The impact of organizational culture on supply chain integration: a contingency and configuration approach

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Abstract
Purpose – This study aims to bridge the gap in understanding the effects of organizational culture on supply chain integration (SCI) by examining the relationships between organizational cultures and SCI. The extant studies investigating the antecedents of SCI focus mainly on environments, interfirm relationships and other firm-level factors. These studies generally overlook the role of organizational culture. The few studies that do examine the effects of organizational culture on SCI show inconsistent findings.
Design/methodology/approach – By placing organizational culture within the competing value framework (CVF), this study establishes a conceptual model for the relationships between organizational culture and SCI. The study uses both a contingency approach and a configuration approach to examine these proposed relationships using data collected from 317 manufacturers across ten countries.
Findings – The contingency results indicate that both development and group culture are positively related to all three dimensions of SCI. However, rational culture is positively related only to internal integration, and hierarchical culture is negatively related to both internal and customer integration. The configuration approach identifies four profiles of organizational culture: the Hierarchical, Flexible, Flatness and Across-the-Board profiles. The Flatness profile shows the highest levels of development, group and rational cultures and the lowest level of hierarchical culture. The Flatness profile also achieves the highest levels of internal, customer and supplier integration.
Research limitations/implications – This study is subject to several limitations. In theoretical terms, this study does not resolve all of the inconsistencies in the relationship between organizational culture and SCI. In terms of methodology, this study uses cross-sectional data from high-performance manufacturers. Such data cannot provide strong causal explanations, but only broad and general findings.
Practical implications – This study reminds managers to consider organizational culture when they implement SCI. The study also provides clues to help managers in assessing and adjusting organizational culture as necessary for SCI.
Originality/value – This study makes two theoretical contributions. First, by examining the relationships between organizational culture and SCI in a new context, the findings of the study provide additional evidence to reconcile the previously inconsistent findings on this subject. Second, by departing from the previous practice of investigating only particular dimensions of organizational culture, this study adopts a combined contingency and configuration approach to address both the individual and synergistic effects of all dimensions of organizational culture. This more comprehensive approach deepens our understanding of the relationship between organizational culture and SCI.

Keywords Organizational culture, Contingency, Supply chain integration, Competing value framework, Configuration

Paper type Research paper

1. Introduction

Supply chain integration (SCI), or the development of strategic intrafirm and interfirm collaboration along the supply chain (Zhao *et al.*, 2008), has been widely regarded as an important strategy for improving firm performance (Flynn *et al.*, 2010; Frohlich and Westbrook, 2001; Koufteros *et al.*,

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2005; Vickery *et al.*, 2003; Wong *et al.*, 2011). However, the implementation of SCI is not easy, as it requires mutual adaptation and relation-specific investments among supply chain partners, which are often quite complicated and risky (Wu *et al.*, 2004). The strategic management literature indicates that strategic alliances, which are important aspects of SCI (Zhao *et al.*, 2011), have a high failure rate (Das and Teng, 1999; Park and Ungson, 2001; Whipple and Frankel, 2000). The SCI literature also suggests that full integration with suppliers and customers is rare, and the results can be far from ideal (Braunscheidel *et al.*, 2010; Fawcett and Magnan, 2002; Frohlich and Westbrook, 2001). Thus, to facilitate the implementation of SCI, it is necessary to the identify factors involved and their effects on SCI (Fawcett and Magnan, 2002).

Among the possible antecedents of SCI, we are particularly interested in organizational culture, which is defined as the values or beliefs shared by members of an organization (Schein, 2004; Zu *et al.*, 2010). There are two reasons for focusing on organizational culture. First, organizational culture is more intractable than other factors such as technology or information (Fawcett *et al.*, 2008; McCarter *et al.*, 2005). Second, organizational culture plays an important role in supply chain management (SCM) (Braunscheidel *et al.*, 2010; Dowty and Wallace, 2010; Fawcett *et al.*, 2008). Appropriate organizational culture influences the behavior of internal employees in terms of information sharing, teamwork and risk taking (McCarter *et al.*, 2005). Organizational culture also affects interfirm behavior in areas such as relationship skills and trust (Beugelsdijk *et al.*, 2006; Schilke and Cook, 2014). Such organizational culture-related skills are important for SCI success (Fawcett *et al.*, 2008; McAfee *et al.*, 2002; McCarter *et al.*, 2005; Whitfield and Landeros, 2006). When the support of an appropriate organizational culture is absent, firms may not achieve their objectives. For example, because of internal organizational culture clashes, European subsidiaries of Japanese companies have sometimes failed to provide satisfactory delivery service (de Koster and Shinohara, 2006).

Given the importance of organizational culture for SCM, previous studies have extensively examined the relationship between organizational culture and SCI (Braunscheidel *et al.*, 2010; Naor *et al.*, 2008; Zu *et al.*, 2010). Most of these studies have used the competing value framework (CVF) proposed by Quinn and Rohrbaugh (1983) to represent organizational culture. The CVF includes four dimensions, namely, the development, group, hierarchical and rational culture dimensions. Studies based on the CVF establish the links between these various dimensions of organizational culture and the different dimensions of SCI (Braunscheidel *et al.*, 2010; Naor *et al.*, 2008; Zu *et al.*, 2010). Nevertheless, two gaps remain in these extant studies.

First, the findings of the extant studies are not consistent, even though they use similar definitions of group culture. For example, Naor *et al.* (2008) find that group culture is positively related to both supplier and customer involvement, which are two important aspects of SCI. However, Braunscheidel *et al.* (2010) find that group culture is related to neither supplier intergration (SI) nor customer integration (CI). Zu *et al.* (2010) report that hierarchical culture is related to neither customer nor supplier relationships, and Braunscheidel *et al.* (2010) find that hierarchical culture is negatively related to both SI and CI.

Second, the extant studies examine only the individual effects of each different dimension of organizational culture on SCI, rather than the joint effects of these dimensions (Braunscheidel *et al.*, 2010; Naor *et al.*, 2008; Zu *et al.*, 2010). For instance, Braunscheidel *et al.* (2010) examine the individual effects of the four cultural dimensions on SCI separately, without investigating their synergistic effects on organizational culture simultaneously. In fact, this limitation is prevalent in most studies of organizational culture that involve the CVF (Leisen *et al.*, 2002; McDermott and Stock, 1999; Nahm *et al.*, 2004; Prajogo and McDermott, 2005; Stock *et al.*, 2007; Zu *et al.*, 2010). In a recent review of literature on the CVF, Hartnell *et al.* (2011, p. 687) find that most studies using CVF examine only the "culture types' independent association with effectiveness criteria", but not the "synergistic interaction among the values that define an organization's culture" ignore the relationships between closely related cultural dimensions that work together collectively to support or hinder SCM practices (Dowty and Wallace, 2010). This fragmented approach may fail to correctly reflect the true influence of organizational culture in a holistic way (Flynn *et al.*, 2010; Hult *et al.*, 2006; Meyer *et al.*, 1993; Miller, 1986). In the hope of avoiding this problem in the future, many researchers call for further research that uses a configuration approach to consider the interwoven cultural dimensions simultaneously (Detert *et al.*, 2000; Hartnell *et al.*, 2011; Stock *et al.*, 2007; Zu *et al.*, 2010).

This study seeks to address these gaps in previous studies by answering two research questions:

RQ1: How do the four organizational culture dimensions influence SCI individually?

RQ2: How do the four culture dimensions jointly influence SCI?

To answer these questions, we conduct survey research in a new context with high-performance manufacturers (HPMs) in ten countries. With a dataset drawn from the participating HPMs and by taking a contingency approach, we investigate how the four dimensions of organizational culture (development, group, hierarchical and rational culture) are related to the three dimensions of SCI (SI, II and CI). We also intend to clarify these relationships through the use of structural equation modeling (SEM). Then, applying a configuration approach, we aim to identify various organizational culture profiles and investigate how the dimensions of SI, II and CI vary across different culture profiles. By answering our research questions, we contribute to the SCI literature in two ways.

