 309 implanted logistics service provider representatives is analyzed using structural equation modeling.

Findings – The findings show that intra-organizational task interdependence and face-to-face communication can lead to a greater understanding of firm processes developed for specific customers and greater diffusion of these new processes to other customers. Rather than separating customers that require implanted employees; these implants can be a conduit of valuable information and process enhancements that can positively impact a firm's customer network.

Originality/value of paper – The current research shows how logistics service providers can effectively use their customer networks to provide process improvements for multiple customers. Specifically, transferring processes between customers can lead to efficiencies and contribute to supply chain robustness not possible without process diffusion.

Keywords – Process diffusion, logistics service providers, implants,

Paper type – Research paper

Intra-Organizational Communication, understanding, and process diffusion in logistics service providers

Introduction

Ideas for process improvement and innovation within supply chains are often born from a collaborative process that occurs between firms (Cabanelas *et al.*, 2013; Mackelprang *et al.*, 2018; Piercy, 2009). This is especially true in supply chains where partners work together to design customized solutions (Oke *et al.*, 2013). In the case where a logistics service provider (LSP) and customer are working together, characteristics other than information sharing may be necessary for value creation (Mackelprang *et al.*, 2018; Zhang *et al.*, 2016). Whatever the initiatives to value creation may be, both parties should benefit from new knowledge or process development/enhancement.

In addition to benefits to the customer and the LSP when process improvements are made, the LSP may have the opportunity to implement similar improvements with other customers. The diffusion of these new processes to multiple customers of a single organization presents an important challenge for firms and their managers and is the driver of the current research (Wagner and Franklin, 2008). The current research examines the role of human interaction as firms seek to expand best practices to new customers.

Human interactions are vital to supply chain effectiveness, both externally and internally within a firm (Thornton *et al.*, 2016). Durach *et al.*, (2015) stated that human capital of an organization should be recognized as a valuable resource necessary for organizational robustness. Robustness refers to being physically sturdy or in a period of stability despite pressures which organizations can face (Durach *et al.*, 2015). If employees have been educated well and are properly trained, they often have an innate sense of how best to work for the success of their

employer (Blackhurst *et al.*, 2011). One area where this can be especially true is how to best utilize firm resources and capabilities for maximum advantage.

Diffusion is the process by which knowledge and innovation are communicated throughout a network (Grant, 1996; Hult *et al.*, 2007; Rogers, 2010). Diffusion of successful practices among multiple LSP customers in a firm's customer network should result in increased efficiencies through cost reductions or higher profits. Not all practices can be easily transferred, though. From product type to shipping or delivery requirements, any process may be highly customized preventing easy transfer to other applications. Understanding customer nuances while ensuring there is a basic process or operation which can be transferred is important. Specifically, we argue that process diffusion may be enhanced by specific organizational formations which improve communication between employees resulting in a better understanding of customer requirements (Tenhiala and Salvador, 2014; Thornton *et al.*, 2016). Consider the organizational network associated with a typical LSP. In addition to employees located at the home office and operations centers, LSP's may also employ representatives in the field working on-site (implanted) within customer facilities. As such, they can become intimately engaged with the customer's operation and identify opportunities to work with these customers to develop processes that can improve the performance of the operation (Grawe *et al.*, 2012). Organizational implants possess knowledge and expertise important to the firm's market competitiveness as they are able to view the host firm's operation from inside the customer's facility (Kogut and Zander, 1992; O'Donnell, 2000). It is this familiarity of customer operations married with understanding the processes and workings of the LSP, which can allow implants to aid in the knowledge diffusion process.

One payoff of the knowledge diffusion process is the robustness to a focal firm which that diffusion can provide. Meeting customer needs may result in some customization showing a firm's

adaptability. However, if a firm continuously meets each customer's needs that it serves individually, firm processes can become inefficient, costs may climb, and the organization may become unmanageable (Kumar and Reinartz, 2016). Arguably, finding ways to meet multiple customers' needs with similar offerings will align customer processes and resources while contributing to the robustness of the organization.

The current work investigates the use of LSP on-site professionals and their role in aiding process diffusion. The research contributes to our understanding of supply chain relationships by specifically considering the following questions:

1. How do firms create a common understanding within (intra-organizationally) their own firm regarding customer operations and the cross-application of processes?
2. What effect does this common understanding have on the ability of firms to transfer process improvements to other customers' operations?

Theoretical Background and Hypotheses

Knowledge, whether new or existing, has long been recognized as a key resource within a firm because of its potential to create a competitive advantage (Grant, 1996). This is because heterogeneous knowledge bases and capabilities among firms can be the main determinants of differences in competitive performance (DeCarolis and Deeds, 1999). Therefore, effective knowledge management represents a valuable strategic asset for firms. Kogut and Zander (1992) dissected organizational knowledge into two parts: information and know-how. Information is typically classified as easily codifiable and transferable if mechanisms exist which allow its flow. Know-how is the accumulated practical skill or expertise that allows something or someone to perform a task smoothly and efficiently (von Hippel, 1988). Know-how is often considered harder to transfer because of the accumulation and experience needed to generate it. Kogut and

Zander (1992) succinctly defined information as knowing what something means and know-how the ability to know how to do something.

A significant challenge for firms stems not only from the need to actively develop knowledge, but also the necessity to share that knowledge throughout an organization. However, knowledge management requires more than the simple transfer of information (Fugate *et al.*, 2009). Rather, firms must overcome functional specialization, and difficulties in sharing must be harmonized across vested parties (Spekman and Davis, 2016; Zahara and Nielsen, 2002). Knowledge sharing can differentiate companies and lead to increased customer value. The organizations which provide an outlet for gathering, generating, sharing, interpreting, and applying knowledge should perform better than those companies that do not (Daft and Weick, 1984; Grant, 1996; Hult *et al.*, 2007).

However, traditional coordinating mechanisms for knowledge generation, exchange, and dissemination have been challenged due to the dynamic nature of business relationships (Mena *et al.*, 2013). Valuable knowledge may span organizational boundaries in supply chain settings (Dyer and Singh, 1998; Schoenherr *et al.*, 2014). With relationships becoming even more vital to sustained business partnerships, suppliers can have an intimate understanding of key customers' businesses due to the required time spent with them to ensure coordination and service effectiveness (Thomas *et al.*, 2011).

LSPs are “companies which perform logistics activities on behalf of others” (Delfmann, *et al.*, 2002). LSPs core business offering, and broad service supply, are logistics services (Busse and Wallenburg, 2011). Because of the requirement to be spatially close to long-term customers, LSPs are inherently decentralized operations with a number of offices and terminals away from company headquarters (Bellingkrodt and Wallenburg, 2013). As such, the intra-organizational

transfer of knowledge is more difficult for LSPs (Busse and Wallenburg, 2011). Finding ways to facilitate this knowledge transfer may be one way to distinguish, and improve the competitiveness of, LSPs.

