Dependence and resource commitment as antecedents of supply chain integration

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Abstract

Purpose – The purpose of this paper is to explore and further the existing knowledge on supply chain integration (SCI). This study proposes a model and several hypotheses to better understand some SCI antecedents, dependence and resource commitment and their relationships with performance.

Design/methodology/approach – Based on diverse theoretical approaches, the author develops and tests an integrated model in which dependence and resource commitment are proposed to enhance external integration, leading to an increase in economic performance. This study's empirical validity is reinforced by collecting data from 142 manufacturing firms in Spain and Germany and testing the model using structural equation model (SEM).

Findings – The results support dependence and resource commitment as antecedents of SCI, both with a positive effect. Also, discrepancies in the effect of external integration on performance are found where supplier integration seems not to have any effect on performance.

Originality/value – This study helps to better understand SCI antecedents. It makes both theoretical and managerial contributions by empirically analyzing both antecedents. This furthers extant knowledge regarding the joined impact of resource commitment and dependence on SCI. In particular, it incorporates resource commitment by considering it as the sacrifice firms need to implement to get involved in a long-term relationship.

Keywords Supply chain integration, Resource commitment, Dependence, Economic performance, External integration, Supplier integration, Customer integration

Paper type Research paper

1. Introduction

Firms have to consider other participants beyond their limits. For that reason, an external perspective becomes essential to understand the integration process. External relationships comprise "a wide range of activities from information sharing to coordination, to joint decision making and incentive alignment" (Peng *et al.*, 2013, p. 5). Therefore, external integration can be understood as the process by which the focal firm acquires, shares and consolidates knowledge and information from its supply chain partners (Huo, 2012; Peng *et al.*, 2013; Swink *et al.*, 2007).

Since the first studies that supported and promoted the processes of collaboration and coordination within the supply chain (Stevens, 1989; Frohlich and Westbrook, 2001), a vast part of the literature has focused on searching for the elements that intervene in the

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development of external relationships (Flynn *et al.*, 2010; Liu *et al.*, 2013; van der Vaart *et al.*, 2012; Zhao *et al.*, 2015). In this sense, the determination of certain characteristics has been a focus of great concern, mainly centered on resources and capabilities (Kumar *et al.*, 2020; Munir *et al.*, 2020; Wiengarten *et al.*, 2019; Wong *et al.*, 2021), which can enhance firms' preparedness to compete in highly collaborative environments.

Although, literature has mainly focused on finding the elements that generate solid external relationships (Corsten and Felde, 2005; Lorentz, 2008; Schoenherr and Swink, 2012; Wiengarten *et al.*, 2016), it has overlooked other essential or defining elements for the good use of collaborative resources to the extent that they determine a specific relational background. These factors are of great importance because they cover the main areas of inter-organizational relationships: constraints to bargain for power and motivation for (re)acting (Connelly *et al.*, 2018; Lumineau, 2017). The former includes the factors derived from the establishment of inter-organizational relationships such as dependence, while the latter includes enablers that may affect the decision to establish external relationships (or not) such as the commitment of resources.

Under situations of dependence, be it power imbalance or joint dependence, firms obtain the abilities to convince others to agree with their positions. For instance, an unequal balance of power helps to understand the reluctance of firms in sharing sensitive information such as costing information (Bernon *et al.*, 2013). In doing so, firms can find inconsistencies with their partners when implementing inter-organizational strategies (Bastl *et al.*, 2010). Thus, firms need to increase their efforts if they want to collaborate with their partners and achieve the greatest possible benefit from their relationship. According to Gulati and Sytch (2007), "if two separate relationships are each perfectly balanced in terms of their actor's dependence level, they may have different implications if they are balanced at different levels of dependence" (p. 37). Therefore, the firms involved will pay significant attention to the responses and attitudes of the others in such a way that the supply chain relationship may produce desirable results (Cho *et al.*, 2017).

This enables firms to face different situations and keep them under control. In this sense, dependence provides the conditions of power to influence others (or not), which is of vital importance to control the relational balance (Wang *et al.*, 2016).

Likewise, the fact that firms have to compromise certain amounts of resources if they want to carry out inter-organizational relationships can act as a motivational factor. This is due to firms having to overcome the uncertainty surrounding new collaborations, being the future or possible joint benefits the motivation to further the relationship. Thereby, through the commitment of resources companies pretend to share a set of resources, primarily specific, at the same time that they have access to others. This situation allows partners to achieve such a level of satisfaction from the exchange process that the risk of considering other partners offering similar benefits is greatly reduced (Dwyer *et al.*, 1987). Therefore, this generates sealed relationships, characterized by their idiosyncrasy and personalization. Eventually, this can provide the motivation to reinforce the idea of engaging in a relationship. This has highlighted the deployment of supply-chain relational capabilities, referring to the stock of knowledge-based competencies to effectively manage a firm's relationship with its supply chain partners (Chen and Paulraj, 2004).

Although dependence and resource commitment coexist in supply chain relationships and despite their potential to increase external integration separately having been acknowledged (Whipple and Russel, 2007; Huo *et al.*, 2017; Zhang and Huo, 2013), no study, to the best of my knowledge, has investigated their simultaneous impact on SCI. Therefore, the importance of these two closely related concepts becomes clear when firms consider furthering their relationships with their supply chain partners. This becomes indispensable in today's environments, given that the alternative, developing in isolation, is practically unthinkable due to the negative impacts on performance, competitive position or even survival.

This study tries to advance the knowledge of the elements that favor the development of integrative external relationships. The main contribution of this study is twofold. On the one hand, this study analyzes two antecedents of SCI, dependence and resource commitment, a link mostly unexplored when it comes to relational capabilities. On the other hand, it analyses the relationships between external integration and performance (both with customers and with suppliers) that, although widely studied, literature has mainly shown contradictory results (Autry *et al.*, 2014).

2. Theoretical background and research hypotheses

The research model guiding this study (Figure 1) is rooted theoretically in the integration of the Resource Dependence Theory (RDT), Resource Based View (RBV) and Transaction Cost Economics (TCE). First, RDT establishes that organizations are the essential unit to understand inter-organizational relationships and they are constrained by a network of interdependencies with other organizations (Pfeffer, 1987). Dependence influences inter-organizational relationships and encourages dependent firms to maintain the relationship with their partners (Zhan and Huo, 2013). In this sense, integration with supply chain partners entails the willingness to establish certain activities and objectives jointly to obtain mutual benefits (Kim and Lee, 2010). This generates an interdependence and relies on their partners' resources and capabilities to complement their own (Davis and Cobb, 2010; Pfeffer and Salancik, 2003).

Second, under the RBV, supply chain integration is seen as a strategic internal resource that helps organizations to create value and, therefore, to get a competitive advantage (Barney, 2012). In doing so, supply chain integration can ease inefficient reductions among supply chain partners or better meet customer requirements, all of which affects performance. The incentives for integration are laid on the acquisition of scarce and specific resources to protect and maintain the competitive advantage (Barney, 1991). Thus, SCI can be viewed as a series of integrative capabilities that lead, directly or indirectly, to firm performance (Ataseven and Nair, 2017; Huo, 2012). Developing integrative relationships with both customers and suppliers enables firms to manage the resources and knowledge provided by them. In a long-term view, this would lead to an increase in the joint performance, as firms possess the specific resources and the potential to exploit the opportunities and neutralize threats arising in the environment (Cousing and Menguc, 2006). In this sense, resources involve the allocation of tangible and intangible entities available that enable firms to produce efficiently and/or effectively a market offering that has value in some market segment (Hunt, 1999; Madhavaram and Hunt, 2008). In other words, resource commitment deals with how valuable resources are allocated or targeted to achieve an optimal outcome.

Third, TCE acknowledges the existence of certain tools that guarantee a successful development of long-term inter-organizational relationships (Young-Ybarra and Wiersema, 1999). It considers SCI as a governance mechanism to underlying transactions (Williamson, 1979).
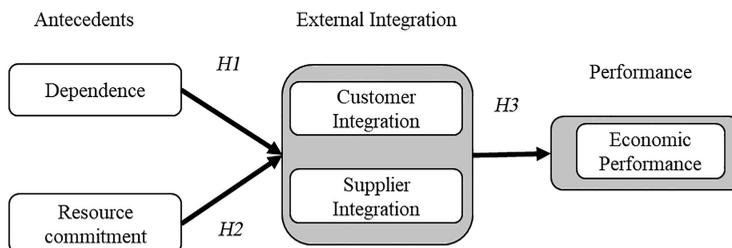
Figure 1.
Research framework

Therefore, the adoption of close and long-term oriented relationships can act as a mechanism to avoid opportunistic behavior as it implies the adoption of strategic connections based on trust and commitment among other relational abilities. Thus, "firms jointly decide the amount of relation-specific investments they will commit to a collaboration depending on the motives they are pursuing and the characteristics of partners to maximize the expected pay-off of the alliance" (Colombo, 2003, p. 1210). The presence of these investments works to maintain the relationship by strengthening commitments that impulses the long-term orientation needed to build a stable integration (Kent and Mentzer, 2003). In doing so, partners create a lock-in condition that promotes behaviors that, eventually, ensure the continuity and mutual tolerance of the partnership (Buckley and Casson, 1988).

