THE EFFECTS OF DISTRIBUTIVE, PROCEDURAL, AND INTERACTIONAL JUSTICE ON DIGITALLY ENABLED SUPPLY CHAIN INTEGRATION: AN UPPER ECHELONS PERSPECTIVE

Shaobo Wei, USTC-CityU Joint Advanced Research Center, University of Science and Technology of China, City University of Hong Kong, Hong Kong, China, shaobow@mail.ustc.edu.cn
Hefu Liu, School of Management, University of Science and Technology of China, China, liuhf@ustc.edu.cn
Weiling Ke, School of Business, Clarkson University, US, wke@clarkson.edu
Wenjie Liu, College of Business, City University of Hong Kong, Hong Kong, wjliu6-c@my.cityu.edu.hk
Kwok-Kee, Wei, College of Business, City University of Hong Kong, Hong Kong, isweikk@cityu.edu.hk
Zhongsheng Hua, School of Management, University of Science and Technology of China, China, zshua@ustc.edu.cn

Abstract

Firms are increasingly engaged in digitally enabled supply chain integration (DeSCI) with their supply chain partners to leverage each other’s resources and capabilities for achieving competitive advantage. However, how the top management’s perceptions of justice and behaviors in the supply chain influence the DeSCI are not well understood. Drawing upon the upper echelons theory, we investigate how top management mediates the impact of justice on firm’s DeSCI. Specifically, we identify three types of justice (distributive, procedural, and interactional justice) that influence top management behaviors (top management belief and top management participation), which in turn affect DeSCI (digitally enabled information sharing and digitally enabled collaborative planning). We test the hypotheses of interest with data collected from 198 firms in China. Our findings reveal that procedural justice positively affects top management belief, which then positively affects top management participation. In turn, top management participation positively affects both digitally enabled information sharing and digitally enabled collaborative planning. Furthermore, we find interactional justice positively affects top management participation without the mediation of top management belief. However, we do not find distributive justice significantly relates to top management belief or top management participation. Theoretical contributions and managerial implications of this study are discussed.

Keywords: Digitally enabled information sharing, Digitally enabled collaborative planning, Justice, Top management, Upper echelons theory.
Contemporary firms have been increasingly engaged in digitally enabled supply chain integration (DeSCI) with their supply chain partners to collectively leverage each other’s resources and capabilities through digital enablement (Dong et al. 2009; Liu et al. 2010; Saldanha et al. 2013). Over the past decade, particularly with interorganizational systems (IOS), there is a fundamental transformation taking place in the relationships between firms and their supply chain partners (Chatterjee & Ravichandran 2013; Saeed et al. 2011). DeSCI enables firms to achieve open, worldwide, and real-time supply chain management (SCM), and thus resolving the trade-offs between the reach and richness of the firms’ knowledge and processes (Sambamurthy et al. 2003). DeSCI can be broadly classified into digitally enabled information sharing and digitally enabled collaborative planning (Cai et al. 2010; Kulp et al. 2004; Rai et al. 2006). The existing literature has indicated that the DeSCI plays a vital role in SCM by leveraging the information and resources residing in the supply chain partners, and consequently improving supply chain performance (Devaraj et al. 2007; Dong et al. 2009; Kulp et al. 2004; Rai et al. 2006). However, quite a lot of firms have struggled to achieve this level of success (Saeed et al. 2011). It is estimated that about one-half of the enterprise system-based implementations, such as DeSCI, fail to achieve the expected benefits (Adam & O’Doherty 2003; Liang et al. 2007). Thus, there is a need to fully understand the nature of DeSCI, and investigate which factors facilitate the implementation of DeSCI to improve firm performance.

Amongst the many influencing factors, justice (or fairness) has been identified as an important factor that affects how firms integrate with their supply chain partners (e.g., Duffy et al. 2013; Griffith et al. 2006; Liu et al. 2012). In the DeSCI context, firms are “strategically, operationally, and technologically integrated”, which is underscored by long-term relationships based on stability yet flexibility (Hult et al. 2004, p.241). Under this situation, fairness perceptions are of particular importance because firms within supply chain need to collaborate with their supply chain partners to some extent so as to leverage each other’s resources and capabilities for achieving mutual goals (Liu et al. 2012). When fairness is properly managed within supply chain, firms would become more fully committed to supply chain relationships, otherwise, it may lead to damage to the relationships (Ireland & Webb 2007; Liu et al. 2012). Consequently, scholars are calling for incorporating justice into research on how firms implement interorganizational change efforts, such as DeSCI (Ellis et al. 2009). In this regard, a large number of researchers have examined fairness in the context of interorganizational relationships. For example, Griffith et al. (2006) examine that the firm’s enacted procedural and distributive justice policies influence its partner’s attitudes and behaviors in the supply chain relationships. Liu et al. (2012) further propose that justice perceptions influence the buyer-supplier relationship performance through mutual coupling behaviors, such as knowledge sharing, continuous commitment, and relationship investment. Following this logic, it is reasonable to assume that the perception of fairness could influence the firms’ DeSCI with their supply chain partners.