First, we provide more empirical evidence to address the previous inconsistent findings concerning the relationships between organizational cultures and SCI. Our findings on the ways that SCI is influenced by the development, group, rational and hierarchical dimensions of organizational culture serve to complement previous findings (Braunscheidel *et al.*, 2010; Naor *et al.*, 2008; Zu *et al.*, 2010). Second, although previous studies focus only on the independent effects of

different cultural dimensions, we explore how organizational culture profiles (which combine all four cultural dimensions) are related to SCI. As far as we know, this is one of the first studies in the operations management area to use such a configuration approach for identifying different organizational culture profiles and exploring their effects on SCI. Our findings on organizational culture profiles not only clarify the independent effects of cultures but also reveal how different cultures work together to influence SCI, thus extending our understanding of the relationship between organizational cultures and SCI.

The remainder of this study is organized as follows. In the next section, the relevant literature is reviewed, and hypotheses based on the theoretical background are proposed. Following the hypotheses, the research methodology, analyses and results are provided. Finally, our interpretations of the results and our conclusions are presented.

2. Theoretical background and the conceptual model

2.1 Supply chain integration

SCI refers to:

> [. . .] the degree to which an organization strategically collaborates with its supply chain partners and manages intra- and inter-organization processes to achieve effective and efficient flows of products, services, information, money and decisions, with the objective of providing maximum value to its customers" (Zhao *et al.*, 2008, p. 374).

SCI includes both internal and external integration, and external integration can be further classified into CI and SI (Braunscheidel *et al.*, 2010; Flynn *et al.*, 2010; Frohlich and Westbrook, 2001; Narasimhan and Kim, 2002). Internal integration (II) refers to intra-organizational integration processes, and external integration refers to the inter-organizational process of integration with customers and suppliers (Zhao *et al.*, 2011). Such integration within and beyond firm boundaries enables firms to form strategic alliances, share information and work cooperatively (Zhao *et al.*, 2011). Various extant studies have shown that SCI can bring positive outcomes, such as reductions in transaction costs and improvements in operational or financial performance (. Flynn *et al.*, 2010; Frohlich and Westbrook, 2001; Koufteros *et al.*, 2005, 2007; Wong *et al.*, 2011). The importance of SCI calls for studies on the antecedents of such integration.

The extant literature on SCI antecedents can be divided into three main streams. The first stream focuses on environmental effects such as environmental uncertainty (Iyer, 2011; Wong *et al.*, 2011), technological uncertainty (Boon-itt and Wong, 2011; Ragatz *et al.*, 2002) and demand uncertainty (Boon-itt and Wong, 2011). The second stream focuses on the effects that inter-organizational factors such as trust, power and commitment have on the relationships that firms have with their suppliers or customers (Maloni and Benton, 2000; Yeung *et al.*, 2009; Zhao *et al.*, 2008). The third stream focuses on firm-level factors such as strategy (Rodrigues *et al.*, 2004) or information technology (IT) (Paulraj and Chen, 2007; Sanders, 2008; Subramani, 2004). These three kinds of studies all provide insights on the driving factors involved in SCI. However, such studies commonly ignore the influence of cultural factors in SCI implementation (Fawcett *et al.*, 2008)[1]. As SCI is executed by human beings, it is important to know what factors drive managers and employees to integrate with their colleagues within their firms and with their external colleagues such as customers and suppliers across the supply chain. As many studies indicate, organizational culture plays crucial roles in guiding people's behavior, which further influences SCI (Braunscheidel and Suresh, 2009; Braunscheidel *et al.*, 2010; Cadden *et al.*, 2013; Fawcett *et al.*, 2008; McAfee *et al.*, 2002; McCarter *et al.*, 2005; Mello and Stank, 2005; Sambasivan and Yen, 2010). Thus, we explore the specific ways that organizational culture influences SCI.

2.2 Organizational culture and CVF[2]

Organizational culture has long been an important theoretical factor in organization theory (Allaire and Firsirotu, 1984; Denison and Mishra, 1995; Peterson, 2010). However, there is still no consistent definition of organizational culture in the extant literature (Detert *et al.*, 2000; Schein, 2004). Hofstede (2001) regards organization culture as "the differences in the collective mental programming" found among people in different organizations. Schein (2004) argues that culture includes underlying assumptions, espoused values or beliefs and artifacts. He defines organizational culture as:

> [. . .] a pattern of shared basic assumptions that was learned by a group as it solved its problems of external adaptation and II, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems (Schein, 2004, p. 17).

Although these definitions are insightful, they are difficult to further operationalize or to examine empirically. Scholars commonly focus on the value or belief aspects of organizational culture rather than the underlying assumptions or the artifact aspects (Nahm *et al.*, 2004; Schein, 2004). Schein (2004) argues that values are less invisible and less preconscious than basic assumptions and are more decipherable than artifacts, so that values are easier to study (Gregory *et al.*, 2009; Hofstede, 2001; Leidner and Kayworth, 2006; McDermott and Stock, 1999; Naor *et al.*, 2008). Following previous studies, we define organizational culture as the values or beliefs shared by all members of a firm.

Among the various operationalizations of organizational culture as a system of values, the CVF is one of the most popular (Braunscheidel and Suresh, 2009; Gregory *et al.*, 2009; Hartnell *et al.*, 2011; Leisen *et al.*, 2002; Prajogo and McDermott, 2005; Shih and Huang, 2010; Zu *et al.*, 2010). The CVF involves two axes: the flexibility – control and internal – external axes. These axes divide organizational culture into four dimensions, namely, the development, group, hierarchical and rational dimensions (Denison and Spreitzer, 1991; Gregory *et al.*, 2009; Stock *et al.*, 2007; Quinn and Rohrbaugh, 1983; Zu *et al.*, 2010). These dimensions of culture reflect various values, such as long- or short-term orientation (development culture), cooperation and team spirit (group culture), reward systems (rational culture) and centralized or decentralized control (hierarchical culture) (Gregory *et al.*, 2009; Hartnell *et al.*, 2011; Stock *et al.*, 2007; Zu *et al.*, 2010). Following previous studies, we use the CVF to represent organizational culture.

2.3 Contingency and configuration approach

Two approaches are widely used to investigate multidimensional constructs. One approach is the "contingency" approach, which is also called the "dimensional" (Tsui *et al.*, 2006) or "universal" approach (Robinson *et al.*, 2001). This approach directly regresses dependent variables on the various dimensions of culture, assuming that each dimension of the construct has a separate, independent and additive effect on the dependent variables of interest (Robinson *et al.*, 2001; Tsui *et al.*, 2006). Such an assumption of atomistic or independent effects tends to overlook the inter-relationships between dimensions, and this approach may distort any real relationships among the investigated variables (Flynn *et al.*, 2010; Meyer *et al.*, 1993; Tsui *et al.*, 2006). This approach views organizational phenomena in a reductionist way that cannot reflect complicated phenomena holistically.

To address the limitations of the contingency approach, a different approach is proposed, namely, the configuration approach (Miller, 1986). The term configuration refers to the constellation or gestalt of values of different dimensions as they configure in specific ways (Hult *et al.*, 2006; Tsui *et al.*, 2006). The configuration approach is further defined as a research method that builds configurations, either theoretically or empirically (Kraus *et al.*, 2011; Tsui *et al.*, 2006). In contrast to the contingency approach, the configuration approach can achieve parsimony while allowing a rich and complex description of organizational phenomena (Dess *et al.*, 1993). This approach can simultaneously consider both the multiple dimensions of organizational culture and their interrelationships (Hult *et al.*, 2006), thus complementing findings derived from the contingency approach (Flynn *et al.*, 2010; Tsui *et al.*, 2006). In organizational culture research that uses the CVF, the importance of configuration has long been emphasized. Cameron and Quinn (1999) highlight the importance of the organizational culture profile, which is one type of configuration for investigating the four dimensions of the CVF. Unfortunately, most organizational culture studies using the CVF adopt the contingency approach and fail to consider the configuration approach (Braunscheidel *et al.*, 2010; Gregory *et al.*, 2009; Hartnell *et al.*, 2011; Leisen *et al.*, 2002; Naor *et al.*, 2008; Prajogo and McDermott, 2005; Shih and Huang, 2010; Stock *et al.*, 2007; Zu *et al.*, 2010).

