Implementing a Client/Server System in Korean Organizations: Interrelated IT Innovation Perspective

Gil-Hyung Lee and Young-Gul Kim

Abstract—Since information technologies have become critical to business success as a tool for organizational innovation, successful implementation of information technology (IT) innovation is viewed as one of the most crucial tasks for many organizations. This paper examines the effects of the contextual factors on the implementation of the client/server system as an interrelated IT innovation. We clarify the concept of IT innovation by distinguishing between IT innovation object and IT innovation process and provide the conceptual framework for IT innovation process. Four types of IT innovation implementation were classified according to the dimensions of implementation scope and implementation pace. We developed a set of relevant propositions and examined them through multiple case studies following Yin’s case-study methodology.

Index Terms—Client/server, information technology, innovation, interrelated innovation, IT implementation, IT innovation.

I. INTRODUCTION

Organizational change has become a necessity to cope with the uncertainties of an ever more turbulent and complex external environment [20]. Information technology (IT) innovation has become an important research issue over the past decade [32]. While organizational innovation is closely related to IT innovation, the characteristics of IT innovation remain underexplored, and little research has been conducted of the IT-enabled organizational change from the innovation process perspective [32]. Organizational innovation theories need to be extended to explain this new phenomenon of IT innovation [10], [32], [43]. Most IT innovation studies in the organizational change literature focus on organizational change with no regard for the nature of IT involved, resulting in the inconclusive, sometimes inconsistent, findings [15], [31].

As information technologies are getting more complex, diverse, and interrelated, the focus of IT innovation research is changing from a single innovation to a set of interrelated innovations [8]. However, the effects of such interrelated innovations are still not clear [21], and the process of the interrelated innovations has rarely been studied. Interrelated IT innovation objects that drive the related organizational innovations include multimedia networks, client/server systems, computer-aided software engineering technologies, etc. Such technologies are inherently very complex and radical in terms of their overall impact on organizational change [21].

The client/server (C/S) system has been one of the most important topics in IT practices since the early 1990’s, but most of the research on its implementation or management has been isolated case studies, lacking a theoretical perspective. The C/S system is expected to be the predominant technology standard, and will evolve into the most prominent application architecture by the year 2000 [15]. Management of the C/S technology becomes more important now that most of its technical problems have been solved [37].

This paper tries to answer the following research questions.
1) What are the factors influencing the implementation of the interrelated IT innovation object?
2) How are interrelated IT innovation objects implemented by organizations?
3) When is the same interrelated IT innovation object implemented differently by different organizations?

Specifically, the implementation stage of the IT innovation process will be examined through multiple case studies on C/S system implementation.

II. LITERATURE REVIEW

A. Basic Concept of Innovation

The term “innovation” has been used in three different contexts: “an invention” [36], “a new object” [30], [42], and “a process” [7]. In IT innovation, the latter two concepts will be used, since most organizations develop information systems with purchased technologies invented by the vendors. The main body of the previous innovation research has focused on individual adoption of innovations [30], but results from those studies have not been consistent [24], [30].

B. Related Domains of Innovation

The specific domain of innovation is an important factor to understand the organization’s adoption behavior and to identify the determinants of innovation in organizations [7], [12], [32]. Various domains of innovation related to this research are found in the literature: organizational innovation [10], [13], [15], [36], IT [information systems (IS)] innovation [14], [32], and interrelated innovation [21], [30].

1) Organizational Innovation: Since any innovation in organizations results in organizational change(s) inherently, this concept is the most broad one. From the perspective of orga-
nizational change, the concept of radical versus incremental innovation has been used commonly in the organizational innovation studies. Damanpour [8] suggested 13 significant determinants of organizational innovation through a meta-analysis. Ettlie [13] suggested the importance of radical and incremental innovation research, and empirical studies in this area are accumulating [10]. Even though the operationalization of radicalness has not been the same among the studies, radicalness is mostly considered as the degree of risk departure or distinction from the existing practice [9], [10], [13], [16], [18].

