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Enablers of supply chain integration

Interpersonal and interorganizational relationship perspectives

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Abstract

Purpose – Previous research on supply chain integration (SCI) enablers has primarily focussed on interorganizational relationships, the purpose of this paper is to broaden the discussion to include interpersonal relationships (IPRs).

Design/methodology/approach – Based on a comprehensive literature review, a series of propositions are postulated and synthesized into a conceptual model of how IPRs maintain and enable SCI, which is decomposed into strategic alliance, information sharing, and process coordination.

Findings – The authors find that IPRs including personal affection, communication, and credibility, have a positive influence on SCI, and these links are mediated by interorganizational relationships including trust, commitment, and power.

Originality/value – The framework developed in this study provides new insights into the role of interpersonal networks in interorganizational relationships, which lead to SCI.

Keywords Supply chain integration, Interorganizational relationship, Interpersonal relationship

Paper type Research paper

1. Introduction

The central task of supply chain management (SCM) is to plan and control business processes from raw material suppliers to the end-customer in order to maximize consumer value (Harrison and van Koek, 2008). For achieving outstanding performance throughout the whole supply chain, SCM needs to manage activities of all supply chain members. Thus, supply chain integration (SCI) is deemed as an effective means (Bowersox *et al.*, 2007; Lambert, 2001; Fawcett *et al.*, 2007). Effective SCI can create supply chain efficiencies (Ralston *et al.*, 2015), enhance the firms' competiveness (Frohlich and Westbrook, 2001), reduce transaction costs (Yeung *et al.*, 2009), and improve both supply chain and firm performance (Cao *et al.*, 2015; Danese and

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Bortolotti, 2014; Mackelprang *et al.*, 2014). Traditionally, SCI has been classified into two dimensions including internal integration (II) and external integration (EI), while EI can be further classified into supplier integration (SI) and customer integration (CI) (Cao *et al.*, 2015; Huo, 2012; Yeung *et al.*, 2009). While this classification has its merits in emphasizing the focus of SCI on both internal and external relationships involved in a supply chain, it suffers from the shortcoming of weakening the systematic perspective of SCI as a whole. To address this shortcoming, this study identifies three dimensions including strategic alliance, information sharing, and process coordination, to categorize SCI based on supply chain contents. Maintaining relational stability in supply chain strategic alliance is a central task for SCI (Frohlich and Westbrook, 2001; Wu *et al.*, 2014). A supply chain consists of information flow, material flow, and decision flow, which are covered by information management, process management, and strategy management, respectively. Therefore, we address SCI through the three dimensions of strategic alliance, information sharing, and process coordination. The central research question of this study is how SCI is achieved through an combination between its enablers at interpersonal and interorganizational levels.

Current research on SCI relational enablers has notable weakness, as it is mainly at the macro firm-to-firm level, leaving relationships at a more micro individual level unattended (Gligor and Holcomb, 2013). In fact, SCI is achieved through interactive activities that are planned, implemented, and controlled by individuals especially of the key boundary spanning individuals including purchasing officers, sales representatives, customer service staff, invoice/receipt clerks, and decision makers. Thus, interpersonal relationships (IPRs) referring to the relationship among individuals who are involved in supply chain activities, play a significant role in achieving SCI by maintaining and developing supply chain relationships at the interorganizational level. The study on IPRs can potentially develop "a deeper understanding of the behavioral complexities that emerge through the interaction between the buyer and supplier" (Gligor and Holcomb, 2013, p. 329; Sambasivan *et al.*, 2013). Previous studies have explored the management of social networks or people, but are limited to general staff training or awareness of SCM (Fawcett *et al.*, 2007). A recent study also highlighted roles and benefits of personal relationships in buyer-supplier interactions (Gligor and Holcomb, 2013). Therefore, our study aims to unpack how IPR influences three SCI dimensions through three core interorganizational factors including trust, commitment, and power, in order to respond to a recent call for theory building in SCI at the individual level (Gligor and Holcomb, 2013).