However, different firms may have distinct perceptions of justice in supply chain relationships due to their top management’s differential interpretations, which could ultimately affect the firm’s DeSCI with its supply chain partners (Vannoy & Salam 2010). According to the perspective of the upper echelons theory, strategic choice of a firm, such as implementation of DeSCI, is the result of top management’ interpretation of the situation with their cognitive base and values (Hambrick & Mason 1984). Top management, as the firm’s decision-makers, have the opportunity and ability to manage organizational strategies and resources to accommodate the strategic needs, and as such they are responsible for making organizational strategic choices (Bantel & Jackson 1989; Dong et al. 2009; Kor & Mesko 2013). Under this condition, fairness is an important factor in the situation that can be interpreted by top management during decision making process of DeSCI. However, the external situation, no matter how fair it is, will have no effect on the behavior of a firm without first affecting the firm’s top management behaviors (Liang et al. 2007). In this view, the firm’s top management’s perception of fairness influences strategic choice through affecting the behaviors and actions of top management. Therefore, how top management’s behaviors mediate the relationship between justice
DeSCI warrants scrutiny (Carmeli & Halevi 2009; Carmeli & Schaubroeck 2006; Liang et al. 2007).

To this end, drawing on the upper echelons theory, we intend to investigate how top management mediates the relationship between justice and firms’ DeSCI. Specifically, we identify three types of justice, namely, distributive, procedural, and interactional justice as the external situation that influence top management behaviors (top management belief and top management participation), which consequently influence the two types of DeSCI (digitally enabled information sharing and digitally enabled collaborative planning).

The rest of this paper is organized as follows. We first articulate the theoretical framework of our research and hypotheses development. Then, we present our research methodology, which is followed by data analysis and results. Finally, we discuss the implications, limitations, as well as the conclusions of this study.

2 THEORETICAL FRAMEWORK AND HYPOTHESES

2.1 Upper Echelons Theory

The upper echelons theory suggests that the idiosyncracies of top management greatly influence their interpretations of the external situations they face, and consequently affecting the firm’s strategic choices (Hambrick 2007; Hambrick & Mason 1984). The idiosyncratic givens of upper echelons mainly include the cognitive base and values with which top management interprets the situation (Hambrick & Mason 1984). In particular, cognitive base refers to the top management’s knowledge about the future events, alternatives, as well as the alternatives’ possible consequences. Comparably, values refer to the top management’s principles for ordering consequences or alternatives out of preference. In this view, as depicted in Figure 1, it is the cognitive base and values of top management that affect the managerial perceptions of the situation they face, and consequently influencing the firm’s strategic choice (Hambrick & Mason 1984).

![Figure 1. Conceptual Model: An Upper Echelons Perspective of Organizations](image)

Top management of a firm usually faces the complex situations with a wide range of both environmental and organizational stimuli (Hambrick & Mason 1984). In the context of SCM, justice is an important external stimulus that could influence the managerial perceptions of top management in the supply chain relationship (Luo 2007). Top management act as boundary spanners who represent each side in the supply chain relationship and facilitate cooperation and communication among supply chain partners (Luo 2007). As such, top management interprets the situation of cooperation relationship with supply chain partners and then make decisions on the level of contribution in the relationship.

Drawing upon the upper echelons theory, we develop our research model in Figure 2. Specifically, we focus on three types of justice, namely distributive, procedural, and interactional justice, which can be regarded as the external situation the firm faces. Top management belief (TMB) and top management
participation (TMP) represent the overall managerial perceptions which reflects the cognitive base and values of top management. Accordingly, we propose that two types of DeSCI, namely digitally enabled information sharing and digitally enabled collaborative planning, in our model are the firm’s strategic choice made by top management, which can be affected by top management’s interpretations of external stimuli.

![Research Model](image)

**Figure 2. Research Model**

### 2.2 Effect of Top Management on Digitally Enabled Supply Chain Integration

DeSCI refers to the degree to which a firm collaborates with its supply chain partners through the application of Internet-based technologies (Kulp et al. 2004; Lee & Whang 2004; Rai et al. 2006). By extending prior research (Cai et al. 2010; Kulp et al. 2004; Rai et al. 2006), we conceptualize DeSCI in terms of digitally enabled information sharing and digitally enabled collaborative planning. Specifically, digitally enabled information sharing refers to the sharing of information across supply chain partners (e.g., information related to demand forecasting, scheduling plan, and inventory level) via the Internet (Kulp et al. 2004; Lee & Whang 2004; Rai et al. 2006). While digitally enabled collaborative planning refers to the extent to which a firm collaboratively works with its supply chain partners in designing synchronized plans (e.g., production planning and scheduling, demand forecasting, and new product development) via the Internet (Cai et al. 2010; Lee & Whang 2004). Drawing upon the upper echelons theory, DeSCI is the strategic choice for the firm, which would be affected by the top management’s interepations of the strategic environment (Vannoy & Salam 2010).

