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A New Perspective on IT Capabilities and Firm Performance: Focusing on Dual Roles of Institutional Pressures*

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To provide a fundamental understanding on the inherent relationship between IT capabilities and sustainable firm heterogeneity, we investigate the dual roles that institutional pressures play, namely, as antecedents of IT capabilities and as moderator of the relationship between IT capabilities and IT innovation success, where IT innovation success plays a mediating role between IT capabilities and firm performance. The structural model was tested, and the results of the PLS analysis provided general support for the proposed hypotheses. IT capabilities had an indirect effect mediated by IT innovation success on firm performance. With IT activities assumed to be embedded in the institutional context, the dual roles of institutional pressures are verified. This study contributes to the literature on IT capabilities by considering both the determining role of institutional pressures on IT capabilities and the institutional context of the chain that connects IT capabilities to firm performance. The results suggest that a firm not only manages various institutional pressures to foster its IT capabilities but also adapts to different contexts with a certain level of institutional pressures to facilitate its IT capabilities and outperform its competitors, which could be sustained through IT innovation success.

Keywords : Firm Performance, Institutional Theory, Institutional Pressures, IT Capabilities, IT Innovation Success, Resource-based View

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Ⅰ. Introduction

The effects of IT on organizations have long attracted considerable attention from academic researchers and practitioners at the strategic level [Porter and Miller, 1985; Kettinger *et al.*, 1994; Bharadwaj, 2000; Bhatt and Grover, 2005; Fink, 2011]. Bhatt and Grover [2005] reviewed the evolution of research on IT and competitive advantage, and identified classical, economic, complementary resource, and resource-based view (RBV) perspectives. According to Bhatt and Grover [2005], early perspectives focus on the creation and maintenance of a firm's position in the context of external environments through asset-specific IT investment, whereas recent perspectives emphasize the importance of leveraging firm resources and capabilities as sources of competitive advantage. Thus, considering these four perspectives, Bhatt and Grover [2005] argued that Carr's assertion [2003] that IT doesn't matter could be best assessed from the RBV perspective since it emphasizes more on the ability to leverage rather than those undifferentiated IT assets. In addition, King [2002] attributed the productivity paradox partly to wide variations in the ability of firms to develop IT capabilities instead of merely "wasting" money on fragmented IT components.

Although RBV has provided a number of important insights into the relationship between IT capabilities and firm performance and has been widely considered as a dominant theoretical perspective, Oliver [1997] pointed out that explaining the sustained heterogeneity of firms using RBV is bounded by two important limitations. One limitation is the insufficient analysis of the social context in which resource selection decision is embedded; the other limitation is the failure to address resource selection process through which firms make (or fail to make) their decisions. The two limitations naturally coincide with RBV flaws in explaining the relationship between IT capabilities and firm performance. First, the contingent strategic effects of IT on firm performance have been verified across various contexts and dependent variables [Wade and Hulland, 2004]. Second, Ravichandran and Lertwongsatien [2005, p. 238] suggested that "the underlying mechanisms by which IT relates to firm performance remain under examined in both the IS and the management literature."

On the other hand, during the last two decades, information systems researchers, especially from Asia-Pacific countries [Ang and Cummings, 1997; Teo *et al.*, 2003; Miranda and Kim, 2006; Liang *et al.*, 2007; Kim *et al.*, 2012] have been applying the institutional theory to tackle the state-of-the-art information systems issues. The reason why Asia-Pacific information researchers are more concerned of institutional pressures as one of the context-specific factors may lie in the fact that researchers from east are more inclined to view the object in the context, while the researchers from west view the object *per se* [Nisbett, 2003]. What's more, the information systems researches in Asia-Pacific area have been lagged behind relative to the rapid development of IT-enabled innovations taking place in those countries. The local state-of-the-art information systems issues cannot be solved without considering the culture, norms, and perceptions of the local wisdoms [Martinsons, 2008]. Interestingly, the review of institutional theory in information systems research shows that institutional pres-

sure play roles either as antecedents or moderators, but the dual roles of institutional pressures has not been subject to the scrutiny comparing to the significance in IS research.

To bridge the gap between the theory and its applications, Oliver [1997] extended RBV by proposing an integrated model that combines insights from RBV with institutional theory. Such an integrated perspective provides a more comprehensive understanding of sustainable competitive advantage because it embraces both legitimacy and heterogeneity. Fernandez-Alles and Valle-Cabrera [2006, p. 505] further explained that the institutional context can "influence the strategic decisions of managers to result both in conformity to institutional pressures and in differentiation through heterogeneity in resources and capabilities." However, little is known about the effects of institutional factors on the development of IT capabilities and how the effects can moderate the relationship between IT capabilities and firm performance. In this regard, the present study aims to extend the work of Oliver [1997] to contribute to current understanding of the dual roles of institutional factors on both IT capabilities, per se, and the ways through which firms leverage these capabilities as a source of sustained competitive advantage.

The rest of this study is organized as follows. To develop an integrated model that can explain dual roles of institutional factors as antecedents of IT capabilities and the institutional context as a moderator, we first extend the rationale of combining RBV and institutional theory to IT capabilities literature as a more balanced theoretical base. Second, we explain the dual roles of institutional factors by re-conceptualizing IT capabilities in the context of the integrated perspective. Third, we present the research model and hypotheses and then test the hypotheses by using primary data obtained from senior managers of Korean firms. We conclude this study with theoretical and managerial implications, limitations, and suggestions for future research.