Pairing ideas from both the knowledge based view (KBV) of the firm (Grant, 1996; Kogut and Zander, 1992) and the diffusion of innovation paradigm (Rogers, 2010), enhancing the development, transfer, and overall management of knowledge in LSPs may have benefits. Specifically, processes developed for one customer which improve operational efficiencies and overall performance would most likely have a greater organizational impact on the LSP if they were deployed to multiple customers. Companies must realize, even in the case of processes with highly customized factors for a specific relationship, that if the processes can be applied to other service relationships these companies can capitalize on economies of scale. This may be one benefit of timely and effective communication in existing networks, including those found within individual organizations. The diffusion of innovation paradigm sees process adoption as a social and communications issue, and not just a technology issue (Russell and Hoag, 2004). Finding ways to communicate effectively, and quickly, within an established social network should improve the diffusion of that process and most likely have an impact on the overall broad application and success of the process at an organizational level. One such method to effectively communicate may be through field representatives located on-site at customer locations, otherwise known as organizational implants.

LSP implants enjoy a real-time, first-hand view of customer operations, but also possess a unique base of logistics process expertise (Caplice and Ryan, 2011). These factors can positively contribute to customized offerings addressing host firm issues (Grawe *et al.*, 2015). While this is one benefit of implanted employees, another may stem from the opportunity to deploy these

customized, new offerings to other customer/service provider relationships. Because implanted employees have knowledge of LSP processes and capabilities, they may also have an increased understanding of what the service provider must do, or whom to contact within the organization, that would facilitate the transition of new or modified processes to other applications (Kahn and McDonough, 1997).

Communication is the activity that links people together, creates relationships, and serves to develop, organize, and disseminate knowledge (Duncan and Moriarity, 1998). Communication is not always easy, though. Process diffusion can be hindered as the receiver of communication signals may not always interpret them in the same manner in which they were sent. However, implants may be able to overcome this obstacle as they share not only firm knowledge of existing processes, but also an operational expertise. This knowledge lets them know with whom to communicate at the service provider and the proper communication channel to utilize. Communication channels are the means by which messages move from one individual to another (Grabner and Rosenburg, 1969). The selected channel and communication itself supports the implant's role in assisting their host firm, but also in communicating things back to the LSP. This specific ability may provide implants, and organizations which utilize them, an additional advantage over competitors (Caplice and Ryan 2011; Kahn and McDonough 1997).

This research investigates specific facets in and around the communication itself in order to see if organizational implants can impact process diffusion.

-----Insert Figure 1 Approximately Here-----

Implants are positioned at customer facilities to carry out operational duties on behalf of both the customer and service provider (Caplice and Ryan, 2011). In addition to contributing knowledge and information to the customer's operation, implants also act as gatekeepers to their own firm's resources (Grawe *et al.*, 2012). For example, an implant can provide the shipper with access to the truckload capacity and driver availability needed to attain operational goals. In order to effectively manage these resources, the implant must coordinate with employees of his/her organization. Organizational implants still rely on their co-workers whose job responsibilities overlap with the implant in providing services to the entire customer network -- not just the host firm. It is through this interdependence that communication may be enhanced.

Interdependence results when two or more parties interact to jointly determine an outcome (Thompson, 1967). In certain instances, a regular exchange of information and knowledge is required to ensure efficient operations (Savitskie, 2007). The implant, along with other members of his/her organization, perform specific tasks to allocate the firm's resources to the customer's operation. Intra-organizational task interdependence is defined as the manner and extent to which implants and employees of their own organizations must exchange information and resources or actually work together to complete their jobs (Thompson, 1967; Van Der Vegt *et al.*, 2000).

While certain organizational tasks may require interdependence amongst firm employees, how employees communicate to work interdependently often varies (Tenhiala and Salvador, 2014). One communication method often overlooked is face-to-face communication.

Just as co-located employees may utilize face-to-face interactions, geographically dispersed employees working together are likely to communicate at least occasionally face-to-face (Kirkman *et al.*, 2004)). Implanted employees are periodically brought back to central operations for various reasons (i.e. status checks, training, etc.). During these meetings, the implanted

employee may seek out employees with whom they work due to the interdependent nature of the relationship.

Research has shown that as interdependence among individuals increases, face-to-face communication can be a more effective channel of communication when compared to other communication channels (Thomas, 2013). This is because face-to-face communication helps clarify messages and avoid the hang-ups of misunderstood meanings (Van de Ven, 1976). Individuals may seek out co-workers when job responsibilities overlap and success is somewhat dependent on others. This can even be the case for implanted employees when they visit employer operations. Stronger relational links between parties are more easily fostered in face-to-face communication (Warkentin *et al.*, 1997). Although geographic dispersion creates a barrier to this type of communication, LSP implants who rely heavily on their co-workers to perform their duties should seek out more intimate forms of communication for the sharing and routing of knowledge (Daft and Lengel, 1986; Grant, 1996). As such, it is proposed that interdependence among employees of an organization leads to more frequent face-to-face communication.

H1. Intra-organizational task interdependence generates more intra-organizational face-to-face communication.

Cognitive congruence is the similarity in understanding between two parties about firm resources and procedures (Collins and Smith, 2006). This common base of comprehension about firm capabilities allows for the transfer of information and potentially the development of new and better processes (Jansen *et al.*, 2005; Szuslanski, 1996)).

Tasks or processes which overlap the job responsibilities of multiple personnel can provide the opportunity for employees to learn more about one another's job and the company as a whole.

As individuals rely on one another for information and resources to complete their work, they develop an understanding of the role that each plays in the operation (Van Der Vegt *et al.*, 2000). This understanding also contributes to a more holistic view of operations and potentially what the organization hopes to accomplish overall (Sandrin *et al.*, 2018). When employees share task interdependence, each party can gain a clearer picture of job roles, responsibilities, and operational resources and capabilities (Collins and Smith, 2006).

In the current context, where one individual is located at the site of the operation, task interdependence may require the exchange of customer-specific knowledge. Because of the intimate engagement of the implant in the customer's operation, they often possess knowledge and expertise important to the firm's market competitiveness as they are able to view the firm's operation from inside the customer's facility (Caplice and Ryan, 2011; Kogut and Zander, 1992; O'Donnell, 2000). This "locally" developed customer insight helps implants resolve issues and tailor their employer's organizational processes for host firm benefit (Mishra and Sinha, 2016).

Due to the difference in contexts and perspectives between dispersed organizational implants and firm employees located at home organization facilities, shared task interdependencies may actually assist in generating and expanding shared understanding between the coworkers (Prislin and Wood, 2005; Wunderlich *et al.*, 2014). Each party, through the work and information requested of each other, would generate a cognitive congruence of the firm processes available, and the processes' current composition, to assist the customer with which they are working. Thus the following hypothesis is proposed:

H2: Intra-organizational task interdependence positively contributes to cognitive congruence.

Communication is essential for reducing uncertainty and ambiguity among organizational members (Thomas, 2013). Communication in a business setting serves to synchronize the different knowledge bases of individuals (Warkentin *et al.*, 1997). However, the actual effectiveness of communication in helping to complete tasks can vary depending on the communication mode utilized (Kim and Srivastava, 1998; Russell and Hoag, 2004). Previous studies have found that face-to-face communication yields several advantages over mediated (i.e. email, cell phone, or text messages) communication modes. For example, Short *et al.*, (1976) found that face-to-face communication allows for a variety of transmission modes in a single exchange. Gestures, tone, expressions, and utterances (“mm”, “uh-huh”, “right”, etc.) can indicate understanding, acceptance, or confusion related to the speaker’s message (Andres, 2002). From a KBV perspective, the value of face-to-face communication not only comes from the information being communicated, but the shared interpretation of knowledge being developed (Grant, 1996). Face-to-face communication is beneficial due to the creation of a “common” understanding of information and a consensus of how to proceed based on that information (Fugate *et al.*, 2009; Zack, 1999).

