

Guanxi and operational performance: The mediating role of supply chain integration

Abstract

Purpose – The purpose of this study is to extend prior supply chain research by empirically exploring the relationship among guanxi, supply chain integration (SCI), and operational performance. More specifically, this study investigates the mediating role of SCI.

Design/methodology/approach – Ordinary least square regression is used to analyse survey data collected from 126 automobile manufacturers in China.

Findings – The results reveal a significant positive relationship between guanxi and SCI, and that SCI is significantly and positively related to operational performance. Our findings further suggest that guanxi indirectly affects operational performance through SCI.

Practical implications – The empirical findings imply that it is vital for managers to recognize the important mediating role of dynamic SCI capabilities.

Original/value – As a fundamental Chinese cultural norm, guanxi can be critical in a supply chain context. Although previous research has identified the importance of guanxi and SCI in improving firm performance, far less attention was given to the study of the mediating effect of SCI on the guanxi–performance relationship. This study thus fulfils the research gap by providing an initial empirical examination of the mediating role of SCI in China’s automotive industry.

Keywords Guanxi; Supply chain integration; Operational performance; China

Paper type Research paper

1. Introduction

In recent years, there has been an increasing interest in examining the importance of supply chain integration (SCI) capabilities in improving firm performance of manufacturers in China (e.g., Flynn et al., 2010; Huo, 2012; Yu, 2015; Yu et al., 2013). However, previous research has yielded conflicting findings on the relationship between SCI and firm performance, which indicates an important research gap that demands further investigation (Flynn et al., 2010). The SCI literature (e.g., Zhao et al., 2008; Zhao et al., 2011) suggests that SCI patterns, in the context of Chinese manufacturing industry, are greatly dependent on antecedent aspects such as *guanxi*, relationship commitment, and trust. Chinese national culture is very specific and failing to understand its nuances may lead to supply chain problems (Lyles et al., 2008). As one of the key elements to successful business relationships in China (Fan, 2002; Luo et al., 2012; Su et al., 2007), *guanxi* can be defined as interpersonal and inter-organisational relationships and the granting of preferential treatment to business partners in exchange for favours and obligations (Fan, 2002; Lee et al., 2001; Park and Luo, 2001; Zhao et al., 2006). However, studies that demonstrate a relationship between *guanxi* and SCI are lacking. Accordingly, our study seeks to understand the importance of *guanxi* in a supply chain context.

In a supply chain context, respecting and using *guanxi* appropriately can be critical (Lee and Humphreys, 2007; Lyles et al., 2008). According to the resource-based view (RBV) of the firm, it has been widely acknowledged that *guanxi* constitutes a key strategic resource influencing firm performance (Chen et al., 2011; Peng and Luo, 2000). The RBV suggests that sustainable competitive advantage stems from firm resources and capabilities (Corbett and Claridge, 2002). While studies on the role of *guanxi* in Chinese inter-organisational business practices have emerged (e.g., Cai et al., 2010; Cheng et al., 2012; Lee and Humphreys, 2007), none of these studies have empirically investigated the effect of *guanxi* on SCI from a supply chain perspective. Further, previous research has argued that *guanxi*, as a fundamental Chinese cultural norm, appears to offer an interesting vehicle for exploring the antecedent factors that influence the development of SCI to accommodate cultural considerations in the Chinese context (Cheng et al., 2012; Lee and Humphreys, 2007). Despite this argument, research on the effect of *guanxi* in supply chain relationships in China is still in its infancy (Cheng et al., 2012; Zhao et al., 2006), and previous studies that have examined the importance of *guanxi* in developing SCI are fairly rare (Cheng et al., 2012; Lee and Humphreys, 2007). Thus, the present study has the aim of

fulfilling the research gap by empirically investigating the effect of guanxi on SCI and operational performance.

Although empirical studies (e.g., Lee et al., 2001; Luo et al., 2012; Luo and Chen, 1997; Park and Luo, 2001) have identified the importance of guanxi in improving firm performance, the relationship between guanxi and firm performance has not been fully explored (Fan, 2002; Luo et al., 2012; Nie et al., 2011), and the focus has primarily been on firm performance as a direct outcome of guanxi. Yet, there are a number of variables (such as building strategic collaboration with trading partners) that may lead to performance differentials (Zhao et al., 2008; Zhao et al., 2011). Further, some researchers have argued that with China's economic development and modernization, and great changes in China's social structure since the early 1980s, the importance of guanxi has gradually diminished (Cai et al., 2010; Fan, 2002; Nie et al., 2011). China's manufacturing industry has become increasingly competitive, and to address the rapidly changing business environments, manufacturers in China became increasingly focused on developing dynamic SCI capabilities such as cross-functional integration and strategic cooperation with customers and suppliers (Huo, 2012; Yu, 2015; Yu et al., 2013; Zhao et al., 2011). Accordingly, we draw upon the dynamic capability view (DCV) (Eisenhardt and Martin, 2000; Teece et al., 1997) to examine SCI and its mediating role. The DCV suggests that firms need to develop new organisational capabilities to identify business opportunities and to respond quickly in order to survive in dynamic and competitive environments (Eisenhardt and Martin, 2000). Previous research (e.g., Luo et al., 2012; Standifird and Marshall, 2000) has argued that guanxi-based business practices provide certain transaction cost advantages in China, but there is no convincing evidence to support how and to what extent (such as mediation effect) guanxi is beneficial to firm performance (Fan, 2002), especially in a supply chain context. According to the DCV, it can be argued that guanxi is a necessary, but largely insufficient resource for enabling firms to achieve superior performance. Thus, complementing the RBV, our study uses the DCV to explore whether the effect of guanxi on operational performance is *mediated* by the development of SCI, which will provide an initial empirical examination of the *mediating* effect of dynamic SCI capabilities.