Overlooking relationships at the individual level presents a significant gap in the current research on SCI enablers, because SCI across company boundaries is implemented and achieved through individuals. Drawing from social exchange theory (SET) and resource-based view (RBV), this study intends to address this research gap by proposing a conceptual framework of SCI enablers. This framework extends the current IOR-SCI link through integrating SCI enablers at both IPR and IOR levels and providing new insights about the nature of firm-level IORs through the individual-level IPRs. SET suggests that individuals or groups interact with others for expectations of a reward (Wu *et al.*, 2014). Following SET, SCI is achieved from interactions of social exchange among supply chain players for mutual benefits. While rewards and costs involved in interactions are assessed at the IOR level, these social exchange interactions are performed through individuals at the IPR level. On the other hand, RBV suggests that firms can enjoy competitive advantages by acquiring and leveraging a bundle of valuable resources (Barney *et al.*, 2011). Following RBV, SCI provides firms with competitive advantages, and boundary

spanners and IPRs involved in supply chain activities represent an important resource possessed by firms. However, IPR resources need to be transformed into IOR capabilities before they can serve as SCI enablers, as capability represents a firm's ability to deploy its resources for desired outcomes (Helfat and Peteraf, 2003).

This study makes several contributions to the literature and practices. First, extending SCI from the macro organizational level to the micro individual level, this study develops a new SCI conceptual framework by proposing influence of IPRs on SCI through mediators of IORs. Few studies in the literature have examined the role played by IPRs in SCI. This study explores mechanisms through which IPRs influence IORs and SCI, contributing to our understanding on relational enablers of SCI from both the firm and the individual-level relationship management. Second, this study adopts strategic alliance, information sharing, and process coordination as three new dimensions of SCI, contributing to our understanding of SCI dimensions. Third, this study examines SCI enablers at both organizational and individual levels by identifying three dimensions of IPRs and three dimensions of IORs. Our conceptual framework links IPR dimensions with different IOR dimensions and builds links between IOR dimensions and SCI dimensions (Figure 1), contributing to SCI relational enabler research and to the literature on the relationship between different levels of relationship management. Finally, this study provides insights for managers to develop IORs through building IPRs, in order to achieve SCI.

The paper is organized as follows. First, a literature review discusses the central concepts of SCI, IPRs, and IORs. Propositions are then postulated to explore the relationship between IPR, the three interorganizational factors, and three SCI dimensions. Based on the literature review and propositions, a conceptual model is synthesized. Finally, managerial and research implications are presented along with future research imperatives.

2. Theoretical foundation and construct development

2.1 SCI

Raw material extraction, production, manufacturing and retail facilities are often globally dispersed, modern information and transportation technologies allow for these functions to be linked together in supply chains. SCM strategically manages processes from source to final consumption to create value for final customers (Mentzer *et al.*, 2001; Hines, 2004; Harrison and van Koek, 2008). SCI enhances performance (Cao *et al.*, 2015) via the reduction of wastes and duplication (Bowersox *et al.*, 2007), and effective value chain management with better interface management, trade-offs, and wider-ranging decisions (Childerhouse *et al.*, 2011). Firms that integrate their supply chains create value for services and products provided to end-customers as well as benefit the firms in the supply chain network (Wisner *et al.*, 2016). SCI refers to "the degree to which an organization strategically collaborates with its supply chain partners and manages intra- and inter-organization processes to achieve effective and efficient flows of

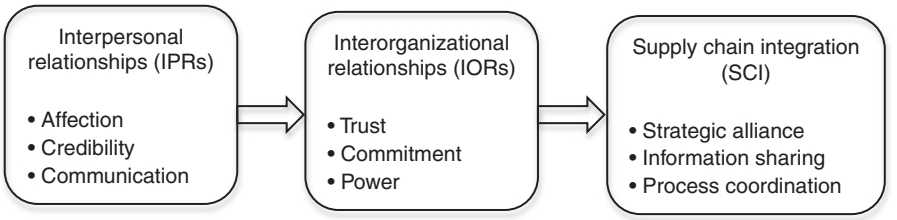

Figure 1.
Interpersonal and interorganizational relationships and supply chain integration

products, services, information, money and decisions, with the objective of providing maximum value to its customers" (Zhao *et al.*, 2008, p. 374).

