The Effects of Electronic Collaboration on Interorganizational Learning and Firm Performance

SuJeong Choi  
College of Business Administration  
Chonnam National University, South Korea  
95choi@hanmail.net

Ilsang Ko  
College of Business Administration  
Chonnam National University, South Korea  
isko@chonnam.ac.kr

Abstract

In this study, we empirically assessed the effects of electronic collaboration on interorganizational learning and firm performance. Electronic collaboration refers to joint activities such as joint planning, coordination activity, and advertisement and promotion conducted via Interorganizational Information Systems (IOIS). Interorganizational learning (IOL), as defined in previous research, consists of three sub-constructs: information sharing, the development of relational memory, and shared meaning for mutual understanding.

In order to test the proposed model and hypotheses, we collected data across various South Korean industries. The results showed that, first, electronic collaboration contributes to facilitated information sharing, relational memory, and shared meaning. Secondly, information sharing is a starting point for IOL. That is, the development of relational memory is predicated on shared information, and shared meaning is developed on the basis of relational memory. Finally, only shared meaning among sub-constructs consisting IOL was shown to improve firm performance. For firm performance, electronic collaboration is not effective when IOL is considered. Electronic collaboration using IOIS is not sufficient to create firm performance. Therefore, firms should attempt to find a strategic use of IOIS. This study indicates that IOL may prove to be a valuable method for the more strategic use of IOIS, in broader attempts to improve firm performance.

1. Introduction

This study assesses whether electronic collaboration enabled by the use of interorganizational information systems (IOIS) fosters interorganizational learning. Additionally, we evaluate the effects of interorganizational learning on firm performance. Interorganizational learning has been noted as a core source for the creation of competitive advantages and the reinforcement of collaborative interorganizational relationships [8][24][26].

Nowadays, IOIS has been recognized as a common infrastructure that facilitates interorganizational transactions, in that firms experience difficulty in creating differential advantages against competitors with the deployment of IOIS in interorganizational relationships. Not only is IOIS deployment necessary for interorganizational relationships, but further activities based on IOIS are also necessary to create differential benefits.

Recognizing this, we suggest that electronic collaborative activities based on IOIS may promote interorganizational learning, which is associated with competitive advantage [18]. New ideas and knowledge derived from electronic collaborative activities can be a major input triggering interorganizational learning.

Firms attempt to develop a relational memory store to accumulate beneficial information such as success or failure experiences, knowledge, and best practice via the forging of collaborative relationships [13][15][19][27]. Firms also attempt to develop common values for mutual understanding with one another [13][19][27]. These efforts can be explained in terms of the concept of interorganizational learning.

Interorganizational learning is generally defined as an ongoing joint activity conducted between the customer and the supplier organizations, directed at sharing information, making sense of information, and integrating acquired information into a shared relationship-domain-specific memory in order to improve the range or likelihood of potential relationship-domain-specific behaviors [27, p.86].

Expanding the definition of interorganizational learning as suggested by Selnes and Sallis [27], we evaluated interorganizational learning as a multidimensional construct including three sub-constructs--information sharing, relational memory, and shared meaning.
The principal objective of this study, first, was to evaluate the relationship between electronic collaboration and interorganizational learning. Secondly, this study confirms the effects of interorganizational learning on firm performance. Finally, we discover links among sub-constructs in interorganizational learning.

2. Theory and hypotheses

2.1 Links among sub-constructs of IOL

Although Selnes and Sallis [27] have previously asserted that interorganizational learning includes three different sub-constructs, they measured it as one generalized construct. However, they also explained that information sharing is a starting point for interorganizational learning, and in the next step, the interpretation or rationalizing of the shared information is necessary. The final step in this process is the development of relationship-specific memories in order to integrate achieved knowledge.

Based on the study conducted by Selnes and Sallis [27], Li and Lin [19] has also defined interorganizational learning as a concept that embodies information sharing, joint sense-making, and the development of relationship-specific memories. However, Li and Lin [19] did not evaluate the relationships existing among sub-constructs. In this study, we suggest that the sub-constructs in interorganizational learning are casually related.

