The role of the quality of shared information in interorganizational systems use

Edward Hartono\textsuperscript{a,1,2}, Xiaotong Li\textsuperscript{a,1,3}, Kwan–Sik Na\textsuperscript{b,1,4}, James T. Simpson\textsuperscript{c,1,4}

\textsuperscript{a} Department of Economics and Information Systems, College of Business Administration, University of Alabama in Huntsville, 301 Sparkman Drive, Huntsville, AL 35899, United States
\textsuperscript{b} Department of Management Information Systems, Seowon University, 241 Musimseoro, Hungduk-gu, Cheongju-shi, Chungbuk 361-742, Republic of Korea
\textsuperscript{c} College of Business Administration, University of Alabama in Huntsville, 301 Sparkman Drive, Huntsville, AL 35899, United States

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This study develops and tests a three-stage model that examines the role of the quality of shared information in interorganizational systems (IOS) use. The model provides a more inclusive method of measuring quality of shared information in IOS use through a re-examination of the impact of top management support and IT infrastructure capability, and by assessing the mediating effect of operational supply chain performance on the relationship between quality of shared information and overall firm performance. Our results suggest that the impact of the quality of shared information in IOS use on overall firm performance starts with top management support and IT infrastructure capability, and that these success factors positively impact the quality of shared information in IOS use. Moreover, our results indicate that the quality of shared information positively impacts operational supply chain performance, which, in turn, leads to improvements in overall firm performance. Overall, our results highlight the importance of high quality of shared information in IOS use.

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1. Introduction

Modern supply chain management takes a holistic view that requires buyers and sellers to proactively integrate their supply chain activities, functions, and systems (Frohlich & Westbrook, 2001; Vickery, Jayaram, Droge, & Calantone, 2003). Previous studies have demonstrated that sharing information significantly improves operational supply chain performance (e.g., Hill & Scudder, 2002). Hence, information management, particularly information sharing management, is an important component of effective supply chain integration (Gunasekaran, Lai, & Cheng, 2008; Pereira, 2009). Interorganizational system (IOS) has become the backbone in supply chain management by advancing firms’ information sharing management capabilities (Kim & Narasimhan, 2002; Sanders, 2007).

While information sharing is important, the significance of its impact on supply chain performance depends largely on the quality of the shared information where quality refers to the shared information’s usefulness, accuracy, and accessibility (Li, Ragu–Nathan, Ragu–Nathan, & Rao, 2006). Sharing low quality information that is void of these attributes will likely not benefit supply chain participants (Huang, Lau, & Mak, 2003). Hence, the role of IOS in supply chain management is not only to facilitate information sharing, but more importantly, to improve the quality of shared information.

A review of quality of shared information, IOS, information management, and supply chain management literature (see Appendix 1 for definitions of these terms) reveals that few empirical studies exist that investigate the role of quality of shared information in IOS use (Nicolaou & McKnight, 2006). Moreover, the only empirical study that investigates antecedents of quality of shared information in the context of supply chain management finds non-significant results for two important antecedents, namely top management support and IT infrastructure capability (Li & Lin, 2006).

The purpose of this study is to contribute further to our understanding of the significance of quality of shared information by developing and testing a three-stage model that examines the role of quality of shared information in IOS use. The model provides a more inclusive method of measuring quality of shared information in IOS use through a re-examination of the impact of top management support and IT infrastructure capability, and by assessing the mediating effect of operational supply chain performance on the relationship between quality of shared information and overall firm performance.

We begin this study by presenting a conceptual background for the study. Then we develop a conceptual model with resulting hypotheses. Next the methodology for collecting and analyzing the data is discussed. Following the presentation of the empirical
results, we discuss the implications, limitations, and conclusion of the study.