Ⅱ. Theoretical Framework

2.1 Combining RBV and Institutional theory

RBV argues that a firm's sustainable competitive advantage is derived from its resources and capabilities that are valuable, rare, imperfectly imitable, and non-substitutable. Such resources tend to survive competitive imitation when they are protected by isolating mechanisms, such as time compression diseconomies, historical uniqueness, embeddedness, and causal ambiguity [Rumelt, 1984; Barney, 1991]. By contrast, institutional theory provides a number of important insights into the critical role that institutional environments play to explain the formal structure of organizations and organizational behavior [Tolbert, 1985; Mezias, 1990]. The institutional perspective assumes that economic choices and organizational behavior are constrained and shaped by social, cultural, and political environments. Thus, if individuals and firms refuse to conform to socially accepted norms, values, traditions, and customs, they are likely to lose their legitimacy for survival.

According to Oliver [1997], RBV and institutional theory have different assumptions on rational choice behavior. As a result, they differ on the purpose of resources. The former argues

that the purpose of resources is to gain a competitive advantage, whereas the latter suggests that organizations need resources to acquire legitimacy. Furthermore, RBV is weak in its internal focus on resources and capabilities by neglecting the role of environment and context which exert strong influences, whereas the weakness of institutional theory lies in its passive tone and neglect of the role of active agency and resistance in the organization – environment relationship [Oliver, 1991]. However, Scott [1987, p. 509] suggested that, "institutional arguments need not be formulated in opposition to rational or efficiency arguments but are better seen as complementing and contextualizing them." Clearly, these two perspectives are related and complementary but they have typically been investigated as distinct constructs. This distinction not only hinders the resolution of RBV and institutional paradoxes [Lado *et al.*, 2006; Fernandez-Alles and Valle-Cabrera, 2006], but also limits the theoretical and empirical investigation of their joint effects.

From this perspective, Oliver's [1997] process model of heterogeneity, which combines RBV and institutional theory, provides a very useful conceptual framework and a starting point to expand and enrich current understanding concerning the paradox as "the dynamic tensions and juxtaposed opposites" [Rosen, 1994: xvii]. To reconcile institutional theory with RBV, Fernandez-Alles and Valle-Cabrera [2006] provided important insights by embracing both legitimacy and differentiation, arguing that, "conformity reduces differentiation but, at the same time, reduces risks associated with the loss of legitimacy and helps in resource acquisition" [p. 505]. With these insights, they further argued that neo-institutional theory could solve these paradoxes by linking itself to RBV. Lado *et al.* [2006, p. 125] also maintained that paradoxical thinking can facilitate understanding and invigorate scholarship by "reconceptualizing key theoretical constructs to include multiple and contradictory attributes or by using multiple theoretical perspectives to address a particular research question." Grewal and Dharwadkar [2002] observed that firms strive for both economic fitness for task environments and social fitness for institutional environments. Thus, for firms facing strong competitive and institutional pressures, integrating RBV and institutional theory to strike a balance between conformity and differentiation can provide a better understanding of the process through which firms gain sustainable competitive advantage [Deephouse, 1999].

2.2 Conceptualizing IT Capabilities

The integrated perspective also provides a solid theoretical basis for conceptualizing IT capabilities by determining the inherent linkages among different research streams. Hodgson [1999, p. 249] treated evolutionary theories as "a subset of a wider class of theories, variously described as 'capabilities,' 'resource-based,' or 'competence-based' theories of the firm" because the evolutionary economic approach shares common research topics (e.g., the competitive advantage of firms) with RBV. Researchers interested in competence-based theories have employed various terms to discuss the institutionalization of resources [Oliver, 1991; Meyer and Rowan, 1977], including the routinization of activities, competencies, processes, skills, and dynamic capabilities. Similarities among concepts, such

as routines, capabilities, and core competencies provide a cross reference between RBV and evolutionary economics [Foss *et al*., 1995]. Koh [2008] considered evolutionary institutionalism as an advanced version of institutional theory because it considers both the firm involved and its external competitive environments. Therefore, he argued that evolutionary institutionalism is limited by its neglect of the effect of or feedback from institutions other than the firms; he suggested that this limitation could be supplemented by importing discussions on neo-institutional theory from sociology [Meyer and Rowan, 1977; DiMaggio and Powell, 1983]. With respect to factors linking IT capabilities to firm performance, conceptualizing and developing continuous measures of IT capabilities to test the effects of IT capabilities on firm performance are considered critical [Santhanam and Hartono, 2003]. Therefore, this paper combines RBV and institutional theory to conceptualize IT capabilities as a "set of routines of IT activities" embedded in the institutional context.

2.3 Dual Roles of Institutional Factors

The integrated perspective bridges the isolated "material" and "social" dimensions by defining IT capabilities as a set of routines of activities, which imbricates both technology and human agencies [Leonardi, 2011; Pentland *et al*., 2012; Kim *et al*., 2012]. The recent decades have reflected a period of socioeconomic change in which economic action is embedded [Granovetter, 1985], whereas both sociopolitical and socioeconomic theorists have viewed IT activity as a complex and socially embedded phenomenon. Barley and Tolbert [1997, p. 100] proposed a recursive model between action and institution by arguing that "social behaviors constitute institutions diachronically, while institutions constrain action synchronically." By incorporating the institutional context in which IT-related decision-making processes are embedded, this study proposes that coercive, normative, and mimetic pressures not only influence institutionalization of IT activities but are also inextricably intertwined in the constitution of institutional contexts to moderate the effect of IT capabilities on IT innovation success.