Focusing on achieved memory, Hult et al. [13] suggested that achieved memory precedes shared meaning. The development of common understanding relies on memory [12][13]. Memory facilitates common understanding by establishing a frame of reference or cognitive map within a supply chain. In particular, when there is a lack of a frame of reference--like a strong culture--to bind firms, shared meaning is important to drive collective action [13]. As a repository for shared experience, memory capacity is crucial for the development of shared meanings among firms in a supply chain [13].

From studies conducted on the absorptive capacity of a firm, which involves the ability to identify new external knowledge, to assimilate it into existing knowledge, and to utilize it for commercial purposes [5], we can identify knowledge acquisition as a starting point. A firm evaluates the value of its knowledge on the basis of its prior relevant knowledge [31]. Zahra and George [31] previously explained absorptive capacity as a process which entails (in order) knowledge acquisition, knowledge assimilation, knowledge transformation, and exploitation.

We suggest that information sharing constitutes a starting point for interorganizational learning, and that shared information is integrated for relationship-specific memory; relationship-specific memory provides a knowledge base for the development of shared meaning for mutual understanding. On the basis of the above discussions, we developed the following hypotheses:

H1a. The greater the information sharing in interorganizational relationships is, the greater will be the relational memory.
H1b. The greater the relational memory in interorganizational relationships is, the greater will be the shared meaning.

2.2 Electronic Collaboration and IOL

Firms currently attempt to exploit external knowledge whenever necessary, because it is difficult to centralize within the firm all of the resources and knowledge required for competitive advantage. Interorganizational collaboration is a favorable source to directly or indirectly acquire the new knowledge required for interorganizational learning [1][24]. Interorganizational collaboration encourages interorganizational learning by increasing the opportunity to introduce new knowledge and a variety of new ideas into a firm [26].

Like organizational learning [20], interorganizational learning is conducted in two directions—namely, explorative learning and exploitation learning [25]. Explorative learning seeks to explore new possibilities, and exploitation learning seeks to exploit old certainties. Whereas the performance aspects of exploitation learning can be clearly and accurately seen, the performance aspects of explorative learning are not so apparent. In general, a firm seeks to conduct explorative or exploitative learning in order to obtain new ideas by building collaborative relationships [25]. According to Schildt et al. [25], exploitative learning is preferred in cases in which technological relatedness and downstream vertical relatedness are high. Generally, similarity between knowledge bases increases the frequency of knowledge exchange. When the knowledge bases among firms are similar, interorganizational learning is promoted [25][18].

The more joint activities become integrated into interorganizational relationships, the more interorganizational learning is fostered [16]. Interorganizational collaboration allows a firm to utilize the knowledge resources of other firms, even in cases in which a firm does not possess internally necessary knowledge [24].
Interorganizational learning functions as a variable that motivates interorganizational collaboration, because a firm does not rely on internal expertise. Scott [26] has asserted that virtual collaboration based on IT facilitates a high level of learning through the review of present management activities in interorganizational relationships. Particularly, in cases in which firms belong to an industry with high levels both of complexity of new products and capital intensity, they attempt to learn from their trading partners. To conduct high-level interorganizational learning, high levels of trust and virtual collaboration are required [26].

In this study, we established the following hypotheses to test electronic collaboration-based IOIS facilities in terms of each sub-construct of interorganizational learning. In our study, electronic collaboration consists of: making a joint long plan, jointly conducting advertisements and promotions, and coordinating activities in interorganizational relationships.

H2. Electronic collaboration facilitates IOL.
H2a. Electronic collaboration facilitates information sharing.
H2b. Electronic collaboration facilitates relational memory.
H2c. Electronic collaboration facilitates development of shared meaning.

### 2.3 Electronic collaboration and firm performance

Various types of IOIS-based electronic collaboration are currently in wide use. IOIS researchers have previously suggested some varieties of collaborative relationships enabled by IOIS, including interorganizational cooperation [2], electronic partnership [10], electronic integration [30], electronic linkage [28], and electronic collaboration [17].

Although they represent in different ways a phenomenon generated by IOIS utilization, as mentioned above, these researchers commonly agree that IOIS helps interorganizational relationships to become collaborative ones, and ultimately contributes to improving firm performance. Mukhopadhyay and Kekre [22] previously asserted that firms that participate in electronic collaboration based on IOIS can achieve operational and strategic benefits. In particular, they emphasized that benefits are maximized in cases in which a customer constructs IOIS, and then its suppliers attempt to proactively utilize IOIS. Wang et al. [29] contended that IOIS-based virtual integration reduces environmental uncertainty by reducing price uncertainty and transaction costs. Based on the above discussion, we established the following hypothesis:

H3. Electronic collaboration increases the performance of a firm.