2. Conceptual background

2.1. The role of quality of shared information in IOS use

IOS has been widely used to support information sharing capabilities among supply chain participants (Kim & Narasimhan, 2002; Sanders, 2007). While information sharing is important, the significance of its impact on supply chain performance depends on the quality of the shared information (e.g., information usefulness, information accuracy, information accessibility) (Li et al., 2006). For instance, shared information that is not useful, accurate, or easily accessible provides no benefit to supply chain participants (Huang et al., 2003). Therefore, the role of IOS is not only to facilitate information sharing, but more importantly, to improve quality of shared information.

The IOS literature reveals that IOS use impacts different dimensions of quality of shared information. For instance, some studies suggest that IOS use improves the usefulness of shared information (e.g., Gosain, Malhotra, & El Sawy, 2004; Salaun & Flores, 2001). Other studies argue that IOS use enhances the accuracy of shared information (e.g., Mukhopadhyay, Kekre, & Kalathur, 1995). Some other studies also reveal that IOS use increases the accessibility of shared information (e.g., Forslund & Jonsson, 2007; Salaun & Flores, 2001).

Based on this literature, we propose that quality of shared information is an immediate manifestation, or the first-order impact (Barua, Kriebel, & Mukhopadhyay, 1995), of IOS use. IOS use enables supply chain participants to share information that possesses high levels of valuable properties such as information usefulness, information accuracy, and information accessibility.

Barua et al. (1995) noted that the impact of information systems use occurs in stages, which begins at the operational level and ends at the aggregate level such as overall firm performance. This view is also consistent with Bradley, Pridmore, and Byrd (2006) who suggest that information systems use first impacts the lower level operations which leads to higher levels of aggregate performance such as overall firm performance.

Consistent with this approach, we model the impact of IOS use in three stages: quality of shared information is modeled as the first-order impact, operational supply chain performance as the second-order impact, and overall firm performance as the third-order impact. Operational supply chain performance refers to the performance of one or a few activities inside the firm such as inventory control and transportation (Barua et al., 1995). Overall firm performance refers to the performance of the firm as a whole (Barua et al., 1995). While operational supply chain performance and overall firm performance have been used in the original study (Barua et al., 1995), quality of shared information is unique in IOS use context.

We propose that quality of shared information precedes operational supply chain performance and overall firm performance as the immediate manifestation of IOS use.

2.2. Top management support, IT infrastructure capability, and quality of shared information

A review of IOS literature reveals that top management support and IT infrastructure capability are among the most cited antecedents of IOS use success. However, the results of empirical studies investigating the relationships between these two antecedents and IOS use success have been mixed. For instance, the results of studies by Craighead, Patterson, Roth, and Segars (2006) and Premkumar, Ramamurthy, and Nilakanta (1994) show significant relationship. Yet, a study by Angeles, Nath, and Hendon (1998) demonstrates insignificant relationship.

Surprisingly, empirical studies that include top management support and IT infrastructure capability as antecedents of quality of shared information are rare. In fact, we found only one such study (Li & Lin, 2006) whose results show not-significant relationship between the two antecedents and quality of shared information. Given the reported importance of top management support and IT infrastructure capability as antecedents of IOS use success, and the insistence by researchers that quality of shared information is an immediate manifestation of IOS use, we suggest that our more inclusive model will capture the unique relationship among top management support, IT infrastructure capability, and quality of shared information. While other antecedents of quality of shared information exist, our theoretical perspective supports the reexamination of top management support and IT infrastructure capability as antecedents to quality of shared information. As demonstrated antecedents of IOS use success, top management support and IT infrastructure capability are expected to positively influence IOS use to effectively improve the quality of shared information in a supply chain system.

3. Hypothesis development

The model presented in Fig. 1 integrates five variables that are prominent in the IOS literature. The focus of the conceptual model is on the role of quality of shared information in IOS use. Specifically, the model evaluates: (1) the impact of two antecedents (top management support and IT infrastructure capability) on quality of shared information, and (2) the impact of quality of shared information on both operational supply chain performance and overall firm performance. Moreover, our model proposes that the impact of quality of shared information on overall firm performance is mediated by operational supply chain performance.