2.1 Determinants of solid external relationships

2.1.1 Dependence and external supply chain integration. In the context of supply chain management, dependence has been conceived as the need of firms to maintain their relationships with their supply chain partners to achieve their goals (Frazier, 1983; Narasimhan *et al.*, 2009). In this sense, dependence and power have been defined similarly (Griffith *et al.*, 2006; Mahapatra *et al.*, 2010; Narasimhan *et al.*, 2009). Therefore, dependence exists when one actor does not entirely control all the conditions necessary to achieve their desired goals (Zailani and Rajagopal, 2005; Zhang and Huo, 2013).

Dependence has been widely studied in the context of the supply chain (Hoejmose *et al.*, 2013; Kim and Fortado, 2021; Shields and Malhotra, 2008). In this sense, Huo *et al.* (2017) analyze its role in conjunction with trust in 3PL integration processes. Hoejmose *et al.* (2013) study power, dependence and asymmetries in shaping socially responsible supply chains, while Zhang and Huo (2013) use dependence as a key factor in predicting trust levels in supply chains. Likewise, Zhang *et al.* (2021) study the extent to which dependence on suppliers is influenced by the transparency and dynamism of the industry in relation to corporate social responsibility initiatives.

In addition, dependence has been used to explain certain characteristics of inter-organizational relationships (Zhao *et al.*, 2008), inter-firm partnering (Mentzer *et al.*, 2000) or investment in innovation (Ma *et al.*, 2021).

Collaborative relationships within the supply chain would operate under dependence conditions (Rinehart *et al.*, 2004), arising because of the relationship itself is inherent to it. It can be assumed that external integration relationships are characterized by mutual dependence because both parties are highly interested in keeping the dependence in balance, that is, in maximizing the joint performance. However, dealing with dependence has been controversial as it has been proved to report both positive and negative effects (see Table 1).

On the one hand, Kumar *et al.* (1995) found dependence to lead to higher conflict. It has been proved to hinder the flow of knowledge and foster the creation of operational barriers. Thus, Corsten and Felde (2005) determined that developing inter-organizational relationships under dependence is unstable as the dependent partner will search for alternatives as soon as a window of opportunity presents itself.

This situation is characterized by power imbalance, that is, when one firm is dependent on another, but it is not reciprocated (Gulati and Sytch, 2007). In this sense, power is the ability of one supply chain member to influence the behavior and decisions of other members (Gaski, 1984). Firms involved in a supply chain relationship characterized by an asymmetric balance of power and dependence face considerable challenges in developing relationships with their supply chain partners (McCarthy-Byrne and Mentzer, 2011). Thus, we propose the following hypothesis:

H1a. There is a negative relationship between a firm dependence level and its supply chain integration.

	Approach	Perception	Consequences	Behavioural reaction	Characteristics
Dependence	• Negative	• Inequality • Distrust • Nonconformity	• Hinder flow of knowledge (Kumar et al., 1995) • Operational barriers (Kumar et al., 1995)	• Constant search for alternative partners (Corsten and Felde, 2005) • Safeguard (Huo et al., 2017) • Wellness	• Opportunistic and benevolent behavior (Noordewier et al., 1990) • Power to keep relationships under control • Avoid threats from switch cost (Pfeffer and Salancik, 2003)
	• Positive	• Cohesion • Trust • Cooperativeness	• Relational stability • "Shelter" from unstable situations		

Source(s): Own elaboration

Table 1.
Consequences, benefits and characteristics of dependence for interorganizational relationships

On the other hand, Scott and Westbrook (1991), state that when firms move towards a closer collaboration with their supply chain partners, they have to control the extent of dependence on the chain. That is, the proportion of supplier/customer's business dedicated to the supply chain will affect their attitude and commitment to collaborative improvements. Thus, firms may face situations where replacing partners might be difficult and, therefore, dependence turns into a safeguarding behavior (Heide and John, 1988; Huo *et al.*, 2017). This situation responds to joint dependence, that is, both members involved in the relationships rely on one another (Gulati and Sytch, 2007; Raveendran *et al.*, 2020).

Dependence can arise when a firm detects that the relationship established with a partner plays a critical role in goal achievement via cost reduction and sales improvement (Frazier, 1983; Huo *et al.*, 2017). Consequently, when firms try to develop external relationships, they identify in their partners, be it customers or suppliers, a set of resources perceived as critical. When this happens, dependence can help firms decide to interact more frequently or closely with these partners (Huo *et al.*, 2017). Therefore, the more attractive the resources detected, the more value the firm will associate with their partners. Likewise, if the level of dependence is low, firms are less likely to develop long-term relationships and, therefore, the development of the integration process will deteriorate (Zhang and Huo, 2013). Thus, we propose the following hypothesis:

> *H1b.* There is a positive relationship between a firm dependence level and its supply chain integration.

2.1.2 Resource commitment and external supply chain integration. Commitment can be considered as the willingness of different parties to exert an effort on behalf of the relationship (Zailani and Rajagopal, 2005). That is, a sacrifice to maintain the relationship in the long-term and its stability (Wu *et al.*, 2004). In this sense, commitment involves the perception of dependence on the other, as well as the amount of investment in time and resources that the organization provides to the relationship (Gundlach *et al.*, 1995). Commitment to a relationship is demonstrated by committing resources to it. Hence, when firms decide to collaborate with others strategically, they commit assets in an idiosyncratic investment and agree, implicitly or explicitly, on the division of benefits and cost of their relationships (Campbell, 1997). These resources are mainly financial, technological and managerial (Das and Teng, 2000; Mao *et al.*, 2016). At the same time, the investment in training personnel on the new technology and information that will be used at all levels should be considered (Richey *et al.*, 2005).

The level of commitment among the different parties can regulate inter-organizational relationships. Thus, Leuschner *et al.* (2013) highlight the fact that "substantial resource commitment is necessary when undertaking integrative activities between customers and suppliers" (p. 46).

The importance of commitment is reflected in a variety of contexts addressed in the literature (see Table 2). For instance, Richey *et al.* (2005) focus on the connection between resource commitment and innovation under the context of reverse logistic. Likewise, Capaldo (2007) and Lavie (2006) have considered the presence of resource commitment as an indicator to strengthen close ties. In addition, other studies have tried to extend the conceptualization by considering resource commitment as a behavior, compounded by three different aspects: personal, budget and planning (Li *et al.*, 2011). Furthermore, more recent studies have connected the commitment of resources with the sustainability of supply chain management (Morgan *et al.*, 2018). In this way, some studies have considered resource commitment as a key factor when choosing environmental initiatives (Richey *et al.*, 2014).

Handfield and Bechtel (2002) suggested that successful partnerships occur when the different parties in a relationship demonstrate a willingness to commit a variety of assets to a set of future transactions. Thus, the practical application and allocation of resources is the

	Elements	Transformation	Consequences	Benefits	Characteristics
Resource Commitment	• Idiosyncratic investment (Campbell, 1997) • Unique resources (financial, technological and managerial) (Das and Teng, 2000)	• Willingness to believe in a joint effort (Handfield and Bechtel, 2002) • Joint effort for the relationship (Zailani and Rajagopal, 2005)	• Involvement in a long-term vision (Kwon and Suh, 2005) • Motivation to start/continue a relationship (Tsanos et al., 2014)	• Supportive behaviours (Yang et al., 2008) • Increase tie strength (Capaldo, 2007)	• Sacrify to maintain their long-term and stability relationship (Wu et al., 2004)

Source(s): Own elaboration

Table 2.
Consequences, benefits and characteristics of resource commitment for interorganizational relationships

key to the transformation of a short-run competitive advantage into a sustained competitive one (Barney, 1991). Firms demonstrate their willingness to further their relationship when they decide to commit a certain amount of resources. This means they think of a long-term relationship, in terms of development, and believe that the joint effort will have a positive effect on their performance.

According to Whipple and Russel (2007), resource commitment can be a determining factor in obtaining effective integration with supply chain partners. This is because it acts directly upon the essential elements of collaboration, such as information sharing or incentive alignment (Agarwal and Narayana, 2020). In this sense, a firm that can match and commit resources to specific programs will achieve a superior performance (Daugherty et al., 2005; Ramirez et al., 2020). This creates incentives for both of them to work hard towards maintaining this relationship (Tsanos et al., 2014). Therefore, firms would work together to achieve joint goals, increasing the coordination among the partners (Wu et al., 2004).

The commitment of resources can help overcome the challenges of working together because they can be used to achieve improvements (Fawcett et al., 2021). Thus, information systems can be tailored to customers or suppliers or even automated to save time and money (Richey et al., 2004). Through resource commitment, firms generate a positive predisposition to exchange information with customers and suppliers. This exchange of information can comprise a higher frequency of the interaction, willingness to develop joint projects or even sharing sensitive information (Handfield and Bechtel, 2002). At some point, resource commitment can be understood "as a sign of good faith" from one partner to the other (Doney and Cannon, 1997, p. 39). Thus, one party provides tangible evidence about their willingness to make themselves vulnerable to the other as it shows their real reasons for the establishment and management of a relationship. This reduces the degree of behavioral uncertainty among partners and, therefore, improves the level of external relationships. Thus, we propose the following hypothesis:

H2. There is a positive relationship between a firm resource commitment level and its supply chain external integration.

