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## The effect of uncertainty avoidance and social trust on supply chain collaboration

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## ABSTRACT

Supply chain collaboration (SCC) is strategically important in today's business world, and the use of inter-organizational systems (IOS) much facilitates SCC. The present study examines: (1) the differential effects of two types of IOS—open and closed—on firms' use of SCC; (2) the impact of a country's uncertainty avoidance and social trust on firms' use of SCC; and (3) the moderating role of uncertainty avoidance and social trust on the firm-level relationships between open/closed IOS and SCC. Using a large dataset from twenty-four countries, a multi-level analysis suggests that, not only uncertainty avoidance and social trust affect SCC directly, but uncertainty avoidance also moderates the relationship between open IOS and SCC at the firm level. These findings are important for the research and practice of SCC, as they provide novel angles for researchers and managers to look at the factors that may affect the success of SCC.

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## 1. Introduction

Increasingly, supply chains are replacing individual firms as the competitive unit in many industries (Kumar, 2001; Swaminathan & Tayur, 2003). Effectively managing resources and collaborations across partnering firms in a supply chain has become the dominant concern. More and more firms have begun to coordinate their production and distribution networks and collaborate with supply chain partners rather than manage their internal resources alone (Baraldi, Gressetvold, & Harrison, 2012; Dyer & Singh, 1998). Supply chain collaboration (SCC)—such as information sharing, collaborative forecasting, and joint new product development—can be a source of strategic advantage (Rai, Patnayakuni, & Seth, 2006; Subramani, 2004). Wal-Mart's success is an excellent example. In the late 1980s, Wal-Mart was only a small retailer. To reduce its inventory level from 30-day to 5-day, Wal-Mart was the leading pioneer in the industry in developing collaborative commerce, using an EDI-based supply chain management system to connect its largest suppliers to its inventory management system. This approach has allowed Wal-Mart to secure its cost leadership in the industry and to establish competitive advantages over its competitors.

Due to the importance of SCC in business practices, previous researchers have investigated SCC-related issues. Mainly two streams of research exist in this domain, one focusing on firm-level factors and the other focusing on country-level factors that can potentially affect the success of SCC. At the firm-level, prior researchers have examined the effect of inter-organizational systems (IOS) on SCC (e.g., Chae, Yen,

& Sheu, 2005; Chatfield & Yetton, 2000; Rai et al., 2006). IOS refers to the application systems that link various business partners, using a public or private telecommunication infrastructure (Robey, Im, & Wareham, 2008). These systems provide the ability for computer-to-computer communication of business transactions and documents. Electronic data interchange (EDI) is one of the earliest IOS technologies. More recently, firms have used XML-based standards such as RosettaNet to provide information flow between suppliers and customers. A significant impact of IOS on SCC would suggest that the technology infrastructure of the firm is an effective predictor of its future success in collaborative activities (e.g., information sharing, and joint new product development) with its supply chain members.

In addition to the firm-level predictors, prior researchers (e.g., Griffith & Myers, 2005; Zhao, Flynn, & Roth, 2007; Zhao, Huo, Selen, & Yeung, 2011) have also compared SCC-related issues across different nations. Zhao et al. (2011), for example, report that for Chinese-controlled companies, relationship commitment has significant impact on collaboration with suppliers and customers. However, for foreign-controlled companies, such effect does not exist. Moreover, Griffith and Myers (2005) show that firm performance is enhanced when US firms establish a low level of information exchange with their US partners while simultaneously establishing a high level of information exchange with their Japanese partners. All these cross-national studies attribute the country-level discrepancies mainly to the differences in cultural value orientations.

Prior studies provide intriguing findings; nevertheless, three gaps exist in this line of literature. First, all these studies use anecdotal evidence from two or three countries. External validity of the findings is questionable with the limited sample size. Second, prior cross-national research usually infers rather than measures culture. According to Hofstede (2001), culture has multiple dimensions, including uncertainty

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avoidance, collectivism/individualism, masculinity/femininity, and power distance. Without measuring the cultural values, research cannot show which dimension of culture is the key attributor for the success of SCC at the firm level. Finally, little research has thus far examined the possible interplay between country- and firm-level factors. A cross-level investigation is of great significance in advancing the research stream because such studies provide novel insights on how country-level factors may set up boundary conditions for the firm-level effects. Studying country-level effects on the firm-level SCC can also advance the understanding of what exact role that specific cultural dimensions play in facilitating or hindering SCC.

This study aims to fill these voids by investigating not only the main effect of relevant cultural values on SCC, but also the interaction between cultural values and firm-level effects. This study centers on uncertainty avoidance and social trust at the country level to examine their direct impact on SCC, as well as their moderating effect on the relationship between IOS and SCC at the firm level. The reason for focusing on the uncertainty avoidance dimension of national culture in this study is that a country's uncertainty avoidance should directly influence the success of SCC. SCC requires relationship-specific investments that involve opportunistic risks (Klein, Rai, & Straub, 2007; Subramani, 2004; Williamson, 1985). Since SCC is accompanied by a lot of behavioral uncertainty, the uncertainty avoidance orientation of a country may serve as an important contextual factor in facilitating or hindering the success of SCC for firms. The nature of SCC suggests that, compared to uncertainty avoidance, other cultural dimensions (i.e., collectivism/individualism, power distance, and masculinity/femininity) are more distal in influencing its success.