The hypothesized relationships derived from the conceptual model are discussed below.
3.1. IT infrastructure capability and quality of shared information

IT infrastructure is defined as a set of shared IT resources which is a foundation for both communication across the organization and the use of present/future business applications (Chanopas, Krairit, & Khang, 2006). IT infrastructure can be classified into two groups: (1) technical, and (2) human. Technical IT infrastructure includes hardware, software, database systems, and communication systems. Human infrastructure includes technological know-how.

Modern IOS are complex systems that use state-of-the-art hardware, software, database systems, and communication systems. Firms operating IOS must have IT infrastructure (e.g., enterprise database technology, enterprise communication technology) that is both supportive and compatible with the IOS (Gunasekaran & Ngai, 2004; Premkumar & Ramamurthy, 1995). Lack of supportive and compatible IT infrastructure (i.e., low IT infrastructure capability) can lead to a variety of integration and operation problems that inhibit the IOS from effectively improving quality of shared information (Gunasekaran & Ngai, 2004). Therefore, IT infrastructure capability is critical to timely and effective improvement in quality of shared information (Jacovou, Benbasat, & Dexter, 1995; Premkumar & Ramamurthy, 1995; Premkumar et al., 1994).

Hence, we offer the following hypothesis:

H1. There is a positive relationship between IT infrastructure capability and quality of shared information.

3.2. Top management support and quality of shared information

IOS studies consistently report that top management support is a critical success factor for IOS use success (Angeles et al., 1998; Ngai & Gunasekaran, 2004). IOS is an enterprise-wide, resource-intensive project that has a significant impact on a firm’s long-term strategy. Moreover, interaction among top level supply chain partners is required to ensure successful IOS implementation (Kumar & van Dissel, 1996; Premkumar & Ramamurthy, 1995). Therefore, effective implementation requires top management support that can coordinate enterprise-wide participation in the project, make resources available for implementation, ensure alignment between the firms’ long-term strategy, and communicate with the supply chain partners that are involved in IOS implementation (Kumar & van Dissel, 1996; Ngai & Gunasekaran, 2004).

Lack of top management support is detrimental and inevitably leads to inadequate resources which would make it more difficult for IOS to quickly and effectively improve quality of shared information (Gunasekaran & Ngai, 2004). Deficiencies in top management support could also negatively impact required communication and coordination with supply chain partners. Inadequate or ineffective communication and coordination increase the risk of conflicts and misalignment with supply chain partners which would likely damage shared information quality (Kumar & van Dissel, 1996). Therefore, high level of support from top management is expected to increase the likelihood of successful IOS use which will result in improved quality of shared information.

Hence, we offer the following hypothesis:

H2. There is a positive relationship between top management support and quality of shared information.

3.3. Quality of shared information and operational supply chain performance

The supply chain and IOS literature is consistent in its assessment that sharing information significantly improves operational supply chain performance (Hill & Scudder, 2002). Specifically, the effective use of high quality shared information by each supply chain entity results in better decisions which lead to the optimization of a multitude of supply chain dynamics (Huang et al., 2003).

While information sharing is important, the significance of its impact on supply chain performance depends on the quality of the shared information (Li et al., 2006). Mason-Jones and Towl (1997) note the importance of timeliness in information sharing. They explain that information loses its value, meaning, and relevance over time. Timely information sharing allows a firm to quickly learn the supply chain dynamics by promptly sensing the changes in the threats and opportunities confronting their own firm and their supply chain partners. This capability allows firms to improve supply chain performance by promptly developing better mechanisms to deal with these changes.

Gosain et al. (2004) illustrate the importance of relevance in information sharing. Changes in the supply chain environment create informational signals that can literally impact a firm’s survival. Unfortunately, in today’s information age these signals are often clouded by other signals. In order to ensure the efficient assimilation of information, supply chain partners must reduce the need to filter incoming information. Therefore, more relevant information should result in better information assimilation and better responses to changes in the macro-environment. Ultimately, the supply chain partner’s ability to respond quickly to environmental threats and opportunities should improve supply chain performance.