Top management of a firm, as the boundary spanners, has the boundary-spanning ties and interpersonal connections with its supply chain partners’ top management, which can facilitate the connectedness, interaction, coordination, and communication between supply chain partners (Gao et al. 2008; Joshi et al. 2010). For example, Mitchell (2006) states that top management’s boundary spanning roles can significantly influence the implementation of IT-related projects through acquiring, integrating, and recombining external and internal knowledge. Following this logic, we conjecture that DeSCI would be affected by the top management’s behaviors and actions in important ways.

Following Liang et al. (2007), we use TMB and TMP to represent the two stages that top management supports the development of DeSCI with supply chain partners. TMB emphasizes the top management’s recognition and strategic insight of the importance, value, and potential of DeSCI, whereas TMP focuses on the top management’s actions to develop strategies and plans to enable the implementation of DeSCI. Previous works indicate that top management’s beliefs significantly influence their behaviors and actions (Liang et al. 2007; Saraf et al. 2013). In particular, top management’s mental image of a desirable future of interorganizational relationships would facilitate or constrain the firm’s actions in the DeSCI implementation process (Srivastva 1983; Villena et al. 2009). Specifically, when firms’ top management believe in the significant potential benefits of implementing DeSCI with supply chain partners, they will be confident about partners’ commitment to such relationship, and be willing to develop strategic partnerships (Liang et al. 2007; Villena et al. 2009; Yeung et al. 2009). In addition, TMB in the value of DeSCI would make the top management...
regard DeSCI as a critical platform to derive competitive advantage (Liang et al. 2007) and thus it enhances the firm’s willingness to participate in the formulation of strategic plans for DeSCI. Hence, TMB would lead top management to actively engage in the process of DeSCI with supply chain partners, and subsequently affecting TMP (Sanders 2008; Villena et al. 2009).

**H1:** Top management belief about the potential of DeSCI positively influences top management participation in the DeSCI process.

It is well established that TMP can facilitate the assimilation of innovative practices by creating appropriate organizational structures (e.g., Liang et al. 2007). Based on the upper echelons theory, cognitive base and values of top management will guide the firm’s behaviors and strategic decisions (Hambrick & Mason 1984). Specifically, TMP can help firms manage the resource provision, organizational change, and vision sharing in the process of DeSCI (Dong et al. 2009). On one hand, firms with high TMP would establish goals and standards to lend legitimacy to facilitating the implementation of DeSCI (Liang et al. 2007), which would make digitally enabled information sharing among supply chain partners more efficient and effective. For example, employees can use their own judgment to share the routine information with supply chain partners by following the formal rules and standards (Gibson & Birkinshaw 2004), which consequently would reduce the unnecessary operational redundancies. On the other hand, high TMP firms would proactively pursue more entrepreneurial opportunities by leveraging their interpersonal ties with their supply chain partners, such as making long term planning, jointly customer needs forecasting, and new product development (Cai et al. 2010; Peng & Luo 2000), and thus facilitating the digitally enabled collaborative planning between supply chain partners. Hence:

**H2a:** Top management participation in the DeSCI process positively influences digitally enabled information sharing.

**H2b:** Top management participation in the DeSCI process positively influences digitally enabled collaborative planning.

### 2.3 Effect of Justice Perceptions on Top Management

Justice stresses the firm’s perceived overall fairness from the supply chain relationship, which subsequently affects the firm’s intentions and motivations to integrate with its supply chain partners (Ellis et al. 2009; Jambulingam et al. 2009; Liu et al. 2012). According to Luo (2007), we define justice as a tripartite concept in terms of distributive, procedural, and interactional justice. Specifically, distributive justice refers to a firm’s perceived fairness of the gain acquired from the relationship with its supply chain partners (Griffith et al. 2006; Liu et al. 2012; Yilmaz et al. 2004). Procedural justice refers to a firm’s perceived fairness of its supply chain partner’s procedural and processes (Liu et al. 2012; Yilmaz et al. 2004). Interactional justice refers to a firm’s perceived fairness of its interpersonal treatment received from its supply chain partner (Liu et al. 2012; Luo 2007). However, different types of justice have unique properties and thus send different signals (Luo 2007; Narasimhan et al. 2013; Whitman et al. 2012). Following the perspective of upper echelons, top management are exposed to several stimuli of the internal and external environment (Hambrick & Mason 1984). In particular, distributive, procedural, and interactional justice are the important external stimuli that influence the managerial perceptions of top management in the supply chain relationship. As such, justice can be regarded as the firm’s important external situation, which shapes how top management interpret the strategic environment they face (Hambrick & Mason 1984; Vannoy & Salam 2010).

Distributive justice reflects the economic aspect of SCM and focuses on a firm’s fairness treatment demonstrated by its supply chain partners (Griffith et al. 2006). Distributive justice is based on the principle of equity (Adams 1965). In the context of supply chain, a firm would engage in sensemaking regarding the fairness with which its supply chain partner distributes rewards and resources and subsequently evaluate its relationship with this partner (Luo 2007). As such, distributive justice helps top management trade-off the expected outcome of cooperation relationship in supply chain, the value of cooperation, and other knowledge and assumptions of the relationship, which further leads to managerial perceptions and actions of top management in the DeSCI process. Specifically, when a
distributive justice climate is shared in the supply chain, firms’ top management will perceive low possibility of opportunism in the relationship and thus actively develop their beliefs about the potential and benefits of DeSCI with supply chain partners (Liang et al. 2007; Liu et al. 2012; Narasimhan et al. 2013). Furthermore, when a high level of distributive justice is perceived, top management will be motivated to participate in the process of DeSCI to derive more benefits because they feel their effort is worthy and they can always get corresponding reward from the contribution (Liu et al. 2012). For instance, Liu et al. (2012) indicate that mutual perceptions of distributive justice between buyer and supplier can positively influence their mutual coupling behaviors (Liu et al. 2012). Thus, we propose that both TMB and TMP are affected by the perception of distributive justice.