2.1.3 External integration and firm performance. External integration refers to the efforts of a firm to integrate with external partners. However, it can be divided into supplier and customer integration based on the direction of the integration efforts. This is because SCI requires that companies be simultaneously integrated upstream and downstream in order to achieve significant benefits (Danese and Romano, 2011). This conceptualization emphasizes the three main characteristics of external relationships: (1) cooperation among focal firms with supply chain partners; (2) cross-organizational information sharing and (3) inter-firm coordination of activities (Danese et al., 2013; Narasimhan and Kim, 2002). Thus, the main role of integration is to allow timely and accurate flow of information across the supply chain (Kong et al., 2021) and facilitate coordination of operational decision-making among partners (Tsanos et al., 2014, p. 436).

External integration minimizes the bullwhip effect (Machuca and Barajas, 2004), increases visibility (Cantor et al., 2009), reduces costs (Hult et al., 2004), helps in obtaining lesser forecasting errors (Williams and Waller, 2010) or helps networked plants to resolve conflicting objectives (Cheng et al., 2016). Also, Fabbe-Costes and Jahre (2008) state that stronger links and a higher degree of integration across organizational boundaries lead firms and their supply network to improve performance.

The development of external relationships can lead to gaining an advantage as they can reduce conflict frequency (Allred et al., 2011; Cahill et al., 2010). This can be done by promoting information sharing in order to reduce the levels of information asymmetries among members. Thus, this reduced information asymmetry should decrease the likelihood

of opportunism and diminish transaction costs. Therefore, the new structure can improve critical elements such as reliability, speed and coordinative efficiency of supply chain members.

External integration supports external routines and processes that collect accurate demand and supply information, essential for the coordination of important tasks such as marketing, procurement, production or logistics (Stank *et al.*, 1999). Also, a broader collaboration may enact a shared interpretation of the competitive situation, market potential and customer needs and thus develop a shared sense of purpose (Bentley *et al.*, 2022; Filieri and Alguezaui, 2012; Koufteros *et al.*, 2005). This shared interpretation enables firms to reach a mutual agreement. Therefore, with a low level of supplier and customer integration, a firm is more likely to receive inaccurate or distorted supply and demand information, which results then in poor production plans, high level of inventory and poor delivery reliability. Integration with suppliers and customers creates a mutual understanding and facilitates task coordination, which helps to reduce wastage and redundancy of efforts in managing supply chain activities across partner firms (Swink *et al.*, 2007).

Thus, external integration improves process flexibility by allowing supply chain partners to better anticipate and coordinate supply and demand (Flynn *et al.*, 2010). The information exchange among partners in the supply chain is cross-functional in nature, which is important to improve trust and commitment across the supply chain and to help partners to delegate decision-making (Lee and Whang, 2000).

Increased benefits can be obtained when carrying out customer and supplier integration simultaneously. However, each element can have its own effect on performance. Consequently, customer integration provides opportunities to improve the accuracy of demand information, allowing for a better response to customer needs (Flynn *et al.*, 2010). This also enables costs to be reduced, creates greater value and detects changes in demand more quickly. Similarly, supplier integration can facilitate the understanding and anticipation of a firm's needs in order to meet its requirements. This mutual exchange of information about products, processes and capabilities helps firms to develop their production plan and produce goods on time. In addition, it contributes new information and expertise that, in the end, will improve delivery performance and the quality of the final product (Flynn *et al.*, 2010; Rosenzweig *et al.*, 2003). Therefore, the following hypothesis is posited:

H3. External integration positively affect economic performance.

3. Methodology
3.1 Questionnaire design and sampling
The questionnaire's design and implementation were carried out in three stages. The first comprised the development of the questionnaire based on the literature and was reviewed by academic experts in supply chain management. Second, the questionnaire was modified to accommodate the academic experts' comments and suggestions. Thus, the updated version was pretested on five firms from the sample. Third, the final version was designed drawing on their feedback and sent out to the rest of the firms in the sample.

While some studies have demonstrated the benefits of using multiple informants, the single respondent method is still widely used to investigate relationship management among companies. To be congruent with this, a key informant who was knowledgeable in supply chain management and familiar with purchasing and distribution processes and customer and supplier relationship management was identified. Such key informants included SC managers, CEO, presidents, senior executives, vice presidents, senior directors and senior managers (Zhang and Huo, 2013; Kull *et al.*, 2018).

The survey was managed by a computer-assisted telephone interview system (CATI), which enabled researchers to improve the quality of the responses (Couper, 2011). The starting population in this study was made up by manufacturing firms in Spain and Germany. The population was downloaded from the company database AMADEUS, and it was limited to companies employing at least 50 people.

Of the 1,052 firms contacted, a total of 921 questionnaires were distributed, and 142 useable samples were collected. The response rate was 15.41% based on the number of questionnaires distributed. The profiles of the responding companies are presented in Table 3.

To assess a potential late response bias, a test was conducted using the extrapolation method suggested by Armstrong and Overton (1977). According to these authors, people responding late can be assumed to be similar to people who do not respond. Thus, the sample was divided into two groups of firms, namely, early and late respondents. Subsequently, demographic characteristics, assets, annual sales and number of employees of the two groups were compared. Furthermore, five items on the questionnaire were randomly selected and compared. No significant differences (t-test) were found between the early and late responses. Accordingly, non-response bias is unlikely to be a significant issue in this study.

This study employed a structural equation model (SEM) to examine the research model. According to Kyriazos (2018), SEM modeling could be safely evaluated with small samples, although a sample size between 100 and 150 cases is the minimum required for SEM research. The sample size for this research is 142, which satisfies the recommendation and, therefore, does not compromise the reliability of the results. In addition, further research has been conducted with similar sample size; obtaining validated results (see Chong and Bai, 2014 or Kaufmann and Gaeckler, 2015).

Industry	$n = 142$	%
Food, beverage and alcohol	18	12.68
Textiles and apparel	9	6.34
Wood and furniture	18	12.68
Publishing and printing	8	5.63
Chemicals and petrochemicals	9	6.34
Rubber and plastic	15	10.56
Metal, mechanical and engineering	30	21.13
Electronics and electrical	35	24.65
Size (number of employees)		
Less than 100	48	33.64
100–249	71	50.00
250–500	19	13.64
Over 500	4	2.73
Sales (EUR million)		
Less than 10	21	19.09
10–50	70	63.64
51–100	14	12.73
Over 100	5	4.55
Respondent position		
CEO	31	21.82
SC managers	67	47.27
Senior director	3	1.82
Senior executive	43	30.00

Table 3.
Profile of the
responding firms

3.2 Measures of constructs

The questionnaire was based on previously validated measures. The literature was surveyed to identify valid measures for related constructs and adapted existing scales. Thus, the variables used in this research were developed according to the following description:

Dependent variable. According to Ataseven and Nair (2017), the association between external integration and performance considers several measures such as growing sales, return on investment and the profit margin on sales and overall business performance. In this sense, Earnings Before Interest and Tax (EBIT) has shown higher reliability and objectivity when determining economic performance (Michelino *et al.*, 2014; Li *et al.*, 2016). This value was obtained from the AMADEUS database. In order to correct the size effect, the economic performance was measured as the ratio between EBIT and the number of employees.

Independent variables. External integration was adapted from Flynn *et al.* (2010) and Narasimhan and Kim (2002). This research follows those studies that consider supplier and customer elements of integration separately to analyze their potentially different relationships with performance (Narasimhan and Kim, 2002; Shah *et al.*, 2002).

Dependence measure was adapted from Zhan and Huo (2013). This measure differentiates between the dependence on customers and suppliers. A total of four items for each construct were used.

Resource commitment measure was adapted from Huang *et al.* (2016). This measure used a total of three items comprising the commitment to technological, managerial and financial resources.

Control variables. According to Lu *et al.* (2015) specific control variables are needed to minimize the problem of multicollinearity. Therefore, it is necessary that the chosen variables have an intimate relationship with the sample. Thus, the author reviewed a few variables such as firm size (measured as the natural logarithm of the number of employees), annual revenues, sector in which the firm operates, age of the organization and nature of the property. After this process, only those variables statistically significant and that improve the result of the structural model were retained. The country is not among the most common control variables, as it only applies when having a sample from different countries, which is the case of this research. That motivated its inclusion.

As a result, two control variables were considered. First, as the sample comprises two countries (Spain and Germany), it was worth considering this distinction. Second, establishing long-term relationships can help family firms to overcome those drawbacks related to making decisions, which involve a greater level of resource commitment (Claver *et al.*, 2009). As the sample used in the study neatly comprises small and medium companies, the nature of the property has been considered: family-owned or not.

3.3 Common method bias

To assess potential common method bias, we followed Harman's one-factor method and conducted exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) tests. The EFA results indicate five distinct factors with eigenvalues above 1.0 that explains 70.09% of the total variance. The first factor explained only 22.82% of the variance, which is less than half of the total variance explained. The results are acceptable for our study where the constructs are correlated both conceptually and empirically. The fit indices of the single-factor CFA model are $\chi^2(170) = 1196.85$, NNFI = 0.342, CFI = 0.411, RMSEA = 0.221 and SRMR = 0.151, which are unacceptable according to the cut-off values suggested by Hu *et al.* (1992) and significantly worse than those of the proposed measurement model. Therefore, common method bias is not a serious issue in this study.

3.4 Reliability and validity

Following the two-step method used by Narasimhan and Jayaram (1998), we tested construct reliability. First, EFA was performed to assess the one-dimensionality of the scales, then Cronbach's α was computed for each construct to evaluate internal consistency.