Hence, we offer the following hypothesis:

H3. There is a positive relationship between quality of shared information and operational supply chain performance.

3.4. Quality of shared information and overall firm performance

The direct link between quality of shared information and overall firm performance indicates that quality of shared information impacts overall firm performance through channels other than the mediating variable, the operational supply chain performance. An example of these channels is organizational capability. The strategic management literature has documented that effective inter-firm knowledge transfer is positively associated with increases in organizational capability (e.g., technological skills, organizational skills, marketing knowledge, and environmental familiarity), which, in turn, impacts to overall firm performance (e.g., ROI) (Luo, 1999; Mowery, Oxley, & Silverman, 1996). Moreover, Li et al. (2006) found that shared information quality is related directly and positively to overall firm performance.

Hence, we offer the following hypothesis:

H4. There is a positive relationship between quality of shared information and overall firm performance.

3.4.1. Operational supply chain performance and overall firm performance

Barua et al. (1995) have proposed a two-stage model to explain the relationship between operational and overall firm performance. Their framework proposes that IT creates direct benefits on operational level variables, which, in turn, generates indirect benefits on higher level variables such as performance of the business as a whole.

In our model of IOS, we view the direct benefits as improvements in operational supply chain performance. Our model positions improvements in overall firm performance as the indirect benefits that are derived from operational supply chain performance (Mukhopadhyay & Kekre, 2002). Consistent with this framework, several studies report a positive relationship between operational supply chain performance and overall firm performance (e.g., Dehning, Richardson, & Zmud, 2007; Subramani, 2004).

Hence, we offer the following hypothesis:
H5. There is a positive relationship between operational supply chain performance and overall firm performance.

4. Research method

4.1. The sampling method

The hypotheses were tested by using cross-sectional survey data that were collected from Korean firms. The sample of firms and appropriate informants were identified in cooperation with the Korea Purchasing and Material Management Association (KPMA) (i.e., a Korean non-profit organization with approximately 2000 Korean firms as active members). Our sample consists of Korean firms that use IOS as information technologies employed in interorganizational contexts to mediate buyer–supplier transactions. We set up interview sessions with representatives (e.g., procurement managers, procurement assistant managers) of KPMA members to inquire if their firms use some kind of IOS. After these interviews, we identified 450 member firms that use such technology. We then identified procurement managers or procurement assistant managers in these firms as key informants. Such managers are appropriate informants because a number of studies (e.g., Gosain et al., 2004; Grover & Saeed, 2007) have shown that they generally have in-depth knowledge about their firms’ IOS use as well as the resulting performance enhancements. Moreover, all of these managers or assistant managers are KPM (Korea Certified Purchasing and Materials Manager) certified.

Initially, each of the 450 respondents was mailed a packet that contained both a cover letter requesting participation in the survey and the survey instrument. Several phone calls were made following the mail out to remind the informants about the survey. We received 232 responses within two months for an effective response rate of approximately 51%. Only 227 responses were included in the final analysis because of missing data (i.e., informants did not answer some of the questions). Hence, the usable response rate is approximately 50%. Such an above-average response rate could be attributed to our cooperation with the KPMA, follow up calls, and short survey questionnaire.

4.2. Sample characteristics

Table 1 shows the characteristics of the informants.

4.3. Measure development and validation

The measures were developed after successive stages which included theoretical specification, and statistical testing and refinement as indicated by Straub (1989). Preliminary measures were developed in Korean language based on literature review. Ten Korean procurement managers and five Korean experienced IT staffs that were responsible for managing the IOS in their firms were then recruited to review the measures and provide feedback regarding wording, understandability, precision, and completeness. The resulting measures (see Appendix B) were then subjected to a series of statistical validations.

The statistical validation process involved three components. First, each multi-item measure was subjected to item-to-item correlation analysis to identify potential item contaminants. Next, the dimensional qualities of each measure were assessed with principal component factor analysis. Items that impaired internal consistency or cross-loaded were eliminated. The remaining items were subjected to confirmatory factor analysis using AMOS 4 (Byrne, 2001).