**H3a:** Distributive justice positively influences top management belief.

**H3b:** Distributive justice positively influences top management participation.

Researches increasingly suggest that firms shift from emphasizing purely on the consequences of reward distributions to the process by which the distributions are made (Cohen-Charash & Spector 2001). Compared with distributive justice, procedural justice addresses both structural elements, such as process control and voice in the decision-making process, and work relationship as the important antecedents of fairness perceptions (Luo 2007). Firms do not always have full access to real information of distribution of gains, top management thus refers to the fairness of policies and procedures to determine the outcome (Luo 2007). In this view, procedural justice is drawn from the principle of instrumentality and focuses on the formalization and routinization in decision making (Luo 2007; Narasimhan et al. 2013). Procedural justice highlights the way how the outcomes are allocated between the firms within the supply chain (Cohen-Charash & Spector 2001). Accordingly, procedural justice can affect higher-order attitudes of trust and commitment, which further enhances top management’s belief and participation in the DeSCI process (Ellis et al. 2009). Moreover, procedural justice eliminates the fear of loss of interest and power in the DeSCI process through formal contract and policies, and thus resulting in top management’s satisfaction with the outcome even when the distribution of outcome is not fair (Chiu et al. 2009; Luo 2007). Procedural justice helps firms’ top management provide “voice” in the relationship and thus establishes a common understanding and expectation of norms and goals between supply chain partners (Liu et al. 2012; Narasimhan et al. 2013). As such, procedural justice involving the formal rules and policies is the cognitive guide for top management to initiate appropriate activities and participate in the DeSCI process (Liang et al. 2007). Therefore:

**H4a:** Procedural justice positively influences top management belief.

**H4b:** Procedural justice positively influences top management participation.

Different from distributive and procedural justice, interactional justice reflects the social aspect of SCM that represents interpersonal treatment between individuals in the supply chain interaction process (Luo 2007). In this view, interactional justice is derived from the principle of social exchange and focuses on the relational attachment between firms (Luo 2007). Specifically, justice in interpersonal exchange and interaction between the boundary spanners will increase their interpersonal and organizational bonding through heightened communication and socialization (Liu et al. 2012; Luo 2007). Thus, interpersonal justice is critical for developing top management’s beliefs of the potential of the DeSCI. Further, interactional justice strengthens the social relationship and helps build long-term trusts which facilitates the development of social capitals between top management (Chiu et al. 2009). Top management will seek for opportunities for further cooperation with their trusted partners in the future. Following this logic, when interactional justice is high, top management, as boundary spanners, from each supply chain partner can be more socially bound through the development of interpersonal relationships (Luo 2007). In other words, high interactional justice increases the level of social embeddedness embodied in the interactions, which can better help top management develop their beliefs about the benefits of DeSCI, and subsequently translating the beliefs into actions (Grewal & Slotegraaf 2007; Liang et al. 2007; Luo 2007). Thus:

**H5a:** Interactional justice positively influences top management belief.

**H5b:** Interactional justice positively influences top management participation.
3 RESEARCH METHOD

3.1 Research Design

To test our hypotheses, we collected data using a questionnaire survey. This survey was conducted in China. With a list provided by government agencies administering major industrial parks, we randomly selected 1,000 firms that had run their supply chains by Internet-enabled applications. We further identified a senior executive from each firm based on the standard practice of using senior executives or “key informants” as data sources (Flynn et al. 2010; Liu et al. 2010; Paulraj et al. 2008). These senior executives were chosen as appropriate informants for three reasons: i) they have significant responsibility in overseeing supply chain partners and IOS; ii) as active executives, they have a good understanding of justice policies demonstrated by their supply chain partners; and iii) as their posts are at the top of the organizational structure, they have the power and opportunities to make or affect their firms’ strategic decisions, such as those regarding DeSCI implementation.

After the questionnaires had been sent out for two weeks, we made follow-up phone calls and sent reminder emails to encourage response. Finally, we received 198 useful questionnaires, with a response rate of approximately 20%. To test for possible non-response bias, we compared the Chi-squares from the first 25% of the respondents to that of the final 25%, and found no significant difference between these two groups on any of the constructs. This result suggested that non-response bias was not a serious issue in this study (Armstrong & Overton 1977). Table 1 shows the demographic information of the sample.