SCI is a long-term strategy for supply chain members, but each member in the supply chain has different priorities because of their organizational goals, competitive policies, business processes, and contingencies within their business environments. From the strategic perspective, to maximize the efficiency of flows, strategic alliance is needed in SCI to share objectives (Cousins, 2005; Harrison and van Koek, 2008). Strategic alliance is defined as a "purposive relationship" between a supplier and a buyer that facilitates the exchange, sharing, or co-development of resources or capabilities to achieve mutually benefits (Kale and Singh, 2009). Strategic alliance allows suppliers and customers to focus on their core activities of providing quality products and services (Kannan and Tan, 2004). Supply chain alliance provides involved firms with competitive advantages and "relational rents" (Dyer and Singh, 1998), which are resulted from three immediate benefits: securing critical technologies and knowledge, expanding market entry and share, dispersing costs and risks (Auster, 1989). From the operational perspective, SCM mainly concerns the flow of physical goods and related information (Harrison and van Koek, 2008). Following RBV, information and materials can be treated as two main process resources that should be integrated (Wisner *et al.*, 2016). Hence, information should be shared within and across supply chain members (Huo *et al.*, 2014), and process should be coordinated along the whole supply chain (Zhao *et al.*, 2011; Cao *et al.*, 2015). Therefore, as indicated by Zhao *et al.* (2011), this study regards strategic alliance, information sharing, and process coordination as the three main dimensions of SCI.

The three classification of SCI is different from the traditional popularly used dimensions of SCI including II, SI, and CI (e.g. Flynn *et al.*, 2010; Huo, 2012). While the traditional classification focusses on the scope of SCI, our new classification focusses on the content of SCI. The content-based SCI dimensions are also helpful for us to understand flow management in supply chains with strategic alliance emphasizing strategic decision flows, information sharing and process coordination emphasizing information and process flows, respectively. While many previous studies examined scope-based SCI dimensions, few studies investigated content-based SCI dimensions. In this study, we adopt this new classification of SCI to improve our understanding of this important concept and its enablers.

Cao *et al.*'s (2015) review of extant SCI literature identifies three main enablers of SCI: environmental factors (e.g. uncertainties of environment, technology, and demand); interorganizational factors (e.g. trust, power, and commitment); and firm-level factors (e.g. strategy, information technology). Cao *et al.* (2015) further add cultural factors that directly address the influence of people on SCI. The interorganizational factors, such as trust and commitment, are now explored in further detail as they are often considered as the "salient features" and determinant factors for supply chain excellence (Zhao *et al.*, 2008; Zhang and Huo, 2013) and the basic foundation of SCM (Chen and Paulraj, 2004).

2.2 Theoretical approaches to SCI

SET and RBV have been applied into the SCM area as major theoretical lenses to SCI (Wu *et al.*, 2014; Vanpoucke *et al.*, 2014). SET provides an explanation on the motivating force for social interactions by suggesting that individuals or groups attempt to interact with others for the expectation of a reward (Wu *et al.*, 2014; Yang *et al.*, 2008). Attitudes and behaviors of social players toward the particular interaction are determined by the difference between expected rewards and costs associated with the

interaction (Wu *et al.*, 2014). For example, empirical research has found that SET-based organizational variables, such as trust, commitment, reciprocity, and power, positively influence information sharing and collaboration, and supply chain performance (Wu *et al.*, 2004). Previous research also suggested that SET-based procedural and distributive justice of a supplier's policies enhance the long-term orientation and relational behaviors of its distributor (Griffith *et al.*, 2006). We extends the application of SET to supply chain activities by including factors at the IPR level, based on the understanding that the exchange link between IORs and SCI is actually initiated, monitored, and controlled through interactive activities at the IPR level. Organizational attitudes and behaviors are assessed by boundary spanning individuals. As a result, perceived exchange rewards and costs in supply chain interactions for involved firms are influenced by attitudes and behaviors of IPR individuals. On the other hand, IPRs involved in supply chain interactions are unlikely to influence SCI without the involvement of IORs, as IPRs at the individual level must rely on an organization platform to play a role on SCI. Therefore, based on SET, we suggest that IPRs influence SCI through IORs and that factors drawn from the IOR level mediate the link between IPRs and SCI.

From the RBV perspective, IPRs represent important resources and capabilities possessed by different firms. RBV suggests that a firm can achieve sustainable competitive advantages through possessing and deploying its valuable, rare, inimitable and non-substitutable heterogeneous resources (Vanpoucke *et al.*, 2014). According to RBV, key resources required in supply chain activities include tangible assets (e.g. facilities, equipment, human resources, IT systems) and intangible assets (e.g. process, procedures) (Xu *et al.*, 2014). Effective SCI provides the firm with competitive advantages, because it leads to operational cost savings, shorter and more predictable lead-times, and increased flexibility through collaboration with supply chain partners. The personnel involved in supply chain activities, together with IPRs they develop, is an important resource for firms. Drawn from RBV, we propose that influence from IPR resources on SCI is more likely through the intermediary of IORs as the firm capability. Although there is a considerable overlap between resources and capabilities, RBV makes clear distinctions: while a resource represents more tangible factors of a firm, capability represents a firm's ability to deploy these resources for desired outcomes (Teece, 2007). Built on IPRs, a firm is able to develop its relational capabilities including trust, power, commitment that are developed in supply chain activities over long term. IPRs need to be transformed into IORs before they can help to achieve SCI. As a type of firm resource, IPRs affect SCI mainly through the intermediary of IORs, because IORs, as a firm capability, can deploy firm resources including associated IPRs, to achieve SCI.