While it is common for co-located organizational members to engage in face-to-face communication, implants can find it difficult to engage in this type of communication with fellow employees of their organization. In a sense, frequent intra-organizational face-to-face communication is sacrificed for the ability to communicate in person with the customer.

While utilizing intra-organizational face-to-face communication can be costly and disruptive, face-to-face communication may also be necessary to build the social rapport necessary for effective communication (Nardi and Whittaker, 2002). This is because the benefits of face-to-face communication do not lie solely on the ability to simply transfer information (Mason and Leek,

2012). Implants who do engage in face-to-face communication with co-workers are more likely to effectively communicate details of the customer's operation, including new and unique processes that allow the operation to be successful (Nardi and Whittaker, 2002). The face-to-face engagement in operational discussions may allow the organization to expand cognitive congruence with the implant regarding the host firm's logistics processes at the customer's facility (Daft and Lengel, 1986). A heightened awareness of the deployment and composition of firm resources and capabilities utilized with one customer should lead to greater overall cognitive congruence of firm processes and capabilities (Mishra and Sinha, 2016). Face-to-face communication can deepen the knowledge exchanged between parties and help deliver a shared understanding with the parties involved (Collins and Smith, 2006). Therefore, the following is offered:

H3. Intra-organizational face-to-face communication leads to more cognitive congruence.

One of the hallmarks of the KBV is that competitive advantage can stem from having new knowledge, or a different understanding, of the business environment (Fugate *et al.*, 2009; Grant, 1996; Zack, 1999). Finding ways to determine how other companies view the marketplace or perform operations can be valuable. Unique interactions with customers can lead to opportunities to improve performance as well as acquire, learn, and internalize information and knowledge (Dyer and Singh, 1998; Oke *et al.*, 2013). These knowledge gains can be used to create new, or reconfigure current, processes and offerings for increased competitiveness (Schoenherr *et al.*, 2014; Wagner and Franklin, 2008).

Due to the embedded nature of implants within customer operations, they understand the host firm's operation differently than other members of the service provider. Through this physical

embeddedness, an implant is able to understand customer capabilities and constantly assess customer needs (Grawe *et al.*, 2012). This relationship can also lead to the development of customer specific innovation or processes utilized to provide solutions and address any challenges the customer may have.

While keeping current customers satisfied is an obvious task of implants (Caplice and Ryan, 2011; Edmondson and Boyer, 2013), spending organizational money on a number of highly customized processes is a challenge. Can firms justify the expense of multiple dedicated organizational implants across a number of customers **and** the expense of new, specific processes for multiple customers? The answer is probably no. Therefore enhancing methods to leverage customized offerings among other customers should be developed (Wagner and Franklin, 2008). In the diffusion of innovations model, Rogers (2010) noted innovation had limited benefits until that innovation could diffuse sufficiently. Finding ways to enhance the speed of diffusion should increase the potential for innovation or process improvement to make a positive impact on an organization (Robertson, 1967). One such method may be through the previously discussed cognitive congruence.

When thinking of LSP processes, we are referring to the operational procedures an LSP has in place to service its customers. While one could make the case all customers are potentially valuable to an LSP, customers which have an organizational implant on-site have been deemed critical to an LSP (Caplice and Ryan, 2011). There is a need for a tighter firm linkage with these customers than others. As a result LSP firm processes are often changed or improved because of the intimate knowledge the implant has with the host firm (Grawe *et al.*, 2015; Piercy, 2009). The thought being that these modified processes better serve the customer housing the organizational implant.

However, what if these modified processes for one customer could positively impact the customer network of the entire firm. For example, if an inter-organizational implant develops a modified process for customer “A” that could potentially benefit other customers, other members of the organization should share a set of cognitive elements to effectively diffuse the process throughout the customer network. Cognitive congruence can bring parties together with different experiences, knowledge or responsibilities in order to transfer and integrate new ideas (Collins and Smith, 2006; Szulanski, 1996). By integrating the KBV as well as the diffusion of innovation platforms, cognitive congruence across an organization may help facilitate knowledge transfer, reconfiguration, and exploitation (Grant, 1996; Rogers, 2010). In effect, organizational implants can be the conduit for what Wagner and Franklin (2008) proposed as the “platform and toolkit” approach. Implants can build from the platform provided by their home organization and customize solutions as needed for their host firms. Should these customized solutions be of value to the implant’s employer, the implant can help expand the foundation for a firm’s processes in order for these modifications to diffuse throughout the employer’s customer network. This platform leads to the sharing or diffusing of ideas, but also allows for ideas to be built upon (Miles *et al.*, 1978, Rogers, 2010). There is a base or common ground from which to work. This congruence facilitates the transfer of ideas within an employer and amongst a customer network (Wagner and Sutter, 2012). Therefore, the following hypothesis is offered:

H4: Cognitive congruence leads to process diffusion.

Methodology

Measurement Development and Sample

A web-based survey was developed to evaluate relevant constructs using multi-item reflective measures (Churchill, 1979; Dillman, 2000). The research team identified and adapted existing scales that reflected the definitions for intra-organizational task interdependence and cognitive congruence. Appropriate scales were not identified for intra-organizational face time and process diffusion. Therefore, items were developed to reflect each construct. During development of each scale, the research team consulted with academic colleagues and representatives in the field and identified literature to support the tie between the items and the definition. A preliminary survey draft was generated and reviewed by five academic researchers and two industry experts, all of whom were familiar with the topics of interest. The feedback provided by the experts ensured survey representativeness, clarity, content validity, and face validity.

After modifying the survey based on the experts' edits and recommendations, the questionnaire was then pretested using 37 inter-organizational implants. Based on the results of the pre-test, the newly developed scales were revised to create the final survey. In the pre-test, the five-item scale for face-to-face communication yielded a rho_C score of 0.55, indicating poor reliability. Two items were removed from the scale and the remaining items were revised for the final survey. The six-item scale for logistics process diffusion yielded a rho_C score of 0.61, also indicating poor reliability. Three items were dropped and the remaining items were revised. The revised scales demonstrated acceptable reliability results and were again reviewed with academic and field representatives to ensure face validity. The final survey was then distributed to employees of various LSP firms.

Targeted respondents were implanted employees located at customer facilities, performing duties on behalf of their employers.

The sample included LSP implant representatives from ocean carriers, airfreight forwarders, truckload carriers, asset-based providers, and non-asset based providers.

Across all participating LSPs, a total of 750 inter-organizational implants received a letter with the link to the survey. A total of 344 surveys were received, representing an initial response rate of 46%. In order to ensure that the representatives completing the survey were appropriately qualified to answer the questions, two additional questions were included in the survey. The first question was: “I had enough information to answer all of the questions” (1 = strongly disagree, 4 = neutral, 7 = strongly agree). The second question was: “The questions in this survey are relevant to my firm” (1 = strongly disagree, 4 = neutral, 7 = strongly agree). Responses of 4 or lower were omitted from the analysis. Of those surveys submitted, 35 surveys were omitted due to responding 4 or lower on the qualifying questions, too much missing data, or submitting all neutral responses. 309 surveys remained for final analysis, representing a final response rate of 41%.