The measurement model fit the data reasonably well. Incremental fit indices (GFI = .876, NFI = .883, CFI = .948, IFI = .949) and absolute fit indices (RMR = .078, RMSEA = .055) suggest that the data fit the model well.

An analysis of reliability and validity also attests to the quality of the proposed measures. First, construct reliability for each measure exceeds the .60 suggested by Bagozzi and Yi (1988). Second, convergent validity is evident because the percentage of variance extracted for each measure exceeds the norm of .50 (Fornell & Larcker, 1981). Third, discriminant validity is evident because the percentage of variance extracted for each measure exceeded the square of the correlations for that measure and any other measure. These analyses taken together suggest a high level of construct validity (Hair, Black, Babin, Anderson, & Tatham, 2006).

For further details of measure development and validation, see http://webpages.uah.edu/~hartone/IJIM.doc.

5. Data analysis and results

The covariance-based structural equation modeling (SEM), using AMOS 4 (Byrne, 2001) is used as the primary data analysis technique in this study. Covariance-based SEM assumes an adequate sample size (Byrne, 2001). Bentler and Chou (1987) note that researchers may go as low as five cases per parameter estimate in covariance-based SEM analyses. Boomsma and Hoogland (2001) consider N < 200 as a small sample size, and N > 200 as sufficient in covariance-based (LISREL-based) SEM. Our study meets these sample size recommendations.

5.1. Hypotheses tests

The structural model in Fig. 1 was estimated to test the hypotheses. Additional tests were conducted to determine the mediating effect of operational supply chain performance on the relationship between quality of shared information and overall firm performance. The results of the hypotheses tests are presented in Fig. 2 and Tables 2 and 3.

The structural model fit statistics presented at the bottom of Table 2 reveal that the model is a reasonable representation of the data. Although the \( \chi^2 \) value of 419 with 224 d.f. (\( \chi^2/d.f. = 1.874, \))
Fig. 2. Results of the structural equation modeling analysis on the structural model.

\( p > .01 \) suggests a less than adequate fit between the model and data, on other criteria, the model fit is acceptable. Two recommended fit indices (IFI = .93 and CFI = .93) exceed the .90 minimum recommended by James, Mulaik, and Brett (1982).

The results of the structural model presented in Table 2. The results strongly support H1 and H2. Both IT infrastructure capability and top management support are associated positively with quality of shared information. The results also support H3 and H4 which posit that quality of shared information is associated positively with both operational supply chain performance (H3) and overall firm performance (H4). As proposed, in H5 the results support the prediction that operational supply chain performance directly impacts overall firm performance. Hence all hypotheses are supported.

Inherent in our model development is the question of whether or not the benefits derived from quality of shared information are captured in a firm's overall firm performance. Following the multi-stage model of IT impact on overall firm performance (Barua et al., 1995; Mukhopadhyay & Kekre, 2002) and Li's, Ragu-Nathan's, Ragu-Nathan's, and Rao's supply chain management model (Li et al., 2006), our model posits that operational supply chain performance is distinct from overall firm performance, and should be modeled as an antecedent to overall firm performance. Specifically, we propose that operational supply chain performance has a mediating effect on the relationship of quality of shared information and overall firm performance. However, a number of studies have empirically demonstrated a direct relationship between quality of shared information and overall firm performance (e.g., Li et al., 2006).

To reconcile these two seemingly opposing ideas, we assess the degree of the mediating effect of the operational supply chain performance on the relationship between quality of shared information and the overall firm performance with a procedure proposed by Cohen and Cohen (1983) and Hair et al. (2006). This procedure includes an analysis of the four models presented in Fig. 3.