2.3 IPRs

SCI is enabled through social interaction, mutual adaptation, and relation-specific investments (Wu *et al.*, 2004). Therefore, it is important to investigate what factors drive managers and boundary spanners to integrate with supply chain partners (Cao *et al.*, 2015). Behaviors of supply chain actors are not limited to economic factors alone, social factors including exchange, obligation, commitment, trust, and belief are also at play (Zhao *et al.*, 2008). Personal ties between organizational trading partners can be developed among various involved individuals, such as senior management, sales and procurement managers, system engineers, and purchasing officers.

IPR is not a new term because it has been discussed across a range of industries and cultures. Related terms include: social networks, personal connections, and "guanxi" in China, "wasta" in Brazil, "pratik" in Haiti, "jeitinho" in Lebanon, "pulling strings" in UK

(Smith *et al.*, 2012), and "blat" in Russia (Michailova and Worm, 2003). According to SET, people are relational beings who depend on properly differentiated personal associations with others (Luo, 2007), although the influence and roles of IPRs play in business relationships may vary in different cultures (Lovett *et al.*, 1999). IPRs have been studied extensively in various fields involving social exchange, such as education and learning (Chickering and Reisser, 1993) and marketing (Gligor and Holcomb, 2013). Macintosh and Lockshin (1997) explore IPRs between retail salespeople and customers and highlight its importance for store loyalty and demonstrate the value of generating and maintaining IPRs as a retail strategy.

IPR has six characteristics: it is usually expressive (emotion based, intrinsic); it is based on voluntary interaction; it is informal; it is motivated by a communal orientation (giving without the expectation of repayment); it develops intimate connections; the parties involved in IPRs are not substitutable (Gligor and Holcomb, 2013). Based on SET, research has identified three IPR dimensions including affection, personal communication, and credibility, that influence interfirm relationships (Barnes *et al.*, 2015). Personal affection refers to human feelings, sentiments, and emotion that are able to reflect closeness of the relation between individuals. Personal credibility refers to the degree to gain confidence, reliability, and trust from other individuals over time. Personal communication refers to the individuals' interaction involving information sharing that is able to generate greater familiarity, closeness, and understanding for involved individuals. Among three IPR dimensions, affection is the most basic feeling of individuals and is a more internal-facing attribute, because affection provides the basic motivation for further interaction between social exchange partners, we put it as the first IPR dimension. Credibility is a basic feeling of confidence degree to trust the social exchange partner in business interactions over time. Compared to affection, credibility is more external-facing. Communication is also external-facing and characterized as the interactive feeling and main direct means to interact with business partners. Thus, we put it as the third dimension.

IPR dimensions can influence relations involved in supply chain activities at the organizational level when integrating supply chains. For example, overlap between supply chains in terms of actors, resources, and activists has been highlighted as a major problem in SCM, as it can seriously delay, hinder, and increase costs to the process when changing the degree of integration in one chain (Hertz, 2006). Efficient and effective personal communication, as a dimension of IPR, is able to play a significant role in solving the IOR problem of overlapping supply chains or at least mitigating incurred costs. Research has also identified shared resources between different firms as another major IOR-level barrier to SCI, because it leads to relationship handling costs and reduced technological flexibility (Childerhouse *et al.*, 2011). At a tactical level, problems involved in SCM at the IOR level include opportunistic use of commercially sensitive information, missed opportunity from a superior power position, increased switching costs, and the costs of coordination, compromise, and inflexibility. The emotion- and voluntary-based IPR has the potential to overcome many of these obstacles, because the mutual orientation of IPR is able to minimize risks of opportunism when sharing resources.

3. Research propositions

3.1 IPRs and SCI

SCI is achieved at the organizational level, but all its three dimensions including strategic alliance, information sharing, and process coordination, are influenced by IPRs.