Independent and Dependent Variables

All measurement items were Likert-type measurement items. Intra-organizational task interdependence was assessed using items adapted from Van der Vegt et al., (2000).

A new scale was developed to measure intra-organizational face-to-face communication. Cognitive congruence was measured using items adapted from Jansen et al. (2005). Finally, a new scale was also developed to measure process diffusion. The measurement items, along with means and standard deviations for each item, are shown in Table I.

-----Insert Table I Approximately Here-----

Analysis

Confirmatory factor analysis was used to develop the measurement model which identified each of the four constructs of interest. All four constructs were allowed to covary with one another. The results are presented in Table II. The fit indices indicate a satisfactory fit between the data and the proposed measurement model. The χ^2 for the measurement model was 147.35 ($df = 48$). The resulting comparative fit index (CFI) was 0.95.. The measurement model also resulted in a RMSEA value of 0.08. The upper and lower 90% confidence intervals are 0.096 and 0.066, respectively.

-----Insert Table II Approximately Here-----

Validity and Reliability

Results of the construct validity analysis are shown in Table II. First, convergent validity was assessed by examining the standardized factor loadings of each item along with the t-values for each coefficient. The lowest t-value was 10.94, providing evidence supporting convergent validity among the measurement items for each construct (Gerbing and Anderson, 1988). Discriminant validity was assessed by examining the variance extracted estimate (AVEs) for each construct. This provides an indication of the amount of variance captured by each construct relative to the error variance (Fornell and Larcker, 1981;). The AVEs were compared with the squared correlations among the variables to ensure they exceeded the squared correlations of each

pair of variables. In each case, the AVE was greater than the squared correlation. All AVE estimates and squared correlations are presented in Table III.

-----Insert Table III Approximately Here-----

Reliability was measured to assess the internal consistency of each construct (Fornell and Larcker, 1981). Reliabilities of the measurement items, along with the congeneric reliabilities (ρ_c) of each construct, are shown in Table II. The results suggest the scales used to measure the constructs are reliable. Variance inflation factors were also examined to assess the risk associated with multicollinearity. These factors ranged from 1.00 to 1.17 between each pair of latent factors, indicating that multicollinearity should not adversely affect the model (Hair et al., 2012).

-----Insert Table IV Approximately Here-----

Results

The results of the hypothesis testing are shown in Table IV. After testing the model, the research team contacted four respondents to the survey for follow-up interviews. Three of the interviewees were implanted at customer warehouse locations, while one interviewee was located at her customer's home office. The purpose of the interviews was to learn more about why the proposed relationships are present.

The first hypothesis stated that intra-organizational task interdependence is positively related to intra-organizational face-to-face communication. The current study supports this hypothesis based on a standardized path coefficient of 0.40 and t-value of 7.48. The results

indicate that as inter-organizational implants depend on employees at their own organizations to complete their work, they are more likely to engage in face-to-face modes of communication. One implant located at a retail distribution center indicated he was often asked to contribute to projects with his co-workers located at a terminal 35 miles from the customer, where he was located. As a result, he stated "...the nature of this particular project meant that I had to show up at the terminal at least once a week and sometimes for an entire week at a time." He indicated it was not only because of the information that needed to be communicated, but also "...the only way to make sure that it was a priority for everyone at the same time." Similarly, another interviewee indicated she believed some of her emails were de-prioritized when she was not physically present at her firm's office.

The second hypothesis, which proposes a positive relationship between intra-organizational task interdependence and cognitive congruence, is not supported. The lack of support for this relationship suggests depending on co-workers for resources to complete tasks does not necessarily result in the ability of those co-workers to fully understand the operation in which the inter-organizational implant is engaged. This is also supported by the implant whose emails were going unnoticed: "I would not be surprised if part of the reason my notes were ignored was because they didn't make sense to the people receiving them." The respondent indicated that her customer would often make uncommon requests she found difficult to explain to her co-workers at the operations center. Another implant indicated he felt that the lack of understanding went in the other direction. He mentioned that although he plays a minor role in several company initiatives, the rationale behind some of them don't make sense. As he stated, "I was put here to serve this customer and I am confused as to why my firm is asking me to give up trucks to serve

the customer down the road when my customer needs them...I'm not going to do that and try explaining that to these guys (customer)!"

Hypothesis 3 stated intra-organizational face-to-face communication was positively related to cognitive congruence. The standardized path coefficient of 0.41 and t-value of 6.36 indicate support for this hypothesis.. As intra-organizational implants interact face-to-face, employees of the implant's own organization can develop a better understanding of the operation in which the implant is involved. This finding, along with the insignificance of the second hypothesis, suggests face-to-face communication mediates the relationship between intra-organizational task interdependence and cognitive congruence. Interestingly, all four of the interviewees indicated a strong preference toward staying on-site and not traveling to operations centers and home offices. However, three of the implants also mentioned when they are able to meet with their co-workers, they are able to share openly and freely about the customer operation. One of the primary reasons cited for this was the lack of privacy at the customer location. One implant indicated he was "guarded" in his phone conversations with co-workers as he did not have a closed office space at the customer facility. When meeting at the operations center, he would trade stories with his colleagues, likely leading to a better understanding of the customer's operations.

The final hypothesis proposed cognitive congruence and process diffusion are positively related. The study yielded a standardized path coefficient of 0.65 and a t-value of 14.96. This finding suggests that as the implant and other employees of the implant's firm share a common understanding of the operation, the firm is more likely to diffuse customer specific innovations or processes to other applications. One of the interviewees indicated while she was not aware of any specific innovation that came from her colleagues at the home office, she did find she was able to provide solutions for her customer by talking with other implants at other customer locations.

According to her, “my customer faces a lot of the same issues as [Competitor]. So, I will often call [Implant at Competitor] because he’s dealing with the same stuff. We share ideas and sometimes he tells me what they’re doing and I will propose the same thing – with a few modifications, sometimes – to my customer.”

The post hoc interviews indicate there is utility to this model. Statistically, we can examine the squared correlations for the endogenous constructs along with the effect sizes for each predicted variable in the study. Effect sizes are shown using Cohen’s f^2 , where 0.02, 0.15, and 0.35 represent small, medium, and large effect sizes, respectively (Cohen, 1988). Effect sizes are shown to demonstrate the expected effect of each variable on the outcome without the risk of overstating the importance of a relationship due to the size of the sample. The reporting of p-values does not provide an indication of the importance of test results and can lead to incomplete conclusions regarding the theoretical implications of the relationships between variables (Wasserstein and Lazar, 2016). The results of this analysis are shown in Table IV. The results show that intra-organizational task interdependence explains almost 16% of the variance in intra-organizational face-to-face communication and produces a f^2 of 0.17, indicating a medium effect. Almost 23% of the variance in cognitive congruence can be explained by intra-organizational task interdependence and face-to-face communication. It is of note that intra-organizational task interdependence and face-to-face communication each demonstrate small effect sizes on cognitive congruence at f^2 values of 0.03 and 0.14, respectively. Results also indicate nearly 43% of the process diffusion variance is explained by cognitive congruence along with a medium effect ($f^2 = 0.23$).