<table>
<thead>
<tr>
<th>Respondent titles</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>President, Managing Director, CEO</td>
<td>58</td>
<td>29.3%</td>
</tr>
<tr>
<td>Senior VP of Operations, COO</td>
<td>64</td>
<td>32.3%</td>
</tr>
<tr>
<td>CIO/CTO</td>
<td>76</td>
<td>38.4%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Industry</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td>87</td>
<td>43.9%</td>
</tr>
<tr>
<td>Service</td>
<td>111</td>
<td>56.1%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ownership</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>State owned</td>
<td>97</td>
<td>49.0%</td>
</tr>
<tr>
<td>Privately owned</td>
<td>60</td>
<td>30.3%</td>
</tr>
<tr>
<td>Foreign controlled</td>
<td>41</td>
<td>20.7%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of employees</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 100</td>
<td>34</td>
<td>17.2%</td>
</tr>
<tr>
<td>100–500</td>
<td>63</td>
<td>31.9%</td>
</tr>
<tr>
<td>500–1000</td>
<td>21</td>
<td>10.6%</td>
</tr>
<tr>
<td>1000–2000</td>
<td>28</td>
<td>14.1%</td>
</tr>
<tr>
<td>More than 2000</td>
<td>52</td>
<td>26.3%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of IT employees</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 5</td>
<td>90</td>
<td>45.5%</td>
</tr>
<tr>
<td>6–10</td>
<td>28</td>
<td>14.1%</td>
</tr>
<tr>
<td>11–15</td>
<td>14</td>
<td>7.1%</td>
</tr>
<tr>
<td>More than 15</td>
<td>66</td>
<td>33.3%</td>
</tr>
</tbody>
</table>

Table 1. Sample Demographic (N=198)

3.2 Measures

The current study developed an English questionnaire through adopting or adapting the previously validated measures from the existing literature. We used 5-point Likert scales, with options ranging from 1 (“strongly disagree”) to 5 (“strongly agree”) to measure the items. Given that the current
research was conducted in China, the English questionnaire was then translated into Chinese by a team consisting of four researchers from different majors. Further, a professional translator, who was unfamiliar with our study, was hired to translate the Chinese questionnaire back to English. No semantic discrepancies were found when the translated questionnaire was compared with the original English version.

Specifically, the items used to measure digitally enabled information sharing were adapted from Devaraj et al. (2007). For example, the respondents were asked to indicate the extent to which they agreed with “We have shared the demand forecasts with channel partners via Internet”. Whereas the items of digitally enabled collaborative planning were developed based on the work of Cai et al. (2010). Meanwhile, distributive justice was measured by four items adapted from the work of Liu et al. (2012) and items used to measure procedural justice were adapted from Liu et al. (2012) and Griffith et al. (2006). Moreover, items used to measure the interactional justice were adapted from Luo (2007). Finally, the items used to measure top management belief were adapted from Chatterjee et al. (2002), while top management participation items were adapted from Liang et al. (2007).

Additionally, several control variables that might affect DeSCI were included: industry, ownership type, and firm size. Specifically, based on whether the firm manufactured physical products or provided services, we used a dummy variable for the industry, with values of 1 and 0 for the manufacturing and service industries, respectively. Dummy variables were also used for ownership types, namely state-owned, private-owned, and foreign-controlled. The size of the firm was measured by the number of full-time employees.

4 ANALYSIS AND RESULTS

4.1 Common Method Bias

All the data collected in this study were perceptual and from a single source at the same time. This may incur the issue of common method bias, which would threaten the validity of our study. To test common method bias, we applied the Harmon’s single-factor test. The results finally revealed that all the items in the dataset could develop seven distinct factors with eigenvalues above 1.0, and explain 76.50% of total variance. Meanwhile, the first factor did not account for the majority of the variance (only 13.01%). These results indicated that common method bias was unlikely to be a major issue in the dataset.

4.2 Reliability and Validity

Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were used to assess the construct reliability and validity of the measurement. We assessed Cronbach’s alpha and composite reliability. The values ranged from 0.763 to 0.876 and from 0.861 to 0.924, respectively, indicating the good reliability of the measurements (Table 2). We further tested construct validity in terms of convergent and discriminant validity. The convergent validity was tested based on the value of loading and average variance extracted (AVE). As Table 3 showed, all the retained items had loadings greater than 0.60 and that items loaded well on their own factors. Further, the values of AVE ranged from 0.674 to 0.859, which were above the 0.50 recommended level. All these results confirmed the convergent validity of the measures.

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>Composite reliability</th>
<th>Cronbach’s alpha</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Justice</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distributive justice</td>
<td>3.700</td>
<td>0.625</td>
<td>0.905</td>
<td>0.763</td>
<td>0.705</td>
</tr>
<tr>
<td>Procedural justice</td>
<td>3.652</td>
<td>0.654</td>
<td>0.915</td>
<td>0.856</td>
<td>0.730</td>
</tr>
<tr>
<td>Interactional justice</td>
<td>3.874</td>
<td>0.581</td>
<td>0.900</td>
<td>0.864</td>
<td>0.694</td>
</tr>
</tbody>
</table>

Top management
Table 3. Item Loadings and Cross Loadings

To assess the discriminant validity, we used multiple techniques. First, as shown in Table 3, all the items loaded well onto their own construct and poorly on other constructs. Second, the square roots of the AVE of each construct were calculated and compared with the correlations among constructs. As shown in Table 4, the square roots of AVEs for all constructs were greater than the correlations between constructs, thus confirming the discriminant validity.