In addition to uncertainty avoidance, the study also includes social trust as another important cultural dimension in the model. Social trust influences people's perception of opportunistic risks (Fukuyama, 1995; Yamagishi, Cook, & Watabe, 1998) and serves as an important dimension of cultural values that has direct impact on business decisions that involve opportunistic risks (Uslaner, 2002). Lazzarini, Miller, and Zenger (2008), for example, find that firms in countries with a higher level of social trust are more proactive in seeking new business partners than those in countries with a lower level of social trust. These research findings suggest that social trust is an important cultural dimension that influences SCC.

This study makes several important contributions to both theory and practice. First, the study represents the first attempt to identify the key dimensions of culture that play critical roles in affecting the success of SCC. Extending previous studies on this topic that treat country and culture interchangeably, this study examines unique contributions of specific dimensions of cultural values on SCC and shows that a country's uncertainty avoidance and social trust are the most relevant aspects in culture to affect SCC. These findings open a new way for managers to screen their environment and to develop effective strategies to facilitate their SCC plan. Second, this study breaks IOS into open-IOS and closed-IOS, and simultaneously examines how these two distinct types of IOS may have differential effects on SCC. Third, the study shows that the key dimensions of cultural values can also interplay with firm-level factors in influencing SCC. These findings are new and important to managers, especially when their firms engage in global SCC. The framework suggests that uncertainty avoidance and/or social trust may set boundaries for the success of IOS-based SCC; as a result, one important decision in global SCC is to determine how to manage open IOS and closed IOS differently in different countries.

The structure of the rest of paper is as follows. The paper starts with a literature review on IOS and SCC, and then develops hypotheses about the direct effects of country-level uncertainty avoidance and social trust on the firm-level SCC, as well as their moderating roles in the effects of open/closed IOS on SCC. Afterwards, the paper presents the multi-level analysis and the results. The paper ends with theoretical and practical implications and discussion on limitations and future research directions.

## 2. Literature review

A few studies have investigated the effect of IOS on SCC. For instance, Grover, Teng, and Fiedler (2002) show a positive role of IOS in partially offsetting the negative relationship between transaction costs and inter-firm collaboration. The results suggest that the use of IOS within a supply chain can encourage the commitment to establish collaboration between transaction partners. Subramani (2004) finds that the use of IOS increases inter-firm asset specialty in business processes (e.g., operating processes, administrative processes, and quality-control processes), and inter-firm knowledge specificity in business activities (e.g., competitive analysis, strategy formulation, and new-product development). Rai et al. (2006) report that inter-firm IT infrastructure integration for supply chain management (e.g., data consistency, and IT application integration) can enhance the supply chain process integration in information flow, physical flow, and financial flow. These findings are consistent with the traditional vendors-to-partners view, namely, that the use of IOS may lead to a partner relationship between firms along a supply chain (Bakos & Brynjolfsson, 1993; Clemons, Reddi, & Row, 1993).

Other studies suggest that contextual factors matter in the success of IOS-based SCC. For instance, Chatfield and Yetton (2000) report that only firms with good relationships with their trading partners will make strategic use of the EDI by adopting EDI-enabled joint economic actions and thus gaining strategic payoff. Similarly, Chae et al. (2005) show that the effect of IT on inter-organizational collaboration is the emergent property of the interplay between IT and the existing relationships among partners. IT often reinforces and stabilizes the already existing inter-organizational structures and arrangements. Saeed, Malhotra, and Grover (2011) find that firms at the lower end of SCC configure IOS features to support supplier evaluation and automatic alerts. But firms at the upper end pay greater attention to features associated with systems integration, planning, and forecasting.

This paper extends the existing literature on IOS–SCC in two ways. First, the paper distinguishes between two types of IOS, namely, open IOS and closed IOS, and examines their effect on SCC. Second, the paper focuses on uncertainty avoidance and social trust to understand how national level cultural dimensions may differentially moderate the effect of open/closed IOS on SCC at the firm level.

## 3. Hypothesis development

### 3.1. Country-level hypotheses

Uncertainty avoidance refers to how people feel either uncomfortable or comfortable in novel and unusual situations (Hofstede, Hofstede, & Minkov, 2010). In countries with a high level of uncertainty avoidance, people often try to minimize all kinds of uncertainty by enacting strict laws and rules and by enforcing security measures because they feel anxiety in uncertain situations (Hofstede et al., 2010). To the contrary, in countries with a low level of uncertainty avoidance, people feel more comfortable with uncertain situations and usually tolerate different opinions and behaviors.

Although SCC may provide firms with strategic advantages, SCC also involves certain behavioral uncertainty. In order to make SCC effective, supply chain partners usually need to make relationship-specific investments in supply chain processes (Subramani, 2004). Klein et al. (2007) show that relationship-specific investments are necessary for developing collaborative activities such as sharing strategic information. However, a firm's unilateral relationship-specific investments may result in its partner firms' opportunistic behaviors (Klein, Crawford, & Alchian, 1978; Williamson, 1985). For example, a partner firm may exploit this situation by asking for a lower price. In this case, the focal firm may have no choice but to accept the lower price because the unilateral relationship-specific investments by the firm may have little value if the transaction relationship does not continue.

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