2) IT (IS) Innovation: Swanson [32] defined IS innovation broadly as “innovation in the organizational application of digital computer and communications technologies” (now commonly known as IT). Emerging IT can be an innovation object [4], but it is not an innovation itself. Swanson [32] and Fichman [14] proposed that traditional innovation theory should be extended to be applicable for the IT innovation domain. Therefore, Swanson [32] suggested the tri-core model by adding “information systems core,” serving as a link between the technical core and administrative core of Daft’s “dual core model” [7].

3) Interrelated Innovation: Rogers [30] defined the concept of an interrelated innovation object as a “technology cluster,” which consists of one or more distinguishable elements of technology that are perceived as being closely interrelated. The impact of an interrelated innovation is stronger for the economic effects of technical progress than a single innovation [21]. Multiple innovation research, including interrelated innovation, is said to be difficult to design and known to compound conceptual difficulties, since many mistakenly presume that the adoption of one blended set of innovations follows the same laws as the adoption of another, regardless of the kinds of innovations included in each [12]. Intergroup innovation studies, however, are also required for better understanding the dynamic contextual characteristics and are necessary for the design and management of innovations in organizations [8], [21]. In general, the more interrelated an innovation is, the more difficult but the more practical it becomes. Interrelated information technology is typically regarded as radical since heavy knowledge is required to understand its component technologies and architecture [21].

C. Innovation Process

1) Innovation Process Model: Rogers [30] has provided a framework for an individual innovation diffusion process. He and Thompson suggested an innovation process in organizations, which consists of initiation, adoption, and implementation [27], [30]. The adoption and diffusion model has been supported through empirical studies for individual adopters, but not for organizations due to mixed results [39]. Cooper and Zmud [6] regarded IT implementation as a technological innovation diffusion process and extended the traditional innovation process model to a six-staged model: initiation, adoption, adaptation, acceptance, implementation, and institutionalization.

2) Influencing Factors on Innovation Process: Kwon and Zmud [19] classified the major contextual factors affecting IT implementation into five categories by synthesizing the technology diffusion, organizational innovation, and IT innovation literature. They are user, task, organization, technology, and environment, the latter three of which are more relevant in organizational-level research [6]. From the perspective of IT management, three major domains (the environment domain, the organizational domain, and the IT domain) are suggested in the insightful picture for IT management in organizations [25], [34].

Among the environmental factors, push–pull theory is the most common [14], [43]. There are others, such as reference organizations [14], heterogeneity, uncertainty, competition, concentration, and organizational dependence [19]. Among the organizational factors, top management support and slack resource are perceived as the strong influencing factors on the decision of adoption and implementation approach and success [8], [14], [15], [28]. The organizational goal is regarded as a key factor of innovation research in the strategic perspective [22], [31]. IS sophistication is suggested as another factor [28]. By analyzing the previous research on the five typical innovation characteristics given by Rogers, there have been consistent results only for three characteristics: relative advantage, complexity, and compatibility [19], [28], [33]. Risk is added in recent research as another factor of innovation characteristic [35].

3) Pace and Scope of Innovation Process: The dichotomous typology of the pace of organizational innovation process is rapid versus gradual [15] or evolutionary versus revolutionary [31]. The evolutionary pace of the innovation process is a gradual, staged approach, and the revolutionary pace is all-at-once in a short period [31]. The issue of what is the right pace of organizational change or innovation has been debated but remains unresolved [15]. Some radical theorists have suggested that the revolutionary approach should be taken for the radical innovation to implement it with less resistance [36], [39]. In the IT research area, however, the evolutionary approach has been proposed and validated as a better alternative implementation pace for the radical innovation [15], [30]–[32], [43]. The typical option of the scope of implementation is functional/local or enterprise-wide [31].