Institutional studies that consider three specific mechanisms or pressures that engender consistency within or across organizations over time have two streams. One perspective ascribes the institutionalization of organizations to internal sources. Berger and Luckmann [1966] argued that institutions are socially constructed by organizational members following a persistent pattern of activities. IT capabilities, as a set of routines of activities, are formed through structuration in conjunction with the impact of institutional pressures. The other perspective attributes this institutionalization to external sources and considers the influence of pressures emanating from external environments on the persistent pattern of organizational activities [e.g., DiMaggio and Powell, 1983; Meyer and Rowan, 1977; Scott, 1987]. As the present study intends to strike a balance between heterogeneity and isomorphism, which are two seemingly contradictory concepts, this work draws on DiMaggio and Powell's [1983] institutional theory and assumes that IT capabilities reflect the external institutional pillars that emerged through structuration of IT activities by forming the set of routines [Barley and Tolbert, 1997].

Ⅲ. Research Model and Hypotheses

We propose a research model that combines RBV and institutional theory to demonstrate the antecedents of IT capabilities and the moderating role of the institutional context in the way IT capabilities produce above-normal rents through intermediate-level contributions. <Figure 1> shows the research model.

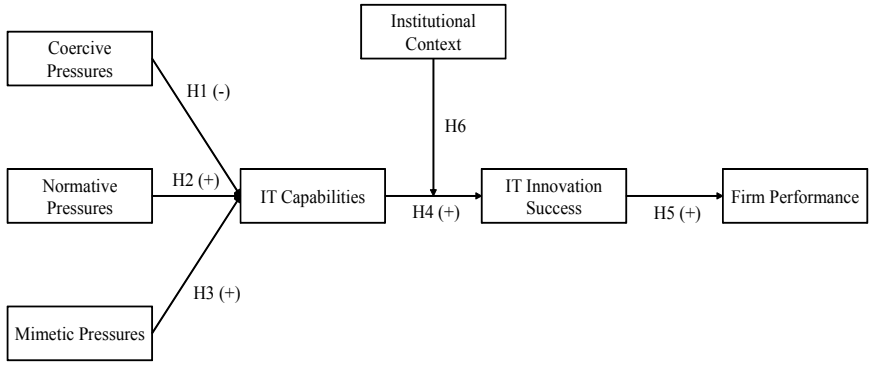
3.1 Coercive Pressures and IT Capabilities

The power of institutions is supposed to be exercised to regulate agencies through allocation of material resources or authorization of human resources [Miranda and Kim, 2006]. Accordingly, the effects of coercive pressures on IT capabilities may appear inconsistent with their positive effects on fragmented IT activities, such as adoption [Teo *et al*., 2003], assimilation [Liang *et al*., 2007] and outsourcing [Ang and Cummings, 1997]. This difference comes from diverse interests and values reflected in the structure of domination [Satow, 1975]. In addition, competing interests and efforts to manage these interests tend to be relatively more expensive and complex [Kling and Iacono, 1989] because of the lack of consensus on the means or ends, and stakeholders with disparate interests need to be co-opted toward necessary collective action [*e.g*., Miranda and Kim, 2004]. Hence, we propose the following hypothesis.

Hypothesis 1*: Coercive pressures have negative effects on IT capabilities.*

3.2 Normative Pressures and IT Capabilities

Sharing norms that prevail within the relational collective among members of a network facilitates a consensus, which in turn can increase the strength of those norms and their influence on organizational behavior [Powell and DiMaggio, 1991]. Previous studies have identified two important sources of normative pressures [Teo *et al*., 2003]. One source is the firm's network with stakeholders, and the other is its participation in professional, trade, or business



<Figure 1> Research Model

organizations. By attending conferences or becoming a member of trade associations, a focal firm may investigate and acquire knowledge of IT-related decision-making processes prevalent in the industry [Ang and Cummings, 1997]. Along with the firm value chain are diverse networks among top, senior, and line managers. These managers tend to be boundary spanners who collectively shape and are inevitably influenced by institutional norms reflected in their networks [Liang *et al*., 2007]. Such norms can guide them in terms of the extent to which they should adapt certain business processes and work routines to new IT innovations as well as determine which features of IT applications can be modified to suit their processes and routines. Hence, we propose the following hypothesis.

***Hypothesis* 2**: *Normative pressures have positive effects on IT capabilities.*

3.3 Mimetic Pressures and IT Capabilities

Proponents of mimetic pressures have suggested that a firm in a group has two characteristics that can have considerable influence on the occurrence, extent, and persistence of mimetic pressures [Abrahamson and RosenKopf, 1993]. These characteristics include the organization's assessment of an innovation's efficiency and return and the level of ambiguity surrounding such assessment. With increased competition, uncertainty, and complexity, firms are likely to encounter ambiguous information from markets and to use network structure as their best available alternative. In Burt's [2000] network modes of prominence, IT innovation can be so complex that competition is more accurately modeled as imitation. Firms with structurally equivalent positions in networks can be potential targets of reference. Networks are typically viewed as "cognitive communities" in which common mental models are used by key decision-makers to interpret the task environment of their organization [Fiegenbaum and Thomas, 1995]. Therefore, the salience of these groups in decision-making under uncertainty is a critical reflection of the patterning of organizations' cognition or meaning systems [Bamberger and Fiegenbaum, 1996]. Hence, we propose the following hypothesis.