First, IPRs can affect strategic alliance significantly. Strategic alliance is divided into three stages of formation and partner selection, alliance governance and design, and post-formation alliance management (Kale and Singh, 2009). All these three stages are reinforced through "conscious and subconscious behaviours" between the supplier and the buyer (Kannan and Tan, 2004). IPRs developed in the interaction behavior can affect strategic alliance at all three stages. Personal affection acts as a bonding agent across three stages. Frequent, accurate, open, and in-time personal communication can shorten the formation and partner selection stage, improve alliance governance efficiency and effectiveness, supplement and modify the post-alliance management. Personal credibility can enhance partner's willingness and strengthen confidence to collaborate.

Second, IPRs developed across boundary spanners play an important role in information sharing. Personal affection can lead to the frequent, accurate, in-time, and comprehensive information sharing. Personal credibility can provide the partner with confidence to share right information in the right time. Personal communication directly contributes to information sharing. Personal communication can even give your partner an extra prompt or hint by leaking some important information "unconsciously" if good IPRs have developed between transaction partners over time. On the other hand, some important information sharing may be delayed, blurred, or even hidden in massive information in the case that IPRs are not at presence.

Third, IPRs can influence process coordination. SET suggests that the attitude and behavior can affect social interaction. Personal affection is formed from the preceding interaction between suppliers and buyers, thus it can demonstrate the potential attitude and following behavior during process coordination including customer relationships/services, demand, order fulfilment, production development and commercialization, and manufacturing (Wisner *et al.*, 2016). Personal credibility can reflect the attitude and behavior accumulated from the historical interaction. With the confidence and trust related to good personal credibility, companies can save time and costs when coordinating processes, such as transaction, order, and delivery. Personal communication can exchange right quality, in-time information during process coordination. Personal communication can also help to understand partners' working environment, business advantages and disadvantages, resources and capabilities in integrated processes, and to solve disputes and conflicts in the processes.

In summary, IPRs play a significant role in enabling SCI. IPRs, associated with the personnel involving in supply chain activities, are a type of important firm resource. However, its influence on SCI is more likely to occur through the intermediary of IORs. RBV suggests that a resource can contribute to the firm's competitive advantages more effectively by converting it into a firm capability so that it can align with the firm's business strategy (Zott, 2002). In the case of SCM, IPRs represent an important resource for the firm, but to act as a SCI enabler, it needs to be incorporated into IORs. Without IORs acting as a platform or intermediary, IPRs can only function at the individual level and are unlikely to influence SCI at the organizational level. Among various IORs, previous literature has identified trust, commitment and power as three major factors of IORs (Zhao *et al.*, 2008; Yeung *et al.*, 2009; Zhang and Huo, 2013), thus, we propose that these three factors serve as mediators for the link between IPRs and SCI.

3.2 The mediating role of trust

As discussed early, IPRs can positively influence SCI. We propose that this impact is mediated by trust between the supplier and the buyer. Trust refers to the extent to which a firm believes its exchange partner is honest and/or-benevolent (Yeung *et al.*, 2009).

Trust also means that interaction parties expect others not to act opportunistically or violate norms of the relationship (Lyles *et al.*, 2008). Trust can be divided into reliability- and character-based trust (Bowersox *et al.*, 2007). With reliability-based trust, a supplier or a buyer is willing to perform and is capable of performing SCI. Character-based trust is based on the honest culture and philosophy of a supplier or a buyer.

Trust is regarded as a vital ingredient in facilitating supply chain activities (Bachmann, 2001), and is positively related to manufacturer – SI/CI (Zhang and Huo, 2013), because it facilitates all three SCI dimensions of strategic alliance, information sharing, and process coordination. Trust-building has become a key approach to upholding long-term cooperative relationships in strategic alliance (Zhang and Huo, 2013), because trust can maintain cooperation and significantly contribute to the long-term stability of a supply chain (Chen and Paulraj, 2004). As strategic alliance is based on joined decisions to achieve agreed goals of aligned companies that share resources, information, profits, knowledge, and risks (Min, 2015), trust is regarded as a fundamental element of the successful "marriage" of strategic alliance (Sambasivan *et al.*, 2011). Empirical evidence show that trust positively affects information sharing in the supply chain, because trust encourages necessary information sharing and improves information quality (Wu *et al.*, 2014). Trust enables process coordination between suppliers and buyers, because trust means a willingness to take risk (Mayer *et al.*, 1995) and to rely on an exchange partner in whom one has confidence (Kwon and Suh, 2005). In addition, trust can drive coordination and cooperation among trading partners (Swink *et al.*, 2007; Zhao *et al.*, 2008), because it facilitates the investment of specific assets to achieve expected goals (Ireland and Webb, 2007; Yeung *et al.*, 2009).