### 2.4 IOL and firm performance

Interorganizational learning allows a firm to find opportunities to create differential advantages and excess profits [24][8]. Interorganizational learning also enhances firms’ capabilities [1]. This is because firms can use their resources and capabilities in a firm, as well as the trading partner’s resources and capabilities in interorganizational relationships.

Interorganizational learning, in general, is related positively to relational performance, including relational quality and relational effectiveness [19][27]. Through interorganizational learning in interorganizational relationships, firms seek methods to reduce or eliminate costs, to improve product quality and trust, and to increase the speed of product development.

Suppliers attempt to understand the needs and wants of their customers, such that they can develop the right products at the right time. In turn, customers can also obtain products that fulfill their needs and wants. Therefore, interorganizational learning can be considered to improve the competitiveness of a firm [7][27]. As an example, Toyota built an information sharing network by expanding organizational learning into interorganizational learning. Through this network, Toyota shares production knowhow, such as Toyota production systems data as well as a variety of other knowledge, with suppliers [7].

In the study conducted by Johnson et al. [15] focusing on relational memory stores, they have determined that relational memory is related positively to relational quality and relational effectiveness.

Moorman and Miner [21] have asserted that organizational memory affects the development of new products and fosters creativity. In particular, performance jumps in cases in which firms have high levels of organizational memory, a great deal of organizational memory, high accessibility to organizational memory, and plenty of organizational memory contents. On the basis of the above-listed previous research, we proposed the following hypotheses:

H4. IOL increases the performance of a firm.
H4a. Information sharing increases performance of a firm.
H4b. Relational Memory increases performance of a firm.
H4c. Shared Meaning increases performance of a firm.

The hypothesized relationships are depicted in Figure 1. In addition to testing hypotheses, we, first, propose the research model that links electronic collaboration based on IOIS with interorganizational learning. Secondly, the model encompasses an assertion that interorganizational learning has a mediating role between electronic collaboration and firm performance. Finally, interorganizational learning consists of three sub-constructs i.e. information sharing, relational memory, and shared meaning. And there are certain relationships among sub-constructs.

3. Methods

3.1 Instrument development

All the constructs were measured using multiple-item scales. We utilized well-validated measures confirmed in prior research, and then modified or developed them for our study. Each of these variables was measured using a seven-point Likert-type scale, ranging from 1 (strongly disagree) to 7 (strongly agree).

3.1.1 Interorganizational learning. We define interorganizational learning as a process including information sharing, relational memory, and shared meaning. (1) Information sharing refers to the extent to which a firm shares coordination information associated with transaction and relationship-specific exclusive information via IOIS. This is measured using 4 items drawn from the studies of Dyer and Chu [6], Nishiguchi [23], and Selnes and Sallis [27]: the degree of sharing information related to analysis and prediction on market trends, operational information (e.g., order/sales statement), marketing and promotion, and long-term production schedule and product provision plan. (2) Building relational memory refers to the extent to which a firm integrates shared information and knowledge into relationship-specific memory via IOIS. This is measured using 4 items developed on the basis of the studies conducted by Li and Lin [19] and Selnes and Sallis [27]: degree of storing information generated in interorganizational relationships into electronic relational memory, degree of updating information, degree of searching and retrieving information, and degree of accumulating best practice and success/failure experience. (3) Shared meaning refers to the extent to which a firm develops common interpretation or knowledge to expand mutual understanding. This quantity is measured using 3 items drawn from the studies conducted by Li and Lin [19] and Selnes and Sallis [27]: the degree of joint analysis on the effectiveness of decision-making, the degree of mutual understanding regarding the importance of supply chain activities, and the degree of mutual understanding regarding the reasons for the success/failure of events in interorganizational relationships.

3.1.2 Electronic collaboration. Electronic collaboration is defined as IOIS-based collaborative joint activities. The variable is measured with 4 items developed on the basis of previous studies conducted by Bensaou [2], Heide and John [11], and Ko et al. [17]. The measure entails making or adjusting the joint planning, grasping and predicting requirements.
of a trading partner, conducting joint ads and promotion, and coordinating business (ex. production planning, amount of stock).