To conclude that operational supply chain performance mediates the effects of quality of shared information on overall firm performance the following four conditions must hold (Andrews, Netemeyer, Burton, Moborg, & Christiansen, 2004; Baron & Kenny, 1986; Bart, Shankar, Sultan, & Urban, 2005):

1. The predictor variable (quality of shared information) must impact the mediator (operational supply chain performance) in the proposed direction (model 1).
2. The mediator (operational supply chain performance) must impact the dependent variable (overall firm performance) in the proposed direction (model 2).
3. The predictor (quality of shared information) variable must impact the dependent variable (overall firm performance) in the proposed direction (model 3).
4. The impact of the predictor (quality of shared information) on the dependent variable (overall firm performance) must not be statistically significant (full mediation) or the impact must be significantly reduced (partial mediation) after controlling for the mediator (operational supply chain performance) (model 4).

The parameters necessary to assess these four conditions were generated by the SEM program (AMOS). The analysis reported in Tables 3 and 4 reveals that the first three conditions are satisfied.
by models 1–3. The relationship between predictor variable, quality of shared information and the mediator, operational supply chain performance, is both positive and significant ($\beta = .606, p < .01$). In addition, the relationship between the mediator, operational supply chain performance, and the dependent variable, overall firm performance, is significant and in the predicted direction ($\beta = .629, p < .01$). Finally, the predictor variable, quality of shared information, is both positive and significantly related to overall firm performance ($\beta = .617, p < .01$).

An analysis of model 4 reveals that the relationship between quality of shared information and overall firm performance remains significant ($\beta = .375, p < .01$) after controlling for the impact of the mediator (operational supply chain performance). Hence, there is no evidence of full mediation. Nevertheless, the magnitude of the relationship was reduced from .617 to .375 which suggests partial mediation. This result is also consistent with Li’s, Ragu-Nathan’s, Ragu-Nathan’s, and Rao’s (Li et al., 2006) although in different setting.

6. Discussion

The results of this study support significant relationships among IT infrastructure capability, top management support, quality of shared information, operational supply chain performance, and overall firm performance in the context of IOS use success. The findings confirm that IT infrastructure capability and top management support are both significant antecedents of quality of shared information. A firm’s existing IT infrastructure that is both supportive and compatible with the supply chain’s IOS should significantly mitigate the inherent operational challenges of integrating the firm’s internal IT system with IOS. This finding suggests that the result of the integration of a firm’s compatible and supportive IT system with the supply chain’s IOS system will lead to higher quality of shared information. Top management support for the IOS that would include the top executives’ visible involvement in encouraging enterprise-wide commitment and participation, the allocation of required resources, the appropriate alignment of the firm’s strategy with the IOS strategy, and the assurance of effective communication and coordination with supply chain partners is also associated with improved quality of shared information.

The findings demonstrate that quality of shared information among supply chain partners is positively related to both the supply chain’s operational performance and the firm’s overall performance; yet, the relationship between quality of shared information and overall firm performance is mediated by operational supply chain performance. Sharing information that is useful, accurate, and accessible enables the firm to quickly learn the dynamics in its supply chain environment. This condition allows the firm to quickly develop and implement better supply chain responses which positively impacts the firm’s overall performance.

The findings also confirm the notion that supply chain is an important function in the firm because supply chain performance has a significant and direct impact on the overall firm performance.

7. Conclusion

The findings of this study have several important implications for information management and information systems researchers and practitioners. First, this study builds on a rich literature that demonstrates the importance of high quality shared information in IOS. Our findings reveal that higher quality of shared information is associated with higher levels of operational supply chain performance and overall firm performance. This literature is consistent in its assessment that sharing high quality information leads to better supply chain decisions (e.g., ordering decisions, capacity allocation decisions, production/material handling decisions) which, in turn, facilitate the optimization of supply chain performance (Huang et al., 2003).

Second, our findings suggest that the support of top management and the capability of existing IT infrastructure have a direct
and positive impact on quality of shared information. To the best of our knowledge, this is the first study to report that top management support and IT infrastructure capability directly impact quality of shared information. Highly supportive and involved top management should ensure enterprise-wide participation in the project, sufficient resources for the project, alignment between the firm’s long-term strategy and IOS strategy, and effective communication among supply chain partners involved in the IOS implementation. These conditions allow IOS to quickly and effectively improve quality of shared information. Moreover, a highly compatible and supportive IT infrastructure will facilitate efficient systems integration which will allow the new IOS to quickly and effectively deliver the desired benefits (i.e., namely improvement in quality of shared information).