D. Client/Server System

The C/S system is a type of information system in which the C/S model and technologies are implemented as a limited or special form of distributed processing system [32]. The terminology “client/server” is a practice-oriented concept that has not been defined rigorously in the literature. “Client/Server model” is a mode of computing where an information-processing role is allocated between IS service consumers (clients) and IS service providers (servers) [37]. A C/S system is defined as a system, hardware, and/or software that is based on the client/server model. Various C/S models were suggested in the literature [37], [38]. Even though the C/S system can be implemented in various configurations, it should include server computer(s), intelligent personal computers (PC’s), and a local-area network as the core components. In addition, network management software, C/S data base
management system, middleware software, and C/S application development tools are frequently added as the required configuration.

III. THEORETICAL FRAMEWORK

A. Conceptual Framework of IT Innovation

IT innovation is defined in this paper as “the overall process of initiation, adoption, and implementation of new information technology to improve organizational performance.” IT innovation is different from a typical organizational innovation in that it is always based on the use of information technologies and promotes subsequent managerial innovations in the organization. Hence, managers must know how to integrate emerging information technologies with their business processes and organizational context to reap the maximum benefits from organizational innovation [10].

A conceptual framework for IT innovation (Fig. 1) can be represented by a system model, which consists of three components: input, process, and output [43]. The IT innovation objects as input are any new or emerging information technologies to be adopted and implemented in an organization. To represent the innovation process, the three-staged (initiation, adoption, and implementation) model of the innovation process is used [26]. The outcome of the IT innovation process is the impact on the IS unit and organization in terms of the nature and scale of organizational change and performance enhancement. It will be useful for conceptual and managerial purposes to distinguish between IT innovation “object” and IT innovation “process.” IT innovation objects are the specific information technologies adopted by the organization to drive its IT innovation process. In this paper, the C/S system is the given IT innovation object. The component technologies of a C/S system cannot be adopted and implemented independently since they are interrelated under the integrated C/S system architecture. Contextual variables affecting the IT innovation process include environmental variables, organizational variables, and innovation characteristics, each of which plays the role of either a facilitator or an inhibitor of the innovation effort. We will focus mostly on the implementation stage of the IT innovation process.

B. Types of IT Innovation Implementation

In implementing IT innovation, two major variables of interest from the change-management perspective are implementation scope and implementation pace. The scope of an IT innovation implementation represents the organizational reach of change: functional or enterprise-wide [31]. It is an important factor for decision makers when they try to implement an interrelated or radical IT innovation object. The pace of IT innovation implementation is the degree of how quickly and radically an IT innovation is implemented. In this paper, we use the typology of the implementation pace: evolutionary or revolutionary.

Fig. 2 shows a contingency framework based on the scope and pace of implementation and four types of IT innovation implementation.

1) Type I—Functional Improvement: The scope of implementation is functional and the pace of implementation is evolutionary. The functional improvement is the least disruptive option, which will be implemented in the form of a staged development process on a limited part of the organization. For example, the introduction of microcomputers to independently operate a new imaging application in a personnel department is an example.

2) Type II—Functional Breakthrough: The scope of implementation is functional but the pace of implementation is revolutionary. IT innovation will address mostly functional area problems, but the pace of implementation is revolutionary when the need is urgent. For example, several Korean banks adopted and implemented a foreign asset-liability-management system in a short period of time because of the imperative direction from the Korean bank association.

3) Type III—Enterprise-Wide Improvement: The scope of implementation is enterprise-wide, while the pace of implementation is evolutionary. Enterprise-wide IT innovation is implemented in the planned and phased mode. For instance, a host-based centralized system can be migrated to the C/S system in the phased mode, starting from a single application or department and gradually spreading to the rest.

4) Type IV—Enterprise-Wide Breakthrough: The scope of implementation is enterprise-wide and the pace of implementation is revolutionary. This is the most radical option, which will result in the dramatic change of an organization and may generate enterprise-level repercussions. Using this option, organizational changes and technical changes are likely to occur together [22]. For example, platform-based technologies such as distributed computing system, groupware technology, or e-mail can be adopted and implemented along with the
enterprise-wide business-process reengineering project in the same period.