***Hypothesis* 3**: *Mimetic pressures have positive effects on IT capabilities.*

3.4 IT Capabilities and IT Innovation Success

With respect to the relationship between IT and firm value, process-oriented models [Soh and Markus, 1995; Tallon *et al*., 2000] have contributed substantially to the examination of intermediate variables. Soh and Markus [1995] examined five models based on process theories and proposed their own synthesis of the models. Conversion of IT assets to IT expenditures depends on a firm's IT managerial capability, and IT assets are necessary for the positive effects of IT impacts of innovation to occur. Barua *et al*. [1995] investigated areas within firms that IT is likely to influence. Ray *et al*. [2005] provided an empirical analysis of the direct effects of IT capabilities on the customer service process at the intermediate level by examining the differential effects of IT capabilities on the relative performance of the process. Tarafdar and Gordon

[2007] suggested that organizations can enhance the effects of IT on their innovation efforts by developing and strengthening relevant IT capabilities. Under similar meanings of IT impacts, the present study defines IT innovation success as the extent to which IT-related innovations (both administrative and technical) provide organizations with commercial success [Gatignon, 2002]. Hence, we propose the following hypothesis.

Hypothesis 4: *IT capabilities have positive effects on IT innovation success.*

3.5 IT Innovation Success and Firm Performance

By distinguishing between ex ante and ex post limits to competition under RBV [Wade and Hulland, 2004], the present study proposes that IT innovation success can serve as a proxy for a firm's initial competitive position. The manner through which a firm's initial competitive position leads to IT innovation success, and thus to a long-term competitive advantage, can be explained by reexamining the measure of firm performance. Meyer [2002] suggested that firm performance depends on the firm's activities or routines and proposed the concept of "performance chain," a causal chain from activities to costs to revenues and then to the valuation of the firm in the capital market. Meyer extended Porter's [1985] idea of the value chain by incorporating costs. Thus, for conduct activity-based profitability analyses, the performance chain presents a firm as a bundle of activities [Meyer, 2002]. Ray *et al.* [2005] argued that IT is deployed to facilitate specific activities and processes. Hence, IT effects should be assessed for areas in which those effects are expected to be realized by correctly assigning revenues to activities in the way costs are assigned to customers. Based on the earlier discussion, we propose the following hypothesis, which assumes that a firm's relative competitive advantage is influenced by the perceived net effect of its IT innovation success [Ray *et al.*, 2005].

Hypothesis 5: *IT innovation success has positive effects on firm performance.*

3.6 Institutional Context as a Moderator

Considering the problems associated with the measurement and conceptualization of the institutional context is crucial for understanding its moderating effect on the relationship between IT capabilities and IT innovation success. Miles *et al.* [1974] considered the institutional context as an enacted environment. Environments that are enacted or created through a process of attention influence an organization's decisions and actions only when they are perceived by the organization (*i.e.*, the decision-maker). Ginsberg [1994] examined the processes through which managers' cognition of the social context lead to sustained competitive advantage. Firms can overcome sociocognitive obstacles, uncertainty, complexity, and intraorganizational conflicts by achieving three fundamental sociocognitive advantages, namely, comprehension, creativity, and consensus [Ginsberg, 1994].

The present study defines institutional context in terms of situations with different levels of the three perceived institutional pressures and the underlying institutional patterns. The

three pillars have been inextricably intertwined and converged to form internal institutional contexts for firms by distinguishing between various roles of power and shared meaning [Miranda and Kim, 2006]. However, in the present study, coercive and mimetic pressures are equally important in the formation of the external institutional context. Although legitimacy-seeking behavior may appear to limit firm performance, legitimacy forms the foundation for survival of any firm engaging in IT activity and its institutionalization. This condition indicates a need for close attention to the fact that an organization can acquire legitimacy when decision makers at all levels of the organization are strongly sensitive to the intensity of institutional pressures, including coercive, normative, and mimetic pressures. This observation suggests that the alternate context with varied perceived level of institutional pressures can systematically change the effects of IT capabilities on IT innovation success. In this regard, we propose the following hypothesis.

Hypothesis 6: *Alternative institutional contexts moderate the effects of IT capabilities on IT innovation success.*

4. Research Methods and Data

4.1 Instruments construction

Given the research design, we selected senior managers from Korean firms as respondents because they can frame the institutional environment in which they compete as well as have accessible information on their decisions and performance at the firm level. We translated the compiled English questionnaires into Korean and had these verified and refined by several colleagues of the authors. We then tested the face and content validity of the Korean version through a focus group with two industry practitioners and six academicians. Based on the results, we applied a few revisions to several survey items. For the pilot test, we distributed the final questionnaire to 33 senior executives [chief executive officers (CEOs) or chief information officers CIOs)] who were alumni of an advanced management program (AMP) at a prestigious business school in Korea.

Through this exploratory factor analysis, we grouped the instruments for measuring six first-order constructs developed by Bharadwaj *et al*. [1998] to form three parsimonious first-order constructs (Appendix A). As the instruments reflected the classification proposed by Barney [1991], Ginsberg [1994], and Bharadwaj [2000], we named them "IT infrastructure capabilities," "IT management capabilities," and "IT strategic capabilities." According to Bharadwaj *et al*. [1998, p. 381], these three distinct but related facets of IT capabilities "encompass both organizational and technological capabilities and, consider together, reflect a firms' overall ability to sustain IT innovation and respond to changing market conditions through focused IT application." The way we develop the multidimensional construct of IT capabilities shares some common theoretical background with the IT capability model proposed by Kim *et al*. [2012]]. The second-order construct of IT capabilities is manifested by three reflective first-order IT capabilities, and their intertwined relationship have the characteristics of interdependence and synergistic complementarities. Thus,

to capture those characteristics, we operationalized the three first-order constructs of IT capabilities to reflect second-order constructs of IT capabilities.