IPRs can facilitate the development of interorganizational trust, because IPRs can have a positive influence on a trustee to pay effort to maintain commitment, honesty, and reduce opportunistic behaviors (Cummings and Bromiley, 1996). IPRs are motivated by a communal orientation (giving without the expectation of repayment) (Gligor and Holcomb, 2013), because the development of personal feelings, sentiments, emotion, or affection implies that interactive individuals can confront disasters or share fortunes (Barnes *et al.*, 2015), so that personal affection can serve as a foundation for both reliability- and character-based trust. Personal credibility can strengthen the confidence and trust between buyers and suppliers directly. Effective personal contacts are helpful to strengthen interorganizational communication, because personal communication can clarify shared business tasks, plans, goals, and risks (Krause and Ellram, 1997). Thus, we postulate:

P1a-c. Trust mediates the positive relationship between affection and (a) strategic alliance, (b) information sharing, (c) process coordination.

P2a-c. Trust mediates the positive relationship between credibility and (a) strategic alliance, (b) information sharing, (c) process coordination.

P3a-c. Trust mediates the positive relationship between communication and (a) strategic alliance, (b) information sharing, (c) process coordination.

3.3 The mediating role of commitment

We propose that the positive impact of IPRs on SCI is mediated by commitment. Commitment contributes to the continuity and growth of an interfirm relationship (Anderson *et al.*, 1994; Hakansson and Snehota, 1995). Interfirm commitment refers to

"the willingness of a party to invest financial, physical or relationship-based resources in a relationship" (Zhao *et al.*, 2008, p. 370). It also means to maintain the relationship and the confidence in the stability of the relationship (Morgan and Hunt, 1994). Brown *et al.* (1995) classify commitment into normative and instrumental commitment. Normative commitment relates to the willingness to secure the supplier-buyer relationship based on mutual commitment and sharing (Ellram, 1991), while instrumental commitment is associated with compliance (Brown *et al.*, 1995). Instrumental commitment influences a party to favor the other party and hence be more accepting of the influence in a supplier-buyer relationship (Zhao *et al.*, 2008). Commitment clearly underscores a dyadic relationship and thus enables SCI. With commitment, supply chain partners are more likely to assist the development of strategic alliance, to share tacit information, and jointly to solve process problems (Zhao *et al.*, 2008, 2011). Empirical studies have also confirmed the positive influence of commitment on SCI (Cheng, 2011; Wu *et al.*, 2014).

IPRs have a positive impact on commitment. IPRs are intrinsic and emotion based voluntary interactions, motivated by communal orientation, which develops intimate connections (Gligor and Holcomb, 2013). Thus, IPRs can induce, identify, and develop normative commitment, and enhance instrumental commitment compliance to make joint plans, policies, and strategies with their partners. IPRs have a direct impact on both normative and instrumental commitment. With IPRs, supply chain parties are likely to identify and internalize values of their partners, and also likely to follow compliance requests.

Furthermore, commitment includes attitudinal and behavior aspects. Attitudinal commitment is affective based, including sentiments of affection, emotional attachment, and social bonding with partners (Sharma *et al.*, 2015). Based on inherent human feelings, personal affection concerns the mutual orientation and focusses on intimate connections, thus it can drive both parties to invest resources to align strategies, share information, and coordinate processes, in this way, it can be a base to initiate the formation of interfirm commitment (Wu *et al.*, 2014). Personal credibility is related to a person's capability which others can have confidence to rely on. It can accumulate long-term commitment with both willingness and compliance. Personal communication between trading partners can directly express the willingness and design to interfirm commitment through understanding the partner's strategies, policies, goals, operation processes, benefits, or loss. Therefore, we postulate:

P4a-c. Commitment mediates the positive relationship between affection and (a) strategic alliance, (b) information sharing, (c) process coordination.

P5a-c. Commitment mediates the positive relationship between credibility and (a) strategic alliance, (b) information sharing, (c) process coordination.

P6a-c. Commitment mediates the positive relationship between communication and (a) strategic alliance, (b) information sharing, (c) process coordination.