Table 4. Correlations

Note: The diagonal elements are the square root of the AVE.
4.3 Hypothesis Testing

We used Partial Least Squares (PLS) Graph Version 3.0 to test our research model due to our relatively small sample size (e.g., Liang et al. 2007; Sun et al. 2012). Moreover, PLS can estimate the loadings/weights of indicators on constructs and explain the complex relationships among constructs (Fornell & Bookstein 1982).

The results of PLS analysis were shown in Figure 3, indicating that top management belief had a significant effect on top management participation (β=0.483, p<0.001), which supported H1. It had also been shown that top management participation had a positive effect on both digitally enabled information sharing (β=0.509, p<0.001) and digitally enabled collaborative planning (β=0.526, p<0.001), thereby H2a and H2b were supported. However, neither the relationship between distributive justice and top management belief (β=0.125, p>0.05) nor the relationship between distributive justice and top management participation (β=0.036, p>0.05) was significant. Hence, H3a and H3b were not supported. Meanwhile, procedural justice had a positive effect on top management belief (β=0.243, p<0.01) yet did not significantly affect top management participation (β=0.053, p>0.05), thus supporting H4a but H4b was not supported. Furthermore, the relationships between interactional justice and top management belief (β=0.170, p>0.05) was not significant, while the relationship between interactional justice and top management participation (β=0.213, p<0.05) was positively significant. Therefore, H5b was supported yet H5a was not supported.

In addition, except for the relationship between ownership and digitally enabled information sharing was negatively significant (β=-0.170, p<0.01), all other control variables were found to be insignificant. It is necessary to highlight the relatively high levels of explained variance in digitally enabled information sharing (R²=0.293), digitally enabled collaborative planning (R²=0.332), top management belief (R²=0.246), and top management participation (R²=0.472).

Figure 3. PLS Results of Research Model

To test for evidence of top management as a mediating variable, we conducted the tests using casual steps approach, which was suggested by Baron&Kenny (1986). First, we removed TMB and TMP from the model and connected three types of justice and two types of DeSCI. The results showed that the relationship between distributive justice and digitally enabled information sharing was significant (β=0.285, p<0.01) yet the relationship between distributive justice and digitally enabled collaborative planning was not significant (β=0.128, p>0.05). The relationship between procedural justice and digitally enabled information sharing, and relationship between procedural justice and digitally enabled collaborative planning were both significant (β=0.210, p<0.05; β=0.299, p<0.01). While the relationship between interactional justice and digitally enabled information sharing, and relationship between interactional justice and digitally enabled collaborative planning were neither significant (β=0.061, p>0.05; β=0.148, p>0.05). Second, we constructed an alternative model in which all three types of justice had direct links to the two types of DeSCI variables in addition to the mediated links. The results showed that the direct link between distributive justice and digitally enabled information sharing was not significant (β=0.170, p>0.05) yet the relationship between distributive justice and digitally enabled collaborative planning (β=0.213, p<0.05) was positively significant. Therefore, H5b was supported yet H5a was not supported.
sharing was significant ($\beta=0.233$, $p<0.01$) but the direct link between distributive justice and digitally enabled collaborative planning was not significant ($\beta=0.063$, $p>0.05$), while the direct link between procedural justice and digitally enabled information sharing was not significant ($\beta=0.128$, $p>0.05$) but the direct link between procedural justice and digitally enabled collaborative planning was still significant ($\beta=0.225$, $p<0.05$). However, the direct link between interactional justice and digitally enabled information sharing, and direct link between interactional justice and digitally enabled collaborative planning were still neither significant ($\beta=-0.058$, $p>0.05$; $\beta=0.035$, $p>0.05$). These results jointly indicated that the impact of procedural justice on digitally enabled information sharing and digitally enabled collaborative planning were both fully mediated by TMB, while the impact of distributive justice on digitally enabled information sharing is partially mediated by TMP. Although interactional justice significantly influenced TMP, and further significantly improved both types of DeSCI, no mediating effect of TMP was found.