3.1.3 Firm performance. Firm performance refers to the benefits acquired from interorganizational relationships. The measure of firm performance consisted of four items relevant to reducing transaction costs, improving or adjusting present business process, increasing profitability, and increasing learning opportunities about a product/service, trading partners, and markets.

3.2 Data collection

To empirically test our research model and hypotheses, we collected data via an online survey. We used the database of the Korean Callcenter Industry Resources Center (KCIRC), which is run with the financial support of the Korean government. The database has a list of over 4,200 members from a variety of industries. We asked the subjects to participate in our online survey via e-mail requests. We received a total of 130 responses. After eliminating 11 responses, a total of 119 responses were ultimately utilized for the analysis. The reason of the low response rate might be on the low email open rate, approximately 11.5% (483/4200). Actually, a total of 483 members verified that they opened the survey request email. Thus, the real response rate on email is about 26.9% (130/483).

4. Results

To test the proposed model and hypotheses, we utilized the structural equation modeling approach with LISREL 8.54.

4.1 Demographics

As a result of data analysis, 37.4 percent of the respondents were managers, 25.2 percent of them were staff, and 20 percent of them were general managers. In our sample, 36.3% of the firms had 300 employees or less, and 63.7% of the firms had more than 300 employees. According to the law in South Korea, they classify a firm into two groups – a small-medium enterprise and a large enterprise depending on the number of a full-time employee. When a firm has more than 300 full-time employees, it is belongs to a large enterprise. Majority of our sample is collected from a large enterprise.

Industry-wise, 27.1 percent of the firms were part of the petroleum and chemicals industry, 25.4% were part of the computer/IT industry, and 24.6% were part of the service industry. The type of IOIS used principally in interorganizational relationships was EDI (27.0%), and the next was Internet-based supply systems (25.5%). In the case of IOIS usage, they utilized IOIS to share transactional information, which accounted for 31.5 percent of the total sample. For the purposes of payment, 22.5% of the responses were utilized in that order. And the 12.6% percent of responses were utilized to conduct joint activities.

4.2 Measurement model assessment

To evaluate the measurement model, confirmatory factor analysis was conducted with covariance matrix as the inputs. The results of the goodness-of-fit indices were: $\chi^2=182.01$, degree of freedom=142, p-value=0.013, $\chi^2/df=1.28$, RMR=0.065, RMSEA=0.049, GFI=0.86, AGFI=0.81, NFI=0.96, NNFI= 0.98, CFI=0.99. Although GFI and AGFI were slightly low, the values were considered acceptable, considering the subject of this analysis [9]. With the exception of GFI and AGFI, all indices are above their criterion levels.

As is shown in Table 1, factor loadings of items to their corresponding constructs range from 0.74 to 0.90, and all factor loadings are significant at p<0.01 level. Average variance extracted (AVE) and Construct reliability were in excess of 0.5 and 0.7, respectively. Those results support both convergent validity and reliability.

Because the square root of the AVE is substantially larger than all the other cross-correlations, discriminant validity can be supported (see Table 2).