C. Research Model and Propositions

To answer the given research questions, we developed a set of propositions based on the research model in Fig. 3. These propositions will be analyzed by the multiple case studies introduced in the next section [41]. Focusing on the implementation stage, we selected two domains (the organization and the innovation), categorized the influencing factors on IT innovation implementation, and excluded the environmental domain, which has previously been applied mostly to the stages of initiation and adoption. The selection and categorization of these factors were based on the innovation literature and their applicability to the IT-specific research context.

Innovation adoption may be initiated in different ways: business driven, crisis driven, opportunity driven [21], or from the business, social, and technical environment. Many of the recent business reengineering projects have used C/S technologies as the implementation tool for organizational change or innovation [38]. Information technology has the role to moderate the relationship between strategic drivers and organizational performance [4]. IT innovation implementation or technological innovation implementation requires an evolutionary pace [15], [21], [32]. However, when the initiation and adoption results from the strategic organizational goal and strong top management commitment, the IT innovation is more likely to be implemented at the revolutionary pace and on the enterprise-wide scope [22], [31]. We expect that slack resource is a critical factor for the decision on the scope and pace of implementation of IT innovation [8], [15], [32], [39]. Since the required skills and experiences for IT innovation cannot be acquired for a short period even by hard training, the existence of enough slack resource is expected to be highly required in the more extended scope and more revolutionary pace of implementation. Top management support is believed to be a critical factor for every successful innovation implementation [10], [13], [15], [43]. The revolutionary pace or the enterprise-wide scope adds to the importance of the positive top management support because organization-wide resource reallocation may be demanded and inhibitors such as employee resistance should be overcome [8], [10], [37].

Proposition 1: Organizational characteristics affect IT innovation implementation.

- Proposition 1-a: The more strategic the organizational goal is, the more revolutionary pace of implementation and the more extended scope of implementation is likely to be taken.
- Proposition 1-b: The existence of slack resources is critical for the IT innovation implementation with more extended scope and/or more revolutionary pace.
- Proposition 1-c: Top management support is critical for the IT innovation implementation with more extended scope and/or more revolutionary pace.

Tornatzky [33] suggested the three innovation characteristics of relative advantage, complexity, and compatibility as critical factors in innovation adoption through a meta-analysis of 75 articles. But each characteristic may have different predicting power in different organizational context, and we examine their influence on the scope or pace of implementation. Though relative advantage is an influencing factor on the adoption of an innovation [19], its effectiveness may be more prominent for the enterprise-wide scope implementation. Since the enterprise-wide change may raise risky problems, the expected benefits should be justified for the implementation. Compatibility is mostly accepted as an effective facilitating innovation characteristic in the adoption and implementation process [13], [19], [33]. When the scope of IT innovation adoption is functional, compatibility with existing infrastructure becomes a critical decision factor. On the other hand, when the scope of IT innovation adoption is enterprise-wide, compatibility with existing infrastructure may not be critical in that all of the legacy systems will be replaced entirely. Though previous studies provide inconclusive results for the predicting power of the innovation complexity on the adoption and diffusion despite Tornatzky’s meta-analysis [6], [19], [30], [33], [43], it is believed that more complex and interrelated innovation is reinvented—i.e., modified—during the implementation process at the evolutionary pace [30], [32]. Risk can be perceived from the viewpoint of the organizational change radicalness caused by IT innovation [10], [18], [42]. The perceived risk of IT innovation may be an inhibitor to the adoption and implementation of an interrelated IT innovation object, particularly when it is implemented at the revolutionary pace or the enterprise-wide scope.

Proposition 2: Innovation characteristics affect IT innovation implementation.