In addition, we operationalized all three forms of institutional pressures in the model, namely, coercive, normative, and mimetic pressures, as reflective constructs. According to Mizruchi and Fein [1999], operationalization of the three types of isomorphism in DiMaggio and Powell [1983] is open to reinterpretation, and the decision to use the concept is discretionary. In the research context, we developed reflective scales to measure the three forms of institutional pressures by reviewing previous works. For coercive pressures, we omitted two items based on the assessing framework of reflective and formative models [Coltman *et al*., 2008]. We determined that the final measures of coercive, mimetic, and normative pressures were consistent with the reflective measures in Colwell and Joshi [2013].

We then adapted the procedures for identifying the institutional context of each firm from Miranda and Kim [2006]. Appendix B provides the results of the cluster analysis. In terms of the extraction of latent variable scores for coercive, normative, and mimetic pressures, instead of conducting an exploratory factor analysis, as in Miranda and Kim [2006], we extracted the scores by conducting a confirmatory factor analysis for the PLS model. In addition, we conducted a cluster analysis of coercive, normative, and mimetic pressures to ascertain the institutional context of each firm. Through this cluster analysis, we identified distinct clusters of firms based on these three forms of institutional pressures. We then used these clusters as indicators of each firm's institutional context (*i.e.*, as a moderator in the analysis of the effects of IT capabilities on IT innovation success). We employed the k-means method to assess each firm's distance from the cluster center and used this distance as an indicator of the extent to which a firm was institutionalized. We then employed this statistic as a control variable in the analysis to account for outliers and the effects of weak institutionalization [Miranda and Kim, 2006].

We operationalized two disaggregated dimensions of firm performance to reflect aggregated higher-order firm performance. Because this research is one of the IS strategy studies which take interdisciplinary approaches, we conceptualized firm performance broadly by placing greater emphasis on various indicators of operational performance (*i.e.*, nonfinancial) [Venkatraman and Ramanujam, 1986]. To operationalize superior and sustainable financial performance [Barney, 1986], we adopted perceptual assessments and evaluations by senior managers of large firms, including the following two important dimensions of firm performance: growth (effectiveness) and profitability (efficiency) [Venkatraman, 1989]. Although objective financial measures are generally preferred, the operationalization of firm performance best fits the present study's research purposes and provides more interesting and important implications for managers.

In addition, we operationalized IT innovation success as a reflective construct. Appendix C lists all the variables and revised survey instruments.

5.2 Data Collection

For the sample, we considered senior manag-

ers who participated in one of four AMP terms between 2005 and 2007 (the 59th term to the 62nd term). We sent the revised questionnaire to 217 executives who fit the research design. Among these, 17 were undeliverable. We contacted these 17 executives via phone call and confirmed that 2 of them provided incorrect email addresses. Thus, we re-sent the questionnaire to these two executives; however, the remaining 15 left their firms. As a result, a total of 202 executives received the questionnaire. A total of 86 executives responded to the questionnaire; among these, 80 were usable for the analysis (a response rate of 39.6%). Appendix D provides an overview of the respondents and their firms, including the industry, number of employees, sales, tenure, IT management experience, and job title. The respondents (mainly senior executives from large firms) had extensive management experience and IT expertise. The sample covered a wide range of industries.

6. Analysis and Results

Although we used a relatively small sample for this analysis, the partial least squares (PLS) method can model latent constructs with small to medium-sized data sets that do not necessarily follow a normal distribution [Chin, 1998]. We employed PLS-Graph Version 3.00 to evaluate the measurement and structural models simultaneously. As we adopted a single-informant approach to collect all self-reported survey data, we addressed the possibility of common method bias [Podsakoff *et al*., 2003] by conducting two statistical analyses. First, we conducted Harman's single-factor test for common method variance [Podsakoff *et al*., 2003]. We conducted a principal component factor analysis using all items and found nine factors with eigenvalues exceeding 1.0 (these factors accounted for 78.82% of the total variance). In addition, the first factor explained only 39.18% of the variance in the data, indicating that common method bias was not a serious concern. Although Harman's single-factor test is the most widely used technique, Podsakoff *et al*. [2003] suggested several limitations of this procedure related to its lack of statistical control for method effects. Thus, following Podsakoff *et al*. [2003] and Liang *et al*. [2007], we employed a second method. We included in the PLS model a common method factor whose indicators included all the principal constructs' indicators and calculated each indicator's variance substantially explained by the principle construct and the method. The results indicate that the average variance explained was 0.744 and that the average method-based variance was 0.022. The ratio of the substantive variance to the method variance was approximately 34:1. Based on this low ratio and few significant factor loadings [Liang *et al*., 2007], we concluded that common method bias was not a serious concern for further analyses. Both tests concluded that common method bias was not a serious concern for further analyses.

6.1 Measurement Model

We considered item reliability, convergent validity, and discriminant validity to evaluate the measurement properties in the PLS method. We examined the reliability of individual items by observing item-to-construct loadings. According to previous research, a factor loading of 0.707

and above indicates that 50% or more of the variance in the item is shared with the latent construct, whereas items with a factor loading of less than 0.5 should be dropped [Hulland, 1999]. All factor loadings exceeded 0.5, and the t-values indicated that they were significant at the 0.01 level, which implied that the properties exhibited an acceptable level of item reliability. Thus, we included all items in the analysis.