The EFA results indicate that all items showed strong factor loadings on the construct they were expected to measure, and weak factor loadings on those that they were not supposed to measure. The EFA results are presented in Table 4. As shown in Table 5, Cronbach's α values of all constructs are above the suggested threshold value of 0.70 (Fornell and Larcker, 1981), supporting the reliability of these constructs.

Our construct validity assessment includes both convergent and discriminant validity. We used the CFA model and the average variance extracted (AVE) values to evaluate convergent validity (Fornerll and Larcker, 1981). CFA model fit indices are $\chi^2(147) = 259.43$, NNFI = 0.917, CFI = 0.936, RMSEA = 0.079 and SRMR = 0.063. Additionally, the AVE values of all constructs are above the threshold value of 0.50 suggested by Fornell and Larcker (1981). Thus, convergent validity was ensured for all constructs. Discriminant validity was tested using AVE values and correlations. The results in Table 5 show that all square roots of the AVE values are higher than the corresponding correlations, indicating that discriminant validity is ensured.

4. Results

To examine the hypotheses, I performed a SEM analysis with the STATA program. The maximum likelihood estimation method was used to estimate the proposed model. SEM model fit indices are $\chi^2(202) = 345$, NNFI = 0.90, CFI = 0.92, RMSEA = 0.076 and SRMR = 0.07, indicating that our model is acceptable (Hu *et al.*, 1992).

	Customer dependence	Supplier dependence	Customer integration	Supplier integration	Resource commitment
ci_1	0.2251	0.1815	*0.5312*	0.0984	0.3629
ci_2	0.2016	0.1776	*0.8583*	0.1799	0.0818
ci_3	0.3014	0.037	*0.5435*	0.0986	0.3592
ci_4	0.2607	0.0964	*0.6959*	0.1248	0.2879
ci_5	0.296	0.121	*0.7012*	0.0979	0.0944
cd_1	*0.6175*	0.1735	0.353	0.0049	0.0033
cd_2	*0.7183*	0.1268	0.3147	0.0133	0.0417
cd_3	*0.8821*	0.1309	0.2221	0.0291	0.0394
cd_4	*0.8735*	0.1642	0.1148	0.1554	−0.002
si_1	−0.0254	0.2227	0.0628	*0.6584*	0.2092
si_3	0.0446	0.3356	0.1731	*0.5203*	0.0804
si_4	0.0846	0.2224	0.1343	*0.8140*	0.0682
si_5	0.0957	0.0724	0.1241	*0.8902*	0.1905
sd_1	0.1711	*0.8793*	0.2241	0.1921	0.0394
sd_2	0.1564	*0.8682*	0.2372	0.2012	0.0839
sd_3	0.1784	*0.7022*	0.1093	0.2278	0.228
sd_4	0.1894	*0.6182*	−0.1065	0.4271	0.2249
rc_1	0.1441	0.0859	0.2764	0.1048	*0.7106*
rc_2	−0.0343	0.1262	0.094	0.1508	*0.9186*
rc_3	−0.101	0.1455	0.1175	0.2303	*0.6823*
Eigenvalues	2.948	2.843	2.715	2.659	2.378
Total variance explained			70.09%		

Table 4.
EFA analysis

Note(s): The complete wording for the scale items are provided in Appendix
The significance of italic represent the factor loadings for the expected construct

	Mean	SD	Performance	Country	Family	CI	SI	CD	SD	RC
Performance (log)	5.11	0.68	0.0197							
Country	n/a	n/a	−0.2314*	−0.1551						
Family	n/a	n/a	0.1702	0.0786	0.0294					
CI	3.68	0.81	0.0638	0.2337*	−0.1313	0.7402[a]				
SI	2.86	1.01	0.0331	0.0142	−0.1266	0.4660***	0.7602			
CD	4.07	0.92	0.2034*	−0.0675	−0.0613	0.7015***	0.3753***	0.8155		
SD	3.69	0.99	0.1335	0.1652	0.0400	0.5197***	0.6115***	0.5751***	0.8276	
RC	3.10	0.97				0.3958***	0.4319***	0.1692	0.4024***	0.8479
Cronbach's α						0.8530	0.8648	0.9035	0.9096	0.8351
AVE						0.548	0.578	0.665	0.685	0.719

Note(s): [a]The square root of average variance extracted (AVE) value. ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$

Table 5.
Descriptive analysis

Analysis results indicate that dependence and resource commitment are significantly related to customer and supplier integration. Besides, customer integration is significantly related to economic performance, but supplier integration is not significantly related to economic performance. Therefore, H1 and H2 are supported, while H3 is partially supported (shown in Figure 2).

The paths leading from customer dependence to customer integration ($b = 0.5426$; $t = 7.35$; $p < 0.001$) and supplier dependence to supplier integration ($b = 0.4879$; $t = 5.15$; $p < 0.001$) were statistically significant. In this sense, Huo *et al.* (2017), McCarthy-Byrne and Mentzer (2011) and Vijayasarathy (2010) found similar results. The paths linking resource commitment with customer integration ($b = 0.4151$; $t = 5.31$; $p < 0.001$) and supplier integration ($b = 0.2139$; $t = 2.18$; $p < 0.05$) were statistically significant. Handfield and Bechtel (2002), Huo *et al.* (2017) or Morgan *et al.* (2018) found similar results. In addition, the path leading from customer integration to economic performance ($b = 0.2029$; $t = 2.09$; $p < 0.05$) was statistically significant while the path leading from supplier integration to economic performance ($b = -0.1572$; $t = -1.56$; $p > 0.05$) was not statistically significant. These ambivalent results are in line with the results obtained by Leuschner *et al.* (2013) and Mackelprang *et al.* (2014), where they highlight the inconsistency of this relationship and the need for further study. Control variables, that is, country ($b = 0.1721$; $t = 2.04$; $p < 0.05$) and family-own ($b = -0.2493$; $t = -3.12$; $p < 0.01$) were both found to be statistically significant.

5. Discussion and implications

The primary objective of this study was to investigate SCI antecedents. It also contextualizes the effect of external integration on performance. This study particularly focuses on two antecedents of the external relationships in the context of supply chain.

On the one hand, my results provide support to previous findings (e.g. Huo *et al.*, 2017) that dependence enhances external relationships and the processes associated, such as information sharing or process coordination. Thus, dependence relationships enable firms to develop integrative efforts to facilitate inter-organizational processes, resulting in improved supply chain relations (McCarthy-Byrne and Mentzer, 2011). Also, Vijayasaranthy (2010) did not find support for the hypothesized negative association between dependence and supply chain integration. Therefore, these results suggest that firms' dependence generated as a consequence of the establishment of the inter-organizational relationships favor the development of closer ties between firms in a way that improves their approach and
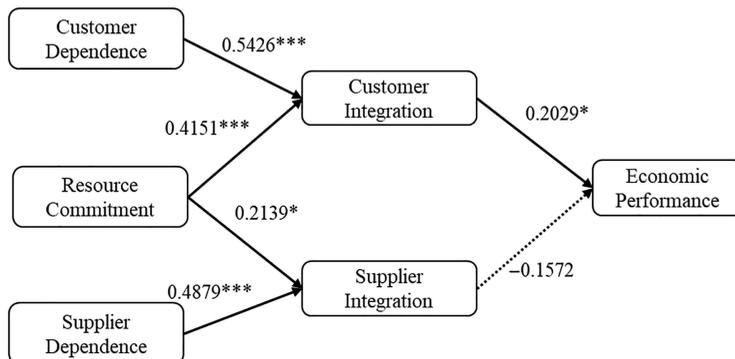
Figure 2.
SEM model

Note(s): Bold line: significant paths
Path fit: *t*-values significant at $*p < 0.05, **p < 0.01, ***p < 0.001$

coordination. That is, firms will find it easier to justify and adopt long-term orientation towards each other to mitigate uncertainties and increase mutual rewards (Vijayasarathy, 2010).

On the other hand, I found a positive relationship between resource commitment and external relationships. This means that firms are willing to carry out a certain resource commitment to maintain their long-term relationship and its stability (Wu *et al.*, 2004), therefore, acting as a powerful sign. Besides, according to Anderson and Weitz (1992), resource commitment plays a significant role in the development of relational resources in relationships within the supply chain.

These results are in line with other studies expressing that a large amount of resource commitment is required to provide an extensive information exchange, the base of integration, among firms (Huo *et al.*, 2017). That is, to the extent that a resource commitment for an inter-organizational relationship is carried out, it will promote the interaction of routines and information flows that will result in a better integration (Patnayakuni *et al.*, 2006). Also, this supports the idea that partners within the supply chain entering into an inter-organizational relationship of integrative nature are incentivized by their idiosyncratic investment agreeing to work hard toward maintaining the relationship (Tsanos *et al.*, 2014). Eventually, this means that although the commitment of resources can generate higher benefits, they must occur through different processes of interaction between the firms involved so that the integration of resources and their adequate deployment among them is guaranteed (Asanuma, 1989).

In addition, this study incorporates the direct relationship between external integration and performance. Despite having been a widely studied relationship, making integration efforts with suppliers and customers has quite a different relational nature. Thus, this findings support the relationship between customer integration and performance and not between supplier integration and performance. This is in line with those studies that state that "it is always easier dealing with suppliers than customers because firms can make demands from the supplier as their customer. But customers request, so it represents a challenge". In this sense, there should be a higher level of politeness when dealing with customers than with suppliers (Kanyoma *et al.*, 2018, p. 1015). This suggests that if firms perceive a greater ease in developing inter-organizational relationships with suppliers, they will focus on giving their best to customers. That is, firms have to prioritize their integrative efforts in accordance with the willingness of suppliers and customers to develop long-term relationships. In doing so, integration with suppliers would be relegated to the background and would go unnoticed, without being perceived, therefore, as important as with customers. Eventually, integration relationships can also increase transaction costs (e.g. with the establishment of new tasks to monitor the proper development of the relationship), and, therefore, have negative implications for performance (Wiengarten *et al.*, 2019).