Finally, we considered the potential mediating effect of cognitive congruence on the relationship between intra-organizational face-to-face communication and process diffusion.

Mediation was assessed using the Preacher and Hayes (2008) bootstrapping method. The first step in this method is to show there is a significant direct effect between intra-organizational face time and process diffusion. The results indicate this relationship is significant ($\beta=0.35$; $t\text{-value} = 6.34$). We then added cognitive congruence as the mediating variable to assess the indirect effect. The indirect effect is 0.27 and the $t\text{-value}$ is 5.73. Variance accounted for (VAF) was then calculated by dividing the indirect effect (0.27) by the total effect (0.29), resulting in a value of 0.93. Since VAF is greater than 0.80, we can assert there is support for full mediation (Hair et al., 2012).

Implications

Managerial Implications

Research has shown implants can play a key role in the management of processes and overall LSP performance for their host firms (Grawe *et al.*, 2012). However, practical observation has also shown firms have not effectively developed methods for diffusing processes modified for one customer throughout their entire customer networks (Wagner and Franklin, 2008). This issue is problematic when certain specific modified processes could be beneficial for LSPs in delivering value to multiple customers they serve.

Reconfiguring firm processes and diffusing them across multiple customers is a way to show a firm's supply chain robustness (Komoto *et al.*, 2011). Supply chain robustness has previously been applied as a supply chain risk mitigation strategy (Brandon-Jones *et al.*, 2014; Durach *et al.*, 2015). The current study shows the applicability of robustness when it comes to the idea of customer value and diffusing logistics processes across a firm's supply chain network. Robustness in the current study is evidenced by being able to do one, or few things, well across a firm's network of customers creating stability and sturdiness throughout the firm.

Another way to view the diffusion of processes across a firm's customer base is with the idea of mass customization. Mass customization is the ability of a company to provide customized offerings to customers that fulfill each customer's idiosyncratic needs without considerable trade-offs in cost, delivery, or quality (Pine, 1993; Sandrin *et al.*, 2018). Organizational implants allow a firm to have a standardized platform of processes which the implant has the authority to alter in a manner to best serve the customer (Wagner and Franklin, 2008). The implant can act as a steward of their employing firm's resources, capabilities, and processes. However, the implant can also be encouraged to share process modifications their host firm finds valuable back with their employer. In this manner, mass customization can pay further firm dividends and help diffuse processes across the firm's customer network.

The current research identifies specific factors that allow firms to more effectively leverage customer specific processes. Our investigation shows it is important for firms to stay connected to field representatives, whether they are implanted in customer operations or working from a remote office. Regular face-to-face engagement allows firms to stay updated on customer activities and assess the degree to which certain services are successful. The post hoc interviews also support the need to engage with field representatives. To enable a free-flowing exchange of ideas, our research indicates that organizations need to intentionally bring colleagues together to ensure communication and a common understanding of the context at hand. Making sure that employees are physically present allows both parties to engage in real-time and generate ideas more quickly.

While setting required meetings for all to attend may appear to be an easy solution, firms should take care to be intentional about structuring these settings properly. Firms should start by creating an environment in which there is interdependence between organizational implants and centralized employees. Managers should assign projects in a way that requires implants to

coordinate with other employees to complete each task. After establishing the need to work together, firms should encourage face-to-face interactions among members of the organization. It is not sufficient to simply exchange emails and short messages between home office and field representatives as this communication does not always fully convey meaning and intent. Implants and home office representatives should physically meet together to share information and knowledge about the host firm and customer operations, focusing specifically on the LSP processes utilized at each customer. Coordinating on projects and meeting face-to-face to discuss operations allows each party to communicate and detect understanding from the other party. Therefore, managers should make time to visit implants in the field and invite the implants to the firm's offices to discuss the customer's operation. This in turn creates the possibility of a standard process platform being created, which may assist in spreading processes across a customer network contributing to the supply chain robustness of the firm.

Scholarly Implications

Several studies have expanded our understanding of the diffusion of innovations to include characteristics of the innovation and of the adopting unit. We extend and augment the framework to consider the diffusion of innovations within a firm's network through the use of field representatives and, by integrating the KBV, look at the role knowledge plays in assisting the diffusion of new or customized processes throughout a LSPs customer network. Specifically, we examined the importance of the type of communication within the social structure of the firm. Although internal to the firm, an organizational structure utilizing field representatives can locate implants spatially distant from many employees of the firms, putting a strain on communication

within the firm's network. We empirically assessed the impact of certain factors on the firm's ability to share innovation and processes from one operation to another through its own network.

The current study identifies the importance of cognitive congruence among the provider and adopter of modified or enhanced processes. The results indicate that 43% of the variance in process diffusion is attributable to cognitive congruence between the implant and the other employees of the organization. If there is not a common understanding of how the new process or service is to be implemented and performed, what resources are involved, and any other details, the process is not likely to be transferred to new applications.

In addition, the study finds that attributes of the communication of processes are important in diffusion. Face-to-face communication was found to play a key role in the development of cognitive congruence among dispersed members of an organization. However, task interdependence was not found to be significant in relation to cognitive congruence. This finding indicates that the manner in which knowledge is shared is more important than simply working together.

Taken cumulatively, the findings of the study enhance our understanding of both the diffusion of innovation paradigm and the KBV and support the application of both theoretical paradigms in increased practical situations. The diffusion of innovations paradigm has long thought the social aspect (communication) of "diffusion" is important (Rodgers, 2010). However, firms have also questioned how to capitalize on customized solutions for specific customers across a customer network (Caplice and Ryan, 2011). In one sense, a firm which utilizes organizational implants may be thought to actually exacerbate the issue of limiting broad applicability of new or enhanced processes and innovation. However, the findings of the current research actually explain how this is not the case. Task interdependence, which most likely exists in a number of field

representative settings, is not enough to generate a common understanding of firm resources and processes. Rather, the social interaction, face-to-face communication in the current context, is a requirement of generating the cognitive congruence necessary to diffuse processes across a customer network. This is also where the KBV plays a role in the identified business relationship. The distinction between information and know-how Kogut and Zander (1992) helped detail provide the foundation for why task interdependence does not necessarily lead to cognitive congruence. Information can be easily shared between parties, but know-how requires a deeper understanding. This know-how can be more effectively transferred in face-to-face settings which can lead to cognitive congruence and diffusion. Therefore, while face-to-face engagement can be expensive, and probably more so when an organizational structure utilizes field representatives, the potential rewards are great. Face-to-face communication, even with organizational implants in an LSP setting, can be the foundation for benefits such as cognitive congruence and process diffusion leading to the effective implementation of new and enhanced processes or offerings across a customer network.