3.4 The mediating role of power

We also propose that the influence of IPRs on SCI is mediated by power between the supplier and the buyer. Power refers to the relative dependence between exchange members and is the capacity of one party to influence decisions and behaviors of partners (Wu *et al.*, 2014). Power is based on the control of resources valued or desired by others (Turner, 2005). Overall, power is shifting from upstream to downstream in

the supply chain, and a powerful firm plays more important roles than less-powerful firms in SCI (Bowersox *et al.*, 2007). Power can be classified into mediated power and no-mediated power (Maloni and Benton, 2000). Mediated power including reward power and coercive power that are exercised through rewards and punishments, respectively. Non-mediated power includes expert, reference, and legitimate power. Expert power is related to knowledge, skills, and expertise through which a firm can use to influence others (Maloni and Benton, 2000). Reference power is related to the value identification between a supplier and a buyer. Legitimate power is related to the natural right a firm used to influence others.

Power is one significant factor to influence SCI (Zhao *et al.*, 2008). Power can push both parties to understand each other's goals and targets, facilitating the formation of strategic alliance. According to power-dependence theory, the power target is dependent on the power source, thus, the power target would share information resources to balance the influence of the power source's influence. Similarly, power can also push both supply chain partners to develop joint problem solving routines to coordinate their activities (Zhao *et al.*, 2008).

IPRs have a positive influence on the use of interorganizational power. The frequency, timeliness, accuracy, openness of personal communication can improve the perception of power. Personal credibility and affection can reconcile power to some extent. Emotion and voluntary interaction at the individual level assist the integration of value identification, internalization, and understanding of the natural right to influence each other (Gligor and Holcomb, 2013). Because IPRs have a communal orientation motivation (giving without the expectation of the repayment) and intimate connections, IPRs can promote the transfer of knowledge, skills, and expertise between partners. The informal and non-substitutable characteristics of IPRs bring supply chain partners together. Based on links between power and SCI, between IPRs and SCI, and between IPRs and power, power mediates the impact of IPRs on SCI. Therefore, we postulate (Figure 2):

P7a-c. Power mediates the positive relationship between affection and (a) strategic alliance, (b) information sharing, (c) process coordination.

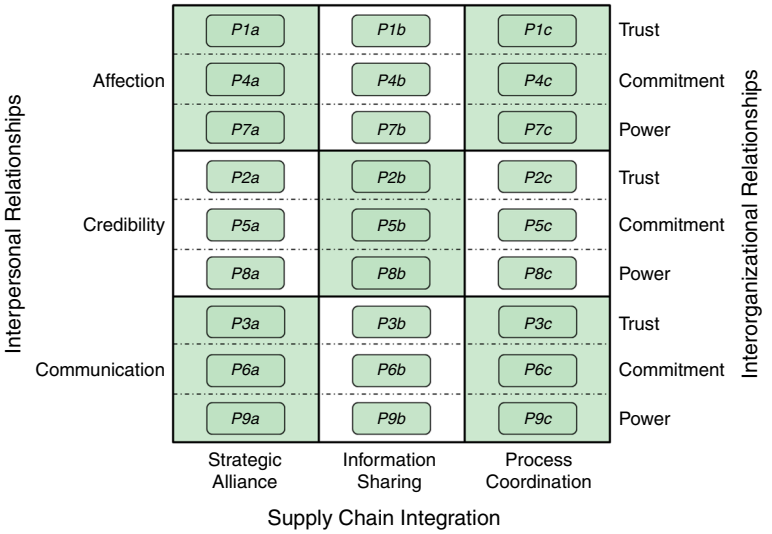

Figure 2.
The role of interpersonal and interorganizational relationships on supply chain integration

P8a-c. Power mediates the positive relationship between credibility and (a) strategic alliance, (b) information sharing, (c) process coordination.

P9a-c. Power mediates the positive relationship between communication and (a) strategic alliance, (b) information sharing, (c) process coordination.

4. Proposed research methodology

4.1 Questionnaire design and measures

We can adopt a three-step approach used by Xu *et al.* (2014) to develop the questionnaire. First, a draft questionnaire based on literature review can be developed to identify valid measures for related constructs. The questionnaire can be revised based on case studies and interviews with managers in companies. Second, ten or more IPR individuals (including five or more from suppliers and five or more from buyers) and five or more academicians can be invited to review the questionnaire. Third, we can conduct pilot tests in selected ten or more companies, followed by in-depth interviews with these IPR individuals to verify the relevance and clarify of the scales. Finally, the refined questionnaire can be modified and finalized based on their feedbacks. Multi-items of IPR, IOR, and SCI can be used to measure key constructs in our conceptual model. All indicators can be measured using the seven-point Likert scale which provides more choices for respondents (Huo, 2012).