2.4 The effects of organizational culture on SCI

We argue that there are two reasons why organizational culture influences SCI. First, as the definition of organizational culture indicates, organizational culture represents the shared values and beliefs of a company (Barney, 1986; Nahm *et al.*, 2004; Schein, 2004). Such values and beliefs define the way a firm conducts business (Barney, 1986). Shared values guide employees in their conduct of both internal operations and external activities, such as the forming of buyer – supplier relationships (Adler *et al.*, 1999; Schilke and Cook, 2014). Thus, organizational culture serves as a foundation for management and operations practices (Braunscheidel *et al.*, 2010). Furthermore, organizational culture is closely related to organizational learning (López *et al.*, 2004). By providing an atmosphere for companies to learn from supply chain partners, organizational culture can facilitate SCI (Hult *et al.*, 2003, 2004; Zhao *et al.*, 2011). Thus, we expect that SCI, as an important aspect of a firm's operational practice, will be significantly influenced by organizational culture.

Second, as the SCI literature suggests, successful SCI requires both the capability and the willingness to integrate (Fawcett *et al.*, 2007; Koufteros *et al.*, 2005; Zhao *et al.*, 2011). A strong capacity for integration allows firms to develop and manage relationships with customers and suppliers and to coordinate cross-functional cooperation, thus enabling firms to integrate their supply chains more easily (Zhao *et al.*, 2011). A willingness for integration in terms of trust and relationship commitment drives firms to proactively integrate both internally and externally, which allows them to engender cooperation more effectively (Cai *et al.*, 2010; Chen *et al.*, 2013; Yeung *et al.*, 2009; Zhao *et al.*, 2008, 2011). The existing literature has established interactive linkages between organizational culture, relationship capability and willingness. With a sample of 102 interfirm relations, Beugelsdijk *et al.* (2006) find that an organizational culture that emphasizes an orientation toward innovation, stability and a long-term perspective is positively related to relationship skills. Similarly, based on data from 171 dyadic strategic alliances, Schilke and Cook (2014) find that clan culture is positively associated with perceived trustworthiness. Thus, organizational culture is related to relationship capability and integration willingness, both of which further influence SCI.

Based on the above discussion, we expect organizational culture to be associated with SCI. In particular, we argue that the four dimensions of organizational culture (the development, group, rational and hierarchical dimensions) are closely related to the three dimensions of SCI (II, CI and SI). Development culture emphasizes future developments and, thus, encourages firms to integrate internal functions, external customers and suppliers for sharing information and providing products or services that adapt to new opportunities (Zahra *et al.*, 2004). Group culture highlights values such as teamwork and cooperation and thus encourages employees to collaborate with internal and external partners (Naor *et al.*, 2008). Rational culture legitimizes the use of incentives to motivate employees toward II and external integration (Braunscheidel *et al.*, 2010; Ellinger, 2000). Unlike the three dimensions just mentioned, however, hierarchical culture emphasizes control and top-down decision-making. These characteristics may suppress employees' motivation to take risks and adapt to changes, which can reduce the extent of SCI (Braunscheidel *et al.*, 2010). Thus, we expect that the four culture dimensions each influence the three SCI dimensions in different ways. Moreover, the four culture dimensions may interact to collectively influence SCI. For example, when both development and group culture are emphasized, the group's spirit of teamwork may accelerate the development culture-driven process of SCI. Development culture can also enhance the effect of group culture on SCI by highlighting the significance of SCI for the future success of the firm. Thus, the four dimensions of organizational culture can jointly influence SCI. In summary, the development, group, hierarchical and rational dimensions of culture can influence SCI both individually and jointly. We provide a conceptual model in

Figure 1 to explain the relationships between organizational culture and SCI.

3. Hypotheses development

3.1 Development culture and SCI

Development culture refers to the value of long-term goals shared by the members of a firm. When firms have a strong development culture, employees pay more attention to activities that can create long-term value (Zahra *et al.*, 2004). Thus, SCI, as an important practice for creating long-term value for firms (Koufteros *et al.*, 2005, 2007), is more likely to be achieved in firms that emphasize development culture.

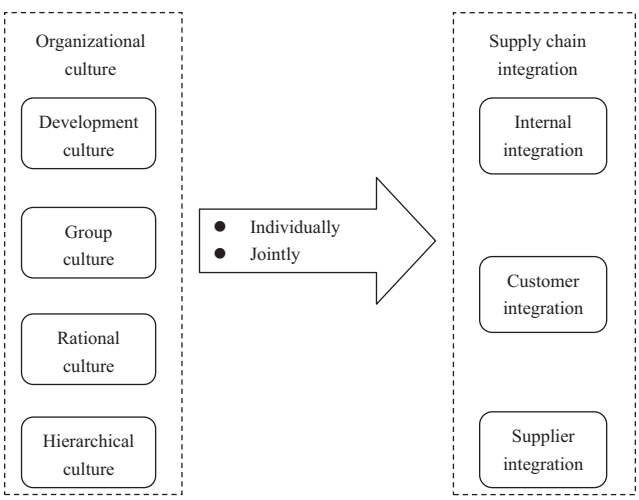
Specifically, we argue that development culture enhances SCI for two reasons. First, when firms emphasize development culture, long-term development will be one of their major objectives. To achieve that objective, the firm pays more attention to new information and technology that may enhance its dynamic abilities for adapting to new opportunities. In this situation, a firm is motivated to acquire information about current situations, future demand and technologies or capabilities that may guide their R&D-related programs. To acquire such market and technological information, a firm needs to collaborate and to integrate its internal functions with those of external suppliers and customers through SCI. Thus, firms with a strong development culture are more willing to conduct SCI in preparing the information, technology and capability needed for future developments. Second, development culture can enhance SCI by encouraging firms to take risks and tolerate short-term losses. The extant literature has indicated that SCI is risky. On the one hand, SCI requires a great deal of relationship-specific investments (tangible or intangible) from supply chain partners (Cousins and Menguc, 2006; Wu *et al.*, 2004; Zhao *et al.*, 2008). On the other hand, the success rate of SCI is low, and full integration along the supply chain is very difficult (Fawcett and Magnan, 2002; Whipple and Frankel, 2000). Thus, firms that are focused on short-term rather than long-term objectives generally cannot tolerate the short-term losses generated by risky integration behavior. However, firms that have a strong development culture and emphasize long-term objectives are more willing to take risky actions and tolerate short-term losses because they expect to achieve long-term benefits from taking those risks. Thus, in considering that SCI enables product innovation, which is critical for a firm's long-term development (Koufteros *et al.*, 2005, 2007), we expect that SCI is more likely to be implemented in a development culture. Therefore, we propose the following hypotheses:

H1a. Development culture is positively related to II.

H1b. Development culture is positively related to CI.

H1c. Development culture is positively related to SI.

Figure 1 Conceptual model



3.2 Group culture and SCI

Group culture refers to the values of team cooperation that are shared by all employees in a firm. Cooperation values are essential for SCI because SCI requires that manufacturers, suppliers and customers work together to jointly solve problems (Fawcett and Magnan, 2002; Flynn *et al.*, 2010). It is impossible for employees who lack a spirit of cooperation to work closely with their partners. Group culture enables supply chain members to understand that they have to cooperate to win in situations of competition (Eng, 2006). The motivation to cooperate pushes firms to enhance mutual understanding, reduce conflicts, strengthen mutual trust and commit to relationships with their customers and suppliers, all of which further improve SCI (Yeung *et al.*, 2009; Zhao *et al.*, 2008, 2011). Furthermore, Naor *et al.* (2008) argue that teamwork activities such as brainstorming are conducive to the formation of a common language. This kind of common language formation is essential for sharing information and knowledge (Nonaka, 1994) and for communication across functions within organizations. These researchers also find that group culture can enhance customer and supplier involvement in organizational activities. Schilke and Cook (2014) find that group culture is positively related to trust, which is essentional for SCI (Cai *et al.*, 2010; Chen *et al.*, 2013; Sahay, 2003; Yeung *et al.*, 2009). Thus, we propose the following hypotheses:

H2a. Group culture is positively related to II.

H2b. Group culture is positively related to CI.

H2c. Group culture is positively related to SI.