Table 1. Measurement model assessment results

<table>
<thead>
<tr>
<th>Variables</th>
<th>Items</th>
<th>Factor loadings</th>
<th>Measure errors</th>
<th>t-Values</th>
<th>Construct Reliability</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic</td>
<td>Co1</td>
<td>0.86</td>
<td>0.32</td>
<td>-</td>
<td>13.35</td>
<td>0.735</td>
</tr>
<tr>
<td>Collaboration</td>
<td>Co2</td>
<td>0.90</td>
<td>0.32</td>
<td>10.95</td>
<td>0.923</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Co3</td>
<td>0.81</td>
<td>0.20</td>
<td>12.08</td>
<td>0.897</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Co4</td>
<td>0.85</td>
<td>0.13</td>
<td>-</td>
<td>14.08</td>
<td>0.917</td>
</tr>
<tr>
<td>Information</td>
<td>Inf1</td>
<td>0.88</td>
<td>0.28</td>
<td>12.37</td>
<td>0.96</td>
<td>0.751</td>
</tr>
<tr>
<td>Sharing</td>
<td>Inf2</td>
<td>0.90</td>
<td>0.24</td>
<td>13.98</td>
<td>0.917</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inf3</td>
<td>0.90</td>
<td>0.26</td>
<td>14.08</td>
<td>0.917</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inf4</td>
<td>0.84</td>
<td>0.34</td>
<td>12.38</td>
<td>0.917</td>
<td></td>
</tr>
<tr>
<td>Relational</td>
<td>Mem1</td>
<td>0.90</td>
<td>0.28</td>
<td>-</td>
<td>14.10</td>
<td>0.674</td>
</tr>
<tr>
<td>Memory</td>
<td>Mem2</td>
<td>0.88</td>
<td>0.25</td>
<td>14.10</td>
<td>0.897</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mem3</td>
<td>0.91</td>
<td>0.45</td>
<td>15.45</td>
<td>0.897</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mem4</td>
<td>0.90</td>
<td>0.50</td>
<td>14.10</td>
<td>0.897</td>
<td></td>
</tr>
<tr>
<td>Shared</td>
<td>Shared1</td>
<td>0.85</td>
<td>0.28</td>
<td>12.37</td>
<td>0.861</td>
<td>0.685</td>
</tr>
<tr>
<td>Meaning</td>
<td>Shared2</td>
<td>0.87</td>
<td>0.25</td>
<td>11.19</td>
<td>0.861</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shared3</td>
<td>0.74</td>
<td>0.45</td>
<td>11.19</td>
<td>0.861</td>
<td></td>
</tr>
<tr>
<td>Firm</td>
<td>Per1</td>
<td>0.68</td>
<td>0.43</td>
<td>-</td>
<td>6.54</td>
<td>0.874</td>
</tr>
<tr>
<td>Performance</td>
<td>Per2</td>
<td>0.69</td>
<td>0.35</td>
<td>7.52</td>
<td>0.874</td>
<td>0.636</td>
</tr>
<tr>
<td></td>
<td>Per3</td>
<td>0.83</td>
<td>0.14</td>
<td>7.05</td>
<td>0.874</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Per4</td>
<td>0.76</td>
<td>0.34</td>
<td></td>
<td>7.05</td>
<td></td>
</tr>
</tbody>
</table>
4.3 Research model and hypothesis testing

The results are provided in Table 3 and Figure 2. They indicate a good fit of the model: $\chi^2=182.02$, degree of freedom=143, $p$-value=0.02, $\chi^2/df=1.27$, RMR=0.065, RMSEA=0.048, GFI=0.86, AGFI=0.81, NFI=0.96, NNFI=0.98, CFI=0.99. Figure 2 shows the results of the path analysis of the proposed research model.

Table 3 provides the path coefficients and the results of our statistical tests. Whereas six hypotheses were accepted as statistically significant, three hypotheses were rejected.

<table>
<thead>
<tr>
<th>No.</th>
<th>Path</th>
<th>Direction</th>
<th>Path Coefficient $t$-Value Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a</td>
<td>Information sharing $\rightarrow$ Relational memory</td>
<td>+</td>
<td>0.31 2.29*</td>
</tr>
<tr>
<td>H1b</td>
<td>Relational memory $\rightarrow$ Shared Meaning</td>
<td>+</td>
<td>0.37 3.47**</td>
</tr>
<tr>
<td>H2a</td>
<td>Electronic collaboration $\rightarrow$ Information sharing</td>
<td>+</td>
<td>0.76 8.45**</td>
</tr>
<tr>
<td>H2b</td>
<td>Electronic collaboration $\rightarrow$ Relational memory</td>
<td>+</td>
<td>0.38 2.92**</td>
</tr>
</tbody>
</table>

5. Conclusions and implication

Given that the majority of firms utilize IOIS to transact with trading partners, we consider the manner in which the IOIS provides a firm with differential benefits over its competitors. Many researchers seek a way to utilize IOIS strategically, in order for a firm to obtain a competitive advantage in return for the use of IOIS.

In line with this idea, we suggest that electronic collaboration based on IOIS facilitates interorganizational learning, and is strongly associated with enhanced firm performance. Firms conduct electronic collaborative activities including joint planning, coordination, ads and promotion, and other IOIS-based activities in interorganizational relationships. However, electronic collaboration is not enough to increase firm performance. It is required more strategic activities not to be imitated by a competitor.