- Proposition 2-a: Relative advantage is likely to be the major influencing factor when IT innovation is implemented with an enterprise-wide scope.
- Proposition 2-b: The compatibility of IT innovation with the legacy technologies is likely to be the major influencing factor when it is adopted and implemented with a functional scope.
- Proposition 2-c: Complex IT innovation is more likely to be adopted and implemented at an evolutionary pace.
- Proposition 2-d: Risk is likely to be the major influencing factor when IT innovation is implemented with an enterprise-wide scope and at a revolutionary pace.
IV. CASE STUDIES

A. Research Methodology

A case-study approach is used to investigate the given research questions and related propositions. According to Downs and Mohr [12], a case-study approach can better explain "how" and "why" questions for multiple innovation study due to its conceptual comprehensiveness. Factor approach studies resulted in inconsistent conclusions and were criticized in this area [12], [40]. Downs and Mohr [40] suggested that a process approach would be more applicable to innovation process studies since innovation process is mostly dependent on many organizational contextual factors. We used Yin’s case-study methodology for this study [41]. We relied on theoretical propositions as a general case strategy and selected the pattern matching mode of analysis.

1) Case Selection: Based on the conceptual framework of IT innovation, this study focused on the process of IT innovation and its two dimensions: scope of implementation and pace of implementation. According to Yin’s recommendation for literal replication of cases to improve the external validity, two firms of the same industry were selected for each category of the implementation scope: functional and enterprise-wide, respectively. The first pair is from the banking industry and the second pair is from the manufacturing industry.

2) Data Collection: We collected retrospective data and interviewed various employees. To provide multiple sources of evidence, the triangular approach [41] was used in part for collecting valid data. That is, 1) we collected and reviewed the relevant internal documents, published papers, and articles and 2) we interviewed different stakeholders: IS managers, general managers, and top management. We then cross reviewed the corresponding data for the relevant factors.

3) Level of Analysis: Level of analysis in MIS research has been criticized for not being used rigorously [12], [40]. In this study, the level of analysis was the organization and its subunits, such as the IS department. In some cases, we gathered value(s) of an organizational characteristic from a single individual (e.g., a top manager’s perception of the organization).

B. Case Summaries

Profiles of the four case firms will be described below. Table I shows the summary information for those profiles.

1) Kwangju Bank: Kwangju Bank is a medium-size bank with 1800 employees and $3.4 billion annual business volume, headquartered in the southwest region of Korea. Like the rest of the Korean banks, Kwangju Bank had long relied on the centralized, mainframe-based banking system. Frustrated by the frequent system upgrades and the lack of flexible IS services, Song, the CEO of the bank, decided to move the entire banking operations to the open, C/S environment in fall 1991. At that time in Korea, while some workgroup or departmental-level applications were developed in the C/S mode on a test basis, none of the banks even thought about implementing a C/S system on the entire banking system. They thought that the C/S system was a still unproven technology and involved too much risk to use for large transaction systems. In November 1993, after two years of working under the unbearable workload, and surrounded by the extremely skeptical views from inside and outside of the bank, Song and Kwangju Bank’s C/S development team could proudly announce the successful completion of their bank-wide C/S system. The impact of the new C/S system was phenomenal. Of the 400 headquartered employees, 23% were transferred to the local branches, and the IS department was able to send 81 of its 118 personnel to other functional departments, operating the entire system with 37 people. Other organizational performance indicators, though not solely due to the C/S system, also have posted a remarkable jump since 1991.

2) Hana Bank: Hana Bank, which was transformed from an investment financing company into a bank in May 1991, adopted the industry-standard banking packages for its account processing system to handle bulk of the daily transaction volume on IBM mainframe. For the information processing system (IPS), which provides diverse analysis capability on internal and external data, Hana Bank decided to use the C/S technologies. Since the CIO of the bank was knowledgeable about information technologies, and the mostly young IS personnel had a pioneering spirit toward new technologies, most of the technology-related directions and policies were driven by the IS people. The top management of the Hana Bank also appreciated and encouraged such IS initiatives, but, aware of the lack of experience among its IS personnel, it wanted the new C/S IPS project to proceed in a phased mode. Developing, testing, and revising the Windows-based pilot system for about 15 months since September 1992, the IS department was able to implement the new C/S-based IPS system for the entire bank between January 1994 and June

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**TABLE I**

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<th>Profile of the Case Firms</th>
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1995 in the phased mode. Since then, Hana Bank saw its end-user computing grow rapidly and has been able to provide its customers with higher quality service thanks to the flexible and rich analysis capability of the new IPS. Since 1992, Hana Bank is ranked number one in virtually every per/employee category of management performance evaluated by Korea’s bank supervisory board.