3.3 Rational culture and SCI

Rational culture refers to the shared beliefs and incentive systems adopted to fulfill the objectives of a firm. This dimension of culture emphasizes the use of incentives for achieving the well-defined goals of a firm, such as achieving excellent performance and gaining competitive advantages (Braunscheidel *et al.*, 2010; Naor *et al.*, 2008; Zu *et al.*, 2010). It is widely accepted that firms need to foster cross-functional cooperation and to integrate with their suppliers and customers as a greater whole to win in business competition (Lambert *et al.*, 1998; Lambert and Cooper, 2000; Wong and Boon-itt, 2008). Firms with a strong rational culture encourage their employees to spend time, resources and effort on SCI as a means to achieve

their defined goals (McDermott and O'Dell, 2001). Previous studies also show that incentive systems drive organizations to respond to competition as cohesive units that form cross-functional collaborations (Ellinger, 2000; Ruppel and Harrington, 2001) and achieve integration with suppliers and customers (Braunscheidel *et al.*, 2010). Thus, we propose the following three hypotheses:

H3a. Rational culture is positively related to II.

H3b. Rational culture is positively related to CI.

H3c. Rational culture is positively related to SI.

3.4 Hierarchical culture and SCI

Hierarchical culture refers to shared values of top-down control and coordination in a firm. When a firm has a strong hierarchical culture, its procedures and routines are specified, decision-making structures are formalized and decisions are reported to supervisors for approval (Zu *et al.*, 2010). Hierarchical culture has two implications for SCI. First, employees in firms with a high level of hierarchical culture are dominated by a mentality of "functional silos" (Braunscheidel *et al.*, 2010). In this situation, II is hindered because it requires cross-functional cooperation. SI and CI are also hindered because the separation of functions restrains a firm from taking a wider view in sharing responsibilities with external supply chain partners (Braunscheidel *et al.*, 2010). Second, employees in firms with a hierarchical culture are used to following rules and regulations (Ruppel and Harrington, 2001). They are, therefore, reluctant to adapt to change. However, to integrate different functions and supply chain partners into a cohesive unit, functional and organizational boundaries have to be broken and change is unavoidable (Romano, 2003). Furthermore, firms have to change their relationships with suppliers and customers if they wish to integrate their operations. To achieve SCI, they must change transactional relationships into strategic partnerships (Braunscheidel *et al.*, 2010). Therefore, a hierarchical culture that focuses on stability hinders the implementation of SCI. At the same time, such a culture offers little or no encouragement for employees to participate in dealing with the new problems and contingencies that SCI involves (Wong *et al.*, 2011). Hence, the implementation of SCI is restrained. McClure (2010) finds that bureaucratic culture is negatively related to market orientation and, therefore, to CI (Min *et al.*, 2007). Braunscheidel *et al.* (2010) find that hierarchical culture negatively influences both II and external integration. Thus, we propose the following further hypotheses:

H4a. Hierarchical culture is negatively related to II.

H4b. Hierarchical culture is negatively related to CI.

H4c. Hierarchical culture is negatively related to SI.

3.5 Organizational culture profiles and SCI

In the previous section, we have predicted the individual effects of each of the four organizational culture dimensions of the CVF on the process of SCI. This approach has been labeled the contingency approach, and Tsui *et al.* (2006) call it the dimensional approach. As previous studies suggest (Flynn *et al.*, 2010; Miller, 1986; Meyer *et al.*, 1993), the contingency approach is an important but inadequate means of understanding the relationships between organizational culture and SCI. As different cultures commonly co-exist within a firm (Alavi *et al.*, 2006; Denison and Spreitzer, 1991) and few firms are dominated by only one culture (Zu *et al.*, 2010), it is difficult for us to fully understand the relationships between the four dimensions of culture and SCI by using only the contingency approach. Instead, we need to apply the configuration approach to explore the overall effects of organizational culture profiles on SCI.

An organizational culture profile is defined as the combination of different cultures that operate within an organization (Stock *et al.*, 2007). As different firms may place different values on each the four dimensions of the CVF, their organizational cultures may have different profiles (Cameron and Quinn, 1999; Stock *et al.*, 2007). For example, the organizational culture profile of an innovative firm that emphasizes the values of long-term development and flexibility will be different from the profile of a firm that values stability, predictability and hierarchy. According to the CVF, the four dimensions of organizational culture are divided by two axes, namely, the flexibility – control and internal – external axes (Cameron and Quinn, 1999; Denison and Spreitzer, 1991; Stock *et al.*, 2007). Different firms emphasize different dimensions of culture to varying degrees due to their particular internal and external environments. Such differences can be portrayed as distinctive cultural profiles for each organization. Configuration theory suggests that the four organizational culture dimensions form a holistic entity in which they work simultaneously (Meyer *et al.*, 1993). Thus, the extent to which the four dimensions fit or complement each other (i.e. internal fit) determines their overall effect on business practices (Sinha and Van de Ven, 2005). Having an organizational culture profile that has a better internal fit can enable a firm's various units to work in a complementary way and accelerate SCI implementation. Having a culture profile with a lesser degree of fit may slow down a firm's progress toward implementing SCI. For example, a group culture that emphasizes the values of cross-functional cooperation and teamwork will facilitate the values of long-term development, thus complementing the firm's development culture. In this case, an alignment of the firm's development and group cultures gives these dimensions of organizational culture a combined effect that facilitates the implementation of SCI. Hence, according to configuration theory, we expect different organizational culture profiles to be associated with different levels of SCI (Hartnell *et al.*, 2011; Zu *et al.*, 2010). We, therefore, propose the following hypotheses:

H5a. Companies with different organizational culture profiles have different levels of II.

H5b. Companies with different organizational culture profiles have different levels of CI.

H5c. Companies with different organizational culture profiles have different levels of SI.

4. Methodology

4.1 Data collection

The unit of analysis in this study is the manufacturing plant. Data were collected as part of the third round of the HPM project (Naor *et al.*, 2008; Schroeder and Flynn, 2001) in ten countries (Finland, the USA, Japan, Germany, Switzerland, Korea, Italy, Australia, Spain and China) between 2005 and 2008. The HPM project was initiated in 1989 to gain a better understanding of the manufacturing practices used in Japan and the USA, and its findings have exerted great influence (Naor *et al.*, 2008; Peng *et al.*, 2008; Schroeder and Flynn, 2001). With more research teams from different countries joining the project, another two rounds of data were collected with updated questionnaires, and many studies based on these datasets have been published (Bozarth *et al.*, 2009; Naor *et al.*, 2008, 2010; Peng *et al.*, 2008; Thun, 2008; Wu *et al.*, 2011; Zhao *et al.*, 2013). We used the third-round HPM project data in this study.

The sample in each country was composed of manufacturing firms randomly chosen from three industries, namely, machinery, electronics and transportation components, with about ten manufacturers in each industry and approximately 30 manufacturers in each country. These three industries were selected because they are subject to rapid transition with intense competition, and these industries are major sectors of industrialized manufacturing in many nations across the world (Naor *et al.*, 2008). Each manufacturer in our dataset had more than 100 employees. This requirement helped to ensure the existence of sophisticated SCM activities, as firms of a smaller size commonly lack such activities (Kim, 2009). Telephone calls were made to the potential respondents and then questionnaires were mailed to them. Each of the participating managers appointed a survey coordinator to take responsibility for distributing and collecting questionnaires in their plants (Bozarth *et al.*, 2009; Peng *et al.*, 2008). Sealed envelopes were used to guarantee anonymity and enable the collection of reliable data (Naor *et al.*, 2008). In each manufacturing firm, various respondents who were knowledgeable about their firm's internal and external operations answered the questionnaires. The respondents included supervisors, managers and direct laborers. During the data collection, the completed questionnaires from all respondents in each company were combined into one questionnaire package. Of the 490 questionnaire packages distributed, 317 usable questionnaire packages were returned, giving a response rate of about 65 per cent (Naor *et al.*, 2008). This rate of response indicated that non-response bias was not a significant issue for this study.