We tested our theoretical model using survey data collected from automotive manufacturing firms in China for several main reasons. First, relationship management in the supply chain is of particular interest in China, whose collectivism culture and emphasis on

guanxi provide a fertile ground for investigating the effects of guanxi on SCI and operational performance (Zhao et al., 2011). Second, the automobile industry, as a networked industry, is in an advanced stage of implementing integrated supply chains, and automotive supply chains and operational structures have been well documented in previous research (Benton and Maloni, 2005; Wong et al., 2011; Yu et al., 2014). Automotive production is one of the most complex and diverse manufacturing activities in the world as an automobile is composed of approximately 15,000 parts (Shin et al., 2000; Oliver et al., 2008). It is virtually impossible for an individual firm in the automotive industry to possess all the technical expertise and capabilities needed to develop and produce a complex product like a car (Lockstrom et al., 2010; Wagner et al., 2009). Effective supply chain management (SCM) such as buyer–supplier partnership management and supplier integration is critical to success in the automotive industry (Lettice et al., 2010; Lockstrom et al., 2010). Thus, given these two elements and given our research objectives, China’s automotive industry provides a particularly interesting context for our study to examine the effect of guanxi on operational performance by considering the mediating effect of SCI.

This study will make a contribution to both theory and practice. From a theoretical perspective, we draw upon the RBV to examine guanxi as a firm resource (Chen et al., 2011; Gu et al., 2008) that strengthens the development of SCI. Further, in accordance with the DCV, we view SCI as a firm’s dynamic capability (Huo, 2012), and investigate its mediating effect on the guanxi–performance relationship. To our knowledge, the proposed relationships have not yet been studied in the literature. From a practical perspective, the findings from this study provide practical guidelines for managers to recognize the important mediating role of dynamic SCI capabilities in rapidly changing business environments.

2. Literature review and hypothesis development

In this study, we adopt the RBV and DCV perspectives to examine guanxi as a key strategic resource, and SCI as a key dynamic capability. These theories represent complementary rather than competing views.

2.1. Resource-based view (RBV) and dynamic capability view (DCV)

The RBV is an influential framework for understanding how sustainable competitive advantage stems from firm resources and capabilities (Barney, 1991; Corbett and Claridge, 2002).

A key distinction has emerged in the RBV literature between resources and capabilities (Grant, 1991). In general, a firm's resources include tangible and intangible assets that could be put into the production process (Amit and Schoemaker, 1993; Grant, 1991). Because few resources are productive on their own, cooperation and coordination of teams of resources is required to perform productive activity (Grant, 1991). Capabilities refer to "a firm's capacity to deploy resources, usually in combination, using organizational processes, to effect a desired end" (Amit and Schoemaker, 1993, p. 35). The RBV literature suggests that resources are the source of a firm's capabilities; however, capabilities are the main source of its competitive advantage (Grant, 1991). The RBV is a major theoretical perspective for examining the importance of guanxi (Chen et al., 2011; Peng and Luo, 2000). A large body of research has viewed guanxi as a critical firm resource that enables firms to induce cooperation and govern relationships efficiently, which can bring strategic implications and competitive advantage to the firm by providing access to resources of other business members (Chen et al., 2011; Gu et al., 2008; Park and Luo, 2001; Peng and Luo, 2000).

However, the mere possession of appropriate bundles of specific resources is necessary but insufficient for sustainable competitive advantage in environments characterized by rapid and unpredictable market change (Eisenhardt and Martin, 2000; Teece et al., 1997). Complementing the RBV, the DCV suggests that firms need to develop new organisational capabilities to identify business opportunities and to respond quickly in order to survive in dynamic and competitive environments (Eisenhardt and Martin, 2000). Teece et al. (1997, p. 516) define dynamic capability as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments". Over the past decade, the significance of guanxi has gradually decreased due to the economic development and cultural change in China (Cai et al., 2010; Nie et al., 2011). In the new business environment, the focus of competition has shifted from independent firms to supply chains. To survive in a rapidly changing business environment, firms need to build SCI capabilities (Huo, 2012; Wong et al., 2011). A large body of research has viewed SCI as a firm's dynamic capability to respond to environmental uncertainty (Flynn et al., 2010; Huo, 2012; Wong et al., 2011). As a dynamic capability, SCI can enable firms to acquire and absorb external knowledge, and to develop strategic routines for supply chain members in different competitive environments (Huo, 2012).

Thus, in this study we draw on the DCV to view SCI as a core dynamic capability that can generate sustainable competitive advantages for firms operating in highly competitive markets.

Drawing upon the RBV and DCV, this study therefore identifies guanxi as a firm resource and SCI as a dynamic capability, and examines their impacts on operational performance improvement. Figure 1 describes the conceptual framework of this study.

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2.2. Guanxi

Guanxi is deeply embedded in China's culture and is also important in the Chinese business communities (Cheng et al., 2012; Park and Luo, 2001). Guanxi refers to an interwoven network of informal interpersonal relationships and exchanges of favours, which has an important effect on social attitudes and business practices in Chinese society (Zhang and Zhang, 2006; Park and Luo, 2001). Researchers (e.g., Ambler, 1994; Perks et al., 2009; Wu and Chiu, 2016; Zhang and Zhang, 2006) have stated that guanxi differs from Western perceptions of relationships. There is an unwritten rule of building interpersonal relationships first in the Chinese communities and, only if successful, commercial transactions will follow (Ambler, 1994). However, Westerners normally build transactions first and, if they are successful, a relationship will ensue (Perks et al., 2009).