3) Daehan Paint, Inc.: Daehan Paint is the leading manufacturer of paint and ink products in Korea. Their business is characterized by the order-based, multiproduct, small-quantity style of production. Since starting computerization in 1978, Daehan Paint introduced the IBM 4361 and developed the first integrated MIS in the paint industry. In 1990, due to the capacity limit of the existing host, they introduced the IBM AS/400, only to find that the two IBM machines were not compatible. Motivation for the open, C/S IT environment was slowly building as they redeveloped their MIS for the new AS/400 host. While technically promising, moving to the C/S environment was not an easy decision, since it required giving up on the two existing host systems. Fortunately, the CEO of Daehan Paint was fully supportive of the IS department’s proposal for C/S migration.

In July 1991, they started the enterprise-wide, PC server-based C/S system development. To minimize the technical as well as implementation risks, they started with the minimum-risk applications, such as payroll and human resources, and gradually moved into more complex and critical applications while operating the existing mainframe-based systems. While there have been several important changes from the original plan (e.g., OS/2 to Windows, Visual Basic to SQL Windows), by February 1993, Daehan Paint was able to finish the C/S development successfully. The number of system-operation personnel was reduced from 17 to 8, and the company spun off its IS department into an independent system integration (SI) company, specializing in the development of PC server-based C/S systems.

4) I-Kun Industry Co.: I-Kun Industry is Korea’s leading manufacturer of wood products, with 1000 employees and $233 million annual revenue as of 1995. The company is widely known in Korea for its successful management based on rational and strategic thinking of top management. During the past five to six years, the Korean wood industry was experiencing many difficulties due to the opening of the domestic market, changes in consumer preferences, and changes in the international trade environment. As the company expanded its business to the importing of foreign wood products, the number of products increased rapidly and the change of business operations became more frequent.

Despite these increased and more dynamic user requirements, I-Kun’s old mainframe-based information system was not able to respond quick enough, necessitating a more flexible IT environment. After conducting information strategy planning with the help of an IS consulting firm, the company decided to develop a C/S system for its management analysis and reporting operations. The new C/S system development took one year and was completed in November 1995 as planned. The new C/S environment is perceived by the top management and other employees to be very successful. The number of program modules dropped from 2500 to 800 due to the spread of end-user computing, and the paperless office movement is materializing, helped by the company-wide e-mail system and electronic documentation transfer and processing.

V. DISCUSSIONS ON CASE STUDIES

We examined the validity of the given propositions with a limited number of cases. While the findings from the case studies may not statistically prove or disprove the given propositions, we were able to understand the diverse organizational contexts and outcome of the C/S system implementation process. The implementation types of the selected four case firms are positioned in Fig. 4. Kwangju Bank has its position at the enterprise-wide breakthrough implementation type (Type IV), while Hana Bank moved from an initial position at functional breakthrough implementation type (Type II) to the position of functional improvement implementation type (Type I) by reinventing the initially adopted C/S system. Daehan Paint, Inc., is positioned at enterprise-wide improvement implementation type (Type III), and I-Kun Industry Co. is positioned mostly at functional breakthrough implementation type (Type II) but to some extent at enterprise-wide breakthrough implementation type (Type IV).

We reviewed and compared these four case firms from the perspective of the theoretical framework and the related propositions. Table II shows the summarized conditions of the IT innovation process contextual factors affecting the scope and pace of implementation. The given propositions are examined by comparing the patterns of the relevant factors’ conditions within each dimension of the implementation type.