Finally, this study addresses an important and specific ambiguity in the literature concerning the impact of quality of shared information on overall firm performance in the context of IOS use. Our study helps reduce this ambiguity by demonstrating that the research model that requires that operational supply chain performance mediate the impact of quality of shared information on overall firm performance is superior to all alternative models tested in this study. This finding does not completely resolve all questions about the most effective measure of overall firm performance in a supply chain. Yet, it does provide strong support for the proposition that models of supply chain dynamics should include both operational and overall firm performance measures. This finding supports the two stage benefits model since there is evidence that the benefits derived from increases in supply chain performance are associated with increases in firm benefits which enhance overall firm performance. The finding provides strong support for the proposition that models of IOS use should include the first-order impact of quality of shared information, the second-order impact of operational supply chain performance, and the third-order impact of overall firm performance. Hence, future researchers should include all three stages in their models to maximize consistency of results.

The previous discussion also represents several obvious implications for practitioners. First, both top management support and the presence of an existing IT infrastructure that is supportive and compatible with the IOS are critical to increasing the quality of shared information. Therefore, managers should attempt to acquire such support and capability. Second, observed increases in the quality of shared information is an immediate indicator of effective IOS use success. A recent Wall Street Journal article highlighted the difficulty senior executives have in quantifying the IT investment payoffs (Basu & Jarnagin, 2008). This study suggests that senior management could use measured improvements in the quality of information shared among supply chain participants as a short-term indicator of payoff in strategic IOS investment.

The interpretation of our results is subject to certain limitations. First, our empirical results must be considered in the context of the particular supply chains included in the study. The exclusive use of Korean respondents has the advantage of excluding unwanted confounding factors resulting from cultural differences; yet the generalizability of the results is likely reduced. Moreover, the sample of firms are all members of the KPMA, and do not reflect a true random sample. Second, in an effort to develop a reasonably parsimonious model all possible variables used in the models reported in the literature could not be included. For instance, future research might include additional antecedents to shared information quality. Third, as with most all empirical studies, collecting similar data from both sides of the supply chain dyad would have been preferable. Hopefully, other researcher will test this model in different settings. The use of multiple informants in each firm would have enhanced the study. Finally, the use of cross-sectional data allows us to examine only a “snapshot” of the IOS impact on overall firm performance. Perhaps future studies will consider the use of longitudinal data which would reveal the dynamic of this phenomenon over an extended period of time.

Acknowledgment

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Appendix A. Definitions of information management, IOS, supply chain management, and quality of shared information

Information management is the planning, organizing, directing, and controlling of information within an open system, such as an organization (Fairer-Wessels, 1997; Rowley, 1998).

Interorganizational system (IOS) can be briefly characterized as: (1) a class of information technologies that transcends the boundaries of firms to link with other businesses (e.g., supply chain partners), and that (2) generally includes EDI on value added networks and supply chain management systems (Craighead et al., 2006, p. 136; Subramani, 2004, p. 46).

Supply chain management is the art and science of creating and accentuating synergistic relationships among the trading partners in supply and distribution channels with the common shared objective of delivering products and services to the “right customer,” in the “right quantity,” and at the “right time” (Vakharia, 2002).

Quality of shared information is the quality of information shared among supply chain partners. This quality includes various aspects such as information usefulness, information accuracy, and information accessibility (Li & Lin, 2006).