4.2 Questionnaire design

For empirical research, numerous methods exist for data collection, such as historical archive analyses, interviews and questionnaires (Flynn *et al.*, 1990). In this study, we used a questionnaire survey to collect data, and we did so for two reasons. First, the questionnaire is the most commonly used method for survey research (Flynn *et al.*, 1990; Malhotra and Grover, 1998). The measures of organizational culture and SCI have been well-developed for the questionnaire method, and the reliability and validity of these measures are also well-established. Also, measures for organizational culture and SCI that use other methods are not yet well-developed. We tried to obtain archive data and interviews with managers to triangulate the questionnaire data. However, most firms were not willing to provide archive data (for reasons of confidentiality) or to participate in further interviews because the large-scale data collection had already taken much of their time. Thus, we relied only on the questionnaire method to collect data for this study.

Before the questionnaires were sent out, the original questionnaires in English were translated (where necessary) into the native language of each country. The translated questionnaires were then back-translated into English by another person (e.g. a local professor) to check against the original English version and ensure the text's accuracy. Each questionnaire was sent with a cover letter briefly introducing the project, promising that the answers would be kept confidential and advising the recipients that a copy of the final report would be provided.

Items measuring development, group, rational and hierarchical cultures were adapted from McDermott and Stock (1999), Naor *et al.* (2008) and Stock *et al.* (2007). We used four items, an example of which is "we pursue long-range programs for manufacturing capabilities in advance of needs" to measure development culture. Three items similar to "our supervisors encourage the people who work for them to operate as a team" were used to measure group culture. Four items, an example of which is "our incentive system encourages us to vigorously pursue plant objectives" were used to measure rational culture. Three items similar to "even small matters have to be referred to someone higher up for a final answer" were used to measure hierarchical culture (Table I). Six items measuring II, including "the functional teams in our plant work well together" were adapted from Narasimhan and Kim (2002). Seven items, an example of which is "we maintain cooperative relationships with our suppliers" measured SI, and six items similar to "we are frequently in close contact with our customers" measured CI. These measures of supplier and CI were adapted from Frohlich and Westbrook (2001) and Narasimhan and Kim (2002) (Table I). The same items were recently used by Naor *et al.* (2008) and Zhao *et al.* (2013) to measure organizational culture and SCI, respectively. All of the items were measured using a seven-point Likert scale, with "1" meaning "strongly disagree" and "7" meaning "strongly agree". All of the items used are listed in Table I.

Most of the items were answered by more than one informant on different questionnaires at each plant, which reduced the potential for common method bias (Venkatraman and Grant, 1986). The data for the measurement items with more than one informant were averaged, and each item, therefore, received only one value.

4.3 Measurement development

We used a rigorous process to develop and validate the instruments used in this study. Content validity was guaranteed by a careful literature review, executive interviews and pilot tests. Various analyses were performed to check the reliability and validity of each construct. Data were also standardized by industry and country to eliminate the effects of these variables and to enhance the robustness of the findings. We also used

Table I Measurement, reliability and validity

Constructs	Measurements	Factor loading
Development culture (Cronbach's alpha = 0.81; ICC = 0.44)	DC1: We pursue long-range programs for manufacturing capabilities in advance of needs	0.64[a]
	DC2: We try to anticipate the potential of new manufacturing practices and technologies	0.84
	DC3: Our plant stays at the leading edge of new technology in our industry	0.61
	DC4: We are constantly thinking of the next generation of manufacturing technologies	0.83
Group culture (Cronbach's alpha = 0.83; ICC = 0.96)	GC1: Our supervisors encourage the people who work for them to work as a team	0.85
	GC2: Our supervisors encourage employees to exchange opinions and ideas	0.81
	GC3: Our supervisors frequently hold group meetings for discussion among employees	0.72
Rational culture (Cronbach's alpha = 0.86; ICC = 0.96)	RC1: Our incentive system encourages us to vigorously pursue plant objectives	0.89
	RC2: Our incentive system is fair in rewarding people who accomplish plant objectives	0.91
	RC3: Our incentive system really recognizes the people who contribute the most to our plant	0.75
	RC4: The incentive system at this plant encourages us to reach plant goals	0.93
Hierarchical culture (Cronbach's alpha = 0.92; ICC = 0.78)	HC1: Even small matters have to be referred to someone higher up for a final answer	0.83
	HC2: Any decision I make has to have my boss's approval	0.88
	HC3: There can be little action taken here until a supervisor approves a decision	0.77
II (Cronbach's alpha = 0.83; ICC = 0.89)	II1: Departments in the plant communicate frequently with each other	0.51
	II2: The functions in our plant work well together	0.84
	II3: The functions in our plant cooperate to solve conflicts that arise between them	0.78
	II4: Our plant's functions coordinate their activities	0.73
	II5: Our plant's functions work interactively with each other	0.78
	II6: We work in teams, with members from a variety of areas to introduce new products	0.45
CI (Cronbach's alpha = 0.81; ICC = 0.78)	CI1: We are frequently in close contact with our customers	0.74
	CI2: Our customers give us feedback on our quality and delivery performance	0.67
	CI3: Our customers are actively involved in our product design process	0.55
	CI4: We work as a partner with our customers	0.73
	CI5: We strive to be highly responsive to our customers' needs	0.68
	CI6: We regularly survey our customers' needs	0.58
SI (Cronbach's alpha = 0.87; ICC = 0.97)	SI1: We maintain cooperative relationships with our suppliers	0.70
	SI2: We help our suppliers to improve their quality	0.75
	SI3: We maintain close communications with suppliers about quality considerations and design changes	0.75
	SI4: Our suppliers are actively involved in our new product development process	0.64
	SI5: Our key suppliers provide input into our product development projects	0.70
	SI6: We strive to establish long-term relationships with suppliers	0.55
	SI7: We actively engage suppliers in our quality improvement efforts	0.79

Note: [a]Factor loading in the CFA model

hierarchical linear models (HLMs) to examine the possible influence of each country on the data, but we did not detect any such influences (Raudenbush and Bryk, 2002).

4.3.1 Unidimensionality and reliability

We followed the two-step method suggested by Narasimhan and Jayaram (1998) to examine the reliability of the constructs. First, an exploratory factor analysis (EFA) was conducted to examine the degree of unidimensionality. Principal components analysis and varimax rotation with Kaiser normalization were used to clarify the factors, and the results are displayed in Tables II and III (Loehlin, 1998). All except one of the item loadings on the factors they were

Table II Explorative factor analysis results for organizational culture

Item	Factor loadings			
	Development culture	Group culture	Rational culture	Hierarchical culture
DC1	*0.652*	0.123	0.332	0.124
DC2	*0.827*	0.213	0.117	−0.111
DC3	*0.780*	0.047	0.020	−0.031
DC4	*0.839*	0.132	0.181	−0.062
GC1	0.176	*0.854*	0.148	−0.111
GC2	0.166	*0.834*	0.156	−0.127
GC3	0.096	*0.831*	0.166	0.016
RC1	0.144	0.166	*0.887*	−0.069
RC2	0.106	0.141	*0.918*	0.006
RC3	0.165	0.139	*0.789*	0.166
RC4	0.164	0.120	*0.912*	−0.034
HC1	−0.066	−0.138	0.001	*0.873*
HC2	−0.020	−0.089	0.077	*0.897*
HC3	0.015	0.019	−0.016	*0.873*
Eigenvalue	2.579	1.491	4.768	1.789
Total variance explained	75.90%			

Note: Values in italics are the major factor loadings

Table III EFA results for supply chain integration

Item	Factor loadings		
	II	CI	SI
II1	*0.533*	0.356	−0.009
II2	*0.827*	0.110	0.201
II3	*0.818*	0.114	0.114
II4	*0.765*	0.104	0.173
II5	*0.823*	0.049	0.159
II6	*0.453*	0.211	0.170
CI1	0.119	*0.782*	0.171
CI2	0.117	*0.703*	0.186
CI3	0.025	*0.647*	0.166
CI4	0.131	*0.630*	0.168
CI5	0.248	*0.726*	0.100
CI6	0.316	*0.553*	0.321
SI1	0.183	0.243	*0.679*
SI2	0.171	0.195	*0.731*
SI3	0.119	0.329	*0.705*
SI4	0.114	0.113	*0.706*
SI5	0.116	0.040	*0.783*
SI6	0.014	0.311	*0.558*
SI7	0.246	0.071	*0.802*
Eigenvalue	3.443	1.025	1.194
Total variance explained	56.30%		

Note: Values in italics are the major factor loadings

supposed to measure were greater than 0.50 (the exception was 0.453). Two items were dropped due to low factor loadings. Second, we calculated the Cronbach's alpha to examine the internal consistency of the constructs (Table I). All of the Cronbach's alpha values were greater than 0.80, which exceeded the threshold of 0.70 (Nunnally, 1978). As we used multiple respondents in this study, the inter-rater agreement (Boyer and Verma, 2000) was evaluated by calculating the interclass correlations (ICCs) (Ebel, 1951). All of the ICCs except one (0.44) were over 0.60, which suggested good reliability (Boyer and Verma, 2000). Although the ICC of development culture was a little low, its reliability was acceptable given that the Cronbach's alpha was above 0.80. Therefore, the reliability of the constructs was assured.