Convergent validity can be examined in terms of the reliability, composite reliability (CR), and average variance extracted (AVE) of constructs [Fornell and Larcker, 1981]. Cronbach's alpha can be used to assess construct reliability, which measures the homogeneity of items in a construct based on the assumption that each item in the scale contributes equally to the latent construct. The CR of constructs uses item loadings estimated in the measurement model to compute internal consistency [Werts *et al.*, 1974]. These measurement properties are considered to be acceptable if their scores are higher than or equal to 0.70 [Nunnally, 1978]. The AVE reflects the variance captured by indicators; a score of 0.5 or higher is desirable, that is, the variance captured by indicators exceeds the measurement error. As shown in Appendix E, the results for the Cronbach's alpha, CR, and AVE indicate sufficient convergent validity for all constructs.

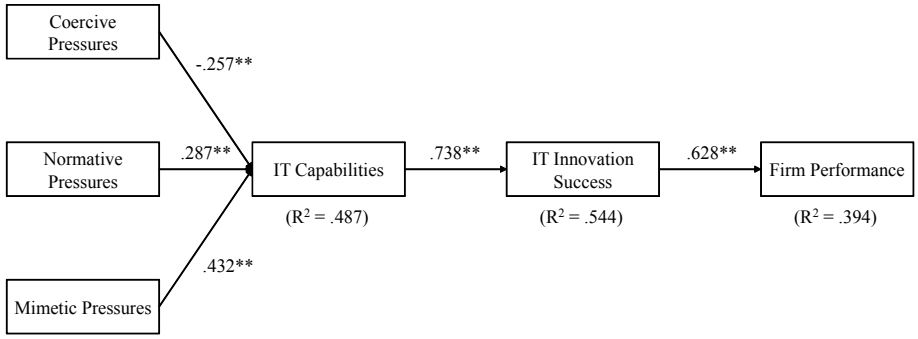
Discriminant validity can be assessed by observing the factor loadings of indicators to verify whether the various measures of constructs are different from one another [Chin, 1998]. As the PLS-Graph does not provide cross-loading information on other constructs, we employed the procedure suggested by Gefen and Straub [2005] to generate cross-loading values. Discriminant validity is assured when the following criteria are fulfilled: (1) the correlation of each item with its own construct exceeds its cross-correlation with other constructs; (2) the value of the square root of the AVE of each construct exceeds its correlation with all other constructs; and (3) the correlation between pairs of constructs is less than 0.9. As shown in Appendix F, the results of the comparison between the value of the square root of the AVE of each construct and the correlation of the construct with all other constructs demonstrate sufficient discriminant validity among all constructs.

6.2 Hypothesis Testing

We assessed the proposed research model by examining the significance of the paths in the structural model. As the PLS method does not directly provide a test of significance and confidence interval estimates of path coefficients, we employed a bootstrap procedure with 500 subsamples to generate the t-statistics and standard errors [Chin, 1998]. <Figure 2> shows the results of the PLS analysis for the research model, which support H1, H2, H3, H4, and H5. The R^2 values for all the dependent variables exceeded 0.394, indicating that significant portions of the variance in IT capabilities, IT innovation success, and firm performance were explained by the proposed independent variables in the research model. Coercive pressures had a negative effect on IT capabilities, whereas mimetic pressures had a positive and the greatest effect on IT capabilities. All three forms of institutional pressures (including normative pressures) were significant at the 0.01 level.

The results supporting H4 and H5 indicate that IT innovation success mediates the relation-

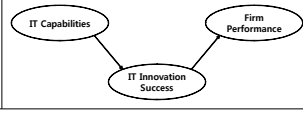
ship between IT capabilities and firm performance, which is consistent with the finding of Ravichandran and Lertwongsatien [2005, p. 238]: "variation in firm performance is explained by the extent to which IT is used to support and enhance a firm's core competencies." Based on this theoretical exploration, we followed the procedure in Baron and Kenny [1986] to test the mediating effect of IT innovation success on the relationship between IT capabilities and firm performance. First, to validate the mediating effect of IT innovation success, we determined whether the independent variable (*i.e.*, IT capabilities) would have a significant effect on the potential mediating variable (*i.e.*, IT innovation success). The results indicate that IT capabilities can explain a significant portion of the variation in the presumed mediator (*i.e.*, IT innovation success), thereby satisfying the first condition. Second, we determined whether IT capabilities would influence firm performance. The estimation results of the PLS analysis indicate that IT capabilities have a positive effect on firm performance. The path coefficient was 0.518 (t = 4.4603), which was significant at the 0.01 level. Finally, we conducted another PLS analysis by adding a direct path from IT capabilities to firm performance. The results indicate that IT innovation success has a significant effect on firm performance, and the previously significant relationships between the independent and dependent variables are no longer significant when controlled for the mediator (*i.e.*, IT innovation success). Thus, the results suggest that the effects of IT capabilities on firm performance are fully mediated by IT innovation success. These results apply



Note : **p < 0.01, *p < 0.05.

<Figure 2> Results of the PLS Analysis

<Table 1> Significance of Mediated Path from IT Capabilities to Firm Performance through IT Innovation Success

Indirect Effect	Mediated Path	Graphical Representation	Path	z-statistics
IT Capabilities → Firm Performance	IT Capabilities → IT Innovation Success → Firm Performance		.464	4.240**

Note) *p < .1, **p < .05.

for complete data as well as for each individual context.