The study was motivated by diffusing knowledge and processes throughout an organization; specifically knowledge and processes that may belong to a host firm, but which were developed off-site. Other theoretical frameworks may also apply to the current research context such as resource orchestration theory (R-O Theory) (Sirmon *et al.*, 2011) and social embeddedness theory (Granovetter, 1985). R-O theory furthers the resource based view of the firm by understanding what a firm does with its valuable resources is just as important as possessing those resources (Hitt, 2011). Orchestrating resources within a firm may be difficult, but looking for ways to maximize the benefit of those resources should be an overarching firm goal. Diffusing

resources and processes across a customer base may require planned orchestration which can contribute to a firm's supply chain robustness.

One underlying foundation of the current research are the interpersonal relationships of firm employees to generate a shared understanding of firm resources and capabilities. While we analyzed task interdependence as being the precursor to a shared knowledge base, interdependence has also been investigated as a precursor to social embeddedness (Choi and Kim, 2015; Szulanski, 1996). With a more micro-level view (individual firm employees), it may be pertinent to view the relationships firm employees develop as a way to generate cognitive congruence and any diffusion of firm resources and processes that result .

Future research and conclusions

The sample was derived from LSPs, specifically targeting implants in a logistics role at customer locations, which may limit the generalizability of the study to logistics operations. However, the use of inter-organizational implants extends beyond the LSP context to include many areas such as IT implants, human resources implants, manufacturing implants, and others. For example, can sales representatives or maintenance operations representatives in the field realize the same benefits from task interdependence and face-to-face communication? The results presented here indicate that from the service provider's perspective, customer knowledge and innovation gained from organizational implants can help serve other firms in the service provider's network. However, firms seeking a competitive edge in the marketplace may want to keep such knowledge and innovation in-house. Future research should examine individual-level, organizational-level, and dyadic-level factors that influence the sharing of knowledge through inter-organizational implants.

The findings from our study paint a promising picture for service providers looking to develop improved, modified services to market to their customers. Even though existing, tightly collaborative relationships may have specific directives for the focal relationship; there is no reason why “wins” from customized relationships should not be diffused throughout a firm’s customer network. The current study reports that task interdependence, intra-organizational face-time, and cognitive congruence all work together to improve process diffusion enabling firms to become more efficient and robust.

References

- Andres, H.P. (2002), "A comparison of face-to-face and virtual software development teams", *Team Performance Management: An International Journal*, Vol. 8 No. 1/2, pp. 39-48.
- Bellingkrodt, S., and Wallenburg, C.M. (2013), "The role of external relationships for LSP innovativeness: A contingency approach", *Journal of Business Logistics*, Vol. 34 No. 3, pp. 209-221.
- Blackhurst, J., Dunn, K.S. and Craighead, C.W. (2011), "An empirically derived framework of global supply resiliency", *Journal of Business Logistics*, Vol. 32 No. 4, pp. 374-391.
- Brandon-Jones, E., Squire, B., Autry, C.W., and Petersen, K.J. (2014), "A contingent resource-based perspective of supply chain resilience and robustness", *Journal of Supply Chain Management*, Vol. 50 No. 3, pp. 55-73.
- Busse, C., and Wallenburg, C.M. (2011), "Innovation management of logistics service providers", *International Journal of Physical Distribution & Logistics Management*, Vol. 41 No. 2, pp. 187-218.
- Cabanelas, P., Cabanelas Omil, J. and Vazquez, X.H., (2013), "A methodology for the construction of dynamic capabilities in industrial networks: The role of border agents", *Industrial Marketing Management*, Vol. 42 No. 6, pp. 992-1003.
- Caplice, C., and Ryan, D. (2011), "Onsite relationships: Challenging but rewarding", *Supply Chain Management Review*, Vol. 15 No. 6, pp. 8-9.
- Churchill Jr., G.A. (1979), "A paradigm for developing better measures of marketing constructs", *Journal of Marketing Research*, Vol. 16 No. 1, pp. 64-73.
- Cohen, J. (1988), *Statistical Power Analysis for the Behavioral Sciences*. Mahwah, New Jersey, Lawrence Erlbaum.
- Collins, C.J., and Smith, K.G. (2006), "Knowledge exchange and combination: The role of human resource practices in the performance of high-technology firms", *Academy of Management Journal*, Vol. 49 No. 3, pp. 544-560.
- Daft, R.L., and Lengel, R.H. (1986), "Organizational information requirements: Media richness and structural design", *Management Science*, Vol. 32 No. 5, pp. 554-571.
- Daft, R.L., and Weick, K.E. (1984), "Toward a model of organizations as interpretation systems", *Academy of Management Review*, Vol. 9 No. 2, pp. 284-295.
- DeCarolis, D.M., and Deeds, D.L. (1999), "The impact of stocks and flows of organizational knowledge on firm performance: An empirical investigation of the biotechnology industry", *Strategic Management Journal*, Vol. 20 No. 10, pp. 953-968.
- Delfmann, W., Albers, S., and Gehring, M. (2002), "The impact of electronic commerce on logistics service providers", *International Journal of Physical Distribution & Logistics Management*, Vol. 32 No. 3, pp. 203-222.
- Dillman, D.A. (2000), *Mail and web based survey: The tailored design method*, Wiley, New York, New York.
- Duncan, T., and Moriarty, S.E. (1998), "A communication-based marketing model for managing relationships", *Journal of Marketing*, Vol. 92 No. 2, pp. 1-13.
- Durach, C. F., Wieland, A., and J.A.D. Machuca, (2015), "Antecedents and dimensions of supply chain robustness: a systematic literature review", *International Journal of Physical Distribution & Logistics Management*, Vol. 45 Issue: 1/2, pp.118-137.

- Dyer, J.H., and Singh, H. (1998), "The relational view: Cooperative strategy and sources of interorganizational competitive advantage", *Academy of Management Review*, Vol. 23 No. 4, pp. 660-679.
- Edmondson, D. R., and Boyer, S. L. (2013), "The moderating effect of the boundary spanning role on perceived supervisory support: A meta-analytic review", *Journal of Business Research*, Vol. 66 No. 11, pp. 2186-2192.
- 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.
- Fugate, B.S., Stank, T.P., and Mentzer, J.T. (2009), "Linking improved knowledge management to operational and organizational performance", *Journal of Operations Management*, Vol. 27 No. 3, pp. 247-264.
- Gerbing, D.W., and Anderson, J.C. (1988), "An updated paradigm for scale development incorporating unidimensionality and its assessment", *Journal of Marketing Research*, Vol. 25 No. 2, pp. 186-192.
- Grabner, J., and Rosenberg, L.J. (1969), "Communication in distribution channel systems", in Stern, L.W., *Distribution Channels: Behavioral Dimensions*, Houghton-Mifflin Company, New York, New York.
- Granovetter, M. (1985), "Economic action and social structure: The problem of embeddedness", *American Journal of Sociology*, Vol. 91 No. 3, pp. 481-510.
- Grant, R.M. (1996), "Toward a knowledge-based theory of the firm", *Strategic Management Journal*, Vol. 17 No. S2, pp. 109-122.
- Grawe, S.J., Daugherty, P.J., and Dant, R.P. (2012), "Logistics service providers and their customers: Gaining commitment through organizational implants", *Journal of Business Logistics*, Vol. 33 No. 1, pp. 50-63.
- Grawe, S.J., Daugherty, P.J., and Ralston, P.M. (2015), "Enhancing dyadic performance through boundary spanners and innovation: An assessment of service provider-customer relationships", *Journal of Business Logistics*, Vol. 36 No. 1, pp. 88-101.
- Hair, J.F., Sarstedt, M., Ringle, C.M., and Mena, J.A. 2012. "An assessment of the use of partial least squares structural equation modeling in marketing research", *Journal of the Academy of Marketing Science*, Vol. 40 No. 3, pp. 414-433.
- Hitt, M.A. (2011), "Relevance of strategic management theory and research for supply chain management", *Journal of Supply Chain Management*, Vol. 47 No. 1, pp. 9-13.
- Hult, G.T.M., Ketchen, D.J. and Arrfelt, M. (2007), "Strategic supply chain management: Improving performance through a culture of competitiveness and knowledge development", *Strategic Management Journal*, Vol. 28 No. 10, pp. 1035-1052.
- Jansen, J.J.P., Van Den Bosch, F.A., and Volberda, H. W. (2005), "Managing potential and realized absorptive capacity: How do organizational antecedents matter?", *Academy of Management Journal*, Vol. 48 No. 6, pp. 999-1015.
- Kahn, K.B., and McDonough, E.F. (1997), "An empirical study of the relationships among co-location, integration, performance, and satisfaction", *Journal of Product Innovation Management*, Vol. 14 No. 3, pp. 161-178.
- Kim, N., and Srivastava, R.K. (1998), "Managing intraorganizational diffusion of technological innovations", *Industrial Marketing Management*, Vol. 27 No. 3, pp. 229-246.