4.3.2 Construct validity

Convergent validity is typically tested with confirmatory factor analysis (CFA) (O'Leary-Kelly and Vokurka, 1998). Therefore, CFA was performed with the items linked to the constructs they were supposed to measure. The model fit indices were χ^2 (474) = 969.93; root mean square error of approximation (RMSEA) = 0.060; confirmatory fit index (CFI) = 0.97; nonnormed fit index (NNFI) = 0.96, and standardized root mean square residual (SRMR) = 0.063, which indicated that the model was acceptable (Hu and Bentler, 1999) and that convergent validity was achieved (O'Leary-Kelly and Vokurka, 1998). Furthermore, all of the factor loadings except one (0.45) were greater than 0.50 (Table I). The *t*-values of all of the factor loadings were greater than 2.0, which further demonstrated convergent validity.

The discriminant validity was examined through comparisons of the constrained and unconstrained CFA models (O'Leary-Kelly and Vokurka, 1998). For each case, we set the correlation between one pair of constructs as 1.0 and ran the model. Then, the χ^2 of the constrained model and of the free estimated baseline model were compared. The significant differences of χ^2 indicated discriminant validity (Fornell and Larcker, 1981). The results showed that all of the differences were significant at the 0.001 level. Thus, discriminant validity was achieved.

5. Analysis and results

5.1 Results of the contingency approach

The descriptive statistics for the various organizational cultures in relation to SCI are shown in Table IV. These results indicate that group, rational and development culture

Table IV Descriptive statistics ($N = 317$)

Construct	Mean	SD	1	2	3	4	5	6	7
Hierarchical culture	3.46	0.89	0.68[a]						
Group culture	5.27	0.65	−0.15**	0.64					
Rational culture	4.42	1.02	0.03	0.35***	0.76				
Development culture	5.17	0.76	−0.04	0.35***	0.38***	0.54			
II	5.38	0.56	−0.26***	0.51***	0.46***	0.56***	0.49		
CI	5.43	0.52	−0.30***	0.44***	0.20***	0.35***	0.43***	0.44	
SI	5.21	0.52	−0.09	0.40***	0.27***	0.40***	0.41***	0.49***	0.49

Notes: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; [a]the AVE is shown on the diagonal of the matrix

were positively related to II, CIand SI, but hierarchical culture was negatively related to II and CI. These findings provided initial support for the relationships between organizational culture and SCI. Moreover, the Q-Q plots indicated that the variables had an approximately normal distribution (Raykov and Marcoulides, 2000). Potential outliers were investigated with a studentized residual but were not found. SEM with the maximum likelihood estimation method (Anderson and Gerbing, 1988; Jöreskog and Sörbom, 1993) was used to estimate the relationships between the four types of cultures and the three types of SCI. The overall model fit indices were: χ^2 (542) = 1100.05, RMSEA = 0.059, CFI = 0.96, NNFI = 0.96 and SRMR = 0.069, which indicated that the model was acceptable (Hu and Bentler, 1999). The results of the SEM model (with significant standardized coefficients at the 0.05 significance level) are presented in Figure 2.

The results show that development and group cultures are significantly and positively related to II, CI and SI, which supports *H1a*, *H1b*, *H1c*, *H2a*, *H2b* and *H2c*. For *H3a*, *H3b* and *H3c*, which address the relationships between rational culture and SCI, only *H3a* (that rational culture is positively related to II) is supported. The relationships between hierarchical culture and both II and CI are significant, and the relationship between hierarchical culture and SI is not significant. Thus, *H4a* and *H4b* are supported, but *H4c* is rejected.

5.2 Results of the configuration approach

5.2.1 Taxonomy of organizational culture

The results given in Table IV show that the correlations between the group, rational and development cultures are positively significant, and the correlation between hierarchical culture and group culture is negatively significant. These results suggest that the four dimensions of culture are closely related and that the independence assumption for the contingency approach may not hold. Thus, it may be more appropriate to use the configuration approach to investigate the relationships between organizational culture and SCI. Moreover, the configuration approach can help us to better understand the complexity of organizational culture and help us to investigate the organizational culture – SCI relationships through a holistic rather than a reductionistic perspective (Fiss, 2007; Flynn *et al.*, 2010; Ward *et al.*, 1996).

Previous studies have suggested that combining cluster analysis with ANOVA is a good way to perform configuration analysis (Dess *et al.*, 1993; Flynn *et al.*, 2010; Homburg *et al.*, 2008; Jonsson, 2000). Thus, we used cluster analysis to identify organizational culture profiles based on the four dimensions of organizational culture. We used hierarchical clustering procedures to determine the number of clusters and used non-hierarchical clustering procedures to produce the final clusters (Hair *et al.*, 1998). The percentage of change in the agglomeration coefficient was highest when the group number changed from seven to six (Figure 3). However, 6six out of the seven cultures had fewer than 50 cases. For the sake of stability in the results, we chose the second-highest percentage of change in the agglomeration coefficient (i.e. when the group number changed from four to three). Random sampling of the dendrograms also verified that the

Figure 2 Estimated results of the SEM

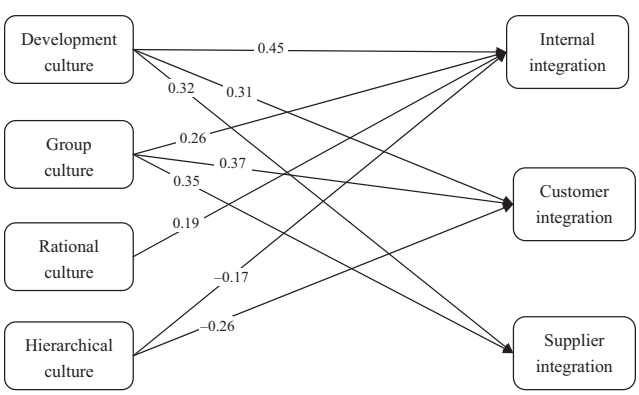
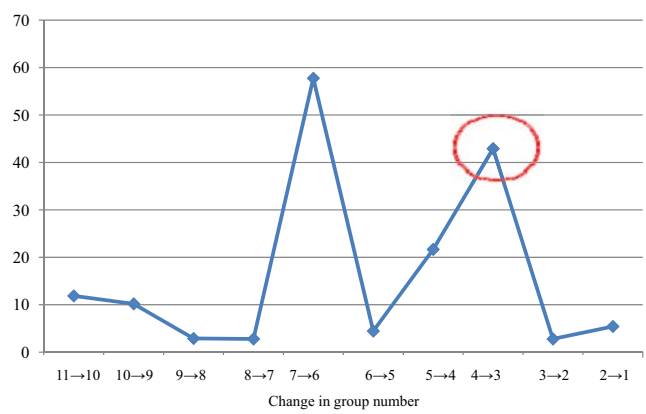


Figure 3 Percentage change in the agglomeration coefficient



Note: The circles mean that the differences between the profiles in the circle are non-significant

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classification of the four clusters was acceptable. The results of this cluster analysis are presented in Table V and Figure 4. As Figure 4 indicates, four organizational culture profiles emerged.