Doing business in China is interpersonal and cooperative (Su et al., 2007). Researchers have stated that business and personal relationships cannot be separated from each other in the Chinese business context (Perks et al., 2009). Guanxi can be transferred from the individual level to the corporate level (Luo et al., 2012; Park and Luo, 2001). Guanxi can become a valuable asset at the organizational level when personal relationships are dedicated to and used by the organization through the strong relationships among employees such as key managers (Park and Luo, 2001; Zhang and Zhang, 2006). Inter-organisational guanxi refers to the aggregate of interpersonal relationships between organizations (Chen et al., 2011; Park and Luo, 2001). Park and Luo (2001) further suggest that inter-organizational guanxi (guanxi hu) with the business community (such as buyers, suppliers and competitors) is built upon and expanded through personal relationships.

The Chinese guanxi philosophy refers to the social network of personal relationships and the strategic cooperative networks with trading partners (such as suppliers and customers)

(Hingley et al., 2009). In the present study, we define guanxi as interpersonal and inter-organisational relationships and exchanges of favours and obligations established for the purpose of conducting supply chain activities (Park and Luo, 2001; Peng and Luo, 2000; Su et al., 2007). This definition, from a supply chain perspective, views guanxi as interpersonal and inter-organisational network ties that influence the extent of integration, including information sharing and strategic cooperation with customers and suppliers (Cai et al., 2010). According to the RBV, guanxi networks are important to build SCI capabilities, which subsequently influences operational performance of automotive manufactures in China.

2.3. Supply chain integration (SCI)

To survive in highly dynamic competitive environments, firms need to make their supply chains both integrated and aligned through cross-functional integration and external integration with supply chain partners (Flynn et al., 2010; Lee, 2004). In accordance with the DCV, we view SCI as a dynamic capability that can deliver significant competitive advantage for firms operating in a rapidly changing environment (Huo, 2012; Teece et al., 1997). Supply chain integration (SCI) refers to “the degree to which a firm can strategically collaborate with its supply chain partners and collaboratively manage the intra- and inter-organization processes to achieve effective and efficient flows of product and services, information, money and decisions with the objective of providing maximum value to customers at low cost and high speed” (Zhao et al., 2008, p. 374). Cross-functional integration within a firm involves real-time data and information sharing across business functions, and strategic coordination of logistics activities with other functional departments (Flynn et al., 2010; Frohlich and Westbrook, 2001; Jacobs et al., 2016; Seo et al., 2014; Yu, 2015; Wong et al., 2011; Zhao et al., 2011). External integration with customers and suppliers encompasses information sharing and strategic collaboration between a focal firm and its supply chain partners such as upstream suppliers and downstream customers, which will enable the firm to create greater value through a collaborative supply chain process (Flynn et al., 2010; Frohlich and Westbrook, 2001; Jacobs et al., 2016; Seo et al., 2014; Swink et al., 2007; Yu et al., 2013; Zhao et al., 2011). It has been argued that SCI can be viewed as a multidimensional construct, which includes internal, customer and supplier integration (Flynn et al., 2010; Wong et al., 2011). However, it has been equally suggested that SCI can be measured as a unidimensional construct, and it should be analysed as such (Vickery

et al., 2003). Accordingly, consistent with Rosenzweig et al. (2003) and Vickery et al. (2003), in this study we conceptualise SCI as a unidimensional construct, which focuses on data integration across functional departments and information sharing with customers and suppliers. As a dynamic capability, SCI enables firms to achieve superior business performance in the increasingly dynamic competitive environments.

2.4. Guanxi and SCI

The RBV literature asserts that resources are important for a firm to build organizational capabilities (Grant, 1991). Consistent with the RBV, guanxi can be viewed as an intangible and valuable firm resource that promotes inter-firm collaboration (Chen et al., 2010). The RBV suggests that isolating mechanisms such as social complexity make firm resources harder to imitate (Dierickx and Cool, 1989). Drawing upon the RBV, researchers (e.g., Chen et al., 2011; Lee and Humphreys, 2007; Peng and Luo, 2000) have viewed organisational guanxi as an intangible asset and a strategic tool that helps organizations facilitate business operations and build trust-based relationships. The intricacies of guanxi-driven networks may therefore significantly reduce opportunistic behaviour between buyer and seller firms and promote inter-firm collaboration to yield supply chain operational improvements (Chen et al., 2010). In China, guanxi is necessary in the absence of institutions that sanction or provide incentives for cooperative behaviours (Cheng, 2011; Chris and Liu, 2008). Lu (2007) states that guanxi networks are advantageous to information sharing and collaboration and trust-based relationship building between suppliers and buyers. Previous work has emphasized the importance of guanxi, where external guanxi partners are chosen for their effectiveness in ensuring a long-term success in China (e.g., Lee et al., 2001; Pearce and Robinson, 2001). In other words, guanxi is a cultural value that facilitates and promotes integration (Chen et al., 2010). To achieve supply chain success, collaborative behaviour and activities (such as interorganisational guanxi) need to be promoted to build value-based relationships among members (Wang and Wei, 2007; William and Diana, 2007). A high degree of value-based collaborations between supply chain partners (such as customers and suppliers) enables better knowledge sharing and collaboration and consequently competitive advantages for each party (Cheng, 2011).