- Kim, Y. and Choi, T.Y. (2015), “Deep, sticky, transient, and gracious: An expanded buyer–supplier relationship typology. *Journal of Supply Chain Management*, Vol. 51 No.3, pp. 61-86.
- Kirkman, B.L., Rosen, B., Tesluk, P.E., and Gibson, C.B. (2004), “The impact of team empowerment on virtual team performance: The moderating role of face-to-face interaction”, *Academy of Management Journal*, Vol. 47 No. 2, pp. 175-192.
- Kogut, B., and Zander, U. (1992), “Knowledge of the firm, combinative capabilities, and the replication of technology”, *Organization Science*, Vol. 3 No. 3, pp. 383-397.
- Komoto, H., Tomiyama, T., Silvester, S. and Brezet, H., (2011) “Analyzing supply chain robustness for OEMs from a life cycle perspective using life cycle simulation”, *International Journal of Production Economics*, Vol. 134 No. 2, pp. 447-457.
- Kumar, V. and Reinartz, W. (2016), “Creating enduring customer value”, *Journal of Marketing*, Vol. 80 No. 6, pp. 36-68.
- Mackelprang, A.M., Bernardes, E., Burke, G.J., and Welter, C. (2018), “Supplier innovation strategy and performance: A matter of supply chain market positioning”, *Decision Sciences*, Forthcoming.
- Mason, K., and Leek, S. (2012), “Communication practices in business relationship: Creating, relating, and adapting communication artifacts through time”, *Industrial Marketing Management*, Vol. 41 No. 2, pp. 319-332.
- Mena, C., Humphries, A., and Choi, T.Y. (2013), “Toward a theory of multi-tier supply chain management”, *Journal of Supply Chain Management*, Vol. 49 No. 2, pp. 58-77.
- Miles, R.E., Snow, C.C., Meyer, A.D., and Coleman Jr., H.J. (1978), “Organizational strategy, structure, and process”, *Academy of Management Review*, Vol. 3 No. 3, pp. 546-562.
- Mishra, A. and Sinha, K.K., (2016), “Work design and integration glitches in globally distributed technology projects”, *Production and Operations Management*, Vol. 25 No. 2, pp. 347-369.
- Nardi, B.A., and Whittaker, S. (2002). The place of face-to-face communication in distributed work. in P. Hinds & S. Kiesler (Eds.), *Distributed Work*: MIT Press.
- O’Donnell, S.W. (2000), “Managing foreign subsidiaries: Agents of headquarters, or an interdependent network?”, *Strategic Management Journal*, Vol. 21 No. 5, pp. 525-548.
- Oke, A., Prajogo, D.I., and Jayaram, J. (2013), “Strengthening the innovation chain: The role of internal innovation climate and strategic relationships with supply chain partners”, *Journal of Supply Chain Management*, Vol. 49 No. 4, pp. 43-58.
- Piercy, N.F. (2009), “Strategic relationships between boundary-spanning functions: Aligning customer relationship management with supplier relationship management”, *Industrial Marketing Management*, Vol. 38 No. 8, pp. 857-864.
- Pine, B.J. (1993). *Mass customization: The new frontier in business competition*. Cambridge, MA, Harvard Business Press.
- Preacher, K.J. and Hayes, A.F. (2008), “Asymptotic and resampling strategies for assessing and comparing indirect effects in simple and multiple mediator models.” *Behavior Research Methods*, Vol. 40 No. 3, pp. 879-891.
- Prislin, R., and Wood, W. (2005). Social Influence in Attitudes and Attitude Change. In D. Albarracín, B. T. Johnson, & M. P. Zanna (Eds.), *The handbook of attitudes* (pp. 671-705). Mahwah, NJ: Lawrence Erlbaum Associates.

- Robertson, T.S. (1967). The process of innovation and the diffusion of innovation. *Journal of Marketing*, 31 (1), 14-19.
- Rogers, E.M. (2010). Diffusion of innovations. New York, New York, Simon and Schuster.
- Russell, D.M., and Hoag, A.M. (2004), "People and information technology in the supply chain", *International Journal of Physical Distribution & Logistics Management*, Vol. 34 No. 2, pp. 102-122.
- Sandrin, E., Trentin, A, and Forza, C. (2018), "Leveraging high-involvement practices to develop mass customization capability: A contingent configurational perspective", *International Journal of Production Economics*, Vol. 196 February, pp. 335-345.
- Savitskie, K. (2007), "Internal and external logistics information technologies", *International Journal of Physical Distribution & Logistics Management*, Vol. 37 No. 6, pp. 454-468.
- Schoenherr, T., Griffith, D.A., and Chandra, A. (2014), "Knowledge management in supply chains: The role of explicit and tacit knowledge", *Journal of Business Logistics*, Vol. 35 No. 2, pp. 121-135.
- Short, J., Williams, E., and Christie, B. (1976). The Social Psychology of Telecommunications. New York, New York, Wiley.
- Sirmon, D.G., Hitt, M.A., Ireland, R.D., and Gilbert, B.A. (2011), "Resource orchestration to create competitive advantage: Breadth, depth, and life cycle effects", *Journal of Management*, Vol. 37 No. 5, pp. 1390-1412.
- Spekman, R., and Davis, E. W. (2016), "The extended enterprise: A decade later", *International Journal of Physical Distribution & Logistics Management*, Vol. 46 No. 1, pp. 43-61.
- Szulanski, G. (1996), "Exploring internal stickiness: Impediments to the transfer of best practice within the firm", *Strategic Management Journal*, Vol. 17 No. S2, pp. 27-43.
- Tenhiälä, A. and Salvador, F. (2014), "Looking inside glitch mitigation capability: The effect of intraorganizational communication channels", *Decision Sciences*, Vol. 45 No. 3, pp. 437-466.
- Thomas, E. (2013), "Supplier integration in new product development: Computer mediated communication, knowledge exchange and buyer performance", *Industrial Marketing Management*, Vol. 42 No. 6, pp. 890-899.
- Thomas, R.W., Fugate, B.S., and Koukova, N.T. (2011), "Coping with time pressures and knowledge sharing in buyer-supplier relationships", *Journal of Supply Chain Management*, Vol. 47 No. 3, pp. 22-42.
- Thompson, J.D. (1967). Organizations in action. New York, New York, McGraw-Hill.
- Thornton, L.M., Esper, T.L., and Autry, C.W. (2016), "Leader or lobbyist? How organizational politics and top supply chain manager political skill impacts supply chain orientation and internal integration", *Journal of Supply Chain Management*, Vol 52 No. 4, pp. 42-62.
- Van Der Vegt, G., Emans, B., and Van De Vliert, E. (2000), "Team members' affective responses to patterns of intragroup interdependence and job complexity", *Journal of Management*, Vol. 26 No. 4, pp. 633-655.
- Van de Ven, A.H. (1976), "A framework for organization assessment", *Academy of Management Review*, Vol. 1 No. 1, pp. 64-78.
- von Hippel, E. (1988), The sources of innovation. Cambridge, Massachusetts, MIT Press.
- Wagner, S.M., and Franklin, J. (2008), "Why LSPs don't leverage innovations", *Supply Chain Quarterly*, Vol. 2 No. 4, pp. 66-71.