We then performed a canonical discriminant analysis to identify the underlying dimensions defining the clusters. Table VI shows that the eigenvalues of the first two functions were over 1.0 and that these functions explained 98.2 per cent of the variance. Table VII shows that all four culture profiles were important in Function 1. However, the hierarchical culture dominated Function 1 and divided the clusters into two low-hierarchy profiles (Flatness and Flexible) and two high-hierarchy profiles (Hierarchical and Across-the-Board). The development, hierarchical and rational dimensions of culture were all important in Function 2, with rational culture dominating and dividing the clusters into two low-rational culture profiles (Flexible and Hierarchical) and two high-rational culture profiles (Flatness and Across-the-Board). These four cluster centroids are illustrated in Figure 5.

Table VII Standardized canonical discriminant function coefficients

Factor	Function 1	Function 2
Development culture	−0.328	0.214
Group culture	−0.275	0.021
Hierarchical culture	0.953	0.285
Rational culture	−0.169	0.888

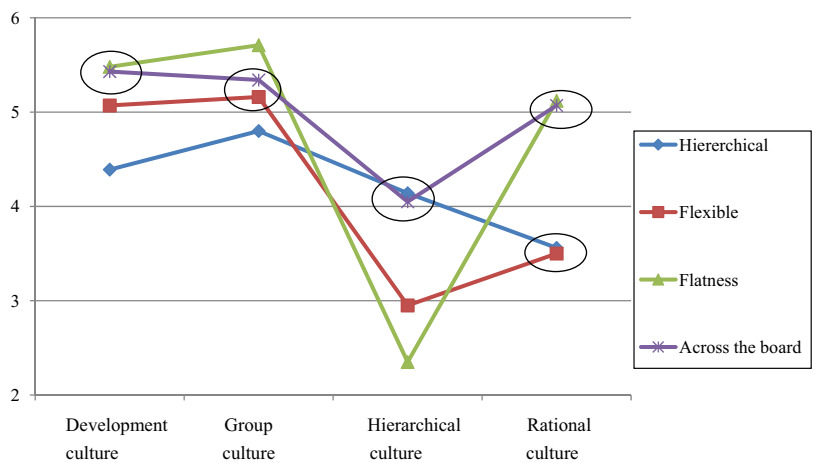
Figure 5 shows that the Flatness profile has the highest level of the development, group and rational cultures and the lowest level of hierarchical culture. Unlike the Flatness profile, the Hierarchical profile has the highest level of hierarchical culture and the lowest level of the development, group and rational cultures. The Across-the-Board profile has the highest level of all four cultures. The Flexible profile has the lowest level of rational culture and a medium level of the other three cultures, which reflects that this profile involves flexibility in terms of value creation and evaluation.

Table V Cluster centroids

No. of clusters	Development culture	Group culture	Hierarchical culture	Rational culture	*n*
1	4.39	4.8	4.14	3.56	55
2	5.07	5.16	2.95	3.5	79
3	5.48	5.71	2.35	5.12	61
4	5.43	5.34	4.05	5.07	122
F	38.396***	24.596***	202.967***	143.920***	

Notes: $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Figure 4 Taxonomy of organizational culture



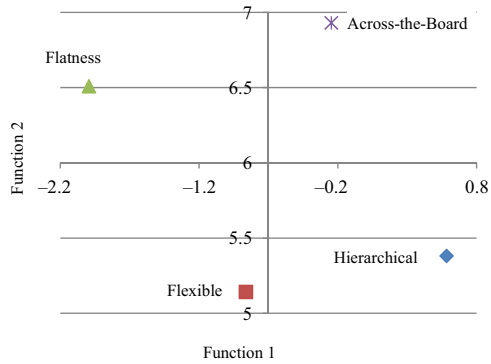
Note: The circles mean that the differences between the profiles in the circle are non-significant

Table VI Discriminant analysis

Function	Eigenvalue	(%) of variance	Cumulative (%)	Canonical correlation
1	2.378	60.4	60.4	0.839***
2	1.488	37.8	98.2	0.773***
3	0.070	1.8	100.0	0.256***

Notes: $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

Figure 5 Cluster centroids



5.2.2 The relationships between organizational culture profiles and SCI

To test *H5a*, *H5b* and *H5c*, ANOVA was performed, and the results are presented in Table VIII. As the table shows, the mean of II for the Flatness profile is higher than those of the other three profiles, and the difference in the means between the Flatness profile and the other three profiles is significant. Thus, *H5a* is supported. Table VI demonstrates that the Flatness profile also has the highest level of CI, which supports *H5b*. The mean of SI is highest in the Flatness profile, yet the differences between the Flatness profile and the Flexible and the Across-the-Board profiles are not significant. This result provides partial support for *H5c*. Furthermore, Table VIII shows that the Hierarchical profile has the lowest levels of II, CI and SI. The differences in SCI between the Hierarchical profile and the other three profiles are significant. Therefore, *H5a* and *H5b* are supported, and *H5c* is partially supported.

5.3 Combined results of the contingency and configuration approaches

Our combined contingency and configuration approaches indicate that the development, group and rational dimensions of culture are positively related to II because the Flatness and the Across-the-Board profiles have better II than the Hierarchical and Flexible profiles. However, hierarchical culture is negatively related to II because the Flatness profile has better II than the Across-the-Board profile, and the Flexible profile has better II than the Hierarchical profile. Similarly, hierarchical culture is negatively related to CI because the Hierarchical profile has the worst CI.

There is no significant difference in the degrees of SI among the Flexible, Flatness and Across-the-Board profiles, which indicates that the four cultures do not have much predictive power to explain SI. This finding is consistent with our contingency results that SI is only influenced by two of the cultures, but II and CI are influenced by four and three cultures, respectively. The Hierarchical profile has the worst SI, implying that hierarchical culture is negatively related to SI. However, this potential finding is not supported by our contingency results, which show that hierarchical culture is not significantly related to SI. In this way, the results indicate that both the contingency and the configuration approaches are important to understand the complex relationships between organizational cultures and SCI.

6. Discussion

This study shifts the focus taken by previous studies of business environments (Boon-itt and Wong, 2011; Iyer, 2011; Ragatz *et al.*, 2002; Wong *et al.*, 2011), interfirm relationships (Maloni and Benton, 2000; Yeung *et al.*, 2009; Zhao *et al.*, 2008) or "hard" firm-level factors (Paulraj and Chen, 2007; Rodrigues *et al.*, 2004; Sanders, 2008; Subramani, 2004). Instead, it considers the cultural factors that affect SCI and investigates how organizational culture (or the values and beliefs shared by employees) affect SCI. We examine the individual and joint effects of four dimensions of organizational culture on three types of SCI, using both the contingency and configuration approaches in a global context. We find that the development and group cultures are beneficial to all types of SCI, but rational culture is only beneficial for II. Hierarchical culture is negatively related to both II and CI. We identify four organizational culture profiles and find that the Flatness profile (which is characterized by high levels of development, group and rational cultures and a low level of hierarchical culture) performs best for enabling all types of SCI. These findings contribute to both the theory and practice of SCI.

6.1 Theoretical contributions

Our findings contribute to the literatures on SCI and organizational culture in two ways. First, considering that previous findings on the relationships between organizational culture and SCI have not been consistent, our findings based on the contingency approach provide additional evidence to resolve the inconsistencies. Although the extant studies have used similar definitions and conceptualizations (i.e. the CVF) in discussing organizational culture, they have not reached agreement on how the various dimensions of organizational culture influence SCI (Braunscheidel *et al.*, 2010; Naor *et al.*, 2008; Zu *et al.*, 2010). Specifically, it has been argued that development culture is related to SCI. However, robust empirical evidence has not yet been provided. Zu *et al.* (2010) do not find a significant relationship between development culture and customer – supplier relationships. Braunscheidel

Table VIII Analysis of variance

Factor	Hierarchical (Cluster 1)	Flexible (Cluster 2)	Flatness (Cluster 3)	Across-the-board (Cluster 4)	*F*-value
II	4.82 (2, 3, 4)	5.27 (1, 3, 4)	5.80 (1, 2, 4)	5.48 (1, 2, 3)	44.65***
CI	5.00 (2, 3, 4)	5.52 (1, 3)	5.71 (1, 2, 4)	5.43 (1, 3)	23.22***
SI	4.90 (2, 3, 4)	5.19 (1)	5.38 (1)	5.28 (1)	10.47***