Recently, several empirical studies (e.g., Cai et al., 2010; Cheng et al., 2012; Lee and Humphreys, 2007) have identified that guanxi has an important influence on supply chain

management, for example, leading to a closer supplier partnership. Although Liu et al. (2009) do not directly examine guanxi, their study reports that guanxi-related trust and relational norms are powerful in effectively governing buyer–supplier partnerships and even more so in nourishing long-term relationship performance. Cai et al. (2010) investigate the effects of the importance of guanxi on the development of trust and information integration between buyers and suppliers. They find that a guanxi network has a direct and positive impact on information sharing. Cheng et al. (2012) find that guanxi development significantly improves communication between buyers and suppliers. Lu et al. (2009) examine the effects of guanxi networks in the Chinese agribusiness sector and find that the guanxi networks show positive contributions to buyer-seller relationship development in China’s vegetable sector. Lee and Humphreys (2007) investigate the role of guanxi in the adoption of strategic purchasing and supplier development practices. They find that firms with a high level of guanxi are more likely to adopt strategic purchasing, supplier development and outsourcing, and that the strong emphasis of guanxi leads to the development of closer and more integrated supplier relationships. Based on the foregoing arguments and theoretical perspective outlined, we posit the following hypothesis.

H1: Guanxi has a significant positive effect on SCI.

2.5. SCI and operational performance

Organizational capabilities are the main source of competitive advantage (Grant, 1991). The importance of SCI in improving firm performance has been conceptually and empirically addressed in the literature and has become well accepted by researchers (Flynn et al., 2010; Wong et al., 2011; Yu et al., 2013). According to the DCV, as a dynamic capability, SCI enables firms to gain superior operational performance. The benefits of strategic cross-functional coordination and integration with supply chain partners have been recognized to be an important contributor to operational performance improvement (Prajogo and Olhager, 2012; Wong et al., 2011). Effective cooperation among various functional departments (such as R&D, purchasing, manufacturing, and marketing departments) can help firms adapt quickly to changing consumer demands and facilitate operational performance, such as delivery, cost, quality and flexibility (Droge et al., 2004; Huo, 2012; Wong et al., 2011). Previous empirical studies (e.g., Flynn et al., 2010; Wong et al., 2011) have found that internal integration is positively related to operational performance. There is growing evidence to suggest that the higher the level of customer and

supplier integration the greater the operational benefits (Frohlich and Westbrook, 2001; Wong et al., 2011; Zailani and Rajagopal, 2005). Building strategic collaboration with customers helps firms reduce business cost and detect demand changes more quickly (Flynn et al., 2010), and supplier integration enhances operational flexibility and responsiveness (Michael and Tan, 2001; Wong et al., 2011). Previous empirical studies (e.g., Droge et al., 2004; Frohlich and Westbrook, 2001; Rosenzweig et al., 2003; Wong et al., 2011) have found a positive association between customer and supplier integration and operational performance. According to the DCV and empirical evidence, we propose that SCI drives superior operational performance. Thus, we offer the following hypothesis.

H2: SCI is positively related to operational performance.

Given the development of H1 and H2, we draw on the RBV and DCV to expect that SCI acts as a mediator in the relationship between guanxi and operational performance. The RBV and DCV assert that resources are the source of a firm's capabilities; capabilities are the main source of its competitive advantage (Grant, 1991). Mediation analysis specifies the existence of a significant intervening mechanism (i.e., SCI capabilities) between the antecedent variable (i.e., guanxi) and the consequent variable (i.e., operational performance) (Baron and Kenny, 1986). We discuss the mediation hypothesis in more detail in the following section.

2.6. Guanxi and operational performance

Drawing upon the RBV, previous research has viewed guanxi as firm's key resources that influence business performance (Wu and Chiu, 2016). Due to the social embeddedness of business relationships in China, guanxi has been identified as an important strategic tool that helps to increase the efficiency and effectiveness of daily business operations (Luo et al., 2012). Guanxi is characterized by mutual trust and a willingness to engage in a process that produces mutual benefits (Lee and Humphreys, 2007). Guanxi helps overcome distrust and build strategic cooperation with supply chain partners such as suppliers and customers, which leads to improved firm performance through reduced transaction costs (Luo et al., 2012; Standifird and Marshall, 2000). Researchers have been paying increasing attention to the importance of guanxi in improving firm performance (Luo et al., 2012). Empirical studies (e.g., Lee et al., 2001; Luo et al., 2012; Pearce and Robinson, 2000; Peng and Luo, 2000) have shown the importance of

guanxi in the Chinese business environment and identified that guanxi is a key factor for business success in China. For example, Luo and Chen (1997) and Park and Luo (2001) identify a strong link between guanxi and firm performance. Based on effect sizes from fifty-three studies encompassing 20,212 organizations, Luo et al. (2012) estimate that the overall effect size of the guanxi–performance relationship is positive and significant, thus endorsing the argument that guanxi does improve firm performance. They find that business ties with customers and suppliers have a greater impact on operational performance than on economic performance.