<table>
<thead>
<tr>
<th>IV</th>
<th>M</th>
<th>DV</th>
<th>IV→DV</th>
<th>IV→M</th>
<th>IV+M→DV</th>
<th>IV→DV</th>
<th>M→DV</th>
<th>Mediating</th>
</tr>
</thead>
<tbody>
<tr>
<td>DJ</td>
<td>TMB</td>
<td>DeIS</td>
<td>0.285**</td>
<td>0.170</td>
<td>0.233**</td>
<td>0.195*</td>
<td>Not</td>
<td></td>
</tr>
<tr>
<td>DJ</td>
<td>TMB</td>
<td>DeCP</td>
<td>0.128</td>
<td>0.170</td>
<td>0.063</td>
<td>0.186*</td>
<td>Not</td>
<td></td>
</tr>
<tr>
<td>DJ</td>
<td>TMP</td>
<td>DeIS</td>
<td>0.285**</td>
<td>0.176*</td>
<td>0.233**</td>
<td>0.509***</td>
<td>Partially</td>
<td></td>
</tr>
<tr>
<td>DJ</td>
<td>TMP</td>
<td>DeCP</td>
<td>0.128</td>
<td>0.176*</td>
<td>0.063</td>
<td>0.526***</td>
<td>Not</td>
<td></td>
</tr>
<tr>
<td>PJ</td>
<td>TMB</td>
<td>DeIS</td>
<td>0.210*</td>
<td>0.243**</td>
<td>0.128</td>
<td>0.195*</td>
<td>Fully</td>
<td></td>
</tr>
<tr>
<td>PJ</td>
<td>TMB</td>
<td>DeCP</td>
<td>0.299**</td>
<td>0.243**</td>
<td>0.063</td>
<td>0.186*</td>
<td>Fully</td>
<td></td>
</tr>
<tr>
<td>PJ</td>
<td>TMP</td>
<td>DeIS</td>
<td>0.210*</td>
<td>0.177</td>
<td>0.128</td>
<td>0.509***</td>
<td>Not</td>
<td></td>
</tr>
<tr>
<td>PJ</td>
<td>TMP</td>
<td>DeCP</td>
<td>0.299**</td>
<td>0.177</td>
<td>0.063</td>
<td>0.526***</td>
<td>Not</td>
<td></td>
</tr>
<tr>
<td>IJ</td>
<td>TMB</td>
<td>DeIS</td>
<td>0.061</td>
<td>0.170</td>
<td>-0.058</td>
<td>0.195*</td>
<td>Not</td>
<td></td>
</tr>
<tr>
<td>IJ</td>
<td>TMB</td>
<td>DeCP</td>
<td>0.148</td>
<td>0.170</td>
<td>0.035</td>
<td>0.186*</td>
<td>Not</td>
<td></td>
</tr>
<tr>
<td>IJ</td>
<td>TMP</td>
<td>DeIS</td>
<td>0.061</td>
<td>0.292*</td>
<td>-0.058</td>
<td>0.509***</td>
<td>Not</td>
<td></td>
</tr>
<tr>
<td>IJ</td>
<td>TMP</td>
<td>DeCP</td>
<td>0.148</td>
<td>0.292*</td>
<td>0.035</td>
<td>0.526***</td>
<td>Not</td>
<td></td>
</tr>
</tbody>
</table>

Note 1: *p<0.05, **p<0.01, ***p<0.001.
Note 2: IV: independent variable; M: mediator; DV: dependent variable; DJ: distributive justice; PJ: procedural justice; IJ: interactional justice; TMB: top management belief; TMP: top management participation; DeIS: digitally enabled information sharing; DeCP: digitally enabled collaborative planning.

Table 5. Results of Mediating Effects Tests

5 DISCUSSION

Overall, our findings provide broad support for the theoretical arguments on how TMB and TMP affect the firm’s DeSCI, as well as how a firm’s TMB and TMP are affected by the justice demonstrated by its supply chain partner. Our findings suggest that TMB and TMP can significantly improve both types of DeSCI, namely, digitally enabled information sharing and digitally enabled collaborative planning. Specifically, TMP directly improves the firm’s DeSCI, while TMB indirectly enhances DeSCI through TMP. This implies that top management, as boundary spanners, plays an active role in the resource provision, change management, and version sharing that facilitate the implementation of DeSCI (Dong et al. 2009). TMB and TMP allow the focal firm to create a supportive environment that encourages employees to engage in the process of DeSCI in terms of digitally enabled information sharing and digitally enabled collaborative planning. Our findings on the indirect effects of TMB and direct effects of TMP are consistent with what is found by Liang et al. (2007), thereby confirming the critical role of human decision makers in the implementation of IT-related projects, such as DeSCI, in the SCM context.

In addition, our findings reveal that different types of justice have differential effects on top management. Specifically, procedural justice significantly improves TMB but does not significantly affect TMP. This result indicates that procedural justice brings no direct effect on TMP, instead it stimulates the TMP through affecting TMB. This finding may be explained by the instrumentality logic of procedural justice (Luo 2007). Only when firms’ top management believe the fair procedures and processes can create strategic benefits can the procedural justice lead to TMP. Our mediating
effect tests also indicated that top management can fully mediate the relationship between procedural justice and digitally enabled information sharing, but only partially mediate the relationship between procedural justice and digitally enabled collaborative planning. While interactional justice directly significantly affects TMB without affecting TMB. A possible explanation for this result is that interactional justice is based on the social exchange logic and as such it will directly result in relationship investment by following the social norm in the supply chain relationship (Liu et al. 2012; Luo 2007).

However, contrary to our expectations, the distributive justice is found to be neither associated with TMB nor TMP. A possible explanation is that distributive justice may be taken for granted by firms in the supply chain. Another possible explanation is that fair distribution of outcome cannot reflects the value of the relationship because there might be some unfairness on the process or interpersonal exchange that may reduce the top management’s belief and participation. More surprisingly, we find distributive justice can lead to digitally enabled information sharing directly.