- Wagner, S.M., and Sutter, R. (2012), “A qualitative investigation of innovation between third-party logistics providers and customers”, *International Journal of Production Economics*, Vol. 140 No. 2, pp. 944-958.
- Warkentin, M., Sayeed, L., and Hightower, R.T. (1997), “Virtual teams versus face-to-face teams: An exploratory system of a web based conference system”, *Decision Sciences*, Vol. 28 No. 4, pp. 975-996.
- Wasserstein, R.L. and Lazar, N.A. (2016), “The ASA’s statement on p-values: Context, process, and purpose”, *The American Statistician*, Vol. 70 No. 2, pp. 129-133
- Wunderlich, P., Grossler, A., Zimmerman, N., and Vennix, J.A.M., (2014), “Managerial influence on the diffusion of innovations within intra-organizational networks”, *System Dynamics Review*, Vol. 30 No. 3, pp. 161-185.
- Zack, M.H. (1999), “Managing codified knowledge”, *Sloan Management Review*, Vol. 40 No. 4, pp. 45-58.
- Zahara, S.A., and Nielsen, A.P. (2002), “Sources of capabilities, integration and technology commercialization”, *Strategic Management Journal*, Vol. 23 No. 5, pp. 377-398.
- Zhang, X., Van Donk, P.D., and van der Vaart, T., (2016), “The different impact inter-organizational and intra-organizational ICT on supply chain performance”, *International Journal of Operations & Production Management*, Vol. 36 No. 7, pp. 803-824.

Table 1:
Constructs and measurement item summary

		Mean	Std. Dev.
Intra-Organizational Task Interdependence			
(Adapted from Van Der Vegt, et. al., 2000)			
TI1	I have to obtain information from my colleagues at my own organization to complete my work.	5.30	1.80
TI2	I depend on my colleagues at my own organization for the completion of my work.	5.22	1.87
TI3	I have to work closely with my colleagues at my own organization to do my work properly.	5.31	1.80
Intra-Organizational Face-to-face Communication			
(New Scale)			
FT1	I meet face-to-face with members of my firm regularly to discuss processes in my host firm's operation.	4.45	1.94
FT2	I share ideas with members of my own organization face-to-face.	4.62	2.01
FT3	I interact face-to-face with members of my own organization outside of work.	3.66	1.97
Cognitive Congruence			
(Adapted from Jansen et al., 2005)			
CC1	The ideas that I share with members of my own organization are well-understood.	5.73	1.28
CC2	My organization constantly considers how to better exploit the knowledge gained from my host firm's logistics operation.	5.14	1.59
CC3	The knowledge required to replicate my host firm's logistics processes is easy to communicate to my firm.	5.19	1.56
Process Diffusion			
(New Scale)			
PD1	My firm is adopting similar processes or services with other customers based on my host firm's operation.	4.56	1.60
PD2	My firm has identified opportunities to duplicate my host firm's logistics operation to serve other customers.	4.58	1.60
PD3	My firm is slow to duplicate processes and services to serve other customers. (reverse-coded)	4.48	1.71

* Measured using a 7-point Likert-type scale, where 1 = Strongly Disagree and 7 = Strongly Agree.

**Table 2:
The measurement model**

Constructs and Indicators	Standardized Weight	t-value	Standard error	rho C
<i>Intra-Org. Task Interdependence</i>				0.891
TI1 ← Task Interdependence	0.891	46.63	0.019	
TI2 ← Task Interdependence	0.918	51.41	0.018	
TI3 ← Task Interdependence	0.749	26.47	0.028	
<i>Intra-Org. Face-to-face Communication</i>				0.828
FT1 ← I-O Face-to-face Comm.	0.893	35.84	0.025	
FT2 ← I-O Face-to-face Comm.	0.891	35.74	0.025	
FT3 ← I-O Face-to-face Comm.	0.539	12.23	0.044	
<i>Cognitive Congruence</i>				0.724
CC1 ← Cognitive Congruence	0.534	10.94	0.049	
CC2 ← Cognitive Congruence	0.739	19.51	0.038	
CC3 ← Cognitive Congruence	0.766	20.81	0.037	
<i>Process Diffusion</i>				0.881
PD1 ← Process Diffusion	0.915	57.02	0.016	
PD2 ← Process Diffusion	0.965	67.61	0.014	
PD3 ← Process Diffusion	0.623	16.99	0.037	

Table 3:
Average Variance Extracted and Squared Correlations *

	Average Variance Extracted	I-O Task Interdep.	I-O Face- to-face Comm.	Cognitive Congruence	Process Diffusion
I-O Task Interdependence	0.732	1.000			
I-O Face-to-face Comm	0.627	0.160	1.000		
Cognitive Congruence	0.473	0.084	0.203	1.000	
Process Diffusion	0.719	0.036	0.102	0.423	1.000

* Squared Correlations appear below the diagonal

**Table 4:
Hypothesis test results**

Hypothesis	Relationship	Std. Beta	t-value	Std. Error
H ₁	I-O Task Interdep. → I-O Face-to-face Comm	0.40	7.48	0.05
H ₂	I-O Task Interdep. → Cognitive Congruence	0.12	1.79	0.07
H ₃	I-O Face-to-face Comm → Cognitive Congruence	0.41	6.36	0.07
H ₄	Cognitive Congruence → Process Diffusion	0.65	14.96	0.04
Endogenous Construct		R²		
I-O Face-to-face Comm		0.16		
Cognitive Congruence		0.23		
Process Diffusion		0.43		

RMSEA = 0.08; CFI = 0.95; $\chi^2 = 147.70$ (d.f. = 50)

Figure 1:

The Theoretical model