Despite this evidence, it has been suggested that the effects of guanxi on firm performance have not been fully explored (Fan, 2002; Nie et al., 2011). The DCV also argues that the RBV has not adequately explained how and why certain firms obtain competitive advantage in a dynamic and fast-changing environment (Eisenhardt and Martin, 2000). According to the DCV, guanxi is a necessary but not sufficient resource for firms to achieve superior business performance in an increasingly competitive environment. Some researchers (e.g., Cai et al., 2010; Fan, 2002; Nie et al., 2011) have argued that the importance of guanxi has diminished gradually because of the development of modernization in China and the changes in Chinese social structure. Firms should build dynamic capabilities to match the requirements of a changing environment. For instance, Gu et al. (2008) empirically identify the direct effect of guanxi on brand market performance and its indirect effects mediated through channel capability and responsive capability. Nie et al. (2011) also find that inter-organizational trust and relationship-specific investment are important mediators that can enhance and amplify the effect of guanxi on firm performance. The DCV posits that firms require dynamic capabilities to adapt to rapidly changing environments and shape the ecosystems they occupy (Eisenhardt and Martin, 2000; Teece et al., 1997). Dynamic capabilities enable firms to renew their competences to meet changing market requirements, and include the ability to integrate and reconfigure internal and external organizational skills and resources (Teece et al., 1997). Thus, we draw upon the DCV to explore how and to what extent guanxi is beneficial to operational performance via the development of SCI capabilities such as building internal integration and strategic cooperation with supply chain partners (Cai et al., 2010; Flynn et al., 2010). SCI is a dynamic capability that can evolve and change with the market and competitive responses thus enabling firms to achieve superior operational performance. We argue that the effect of guanxi on operational performance

in a supply chain context is indirect and transmitted via the development of SCI. Thus, we propose the following hypothesis.

H3: Guanxi has a significant positive effect on operational performance, and the effect is mediated by supply chain integration.

3. Data and research method

3.1. Sample and data collection

The data for this study were obtained from a questionnaire survey of automotive manufacturers in China. As noted earlier, the Chinese automobile industry is an excellent data source for this study. Furthermore, the identification of a single industry at a national level allows us to isolate country specific and activity/sector-specific factors that may influence business behaviour, which will ensure high internal validity (Sarkis et al., 2010; Wong et al., 2011). A random sample of 1000 manufacturing plants (e.g., automakers and first- and second-tier automotive suppliers) was drawn from the directory of China's automotive industry manufacturers, which is the official China automotive industry user's guide. Geographically, survey respondents comprise firms in a number of regions and provinces, e.g., Chongqing and Sichuan province, Shanghai and Jiangsu province, Hubei province, and Guangdong province. According to CAAM (2013), most large automobile manufacturing bases in China are located in these geographic areas. For each randomly selected automotive manufacturer, we identified a key informant (e.g., general managers or directors of the selected firms) with the help of guanxi networks (e.g., personal connections with automakers, industrial authorities, and local universities). Following Dillman's (2000) total design method, we contacted key informants by telephone and email in order to obtain their preliminary agreement to participate and asked whether the informants were willing to participate in our survey or introduce another potential informant who may be able to complete the questionnaire. Our key respondents had typically titles such as general manager, director, supply chain manager, operations manager, and sales and marketing manager. Most of our respondents were corporate managers with an average of more than eight years of work experience in the same company. Therefore, it is reasonable to expect that the respondents are knowledgeable about their respective firms so as to ensure the quality of the collected data.

Because the measurement scales adapted from the literature were in English, the original scales were first developed in English and then translated into Chinese, in order to ensure the reliability of the questionnaire (Zhao et al., 2011). A number of questions were reworded to improve the accuracy of the translation and to make it relevant to supply chain practices in China. The questionnaire survey was also sent to academics from the operations and supply chain management areas to review and provide feedback, and then was pilot-tested with several supply chain and production managers at automakers in China (Dillman, 2000; Frohlich, 2002). Based on the feedback, we modified the wording of some questions when there was any confusion or ambiguity. The questionnaires were then sent to 600 informants that agreed to participate in our study. Follow-up calls were made to encourage completion and return of the questionnaires and to clarify any questions that potentially had arisen (Frohlich, 2002; Zhao et al., 2006). After several reminders by phone calls and emails, we received 126 completed and useable questionnaires. The response rate was 21%, which can be regarded as satisfactory in this type of survey-based study (Frohlich, 2002). A profile of the respondents is reported in Table 1.

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3.2. Non-response bias and common method bias

Following the procedure recommended by Armstrong and Overton (1977), non-response bias was assessed by comparing early and late respondents on two important demographic variables (i.e., annual sales and number of employees). The *t*-test results indicate no significant statistical difference ($p < 0.05$) among the category means for number of employees and company sales. Thus, non-response bias is not an issue in this study. Since the survey data for this study were obtained from single respondents, we used Harman's single-factor test of common method bias to ensure that no one general factor accounted for the majority of covariance between the predictor and criterion variables (Hair et al., 2010; Podsakoff et al., 2003). The results of exploratory factor analysis show four distinct factors with eigenvalues above 1.0, and the first factor explained 33.47% of total variance. In addition, following previous empirical research (e.g., Flynn et al., 2010; Huo, 2012; Jacobs et al., 2016; Yu et al., 2013), confirmatory factor analysis (CFA) was applied to Harman's single-factor model. This approach provides a further assessment of common method bias. The model fit indices of χ^2/df ($328.993/90$) = 3.655, CFI = 0.620, IFI = 0.629, TLI = 0.557 and RMSEA =

0.146 were unacceptable (Hair et al., 2010; Hu and Bentler, 1999). In summary, common method variance bias is unlikely to be a problem in this study.