5.1 Theoretical Contributions

This study makes several key contributions to the theory. First, given that there are few studies investigating justice in the context of supply chain (Griffith et al. 2006; Liu et al. 2012; Narasimhan et al. 2013), our study adds to the supply chain literature by incorporating justice into DeSCI. Griffith et al. (2006) further indicate that lack of studies on justice in the supply chain context is surprising due to its importance in buyer-supplier context. Our study therefore extends the applicability of justice to the supply chain context by demonstrating how justice influences the firm’s DeSCI. This research serves as an initial step to empirically investigate the roles of justice in the context of DeSCI.

Second, this study further unveils the underlying casual mechanisms through which justice influences firms’ DeSCI by establishing two top management constructs as the key mediators. This highlights the importance of human decision makers in the DeSCI process, which further enriches our understanding of the nature of justice. Specifically, procedural justice influences the beliefs of top management and thereby their behavior indirectly, interactional justice directly influences the top management’s behavior, while distributive justice does not influence top management’s beliefs or behavior.

Finally, this study also contributes to the upper echelons theory. Specifically, we identify three types of justice, namely distributive, procedural, and interactional justice as the important situation the firm faces, which consequently influences DeSCI through affecting top management’s beliefs and behaviors. Our study uses the upper echelons perspective as the underlying conceptual foundation to propose a model that links the justice, top management behaviors, and the organization’s DeSCI, and thus extending the upper echelons theory into the DeSCI.

5.2 Managerial Implications

In terms of practicality, this study also has several important implications for management. First, we offer a theoretical framework for managers to understand how justice helps firms achieve DeSCI through the top management’s beliefs and actions. This study highlights that firms’ justice perceptions in the supply chain can be regarded as important external stimuli they face. For managers, they should develop their recognition of the justice policies demonstrated by their supply chain partners, as well as how to leverage the justice policies to enable the firm’s DeSCI implementation.

Second, the significantly direct effect of TMP and indirect effect of TMB clearly highlight the critical role of human decision makers in the DeSCI implementation process. As such, the managers who strive to effectively implement the digitally enabled information or digitally enabled collaborative planning should be aware of enhancing their beliefs and participation level in the process of SCM.

Finally, the differential effects of different types of justice provide managers with support for making right decision on how to enact appropriate justice policies for improving DeSCI through top management. That is, investing in developing justice policies indiscriminately is not an effective way
for facilitating the implementation of DeSCI. For example, for firms that intend to improve DeSCI through top management’s beliefs of the DeSCI, they should focus on developing the procedural justice in the supply chain relationship. Meanwhile, managers should invest more on interactional justice when they struggle to improve DeSCI by leveraging top management’s participation in the SCM process. More importantly, managers should notice that it is useless to employ distributive justice to motivate top management’s beliefs or actions and thereby the firm’s DeSCI.

6 LIMITATIONS AND FUTURE RESEARCH

There are some limitations in this study should be recognized which may open up several opportunities for future research. First, we tested our hypotheses using data collected in China, which may limit the generalizability of the findings. Indeed, China has specific cultural, economic, and institutional mechanisms. For example, Chinese government is still playing a critical role in the business environment. In particular, government support may have an important impact on the firm’s DeSCI, which may influence our results. In this view, it should be cautious when extending the findings of the current research to other contexts. Second, the hypotheses were tested with cross-sectional data. Given that the DeSCI implementation is a gradual process, a longitudinal study may help extend our understanding about these issues. The longitudinal study could explore the interrelationships between justice perceptions and top management at different stages considering the time issue. Besides, it also help reduce common method bias (Podsakoff & Organ 1986). Third, although we employed the upper echelons theory to build our research model, we did not explicitly measure the cognitive based and values. Further research capturing all the components of this theory is needed. Finally, this study applied the single respondent as the source of survey data. However, a firm’s strategic decisions on DeSCI and top management behaviors usually involve a group of related executives. Therefore, collecting data from multiple informants in the top management team would be helpful to enhance the robustness of the research results.

7 CONCLUSION

Drawing upon the upper echelons theory, we investigate how three types of justice in the supply chain relationship influence top management belief and participation and thereby two types of DeSCI, namely, digitally enabled information sharing and digitally enabled collaborative planning. We conduct an empirical study in China and find top management belief can significantly affect top management participation, and consequently improving both digitally enabled information sharing and digitally enabled collaborative planning. It highlights the importance of top management in facilitating the implementation of DeSCI by interpreting the external situation. We further find the three types of justice, as important external stimuli, have different impacts on top management. These research findings not only enhance our understanding of the underlying mechanism through which the different types of justice improve DeSCI but also provide a new venue to further explore the nomological network of justice, especially in the supply chain context. We hope this study opens future research and advances theory to further explore the nature and dynamics of justice and DeSCI.

ACKNOLEDGEMENTS

The work described in this paper was fully/partially supported by the grants from the National Natural Science Foundation of China (NSFC: 71101136, 71201150, 71090401/71090400) and the Research Grants Council of the Hong Kong Special Administrative Region, China (Project No. CityU 195413 and N_CityU115/10).
References