Notes: The numbers in parentheses indicate the cluster(s) from which that cluster is significantly different at the 0.05 significance level; $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$

et al. (2010) find that development (or adhocracy) culture only affects external integration. Our study, however, finds that development culture is positively related to both external integration and II. Similarly, Braunscheidel *et al.* (2010) find that group (or clan) culture is not related to either II or external integration, whereas Zu *et al.* (2010) find that group culture positively influences the supplier relationship. In this study, we find that group culture is positively related to both II and external integration, as is consistent with the arguments by Naor *et al.* (2008) that group culture drives the integration of customers and suppliers. Our findings emphasize the importance of a shared spirit of long-term development, teamwork and openness in the form of development and group cultures as enablers for SCI. Concerning rational culture, the extant studies find only that it has an effect on external integration (Braunscheidel *et al.*, 2010; Zu *et al.*, 2010). Our result that rational culture is positively related to II but not to external integration differs from previous findings. Thus, more empirical studies are needed to re-examine the effects of rational culture on SCI. Concerning hierarchical culture, Zu *et al.* (2010) fail to detect its effects on customer or supplier relationships, but Braunscheidel *et al.* (2010) show that hierarchical culture is negatively related to both II and external integration. Our findings are mainly in line with those of Braunscheidel *et al.* (2010), although we do not find a significant relationship between hierarchical culture and SI. These various findings suggest that decentralized organizational culture is more suitable for SCI, although hierarchical culture is good for some other managerial practices (Ruppel and Harrington, 2001).

Second, our findings based on configuration analyses make a contribution to the literature of organizational culture and SCI. To answer the calls of Hartnell *et al.* (2011), Detert *et al.* (2000) and Zu *et al.* (2010) for the use of a configuration approach in organizational culture studies, we apply this approach to identify organizational culture profiles and explore their implications for SCI. To the best of our knowledge, this study is one of the first to adopt the configuration approach in exploring organizational culture profiles and their implications for SCI. In general, four different profiles are identified in our study. The Flatness profile has the highest level of development, group and rational cultures, but the lowest level of hierarchical culture, and this profile outperforms the other three profiles in terms of II, CI and SI. The Hierarchical profile has the lowest levels of development, group and rational cultures, but the highest level of hierarchical culture, and this profile performs the worst in all three types of SCI. Compared with the Flatness profile, the Across-the-Board profile has a moderate level of group culture, but the highest level of hierarchical culture. However, both II and CI are significantly lower in the Across-the-Board profile than they are in the Flatness profile. The Flexible profile has a lower level of development and rational cultures than the Across-the-Board profile. However, the Flexible profile also has a lower level of hierarchical culture than the Across-the-Board profile. These results indicate that the levels of CI and SI are not significantly different in these two profiles, which suggests that hierarchical culture may offset the effects of the development and rational cultures on CI and SI. In summary, our findings suggest that an ideal profile for SCI would have higher levels of development, group and rational culture, but a lower level of hierarchical culture. It is worth noting the effects of hierarchical culture in SCI implementation. Compared with previous findings that are based on the contingency approach alone, our findings based on the configuration approach generate a more complete perspective. The configuration approach helps us to understand the dimensions of organizational cultures and their effects on SCI in a more holistic way, thus extending our understanding of the relationship between organizational culture and SCI.

6.2 Managerial implications

As the supply chain has been widely recognized as the basic unit of competition, many firms are struggling to better integrate with their supply chain partners and achieve competitive advantages. Our findings provide clues for managers on how to accelerate SCI from the perspective of organizational culture. We find that the implementation of SCI requires the support of an appropriate organizational culture. Therefore, company managers who are facing difficulties with SCI or who want to accelerate SCI need to take organizational culture into consideration and adjust their organizational culture when necessary. Of course, it is not easy to change organizational culture.

This study provides insights to help firms adjust their organizational culture to facilitate SCI implementation. According to Cameron and Quinn (1999), firms need to diagnose the characteristics of their present organizational culture and ascertain the changes they need to make if they want to achieve SCI. Our representation of organizational culture in the CVF provides a useful tool for firms to assess their organizational culture, and our findings on the relationships between organizational culture and SCI suggest directions for organizational culture change. We find that development, group and rational culture are positively related to SCI, but hierarchical culture is negatively related to SCI. Our configuration analysis results also show that high levels of development, group and rational culture with low levels of hierarchical culture are associated with better SCI. Thus, firms can benchmark their present organizational culture with our findings to ascertain which culture dimensions must be adjusted and to what extent. Firms with too many elements of hierarchical culture need to take initiatives to change these elements. Managers should strengthen the values of long-term development, teamwork and communication, which are the important aspects of development and group culture. Firms should also strengthen their rational values by establishing fair incentive systems. Managers need to plan and implement such changes in a holistic way, as our findings show that the various dimensions of organizational culture influence SCI jointly rather than individually.

6.3 Limitations and future research

Although our findings make contributions to both the literature and to practice, several limitations of the study should be pointed out. First, as the above discussion indicates, our findings cannot resolve all of the inconsistencies concerning the relationships between organizational cultures and SCI. Some of our findings present additional

contradictions to the previous findings. To make the findings on these relationships more robust, future research should examine the effects of organizational cultures on SCI in greater depth. For example, moderators such as institutional environments could be introduced into the model to reconcile the contradictive findings. Second, our data are collected mainly from world-class manufacturers in ten countries around the world. These world-class firms may have greater advantages in resource acquisition and bargaining power to implement SCI than SMEs. Moreover, we do not test the influences of the various countries represented in our model, and the characteristics of particular countries may have an influence. Future researchers should collect data from both world-class and small-sized firms in a greater number of countries and compare their findings with those of this study. Third, the data used in this study are cross-sectional, and therefore cannot provide causal explanations for the observed effects of organizational culture on SCI. Future research should use longitudinal data to test the relationships between organizational culture and SCI. Fourth, we do not investigate how organizational culture in different phases of firm growth affects SCI. Different dimensions of culture may play different roles in different phases of firm growth and may thus exert different kinds of influence on SCI. Future research could explore the moderating effects of firm growth phases on the relationships between organizational culture and SCI. Finally, the focus of our study is the relationship between intra-organizational culture and SCI. As SCI involves not only intra-organizational cooperation but also inter-organizational cooperation, the fit of organizational cultures between manufacturers and their suppliers or customers should also influence SCI. Moreover, we do not investigate the culture of the buyer – supplier system. Future research could examine the fit between the organizational cultures of different firms along the supply chain and the culture of the buyer – supplier system as a whole to investigate their effects on SCI.

7. Conclusions

Organizational culture has long been regarded as an important factor influencing SCM practices (McCarter *et al.*, 2005; Mello and Stank, 2005; Fawcett *et al.*, 2008). However, the effects of organizational culture on SCI have still not been fully examined. On the one hand, the extant findings on the relationships between these factors are not consistent (Braunscheidel *et al.*, 2010; Naor *et al.*, 2008; Zu *et al.*, 2010). On the other hand, previous studies have ignored the synergistic effects of the various dimensions of organizational culture that co-exist within firms (Detert *et al.*, 2000; Hartnell *et al.*, 2011; Zu *et al.*, 2010). To address these two limitations of previous studies, we examine the relationship between organizational culture and SCI using both the contingency and configuration approaches. We collect data from 317 HPM plants in ten countries. We find that the development and group dimensions of culture are positively related to II, CI and SI and that rational culture is positively related to II. In contrast, hierarchical culture is negatively related to both II and CI. These findings provide more evidence on the relationships between organizational culture and SCI. In addition, we extend previous studies by introducing a configuration approach in exploring organizational culture profiles and their effects on SCI. We identify four culture profiles and find that the Flatness profile, which involves higher levels of development, group and rational cultures but lower levels of hierarchical culture, is the most suitable for enabling SCI. These findings answer the various calls for an application of the configuration approach to evaluate organizational culture profiles. The findings also extend our understanding of how organizational culture as a whole influences SCI.

Notes

1 In a strict sense, our study stands in the third stream, as it investigates the firm-level antecedents of SCI. However, unlike other studies in this stream that focus on factors such as IT, we focus on "softer" factors such as organizational culture.

2 Please note that we use the term "organizational culture" to mean the culture of one organization (be it the buyer or the supplier) rather than the inter-organizational culture of the buyer – supplier system.

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Further reading

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