5.1 Theoretical implications

This study advances the literature of both SCI and its antecedents. Thus, SCI research has applied different theories to support the idea that dependence and resource commitment have an enhanced effect on the development of inter-organizational relationships with both customers and suppliers. Also, the theory supports the idea that a higher level of integration leads to a better performance, where RBV and TCE are the most used.

Various theoretical contributions are made in this paper by further developing the concept of SCI and its antecedents. First, considering dependence and resource commitment together as SCI antecedents, I have been able to explain and extend previous research. Thus, previous research provided conflicting results when trying to disaggregate the concept of dependence. When considering resource commitment few have considered it as the specific investments needed for the development of certain long-term relationships. Some studies, although with some nuances, showed similar results regarding dependence (Huo *et al.*, 2017;

Vijayasarathy, 2010). Here, the main contribution is the consideration of resource commitment and its relationships with integration. These results are in line with those of Huang and Huang (2019), although the analysis was done via a different approach.

Second, through the analysis of the effect of integration on performance, I can show that integration has diverse effects on the performance of firms involved. More and more studies findings support the diversity of effects on performance as a consequence of integration with suppliers and/or customers. This study reflects the need to particularize and differentiate relationships with customers from those with suppliers and assess the commitment to develop integrative skills and routines (Yao *et al.*, 2013). Thus, this study is in line with Kanyoma *et al.* (2018) in determining that integration with customers' needs require more attention than integration with suppliers. Also, it can be anticipated that integration with suppliers has a negative effect on performance (Huang and Huang, 2019).

Third, the difference in the effects of integration on performance can be the result of the massive development of these practices within the industry, that is, if all firms carry out integration processes, the expected benefits can be reduced as a consequence of increasing competitiveness. Also, because suppliers and customers are differently sensitive to diverse measures of performance. Therefore, these results are in line with Wiengarten *et al.* (2019) as they show that supplier integration is more effective in increasing operational performance than customer integration. Besides, and attributing a temporary issue, these results are in line with Tarifa-Fernandez and de-Burgos-Jiménez (2017) when they state that "the operational performance has been proven to be affected in the short-term while other performance dimensions, such as economic or financial, are more evident in the medium and long term" (p. 1263).

In summary, I can make two theoretical conclusions from these results. First, the impact of SCI on performance demonstrates to be more complex and intricate than previously thought, requiring a detailed review of the particular actions and situations under which they can be optimized. Second, the combination of different but related antecedents of SCI are necessary to exploit the full potential of establishing inter-organizational relationships with a long-term vision. These findings are likely to be of great importance for practitioners.

5.2 Managerial implications

The results of this study offer two main managerial implications. First, it reinforces the idea of building strong relationships with partners as a way to strengthen competitiveness at the supply chain level. Despite SCI having demonstrated a positive effect on performance, it should not be taken for granted as these efforts are not always translated into higher returns (Fabbe-Costes and Jahre, 2008; Huang and Huang, 2019). Recognizing that resource dependency and resource commitment can affect the development of inter-organizational relationships means accepting that managers need to think about building a healthy and strong relationship with supply chain partners. This implies distinguishing between whether a more or less closely prior relationship already exists or whether it needs to be generated anew. In the first case, managers should analyze their negotiating position with respect to the partner with whom they want to strengthen the relationship in order to establish their strategy. At the same time, they should recognize in detail the possible fluctuations in joint behavior depending on the resource commitment already made. In the second case, managers' actions should be very similar to the first case, although the flexibility here is greater. In this sense, managers should be more cautious and establish contingency plans in case the relationship does not develop properly. Despite the possible differences, both cases show that if managers are interested in the results of joint collaboration, they should be confident that certain levels of dependence and commitment of resources can be beneficial. Thus, managers can have an open path to collaboration by reducing, in advance, opportunistic behavior that could harm joint interests.

Second, managers cannot expect to increase their performance without considering the resource commitment and dependence derived from inter-organizational relationships. Consequently, investing in resource commitment and keeping the dependency in balance become necessary for the development of higher levels of integration, both with suppliers and customers. That is, they need to be aware of the elements that condition and/or motivate the establishment of long-term relationships. Considering the two antecedents of integration analyzed in this study, managers should prioritize the analysis of dependence when deciding whether or not to integrate with supply chain partners. This is due to the fact that managing dependence generates greater uncertainty and controversy since it will remain an unknown factor until resource commitment, necessary for the integration process, has been carried out.

5.3 Limitations and extensions
Despite the contributions of this study, its findings should not be interpreted without recognizing its limitations. Thus, despite having applied some tests to analyze common method bias and potential late response bias, it is not possible to determine with certainty if these problems do not exist in the research. In addition, the cross-sectional nature of the data used in this study limits the ability to make causal inferences. Furthermore, no contingent analysis has been carried out to explain the relationship between SCI and performance.

These limitations also provide opportunities for future research. For instance, researchers would consider other antecedents related with relational exchange (e.g. trust) or even some variations in the approach (e.g. opportunistic/benevolent behavior). Additionally, researchers could analyze the relationships between dependence and resource commitment, that is, if a certain amount of resource commitment can unbalance the dependence generated between parties. Going further, future research could analyze the implications of resource commitment for the development of integration under the consideration of different bargaining power.

6. Conclusions
In a context of high uncertainty and change as the current one, firms have to recognize the benefits of being integrated with their supply chain partners. However, these integration processes do not always have the expected results, so the entire process has to be evaluated in great detail to achieve the best possible results.

Thus, the primary objective of this study was to investigate the antecedents of SCI, considering dependence and resource commitment as the critical ones. Dependence generated when establishing long-term relationships is of vital importance since it will determine the distribution of power in decision-making, which is crucial for survival. Likewise, it is necessary to consider that the establishment of certain relationships, although of strategic nature, may be linked to a commitment of resources that can be controversial under different situations.

In short, the empirical results suggest that both dependence and resource commitment are directly related to the development of long-term relationships both with customers and suppliers. Besides, this study stresses the importance of simultaneously considering the effect of customer and supplier integration on the performance. This makes integration processes a challenge for the competitiveness of supply chains.

References

Agarwal, U.A. and Narayana, S.A. (2020), "Impact of relational communication on buyer–supplier relationship satisfaction: role of trust and commitment", *Benchmarking: An International Journal*, Vol. 27 No. 8, pp. 2459-2496.

Allred, C.R., Fawcett, S.E. and Wallin, C. (2011), "The evolving role of a collaboration orientation in mitigating functional and inter-organizational conflict", *Decision Sciences Journal*, Vol. 42 No. 1, pp. 129-161.

Anderson, E. and Weitz, B. (1992), "The use of pledges to build and sustain commitment in distribution channels", *Journal of Marketing Research*, Vol. 29 No. 1, pp. 18-34.

Armstrong, J.S. and Overton, T.S. (1977), "Estimating nonresponse bias in mail surveys", *Journal of Marketing Research*, Vol. 14 No. 3, pp. 396-402.

Asanuma, B. (1989), "Manufacturer-supplier relationships in Japan and the concept of relation-specific skill", *Journal of the Japanese and International Economies*, Vol. 3 No. 1, pp. 1-30.

Ataseven, C. and Nair, A. (2017), "Assessment of supply chain integration and performance relationships: a meta-analytic investigation of the literature", *International Journal of Production Economics*, Vol. 185, pp. 252-265.

Autry, C.W., Rose, W.J. and Bell, J.E. (2014), "Reconsidering the supply chain integration–Performance relationship: in search of theoretical consistency and clarity", *Journal of Business Logistics*, Vol. 35 No. 3, pp. 275-276.

Barney, J. (1991), "Firm resources and sustained competitive advantage", *Journal of Management*, Vol. 17 No. 1, p. 99.

Barney, J.B. (2012), "Purchasing, supply chain management and sustained competitive advantage: the relevance of resource-based theory", *Journal of Supply Chain Management*, Vol. 48 No. 2, pp. 3-6.

Bastl, M., Grubic, T., Templar, S., Harrison, A. and Fan, I.S. (2010), "Inter-organisational costing approaches: the inhibiting factors", *The International Journal of Logistics Management*, Vol. 21 No. 1, pp. 65-88.

Bentley, J.R., Robinson, J.L. and Zanhour, M. (2022), "Managerial political skill and achieved supply chain integration: the mediating effects of supply chain orientation and organizational politics", *Supply Chain Management: An International Journal*, Vol. 27 No. 3, pp. 451-465.

Bernon, M., Upperton, J., Bastl, M. and Cullen, J. (2013), "An exploration of supply chain integration in the retail product returns process", *International Journal of Physical Distribution and Logistics Management*, Vol. 43 No. 7, pp. 586-608.

Buckley, P. and Casson, M. (1988), "A theory of cooperation in international business", in Contractor, F. and Lorange, P. (Eds), *Cooperative Strategies in International Business: Joint Ventures and Technology Transfers between Firms*, Lexington Books, New York, pp. 31-53.