Appendix B. Constructs and the measuring items for each construct

Each item is measured with a 7-point Likert type scale
<table>
<thead>
<tr>
<th>Construct code</th>
<th>Constructs</th>
<th>Measuring items</th>
<th>Adapted from</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITIC</td>
<td>Information Technology (IT) infrastructure capability</td>
<td>Item 1: Our corporation has sufficient technology to operate IOS</td>
<td>Iacovou et al. (1995)</td>
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<td></td>
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<td>Item 2: Our corporation has sufficient hardware resources to support IOS</td>
<td>Iacovou et al. (1995)</td>
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<td>Item 3: Our corporation has sufficient software resources to support IOS</td>
<td>Iacovou et al. (1995)</td>
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<td>Item 4: Our corporation has communication and network technology that is compatible with IOS</td>
<td>Premkumar et al. (1994)</td>
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<td>Item 5: Our corporation has database technology that is compatible with IOS</td>
<td>Premkumar et al. (1994)</td>
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<td></td>
<td></td>
<td>Item 6: Our corporation has IS application that is compatible with IOS</td>
<td>Premkumar et al. (1994)</td>
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<tr>
<td>TMS</td>
<td>Top management support</td>
<td>Item 1: The support of CEO for utilizing IOS is high</td>
<td>Premkumar and Ramamurthy (1995), Li and Lin (2006)</td>
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<td></td>
<td></td>
<td>Item 2: The CEO is highly involved in the implementation of IOS</td>
<td>Li and Lin (2006)</td>
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<td></td>
<td></td>
<td>Item 4: The CEO provides adequate education/training program to use IOS</td>
<td>Dong, Neufeld, and Higgins (2009)</td>
</tr>
<tr>
<td>QSI</td>
<td>Quality of shared information</td>
<td>Item 1: The information satisfaction of our corporation and partner corporations is high after the adoption of IOS</td>
<td>Salaun and Flores (2001)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Item 2: The information usefulness of our corporation and partner corporations is high after the adoption of IOS</td>
<td>Gosain et al. (2004), Salaun and Flores (2001)</td>
</tr>
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<td></td>
<td></td>
<td>Item 3: The information accuracy of our corporation and partner corporations is high after the adoption of IOS</td>
<td>Forslund and Jonsson (2007), Li et al. (2006)</td>
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<td>Item 4: Our corporation communicates well with partner corporations to resolve problems after the adoption of IOS</td>
<td>Salaun and Flores (2001)</td>
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<td></td>
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<td>Item 5: Our corporation accesses information easily from partner corporations after the adoption of IOS</td>
<td>Forslund and Jonsson (2007), Salaun and Flores (2001)</td>
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<td>OSCP</td>
<td>Operational supply chain performance</td>
<td>Item 1: The inventory holding level of our corporation has decreased after the adoption of IOS</td>
<td>Shepherd and Gunter (2006)</td>
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<td></td>
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<td>Item 2: The delivery time of our corporation has decreased after the adoption of IOS</td>
<td>Shepherd and Gunter (2006)</td>
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<td>Item 3: The new product launching time of our corporation has decreased after the adoption of IOS</td>
<td>Shepherd and Gunter (2006)</td>
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<td>Item 4: The product return rate (due to low quality) of our corporation has decreased after the adoption of IOS</td>
<td>Shepherd and Gunter (2006)</td>
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<td>Item 5: Our corporation has decreased after the adoption of IOS</td>
<td>Shepperd and Gunter (2006)</td>
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<td>Item 6: Overall collaboration process of our corporation with partner corporations has improved after the adoption of IOS</td>
<td>Rai, Patnayakuni, and Seth (2006)</td>
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<td>Item 7: The profit of our corporation has increased after the adoption of IOS</td>
<td>Rai et al. (2006), Vickery et al. (2003)</td>
</tr>
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<td>OFP</td>
<td>Overall firm performance</td>
<td>Item 1: The overall business operation of our corporation has improved after the adoption of IOS</td>
<td>Cao and Dowlatshahi (2005)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Item 2: The overall business operation of our corporation is not improved after the adoption of IOS</td>
<td>Cao and Dowlatshahi (2005)</td>
</tr>
</tbody>
</table>

References


Forslund and Jonsson (2007), Li et al. (2006)


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izational factors on the decision mode for adoption of interorganizational systems. Decision Sciences, 26(3), 303–336.