3.3. Measures

We surveyed the literature to identify valid measures for the theoretical constructs. The measures and their sources are presented in Table 2. The measures for *guanxi* were adapted from Cheng et al. (2012) and Su et al. (2007), which focused on close interpersonal relationship among employees and building close *guanxi* networks with suppliers and customers. The measures for *SCI* were adapted from Flynn et al. (2010), which emphasized data integration among internal functions and information sharing with customers and suppliers. All of the items pertaining to *guanxi* and *SCI* were measured on five-point Likert scales from 1 (not at all) to 5 (to a great extent). With regard to *operational performance*, the measures were adapted from Flynn et al. (2010), Lai and Wong (2012), and Wong et al. (2011). Our respondents were asked to assess their performance relative to the performance of main competitors over the last three years in terms of flexibility, delivery, quality and cost. The indicators were measured using a five-point Likert scale (ranging from 1 “much worse than competitors” to 5 “much better than competitors”), where higher values indicated better performance.

Principal component analysis was conducted to determine the main theoretical constructs and their related measurement items, and Varimax rotation with Kaiser Normalization was used to clarify the nature of the underlying constructs for the 15 items of *guanxi*, *SCI* and *operational performance* (Hair et al., 2010; Loehlin, 2004). As shown in Table 2, the values of Kaiser-Meyer-Olkin (KMO) were greater than 0.70, suggesting the suitability of using the factor analysis (Hair et al., 2010). The results of factor analysis also reveal that all factors had eigenvalues greater than one, and the factor loadings of all items were higher than 0.50. Thus, unidimensionality was confirmed (Hair et al., 2010). Furthermore, Cronbach’s alpha is the most widely used objective measure of reliability. Table 2 shows that the Cronbach’s alpha value of all variables were above 0.70, suggesting that the scales were reliable (Hair et al., 2010; Nunnally, 1978).

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The control variables used in this study include firm size, firm age, and firm ownership. Firm size and age were controlled in the conceptual model since larger and older manufacturers

may have more resources for building guanxi networks and possess more fully developed SCI to improve operational performance. In this study, firm size was measured by number of employees, and firm age was evaluated by the number of years since firm formation. Firm ownership was controlled because guanxi may have different effects on the integration between supply chain partners across different ownerships (such as state-owned manufacturers, private Chinese manufacturers, JVs, and foreign-owned manufacturers) (Zhao et al., 2011). Table 3 shows the correlations among the variables.

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4. Results

Following the work of Carey et al. (2011) and Narayanan et al. (2015), ordinary least square (OLS) regression was used to test the proposed guanxi–SCI–performance relationship. OLS regression is an appropriate statistical technique when testing a simple exposure–mediator–outcome relationship (Hair et al., 2010). To test the mediating effect of SCI, we used mediated multiple regression suggested by Baron and Kenny (1986), which is the most commonly used approach to testing mediation (MacKinnon et al., 2007). The results of OLS regression are reported in Table 4. We checked for multicollinearity by computing the variance inflation factor (VIF). In all models, the VIF values are well below the recommended cut-off point of 10.0, suggesting that multicollinearity is unlikely to be a concern in our study (Mason and Perreault, 1991). As illustrated in Table 4, Model 6 reveals a significant positive relationship between guanxi and SCI ($\beta = 0.481, p \leq 0.001$), which lends support for H1. Further, the result of Model 3 shows that SCI is positively and significantly related to operational performance ($\beta = 0.429, p \leq 0.001$), which provides support for H2. The result of Model 2 indicates that guanxi has a significant positive effect on operational performance ($\beta = 0.264, p \leq 0.01$), however Model 3 shows that the effect becomes insignificant ($\beta = 0.057, \text{n.s.}$) when SCI is added. The full set of the results provides support for the fully mediating effect of SCI on the relationship between guanxi and operational performance (Baron and Kenny, 1986). Thus, H3 is supported. We further conducted the Sobel test (Sobel, 1982), which lends additional support for the mediated relationships hypothesized through a change in significance of the indirect effect (Carey et al., 2011). The results of the Sobel test ($t = 3.658, p = 0.0002$) further suggest the effect of guanxi on operational performance is *indirect*, and fully mediated by SCI.

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In addition, to address the potential endogeneity problem, we performed a two-stage least squares (2SLS) regression analysis (Bae and Lawler, 2000; Wooldridge, 2009). The OLS regression used in our study may result in biased estimates because of the potential concern about a reverse causal relationship (Nadkarni et al., 2011; Yuan et al., 2016), e.g., enhanced SCI might reinforce guanxi in the supply chain network and improved operational performance might lead to further development of guanxi. We report the results of the 2SLS regression in Table 4. The results of Model 4a and Model 4b indicate that the 2SLS regression results are generally consistent with the OLS regression results. Thus, we conclude that the proposed conceptual framework is strongly supported by the data.

5. Discussion

5.1. Theoretical implications

Our study extends prior supply chain research by developing and empirically testing a theoretical framework that simultaneously investigates the relationship among guanxi, SCI, and operational performance in the context of the Chinese manufacturing industry. The clarification of the effect of guanxi on SCI is important for extending our understanding of supply chain research since our study for the first time validates the attribute of guanxi in a supply chain network context. Important theoretical implications can be gleaned from our study. Previous research using the RBV has viewed guanxi as a valuable resource affecting firm performance. However, according to the DCV, the RBV has not adequately explained how and why certain firms have competitive advantage in a dynamic competitive environment (Eisenhardt and Martin, 2000). This study provides an even stronger argument for the DCV as a way to explain the significant mediating effect of dynamic SCI capabilities.