Cahill, D.L., Goldsby, T.J., Knemeyer, A.M. and Wallenburg, C.M. (2010), "Customer loyalty in logistics outsourcing relationships: an examination of the moderating effects of conflict frequency", *Journal of Business Logistics*, Vol. 31 No. 2, pp. 253-277.

Campbell, A.J. (1997), "What affects expectations of mutuality in business relationships?", *Journal of Marketing Theory and Practice*, Vol. 5 No. 4, pp. 1-11.

Cantor, D.E., Corsi, T.M. and Grimm, C.M. (2009), "Do electronic logbooks contribute to motor carrier safety performance?", *Journal of Business Logistics*, Vol. 30 No. 1, pp. 203-222.

Capaldo, A. (2007), "Network structure and innovation: the leveraging of a dual network as a distinctive relational capability", *Strategic Management Journal*, Vol. 28 No. 6, pp. 585-608.

Chen, I.J. and Paulraj, A. (2004), "Towards a theory of supply chain management: the constructs and measurements", *Journal of Operations Management*, Vol. 22 No. 2, pp. 119-150.

Cheng, Y., Chaudhuri, A. and Farooq, S. (2016), "Interplant coordination, supply chain integration, and operational performance of a plant in a manufacturing network: a mediation analysis", *Supply Chain Management: An International Journal*, Vol. 21 No. 5, pp. 550-568.

Cho, B., Ryoo, S.Y. and Kim, K.K. (2017), "Interorganizational dependence, information transparency in interorganizational information systems, and supply chain performance", *European Journal of Information Systems*, Vol. 26 No. 2, pp. 185-205.

Chong, A.Y.L. and Bai, R. (2014), "Predicting open IOS adoption in SMEs: an integrated SEM-neural network approach", *Expert Systems with Applications*, Vol. 41 No. 1, pp. 221-229.

Claver, E., Rienda, L. and Quer, D. (2009), "Family firms' international commitment: the influence of family-related factors", *Family Business Review*, Vol. 22 No. 2, pp. 125-135.

Colombo, M.G. (2003), "Alliance form: a test of the contractual and competence perspectives", *Strategic Management Journal*, Vol. 24 No. 12, pp. 1209-1229.

Connelly, B.L., Crook, T.R., Combs, J.G., Ketchen, D.J. Jr and Aguinis, H. (2018), "Competence-and integrity-based trust in interorganizational relationships: which matters more?", *Journal of Management*, Vol. 44 No. 3, pp. 919-945.

Corsten, D. and Felde, J. (2005), "Exploring the performance effects of key-supplier collaboration", *International Journal of Physical Distribution and Logistic Management*, Vol. 35 No. 6, pp. 445-461.

Couper, M.P. (2011), "The future of modes of data collection", *Public Opinion Quarterly*, Vol. 75 No. 5, pp. 889-908.

Cousins, P.D. and Menguc, B. (2006), "The implications of socialization and integration in supply chain management", *Journal of Operations Management*, Vol. 24 No. 5, pp. 604-620.

Danese, P. and Romano, P. (2011), "Supply chain integration and efficiency performance: a study on the interactions between customer and supplier integration", *Supply Chain Management: An International Journal*, Vol. 16 No. 4, pp. 220-230.

Danese, P., Romano, P. and Formentini, M. (2013), "The impact of supply chain integration on responsiveness: the moderating effect of using an international supplier network", *Transportation Research Part E: Logistics and Transportation Review*, Vol. 49 No. 1, pp. 125-140.

Das, T.K. and Teng, B. (2000), "A resource-based theory of strategic alliances", *Journal of Management*, Vol. 26 No. 1, pp. 31-61.

Daugherty, P.J., Richey, R.G., Genchev, S.E. and Chen, H. (2005), "Reverse logistics: superior performance through focused resource commitments to information technology", *Transportation Research Part E: Logistics and Transportation Review*, Vol. 41 No. 2, pp. 77-92.

Davis, G.F. and Adam Cobb, J. (2010), "Chapter 2 Resource dependence theory: past and future", *Stanford's Organization Theory Renaissance*, Emerald Group Publishing, pp. 21-42.

Doney, P.M. and Cannon, J.P. (1997), "An examination of the nature of trust in buyer–seller relationships", *Journal of Marketing*, Vol. 61 No. 2, pp. 35-51.

Dwyer, F.R., Schurr, P.H. and Oh, S. (1987), "Developing buyer-seller relationships", *Journal of Marketing*, Vol. 51 No. 2, pp. 11-27.

Fabbe-Costes, N. and Jahre, M. (2008), "Supply chain integration and performance: a review of the evidence", *The International Journal of Logistics Management*, Vol. 19 No. 2, pp. 130-154.

Fawcett, S.E., Fawcett, A.M., Knemeyer, A.M., Brockhaus, S. and Webb, G.S. (2021), "Overcoming the collaborative challenge: commitment as a super-ordinate enabler of value co-creation", *International Journal of Physical Distribution and Logistics Management*, Vol. 51 No. 9, pp. 1022-1047.

Filieri, R. and Alguezaui, S. (2012), "Extending the enterprise for improved innovation", *Journal of Business Strategy*, Vol. 33 No. 3, pp. 40-47.

Flynn, B.B., Huo, B. and Zhao, X. (2010), "The impact of supply chain integration on performance: a contingency and configuration approach", *Journal of Operations Management*, Vol. 28 No. 1, pp. 58-71.

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.

Frazier, G.L. (1983), "On the measurement of interfirm power in channels of distribution", *Journal of Marketing Research*, Vol. 20 No. 2, pp. 158-166.

Frohlich, M.T. and Westbrook, R. (2001), "Arcs of integration: an international study of supply chain strategies", *Journal of Operations Management*, Vol. 19 No. 2, pp. 185-200.

Gaski, J.F. (1984), "The theory of power and conflict in channels of distribution", *Journal of Marketing*, Vol. 48 No. 3, pp. 9-29.

Griffith, D.A., Harvey, M.G. and Lusch, R.F. (2006), "Social exchange in supply chain relationships: the resulting benefits of procedural and distributive justice", *Journal of Operations Management*, Vol. 24 No. 2, pp. 85-98.

Gulati, R. and Sytch, M. (2007), "Dependence asymmetry and joint dependence in interorganizational relationships: effects of embeddedness on a manufacturer's performance in procurement relationships", *Administrative Science Quarterly*, Vol. 52 No. 1, pp. 32-69.

Gundlach, G.T., Achrol, R.S. and Mentzer, J.T. (1995), "The structure of commitment in exchange", *The Journal of Marketing*, Vol. 59 No. 1, pp. 78-92.

Handfield, R.B. and Bechtel, C. (2002), "The role of trust and relationship structure in improving supply chain responsiveness", *Industrial Marketing Management*, Vol. 31 No. 4, pp. 367-382.

Heide, J.B. and John, G. (1988), "The role of dependence balancing in safeguarding transaction-specific assets in conventional channels", *Journal of Marketing*, Vol. 52 No. 1, pp. 20-35.

Hoejmose, S., Grosvold, J. and Millington, A. (2013), "Socially responsible supply chains: power asymmetries and joint dependence", *Supply Chain Management: An International Journal*, Vol. 18 No. 3, pp. 277-291.

Hu, L.T., Bentler, P.M. and Kano, Y. (1992), "Can test statistics in covariance structure analysis be trusted?", *Psychological Bulletin*, Vol. 112 No. 2, p. 351.

Huang, M.C. and Huang, H.H. (2019), "How transaction-specific investments influence firm performance in buyer-supplier relationships: the mediating role of supply chain integration", *Asia Pacific Management Review*, Vol. 24 No. 2, pp. 167-175.

Huang, Y.C., Yang, M.L. and Wong, Y.J. (2016), "Institutional pressures, resources commitment, and returns management", *Supply Chain Management: An International Journal*, Vol. 21 No. 3, pp. 398-416.

Hult, G.T.M., Ketchen, D.J. Jr and Slater, S.F. (2004), "Information processing, knowledge development, and strategic supply chain performance", *Academy of Management Journal*, Vol. 47 No. 2, pp. 241-253.

Hunt, S.D. (1999), "The strategic imperative and sustainable competitive advantage: public policy implications of resource-advantage theory", *Journal of the Academy of Marketing Science*, Vol. 27 No. 2, pp. 144-159.

Huo, B. (2012), "The impact of supply chain integration on company performance: an organizational capability perspective", *Supply Chain Management: An International Journal*, Vol. 17 No. 6, pp. 596-610.

Huo, B., Liu, C., Chen, H. and Zhao, X. (2017), "Dependence, trust, and 3PL integration: an empirical study in China", *International Journal of Physical Distribution and Logistics Management*, Vol. 47 No. 9, pp. 927-948.

Kanyoma, K.E., Agbola, F.W. and Oloruntoba, R. (2018), "An evaluation of supply chain integration across multi-tier supply chains of manufacturing-based SMEs in Malawi", *The International Journal of Logistics Management*, Vol. 29 No. 3, pp. 1001-1024.

Kaufmann, L. and Gaeckler, J. (2015), "On the relationship between purchasing integration and purchasing decision-making speed", *International Journal of Physical Distribution and Logistics Management*, Vol. 45 No. 3, pp. 214-236.

Kent, J.L. and Mentzer, J.T. (2003), "The effect of investment in interorganizational information technology in a retail supply chain", *Journal of Business Logistics*, Vol. 24 No. 2, pp. 155-175.