We also conducted Sobel test to see if the magnitude of the indirect path from IT capabilities to firm performance and the significance level, as depicted in <Table 1> [Preacher and Hayes, 2004]. The yielded z-statistics shown in <Table 1> indicate that mediation effect is significant at $p < 0.05$.

6.3 Moderating Effects of the Institutional Context

To analyze the moderating effect of the institutional context, we conducted a multiple-group PLS analysis [Chin, 2000; Eberl, 2010]. Such an approach treats the estimates of resampled data in a parametric sense via t-tests. We formed a parametric assumption, took standard errors for the structural paths provided by PLS-Graph in the resampling output, and then conducted the t-test for differences in paths between groups. Essentially, we employed bootstrap resampling for various groups and treated standard error estimates for each resampling in a parametric sense via t-tests [Chin *et al*., 2003; Eberl, 2010].

All path coefficients were significant except for the path coefficient from coercive pressures to IT capabilities in the context of severe institutional pressures. In addition, the R^2 values for all the dependent variables exceeded 0.287, indicating that significant portions of the variance in IT capabilities, IT innovation success, and firm performance were explained by the independent variables. Specifically, the path coefficient from mimetic pressures to IT capabilities was the highest ($\beta = 0.433$, $p < 0.01$), whereas that from coercive pressures to IT capabilities was negative and insignificant ($\beta = -0.163$, $p > 0.1$). Coercive and mimetic pressures had a negative and a positive effect on IT capabilities, respectively. In addition, coercive pressures were more likely to influence IT capabilities than mimetic pressures. The three forms of institutional pressures explained IT capabilities and explained IT innovation success and firm performance better; thus, the model had more explanatory power in the context of minimal institutional pressures. Results of the comparison of path coefficients between the two institutional contexts and the t-value (= 5.252) strongly support H6, as depicted in <Table 2>.

6.4 Discussion and Conclusions

By combining RBV and institutional theory [Oliver, 1997], we reconceptualized IT capabilities and considered a structural model with three forms of institutional pressures as antecedents of IT capabilities; moreover, we reconceptualized IT innovation success as a mediating variable and institutional context as a moderating variable. We operationalized DiMaggio

<Table 2> Multi-group Analysis for Differences in Paths between Groups

Path		High	Low	t-value	Results
IT Capabilities → IT Innovation Success	Path Coefficient	.802**	.679**	5.252	Accepted
	Standard Error	.0907	.1011		

Note: *p < .1, **p < .05.

and Powell's [1983] three forms of institutional pressures as reflective constructs to determine the dual roles of institutional forces, that is, whether they enable or constrain the development of IT capabilities [Scott, 1995] and whether they, as an institutional context, play a contingent role in the relationship between IT capabilities and IT innovation success. The results provide general support for the integrated model and hypotheses and have a number of important theoretical and practical implications.

This study provides three key theoretical contributions to the literature on IT capabilities. First, the results verify the dual roles of institutional pressures by assuming the embeddedness of IT activity in various institutional contexts. Embedded IT activities form a business process that is bound to be formed and institutionalized by institutional pressures. In this study, the constrained process is a set of routines of IT activities, which are defined as IT capabilities with imbrications of technology and human [Leonardi, 2011; Pentland *et al*., 2012; Kim *et al*., 2012]. This essential sociomateriality of IT capabilities resonates with the dual roles of institutional forces to shed more light on RBV and institutional theory by reconciling heterogeneity and isomorphism.

Second, despite ample research on this topic, a further literature review, in line with Ravichandran and Lertwongsatien [2005] and Bhatt and Grover [2005], allowed for a better understanding of the relationship between IT capabilities and firm performance. The present study contributes to the literature by demonstrating the mechanisms underlying the formation of IT capabilities and thus the enhancement of firm performance. The results of the analysis of the intermediate variables that mediate the relationship between IT capabilities and firm performance are consistent with the findings of Soh and Markus [1995] and Barua *et al*. [1996]. That is, firm performance is influenced by IT capabilities through an intermediate variable. In their process model, Soh and Markus [1995] referred to the intermediate variable as the IT impact from the appropriate use of IT assets. Meanwhile, in their model of firm value, Barua *et al*. [1996, p. 418] conceptualized the variable as "the quality of routine transactions and exception cases, and the capital and noncapital costs of reengineering."

Finally, the present study contributes to the literature by justifying and developing an integrated perspective of RBV and institutional theory as a more comprehensive theoretical basis for the literature on IT capabilities and firm performance as well as by proposing a model consisting of institutional pressures, IT capabilities, institutional context, IT innovation success, and firm performance. In addition, the study extends Oliver [1997] first, by determining the inherent theoretical relationship between RBV and institutional theory through conceptualizing and modeling an integrated structural model and second, by empirically testing the model with firm-level data. The empirical results indicate that institutional pressures have a considerable influence not only on the development of IT capabilities but also on the way IT capabilities produce rents.

The results have important managerial implications. First, firms should not ignore the effects of institutional pressures because these play critical and diverse roles in facilitating various IT capabilities. Notably, coercive pressures

have a negative effect on IT capabilities, which is inconsistent with the findings of Teo *et al*. [2003] and Liang *et al*. [2007]. As discussed earlier, pluralistic interests of dominant stakeholders make IT innovation a relatively expensive and complex endeavor [Kling and Iacono, 1989]. The present results suggest that firms should not only obtain benefits from conforming to the coercive pressures of a certain IT innovation but also coordinate them with other sources of coercive pressures that might lead to conflict. On the other hand, mimetic pressures have the greatest effect on IT capabilities, suggesting that firms can benefit from perceiving the success of IT-related decision-making of their competitors based on the bandwagon effect [Abrahamson and RosenKopf, 1993], network models of prominence [Burt, 2000], and strategic reference groups [Fiegenbaum and Thomas, 1995].