4.2 Sampling and data collection

Our propositions can be transferred to hypotheses before they are tested. We can collect data in representative areas. The questionnaire can be distributed to potential participants (mainly through electronic distribution) in appropriate industry sectors related to SCI. Non-response bias and common method bias can be checked after data are collected. Distributions of sample can be analyzed. Items should be purified, and reliability and validity, as two main concerns of the measurement, should be tested. Characteristics of IPRs, IORs, and SCI can be reported based on descriptive statistics. Hypotheses can be tested statistically using regression or structural equation modeling methods.

5. Discussion and implications

Based on literature review and our theoretical and practical analyses, we develop a theoretical model to demonstrate the role of IPRs and IORs in facilitating SCI (Figure 1). Our model incorporates factors drawn from previous literature, namely, IPRs including personal affection, personal credibility, and personal communication, IORs including trust, commitment, and power, and SCI including strategic alliance, information sharing, and process coordination. SCI is a complex process and is affected by various factors at both organizational and individual levels. By emphasizing proposed relationships between SCI and its enablers of IPRs and IORs, this model aims to examine how SCI is achieved through interactions between IPRs and IORs. More specifically, our model demonstrates that IPR dimensions including personal affection, personal credibility, and personal communication, have positive impacts on SCI dimensions including strategic alliance, information sharing, and process coordination, and that these impacts are activated through mediators of IORs dimensions including trust, commitment, and power.

IPR research within business is not rare, nonetheless, its applications in SCM remain relatively sparse (Gligor and Holcomb, 2013). SCI is typically explored at an macro interorganizational level, our study focusses on the micro individual level, leading to a deeper understanding of behavioral complexities. Our study sheds new lights on the application of SET and RBV in the SCM area. Our model also extends the application of SET in SCM from the firm level to both firm and individual levels. Traditionally, SET explores attitudes and behaviors and its motions for two partners to exchange relationships in the business interaction. Our study explores the exchange between different-level relationships, i.e. how the IPR level, the IOR level, and the SCI level interact with each other and make exchange. This exchange between three levels gives a new envision and angle to explore SCM.

Our study also extends the application of RBV to SCI research by including IPRs as important SCI enablers and by proposing mediated effects of IOPs on relationships between IPRs and SCI. Following RBV, human resources, together with skills, and relationships associated with them, are regarded as important firm resources. However, the role played by IPRs in enabling SCI has been overlooked to a large extent in previous literature (Gligor and Holcomb, 2013). In addressing this research gap, our study contributes to the literature by identifying three dimensions of personal affection, personal credibility, and personal communication as SCI enablers at the individual level, by providing insights regarding relationships between IPRs at the individual level and IORs at the firm level, and by proposing the joint influence of both IPRs and IORs on SCI. More specifically, our study suggests that IPRs, as an important type of firm resource, are able to positively influence SCI. However, this influence would be more likely to occur through the mediating role of IOR factors, such as trust, commitment, and power, because IPRs, as a type of firm resource, need to embed in IORs as a type of firm capability to affect the firm strategy like SCI (Zott, 2002). In addition, our study contributes to SCI research by providing new understanding on dimensions of SCI. Traditionally, SCI dimensions are classified mainly based on its scope, our study provides a new SCI classification based on its content (strategic alliance, information sharing, and process coordination).

A major managerial implication of this study is that companies need to have a better understanding regarding SCI enablers and take a good use of IPRs and IOPs to achieve SCI. By doing so, companies and their supply chain managers should not only invest in organizational-level IORs, but also make effort in the individual-level IPRs to purposely cultivate resources and capabilities for SCI.

6. Conclusion, limitations, and future research

This study examines mediating roles of IORs in the impact of IPRs on SCI. Specifically, IPRs (i.e. personal affection, communication, and credibility) have a positive influence on SCI (i.e. strategic alliance, information sharing, and process coordination), and interorganizational relationships (i.e. trust, commitment, and power) play mediating roles in the relationships. This study contributes to SCI and relationship management literature and practices.

The main limitation of this study is lack of empirical test. Future research can test constructs and proposed propositions in our conceptual model. Further research can also investigate additional IOR factors that influence SCI, such as organizational and national norms and values (Cao *et al.*, 2015). Further research is also required to clearly define IPRs that are difficult to describe because of their

social and behavioral characteristics. Finally, impacts of IPRs in different industries, countries, and firm types/sizes are worthy of examination to help us to further understand its roles in SCI.

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