Kim, D.Y. and Fortado, B. (2021), "Outcomes of supply chain dependence asymmetry: a systematic review of the statistical evidence", *International Journal of Production Research*, Vol. 59 No. 19, pp. 5844-5866.

Kim, D. and Lee, R.P. (2010), "Systems collaboration and strategic collaboration: their impacts on supply chain responsiveness and market performance", *Decision Sciences*, Vol. 41 No. 4, pp. 955-981.

Kong, T., Feng, T. and Huo, B. (2021), "Green supply chain integration and financial performance: a social contagion and information sharing perspective", *Business Strategy and the Environment*, Vol. 30 No. 5, pp. 2255-2270.

Koufteros, X., Vonderembse, M. and Jayaram, J. (2005), "Internal and external integration for product development: the contingency effects of uncertainty, equivocality, and platform strategy", *Decision Sciences*, Vol. 36 No. 1, pp. 97-133.

Kull, T.J., Kotlar, J. and Spring, M. (2018), "Small and medium enterprise research in supply chain management: the case for single-respondent research designs", *Journal of Supply Chain Management*, Vol. 54 No. 1, pp. 23-34.

Kumar, N., Scheer, L.K. and Steenkamp, J.B.E. (1995), "The effects of perceived interdependence on dealer attitudes", *Journal of Marketing Research*, Vol. 32 No. 3, pp. 348-356.

Kumar, V., Jabarzadeh, Y., Jeihouni, P. and Garza-Reyes, J.A. (2020), "Learning orientation and innovation performance: the mediating role of operations strategy and supply chain integration", *Supply Chain Management: An International Journal*, Vol. 25 No. 4, pp. 457-474.

Kwon, I.W.G. and Suh, T. (2005), "Trust, commitment, and relationships in supply chain management: a path analysis", *Supply Chain Management: An International Journal*, Vol. 10 No. 1, pp. 26-33.

Kyriazos, T.A. (2018), "Applied psychometrics: sample size and sample power considerations in factor analysis (EFA, CFA) and SEM in general", *Psychology*, Vol. 9 No. 8, p. 2207.

Lavie, D. (2006), "The competitive advantage of interconnected firms: an extension of the resource-based view", *Academy of Management Review*, Vol. 31 No. 3, pp. 638-658.

Lee, H.L. and Whang, S. (2000), "Information sharing in a supply chain", *International Journal of Manufacturing Technology and Management*, Vol. 1 No. 1, pp. 79-93.

Leuschner, R., Rogers, D.S. and Charvet, F.F. (2013), "A meta-analysis of supply chain integration and firm performance", *Journal of Supply Chain Management*, Vol. 49 No. 2, pp. 34-57.

Li, P.C., Evans, K.R., Chen, Y.C. and Wood, C.M. (2011), "Resource commitment behaviour of industrial exhibitors: an exploratory study", *Journal of Business and Industrial Marketing*, Vol. 26 No. 6, pp. 430-442.

Li, L., Zhang, Z. and Xu, M. (2016), "Research on the relationship of innovation capability and operating performance based on moderation of openness", *Technology and Investment*, Vol. 7 No. 1, p. 14.

Liu, H., Ke, W., Kee Wei, K. and Hua, Z. (2013), "Effects of supply chain integration and market orientation on firm performance: evidence from China", *International Journal of Operations and Production Management*, Vol. 33 No. 3, pp. 322-346.

Lorentz, H. (2008), "Collaboration in Finnish-Russian supply chains: effects on performance and the role of experience", *Baltic Journal of Management*, Vol. 3 No. 3, pp. 246-265.

Lu, P., Guo, S., Qian, L., He, P. and Xu, X. (2015), "The effectiveness of contractual and relational governances in construction projects in China", *International Journal of Project Management*, Vol. 33 No. 1, pp. 212-222.

Lumineau, F. (2017), "How contracts influence trust and distrust", *Journal of Management*, Vol. 43 No. 5, pp. 1553-1577.

Ma, S., Hofer, A.R. and Aloysius, J. (2021), "Supplier dependence asymmetry and investment in innovation: the role of psychological uncertainty", *Journal of Purchasing and Supply Management*, Vol. 27 No. 2, 100674.

Machuca, J.A. and Barajas, R.P. (2004), "The impact of electronic data interchange on reducing bullwhip effect and supply chain inventory costs", *Transportation Research Part E: Logistics and Transportation Review*, Vol. 40 No. 3, pp. 209-228.

Mackelprang, A.W., Robinson, J.L., Bernardes, E. and Webb, G.S. (2014), "The relationship between strategic supply chain integration and performance: a meta-analytic evaluation and implications for supply chain management research", *Journal of Business Logistics*, Vol. 35 No. 1, pp. 71-96.

Madhavaram, S. and Hunt, S.D. (2008), "The service-dominant logic and a hierarchy of operant resources: developing masterful operant resources and implications for marketing strategy", *Journal of the Academy of Marketing Science*, Vol. 36 No. 1, pp. 67-82.

Mahapatra, S.K., Narasimhan, R. and Barbieri, P. (2010), "Strategic interdependence, governance effectiveness and supplier performance: a dyadic case study investigation and theory development", *Journal of Operations Management*, Vol. 28 No. 6, pp. 537-552.

Mao, H., Liu, S., Zhang, J. and Deng, Z. (2016), "Information technology resource, knowledge management capability, and competitive advantage: the moderating role of resource commitment", *International Journal of Information Management*, Vol. 36 No. 6, pp. 1062-1074.

McCarthy-Byrne, T.M. and Mentzer, J.T. (2011), "Integrating supply chain infrastructure and process to create joint value", *International Journal of Physical Distribution and Logistics Management*, Vol. 41 No. 2, pp. 135-161.

Mentzer, J.T., Min, S. and Zacharia, Z.G. (2000), "The nature of interfirm partnering in supply chain management", *Journal of Retailing*, Vol. 76 No. 4, pp. 549-568.

Michelino, F., Caputo, M., Cammarano, A. and Lamberti, E. (2014), "Inbound and outbound open innovation: organization and performances", *Journal of Technology Management and Innovation*, Vol. 9 No. 3, pp. 65-82.

Morgan, T.R., Tokman, M., Richey, R.G. and Defee, C. (2018), "Resource commitment and sustainability: a reverse logistics performance process model", *International Journal of Physical Distribution and Logistics Management*, Vol. 48 No. 2, pp. 164-182.

Munir, M., Jajja, M.S.S., Chatha, K.A. and Farooq, S. (2020), "Supply chain risk management and operational performance: the enabling role of supply chain integration", *International Journal of Production Economics*, Vol. 227, 107667.

Narasimhan, R. and Jayaram, J. (1998), "Causal linkages in supply chain management: an exploratory study of North American manufacturing firms", *Decision Sciences*, Vol. 29 No. 3, pp. 579-605.

Narasimhan, R. and Kim, S.W. (2002), "Effect of supply chain integration on the relationship between diversification and performance: evidence from Japanese and Korean firms", *Journal of Operations Management*, Vol. 20 No. 3, pp. 303-323.

Narasimhan, R., Nair, A., Griffith, D.A., Arlbjørn, J.S. and Bendoly, E. (2009), "Lock-in situations in supply chains: a social exchange theoretic study of sourcing arrangements in buyer–supplier relationships", *Journal of Operations Management*, Vol. 27 No. 5, pp. 374-389.

Noordewier, T.G., John, G. and Nevin, J.R. (1990), "Performance outcomes of purchasing arrangements in industrial buyer-vendor relationships", *The Journal of Marketing*, Vol. 54 No. 4, pp. 80-93.

Patnayakuni, R., Rai, A. and Seth, N. (2006), "Relational antecedents of information flow integration for supply chain coordination", *Journal of Management Information Systems*, Vol. 23 No. 1, pp. 13-49.

Peng, D.X., Verghese, A., Shah, R. and Schroeder, R.G. (2013), "The relationships between external integration and plant improvement and innovation capabilities: the moderation effect of product clockspeed", *Journal of Supply Chain Management*, Vol. 49 No. 3, pp. 3-24.

Pfeffer, J. (1987), "A resource dependence perspective on intercorporate relations", *Intercorporate Relations: The Structural Analysis of Business*, Vol. 1 No. 1, pp. 25-55.

Pfeffer, J. and Salancik, G.R. (2003), *The External Control of Organizations: A Resource Dependence Perspective*, 2nd ed., Stanford Business Books, Stanford.

Ramirez, M.J., Roman, I.E., Ramos, E. and Patrucco, A.S. (2020), "The value of supply chain integration in the Latin American agri-food industry: trust, commitment, and performance outcomes", *The International Journal of Logistics Management*, Vol. 32 No. 1, pp. 381-301.

Raveendran, M., Silvestri, L. and Gulati, R. (2020), "The role of interdependence in the micro-foundations of organization design: task, goal, and knowledge interdependence", *Academy of Management Annals*, Vol. 14 No. 2, pp. 828-868.

Richey, R.G., Daugherty, P.J., Genchev, S.E. and Autry, C.W. (2004), "Reverse logistics: the impact of timing and resources", *Journal of Business Logistics*, Vol. 25 No. 2, pp. 229-250.

Richey, R., Genchev, S.E. and Daugherty, P.J. (2005), "The role of resource commitment and innovation in reverse logistics performance", *International Journal of Physical Distribution and Logistics Management*, Vol. 35 No. 4, pp. 233-257.