This study can be viewed as a refinement and extension of guanxi research. Although researchers have noted that guanxi is a key business practice in Chinese society that has significant effects on business operations, survival, and growth (Park and Luo, 2001), few empirical studies have defined guanxi in a supply chain network context and examined its impact on SCI. Our findings reveal that guanxi has a significant positive effect on SCI in China's automobile industry, which provides empirical support that guanxi networks, as a valuable organizational resource, help break down functional barriers and engender cooperation across

different functional departments as well as overcome distrust and maintain harmonious relationships with suppliers and customers. This finding is consistent with the key principles of the RBV. When a high level of interpersonal relationships exists among employees and inter-organisational guanxi between a manufacturer and its major suppliers and customers, the manufacturer is more likely to develop internal integration and build strategic collaboration with supply chain partners. The findings support the RBV perspective.

Although the importance of SCI in gaining superior firm performance has been well documented in supply chain practices among Chinese manufacturers (e.g., Flynn et al., 2010; Huo, 2012; Yu, 2015; Yu et al., 2013), our study is unique in that it simultaneously investigates the guanxi–SCI–performance relationship. More specifically, based on the DCV, we found that guanxi indirectly affects operational performance via the development of dynamic SCI capabilities. As a dynamic capability, SCI plays an important role in helping manufacturers achieve superior operational performance. This finding is particularly important because our study extends previous SCI research by investigating the importance of SCI in amplifying the guanxi–performance relationship. SCI is characterized by the integration of logistics activities across functional departments within the firm, as well as coordination and collaboration of logistics activities with those of customers and suppliers (Yu et al., 2013; Zhao et al., 2011), which will enable automotive manufactures to achieve superior operational performance.

Instead of re-examining the widely accepted guanxi–performance relationship (e.g., Luo et al., 2012; Pearce and Robinson, 2000; Peng and Luo, 2000), we draw on the DCV to assess the impact of guanxi on operational performance in the context of SCI. Previous research has paid insufficient attention to the mediating effect of SCI on the guanxi–performance relationship. We found an indirect relationship between guanxi and operational performance, which is mediated by SCI, a dynamic capability of a firm. The findings suggest that guanxi is a necessary, but largely insufficient resource for enabling firms to achieve superior operational performance in rapidly changing environments. Due to the modernization and economic reform in China since the early 1980s, the importance of guanxi has been declining in recent years (Cai et al., 2010; Fan, 2002; Nie et al., 2011). Over the past decade, the automotive industry has become one of dynamic markets in China. According to the DCV, the mere possession of guanxi networks is a necessary but insufficient resource to sustain competitive advantage in situations involving rapid and unpredictable market changes (Eisenhardt and Martin, 2000; Teece et al., 1997). Our

findings suggest that there is no benefit to operational performance from guanxi networks unless dynamic SCI capabilities are developed. To address rapidly changing environments, firms should build strategic cross-functional collaboration and work closely with their supply chain partners so that SCI can be improved. Thus, we argue that defining guanxi from a supply chain perspective will help clarify the nature of the guanxi–performance relationship.

5.2. Managerial implications

Our study provides implications for practice. First, it is important for manufacturing managers to strengthen SCI based on guanxi networks in the context of China's automotive industry, which will help their firms achieve superior operational performance. Although guanxi has been widely recognized as an important factor to the success of doing business in China, from a supply chain perspective our study offers more interesting implications that guanxi is important to the development of SCI, due to China's collective culture and the existence of guanxi networks in supply chain relationships. Relationship norms between Chinese and Western business transactions are different. The Chinese believe that prospective business partners should build close interpersonal relationships and, if they are successful, commercial transactions will follow. In contrast, Westerners normally build transactions and, if they are successful, a relationship will ensue (Ambler, 1994; Perks et al., 2009). Guanxi is a critical firm resource that can be deployed to enhance firm competitive advantage because managers can leverage interpersonal networks and inter-organisational guanxi with trading partners to build an integrated supply chain. It is thus critical for businesses in China to understand and properly utilise guanxi in supply chains in order to improve cross-functional integration and strategic cooperation with customers and suppliers.

Second, managers may then use this study and its empirical evidence as a check on the adequacy of their existing guanxi networks and the benefits of their networks in enhancing SCI. However, changes in Chinese social structure and economy may mean the diminishing importance of guanxi (Cai et al., 2010). In a rapidly changing environment, competition has shifted from single companies to supply chains. Our empirical results reveal that managers should not expect guanxi to directly influence operational performance since the effect of guanxi on performance is indirect and mediated through the development of SCI. To address the rapid

economic growth and cultural change in China, firms should focus on developing dynamic SCI capabilities, which deliver financial benefits to the firms.

Third, our results of *guanxi* and its particular characteristics of building a relationship may also apply to Western countries such as Europe and the US. In recent years, networks and relationships building have become critical for the success and survival of organizations around the world (Park and Luo, 2001; Shaalan et al., 2013). However, managers should be aware that the main characteristics of *guanxi* are deeply embedded in the Chinese culture, and cannot be transferred easily elsewhere. To build *guanxi* networks, managers should build a strong interpersonal relationship first, and then a commercial transaction will follow. In a supply chain context, SCM activities cannot be applied independently, for a supply chain as a whole to achieve its competitive advantage, *guanxi*/relationship networks need to be promoted to build cross-functional integration and collaboration among supply chain partners. Our study reveals that it is important for managers to understand the importance of building strategic networks and relationships in the supply chain in order to survive in today's dynamic and competitive environment.