The results of our study indicate that collaborative activities can become a source to foster interorganizational learning. This is the first implication of our study. That is, electronic collaboration facilitates information sharing,
With regard to relationships between sub-constructs in interorganizational learning, information sharing affects relational memory, and relational memory affects shared meaning. This indicates that information sharing is a source of developing relational memory. Developing relational memory refers to activities intended to save shared information into relational memory, to update information in relational memory, to search and retrieve necessary information from the memory, and to accumulate knowledge, experience, best practices, and so on from interorganizational relationships. Relational memory leads to shared meaning, which is necessary for mutual understanding. Firms can come to a better understanding of their trading partners via joint analyses of decision-making effectiveness, efforts to understand the activities of supply chains, and understanding successes and failures.

The results of the study also provide explanations on the relationships among firm performance and sub-constructs which have suggested as the essential components of IOL. Prior researches do not consider the inter-relatedness of each sub-construct, and its relationships with collaboration and firm performance [19] [29]. Johnson et al. [15] laid emphasis on relational knowledge memory, and Johnson and Sohi [14] focused on information sharing and shared meaning as major activities of IOL. But they did not consider the influence of electronic collaboration on IOL and their corresponding effectiveness on firm performance.

In terms of the relationships between interorganizational learning and firm performance, only shared meaning is statistically significant. The results indicate that information sharing and relational memory development are insufficient to enhance firm performance. The development of shared meaning for mutual understanding is critical to the objective of enhanced firm performance. This result is similar to the findings of Hult et al. [13], in which achieved memory and knowledge acquisition activities are not significantly relevant to performance; conversely, shared meaning is significantly relevant to performance.

When interorganizational learning variables are considered, electronic collaboration does not directly affect firm performance. This implies that firms experience difficulties in achieving enhanced firm performance via electronic collaboration only, in that the majority of firms are already engaging in electronic collaboration. Accordingly, there is a need to develop further activities to be expected to improve firm performance, such as interorganizational learning suggested in this study.

6. Limitations and future research

We attempt to suggest a few ideas for future research by discussing the limitations of this study. The first limitation is the relatively low sample size of 119 in compared with a total population of over 4,200 members in the KCIRC. This weakness is due to the low email open rate. So, the actual survey subjects were significantly diminished from 4,200 to 483. However, according to Breakwell et al. [3], a low response rate does not automatically mean that a sample estimate might be biased [p.112].

Secondly, although this study tries to examine initially the relationships between electronic collaboration and IOL, we have only considered electronic collaboration as the determinant of IOL. This might be a limitation of our study. There may be several factors related to IOL. For example, Lane et al. [17] have verified the organizational and interorganizational factors positively affecting on IOL. They are low levels of formalization, research centralization, compensation practices, research community, and partner’s knowledge base. Schildt et al. [24] have suggested governance modes as the determinants of IOL. These recent trends lead us to rethink influencing factors on IOL and motivate us to drive more studies on the various determinants of IOL.

7. References


Appendix: measures of constructs

Firm performance
1. Transaction costs are reduced due to electronic collaboration and sales growth.
2. Overall business process is improved due to improving or adjusting preset business process.
3. Profitability is increased.
4. Learning opportunities about product/service, trading partners, and markets are increased.

Electronic collaboration
1. We make or adjust the joint planning using an IOIS.
2. We grasp and predict requirements of a trading partner using an IOIS.
3. We conduct joint ads and promotion with the help of an IOIS.
4. We coordinate business works (e.g., production planning, stock management) based on an IOIS.

Interorganizational Learning
(1) Information sharing
1. We share information related to the analysis and prediction on market trends via an IOIS.
2. We share operational information (e.g., order/sales statement) via an IOIS.
3. We share information related to marketing and promotion via an IOIS.
4. We share information related to a long-term production schedule and product provision plan.

(2) Relational Memory
1. We store information into electronic relational memory.
2. We frequently update information in electronic relational memory.
3. We can search and retrieve information from electronic relational memory.
4. We accumulate best practice and success/failure experience in electronic relational memory.

(3) Shared Meaning
1. We perform joint analysis on the effectiveness of decision-making.
2. We try to create mutual understanding regarding the importance of supply chain activities.
3. We try to create mutual understanding regarding the reasons for the success/failure of events in interorganizational relationships.

* This paper was supported by the second BK21 program of Korea Government