Richey, R.G. Jr, Musgrove, C.F., Gillison, S.T. and Gabler, C.B. (2014), "The effects of environmental focus and program timing on green marketing performance and the moderating role of resource commitment", *Industrial Marketing Management*, Vol. 43 No. 7, pp. 1246-1257.

Rinehart, L.M., Eckert, J.A., Handfield, R.B., Page, T.J. and Atkin, T. (2004), "An assessment of supplier—customer relationships", *Journal of Business Logistics*, Vol. 25 No. 1, pp. 25-62.

Rosenzweig, E.D., Roth, A.V. and Dean, J.W. (2003), "The influence of an integration strategy on competitive capabilities and business performance: an exploratory study of consumer products manufacturers", *Journal of Operations Management*, Vol. 21 No. 4, pp. 437-456.

Schoenherr, T. and Swink, M. (2012), "Revisiting the arcs of integration: cross-validations and extensions", *Journal of Operations Management*, Vol. 30 Nos 1-2, pp. 99-115.

Scott, C. and Westbrook, R. (1991), "New strategic tools for supply chain management", *International Journal of Physical Distribution and Logistics Management*, Vol. 21 No. 1, pp. 23-33.

Shah, R., Goldstein, S.M. and Ward, P.T. (2002), "Aligning supply chain management characteristics and interorganizational information system types: an exploratory study", *IEEE Transactions on Engineering Management*, Vol. 49 No. 3, pp. 282-292.

Shields, K. and Malhotra, M.K. (2008), "Manufacturing managers' perceptions of functional power in manufacturing organizations", *International Journal of Operations and Production Management*, Vol. 28 No. 9, pp. 858-874.

Stank, T., Crum, M. and Arango, M. (1999), "Benefits of interfirm coordination in food industry supply chains", *Journal of Business Logistics*, Vol. 20 No. 2, p. 21.

Stevens, G.C. (1989), "Integrating the supply chain", *International Journal of Physical Distribution and Logistics Management*, Vol. 19 No. 8, pp. 3-8.

Swink, M., Narasimhan, R. and Wang, C. (2007), "Managing beyond the factory walls: effects of four types of strategic integration on manufacturing plant performance", *Journal of Operations Management*, Vol. 25 No. 1, pp. 148-164.

Tarifa-Fernandez, J. and De Burgos-Jiménez, J. (2017), "Supply chain integration and performance relationship: a moderating effects review", *The International Journal of Logistics Management*, Vol. 28 No. 4, pp. 1243-1271.

Tsanos, C., Zografos, G.K. and Harrison, A. (2014), "Developing a conceptual model for examining the supply chain relationships between behavioural antecedents of collaboration, integration, and performance", *The International Journal of Logistics Management*, Vol. 25 No. 3, pp. 418-462.

van der Vaart, T., Pieter van Donk, D., Gimenez, C. and Sierra, V. (2012), "Modelling the integration-performance relationship: collaborative practices, enablers, and contextual factors", *International Journal of Operations and Production Management*, Vol. 32 No. 9, pp. 1043-1074.

Vijayasarathy, L.R. (2010), "Supply integration: an investigation of its multi-dimensionality and relational antecedents", *International Journal of Production Economics*, Vol. 124 No. 2, pp. 489-505.

Wang, M., Zhang, Q., Wang, Y. and Sheng, S. (2016), "Governing local supplier opportunism in China: moderating role of institutional forces", *Journal of Operations Management*, Vol. 46, pp. 84-94.

Whipple, J.M. and Russell, D. (2007), "Building supply chain collaboration: a typology of collaborative approaches", *The International Journal of Logistics Management*, Vol. 18 No. 2, pp. 174-196.

Wiengarten, F., Humphreys, P., Gimenez, C. and McIvor, R. (2016), "Risk, risk management practices, and the success of supply chain integration", *International Journal of Production Economics*, Vol. 171, pp. 361-370.

Wiengarten, F., Li, H., Singh, P.J. and Fynes, B. (2019), "Re-evaluating supply chain integration and firm performance: linking operations strategy to supply chain strategy", *Supply Chain Management: An International Journal*, Vol. 24 No. 4, pp. 540-559.

Williams, B.D. and Waller, M.A. (2010), "Creating order forecasts: point-of-sale or order history?", *Journal of Business Logistics*, Vol. 31 No. 2, pp. 231-251.

Williamson, O.E. (1979), "Transaction-cost economics: the governance of contractual relations", *The Journal of Law and Economics*, Vol. 22 No. 2, pp. 233-261.

Wong, W.P., Sinnandavar, C.M. and Soh, K.L. (2021), "The relationship between supply environment, supply chain integration and operational performance: the role of business process in curbing opportunistic behaviour", *International Journal of Production Economics*, Vol. 232, 107966.

Wu, W.Y., Chiag, C.Y., Wu, Y.J. and Tu, H.J. (2004), "The influencing factors of commitment and business integration on supply chain management", *Industrial Management and Data Systems*, Vol. 104 No. 4, pp. 322-333.

Yao, Y.H.J, Fawcett, A.M. and Fawcett, S.E. (2013), "Awareness is not enough: commitment and performance implications of supply chain integration", *International Journal of Physical Distribution and Logistics Management*, Vol. 43 No. 3, pp. 205-230.

Yang, J., Wang, J., Wong, C.W. and Lai, K.H. (2008), "Relational stability and alliance performance in supply chain", *Omega*, Vol. 36 No. 4, pp. 600-608.

Young-Ybarra, C. and Wiersema, M. (1999), "Strategic flexibility in information technology alliances: the influence of transaction cost economics and social exchange theory", *Organization Science*, Vol. 10 No. 4, pp. 439-459.

Zailani, S. and Rajagopal, P. (2005), "Supply chain integration and performance: US versus East Asian companies", *Supply Chain Management: An International Journal*, Vol. 10 No. 5, pp. 379-393.

Zhang, M. and Huo, B. (2013), "The impact of dependence and trust on supply chain integration", *International Journal of Physical Distribution and Logistics Management*, Vol. 43 No. 7, pp. 544-563.

Zhang, Z., Hu, D. and Liang, L. (2021), "The impact of supplier dependence on suppliers' CSR: the moderating role of industrial dynamism and corporate transparency", *Journal of Purchasing and Supply Management*, Vol. 27 No. 5, 100702.

Zhao, X., Huo, B., Flynn, B.B. and Yeung, J.H.Y. (2008), "The impact of power and relationship commitment on the integration between manufacturers and customers in a supply chain", *Journal of Operations Management*, Vol. 26 No. 3, pp. 368-388.

Zhao, G., Feng, T. and Wang, D. (2015), "Is more supply chain integration always beneficial to financial performance?", *Industrial Marketing Management*, Vol. 45, pp. 162-172.

Further reading

Chaudhuri, A., Boer, H. and Taran, Y. (2018), "Supply chain integration, risk management and manufacturing flexibility", *International Journal of Operations and Production Management*, Vol. 38 No. 3, pp. 690-712.

Singh, P.J. and Power, D. (2009), "The nature and effectiveness of collaboration between firms, their customers, and suppliers: a supply chain perspective", *Supply Chain Management: An International Journal*, Vol. 14 No. 3, pp. 189-200.

Yu, Y., Huo, B. and Zhang, Z.(J). (2021), "Impact of information technology on supply chain integration and company performance: evidence from cross-border e-commerce companies in China", *Journal of Enterprise Information Management*, Vol. 34 No. 1, pp. 460-489.

Appendix
Survey items

Customer integration (1 – Strongly Disagree; 5 – Strongly Agree)

ci_1 – The link with our major customers is continuously reinforced by information networks

ci_2 – Customer's ordering is essentially developed by computerization

ci_3 – We carry out exhaustive follow ups with our major customers

ci_4 – We have a high level of periodical contacts with our major customers

ci_5 – We share reliable information and point of sale information with our major customers

Customer dependence (1 – Strongly Disagree; 5 – Strongly Agree)

cd_1 – It is very important for our organization to maintain the relationship with our major customer/s

cd_2 – A strong cooperative relationship must be maintained between our firm and our major customer/s for us to remain competitive in our industry

cd_3 – Our firm's long-term strategy depends on maintaining a good, healthy relationships with our major customer/s

cd_4 – When developing our firm's strategy, we consider our major customer/s as a large part of the picture

Supplier integration (1 – Strongly Disagree; 5 – Strongly Agree)

si_1 – We exchange information with supplier through information technologies

si_3 – We share our production plan with our suppliers

si_4 – We share our demand forecast with our suppliers

si_5 – We help our major suppliers to improve their processes to better meet our needs

Supplier dependence (1 – Strongly Disagree; 5 – Strongly Agree)

sd_1 – It is very important for our organization to maintain the relationship with our major supplier/s

sd_2 – A strong cooperative relationship must be maintained between our firm and our major supplier/s for us to remain competitive in our industry

sd_3 – Our firm's long-term strategy depends on maintaining a good, healthy relationships with our major supplier/s

sd_4 – When developing our firm's strategy, we consider our major supplier/s as a large part of the picture

Resource commitment (1 – Strongly Disagree; 5 – Strongly Agree)

rc_1 – My firm offers technological resources to implement external relationships (included electronic data exchange, customer and supplier relationships management)

rc_2 – My firm offers managerial resources to implement external relationships (included the training, skills, experience and knowledge of the employees about the establishment of external relationships)

rc_3 – My firm offers or has financial resources to implement external relationships

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