6. Conclusions and limitations

This study makes contributions to the existing literature by providing more interesting and useful results for researchers and practitioners in the context of China's automotive industry. Our study fulfils research gaps by providing an initial empirical examination of the effect of *guanxi* on SCI and the *mediating* effect of SCI on the *guanxi*–performance relationship. In accordance with the RBV and DCV, we conclude that *guanxi*, as a fundamental Chinese cultural norm, is a necessary firm resource that enhances the development of SCI, but largely insufficient resource for firms to achieve superior performance in rapidly changing environments. As a dynamic capability, SCI is significantly and positively related to operational performance. Our empirical findings provide managers with practical advice on how to understand and properly utilise *guanxi* to build dynamic SCI capabilities for operational performance improvement.

While the research has made contributions to research and practice, there are limitations that need to be considered when interpreting the study findings. First, apart from *guanxi*, there are a number of other factors that may also influence the degree of SCI, such as environmental uncertainty, relationship commitment, trust, dependence, and use of power (Wong et al., 2011;

Zhao et al., 2008; Zhao et al., 2011). Future studies may examine the effects of these factors on SCI. Second, although we empirically tested the theoretical framework using survey data collected from a single-industry and single-country, it is not clear whether the relationships we found in this study will be applicable in other industries (textiles and apparel or chemicals and petrochemicals) and countries (e.g., Japan or Germany) (Sarkis et al., 2010). More specifically, empirical studies that compare the development of SCI among Chinese firms versus Western firms will be of particular interest. Future research should test the applicability and also confirm the results obtained in our study in different cultural settings. Despite these limitations, this study paves the way for researchers and practitioners to better understand the relationships among guanxi, SCI and performance.

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Table 1: Demographic characteristics of respondents

	Number of firms	Percentage of samples (%)
Automotive industry		
Automaker	38	30.2
First-tier supplier	68	54.0
Second-tier supplier	12	9.5
Others	8	6.3
Total	126	100.0
Annual sales (in million Yuan)		
Below 10	2	1.6
10-50	12	9.5
50-100	16	12.7
100-500	32	25.4
500-1,000	14	11.1
More than 1,000	50	39.7
Number of employees		
1-99	5	4.0
100-199	16	12.7
200-499	32	25.4
500-999	13	10.3
1,000-4,999	33	26.2
5,000 or more	27	21.4
Firm ownership		
State-owned	26	20.6
Private Chinese	23	18.3
Wholly foreign-owned	25	19.8
Joint venture	52	41.3

Table 2: Factor analysis results of guanxi, supply chain integration and operational performance

Items	Factor loadings	α
1. Guanxi (Cheng et al., 2012; Su et al., 2007)		0.765
Close interpersonal relationship among employees	0.756	
You and your major supplier do favours for each other	0.767	
You and your major supplier have many social interactions	0.779	
You and your major customer do favours for each other	0.761	
Eigenvalue = 2.347; % of variance explained = 58.676%; Kaiser–Meyer–Olkin Measure of Sampling Adequacy = 0.779		
2. Supply chain integration (Flynn et al., 2010)		0.803
Data integration among internal functions	0.692	
We share our demand forecasts with our major supplier	0.831	
We share our inventory levels with our major supplier	0.796	
The level of sharing of market information from our major customer	0.719	
Follow-up with our major customer for feedback	0.691	
Eigenvalue = 2.797; % of variance explained = 55.943%; Kaiser–Meyer–Olkin Measure of Sampling Adequacy = 0.766		
3. Operational performance (Flynn et al., 2010; Lai and Wong, 2012; Wong et al., 2011)		0.825
Quickly respond to changes in market demand	0.703	
The capability to make rapid product mix changes	0.725	
An outstanding on-time delivery record to our customer	0.830	
The lead time for fulfilling customers' orders is short	0.809	
Produce consistent quality products with low defects	0.728	
Reduce waste in production processes	0.589	
Eigenvalue = 3.242; % of variance explained = 54.030%; Kaiser–Meyer–Olkin Measure of Sampling Adequacy = 0.840		

Table 3: Descriptive statistics

	Mean	S.D.	1	2	3
1. Guanxi	4.193	0.502	1.000		
2. Supply chain integration	4.048	0.596	0.477**	1.000	
3. Operational performance	4.017	0.600	0.239**	0.440**	1.000

** $p \leq 0.01$ (2-tailed)

Table 4: Results of hypothesis test (OLS and 2SLS)

	Dependent variable					Mediator	
	Operational performance					Supply chain integration	
	Model 1	Model 2	Model 3	Model 4a (OLS)	Model 4b (2SLS)	Model 5	Model 6
Firm size	-0.149 (-1.498)	-0.138 (-1.437)	-0.240 (-2.633)**	-0.249 (-2.770)**	-0.268 (-2.806)**	0.218 (2.149)*	0.238 (2.689)**
Firm age	-0.183 (-1.595)	-0.231 (-2.072)*	-0.235 (-2.288)*	-0.228 (-2.237)*	-0.237 (-2.289)*	0.099 (0.841)	0.010 (0.096)
Firm ownership	0.114 (1.086)	0.100 (0.989)	0.016 (0.173)	0.013 (0.137)	-0.007 (-0.066)	0.220 (2.048)*	0.195 (2.080)*
Guanxi		0.264 (3.052)**	0.057 (0.621)				0.481 (6.022)***
Supply chain integration			0.429 (4.541)***	0.458 (5.601)***	0.548 (3.303)***		
R^2	0.123	0.191	0.319	0.316	0.216	0.080	0.307
Adjust R^2	0.099	0.162	0.288	0.292	0.188	0.056	0.282
F	5.230**	6.543***	10.284***	12.830***	7.660***	3.263*	12.284***

*** $p \leq 0.001$; ** $p \leq 0.01$; * $p \leq 0.05$.

The numbers in parentheses are t-values.

Figure 1: Research model