I) Organizational Factors (Propositions 1-a, 1-b, 1-c): Kwangju Bank had the most strategic intentions prior to the adoption of C/S system, while I-Kun Industry Co. did not have a strategic intention initially but came to recognize the strategic opportunities of the C/S system for the organizational and business innovations. The two cases were implemented at the revolutionary pace, but the implementation scope of Kwangju Bank was wider than that of I-Kun Industry Co. These situations are consistent with Proposition 1-a. All of the case firms had little slack resources for the implementation of emerging IT’s regardless of the pace and scope of implementation. Since the required skills and experiences for IT innovation implementation are common.
in the community, they outsourced the required resources from outside in even revolutionary and/or enterprise-wide IT innovation implementation(s). This implication is contrary to Proposition 1-b. The enterprise-wide and revolutionary implementation of Kwangju Bank was fully supported by the charismatic top management. The functional and evolutionary implementation of Hana Bank was also approved by the top manager, but most of the implementation plan was prepared by the IS unit. These contrasting cases provide support for Proposition 1-c.

2) Innovation Factors (Propositions 2-a, 2-b, 2-c, 2-d): Kwangju Bank and Daehan Paint, Inc., implemented the C/S system with the enterprise-wide scope, and I-Kun Industry Co. did so mostly with the enterprise-wide scope. They recognized the relative advantage of the C/S system with the highest rating (five or four of five), while Hana Bank gave the rating of four. Proposition 2-b seems to fit the examined situations, and it can be a common and typical implication in the interrelated IT innovation. Hana Bank implemented the C/S system for the functional scope and recognized the high compatibility (4/5) of the C/S system with its legacy host system. In other words, Hana Bank selected the C/S system, which is highly compatible with its host system. I-Kun Industry Co. recognized the compatibility of the C/S system to be somewhat low (2/5) and implemented it for the functional scope. Therefore, I-Kun Industry Co. revamped the legacy host system to adapt to the new technology platform, including the functional C/S system. The other two cases regarded the planned C/S system as completely incompatible and, on the enterprise-wide scope, replaced the whole legacy host systems. Even though the complexity of IT innovation object is getting more serious in the interrelated IT innovations, the issue can be resolved by outsourcing the specialized resources. Kwangju Bank and I-Kun Industry Co. recognized the complexity of the C/S system more seriously than the other two, but they still implemented it at the revolutionary pace. The pace of these two cases is presumed to have been determined by other factors such as strategic intention, as examined in the discussion of Proposition 2. These situations are contrary to Proposition 2-c and the finding of the previous research [30], [32]. Even though Kwangju Bank perceived C/S system adoption as a very risky project, it took the enterprise-wide and revolutionary implementation approach under the top management’s full support. So, perceived risk may be just a reflection factor rather than an influencing factor on the decision of adoption. The finding is contrary to Proposition 2-d.

VI. CONCLUSIONS

A. Theoretical and Managerial Implications

This paper clarified the concept of IT innovation by distinguishing the concept of IT innovation object from the IT innovation process. This paper also provides the conceptual model for the IT innovation implementation process and its
relationships with the contextual factors in the implementation stage. We provided the possible alternatives for the implementation approach of IT innovation. The feasibility of the four implementation alternatives was then examined through the selected cases.

With the theoretical framework for the IT innovation process, multiple case studies suggest that there may be no single best way in the IT innovation implementation. The result of this study seems to support the contingent choice view of the implementation pace for radical IT innovation as suggested by Gallivan et al. [15]. The IS managers or CIO’s need to understand that successful IT innovation in organizations can be implemented in various ways. The implementation strategy, however, may need to be based on the relevant contextual factors as examined in this study. Focused investigation of the innovation process can lead the IS manager and CIO’s to better adoption and implementation of the interrelated IT innovation objects such as C/S system or IT infrastructure.

B. Limitations and Future Research

The case-study approach taken in this study has inherent limitations in generalization, and the validity and reliability of such an approach is weaker in comparison to those of a large-scale field survey. Therefore, the propositions of this study need to be further validated by replicating the study for a larger and more diverse set of firms. Since our research model was simplified and the variables were operationalized at the case-study level, more rigorous operationalization and comprehensive empirical field study should be followed in the future. Last, based on the results of this study, more advanced explanatory and interpretive research in the future is expected to answer “why” research questions related to IT implementation and to provide guidance for managers to select the right implementation approach considering the given contextual situation.

REFERENCES


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