Second, the institutional context which is enacted by senior managers should not be neglected because this is likely to play an important moderating role in facilitating firms to transform their IT capabilities into above-normal rents. Importantly, IT capabilities are more likely to facilitate IT innovation success for firms facing severe institutional pressures than for those facing minimal institutional pressures. Perceived severe institutional pressures generally refer to the strong intention of a firm to conform to existing institutions for legitimacy. A firm that perceives severe institutional pressures from existing institutions is likely to institutionalize its fragmented IT-related decision-making activities to strengthen its IT capabilities and further achieve IT innovation success. In addition, in the context of severe institutional pressures, firms should pay additional attention to mimetic pressures to strengthen their IT capabilities. Meanwhile, in the context of minimal institutional pressures, firms should learn to cope with negative coercive pressures to compromise with normative and mimetic pressures.

Finally, the results suggest that IT capabilities can influence the performance of a firm through the commercial success of its IT innovation; this finding is helpful for senior management. With a more defined mechanism through which IT capabilities affect firm performance, practitioners can develop tools that can measure the commercial success of their IT innovations. Meyer [2002] proposed an alternative to the balanced scorecard method. Although the measurement of firm performance based on the principle of reductionism is a second-best measure for revealing important sources of variations, it can help business process management practitioners link IT capabilities to firm performance through a relatively "visible" intermediate variable.

This study has several limitations. First, we did not employ a random sample of executives from more representative firms, such as those under Maekyung 1,000 (Korea) or Fortune 500. However, given that we focused on senior executives from Korean firms, the data collection method in this study was appropriate. Nevertheless, despite the important insights and implications, the generalizability of the findings to Korean firms may be limited. In this regard, future research should consider a random sampling from Maekyung 1,000 or Fortune 500 firms.

Second, although an examination of the role of IT innovation success can provide additional insights into the mechanisms through which IT

capabilities increase the competitiveness of firms, little is known about the existence of other intermediate variables. Thus, appropriate mediating variables need to be identified and developed. Instead of empirical analyses based on variance-based theories (e.g., those in the present study), future research should consider process-oriented models to provide a better understanding of how, when, and why IT expenditures are converted to firm performance [Soh and Markus, 1995].

Lastly, the empirical results have important implications for leveraging RBV and institutional theory to explain IT capabilities and firm performance. Theory development and empirical efforts for determining the relationship between firms and IT remain in the initial stages [Orlikowski and Barley, 2001], future research should adopt a more longitudinal approach and employ mixed research methods to provide a better understanding of the relationships among IT capabilities, institutional pressures, and firm performance by considering duality and multidimensionality [Orlikowski, 1992]. For example, although the interactive relationship between RBV and institutional theory exists at various levels, we focused only on external institutional pressures and ignored the effects of the internal institutional context. However, the internal institutional context may have a different structure when the importance of power is distinguished from that of shared meaning and may contribute to the understanding of the dynamic process through which IT capabilities are formed via structuration between IT and internal institutions [Orlikowski and Robey, 1991].

Considering RBV and institutional theory, this study integrates the determining role of institutional pressures on IT capabilities, the moderating role of the institutional context, and the mediating role of IT innovation success into a structural model to examine the relationship between IT capabilities and firm performance. The proposed theoretical framework reconciles the divergent purposes and the seemingly contradictory nature of the two theories and extends Oliver's [1997] process model of firm heterogeneity, which combines RBV and institutional theory. In spite of its limitations, this study provides important theoretical and practical contributions to the literature on IT capabilities and firm performance.

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〈Appendix A〉 Pilot Test: EFA Results

Rotated Component Matrix[a]			
	Component		
Bharadwaj *et al*. [1998]	IT Infrastructure Capabilities	IT Strategic Capabilities	IT Managerial Capabilities
IT Infrastructure 2	**0.843**	0.192	0.239
External IT Linkage 3	**0.832**	0.212	0.209
IT Infrastructure 3	**0.821**	0.275	0.269
External IT Linkage 2	**0.801**	0.336	0.358
External IT Linkage 1	**0.760**	0.472	0.19
IT Infrastructure 4	**0.687**	0.155	0.517
Business IT Strategic Thinking 4	0.332	**0.875**	0.194
Business IT Strategic Thinking 2	0.149	**0.842**	0.379
Business IT Strategic Thinking 3	0.288	**0.792**	0.418
IT Business Partnership 4	0.246	**0.763**	0.211
IT Management 3	0.496	**0.67**	0.329
IT Business Process Integration 3	0.151	0.319	**0.827**
IT Business Partnership 1	0.378	0.257	**0.757**
IT Business Partnership 2	0.325	0.279	**0.748**
IT Business Process Integration 1	0.450	0.195	**0.706**
IT Business Process Integration 2	0.196	0.440	**0.683**
Initial Eigen Values	10.017	1.594	**1.214**
Reliability (Crobach's α)	0.942	0.940	**0.910**

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
[a]. Rotation converged in seven iterations.

〈Appendix B〉 Results of the Cluster Analysis

Initial Clusters		
	Cluster 1	Cluster 2
Coercive Pressures	-1.463	2.435
Normative Pressures	-2.750	2.050
Mimetic Pressures	-1.499	1.915
Final Clusters		
	Cluster 1	Cluster 2
Coercive Pressures	-.605	.471
Normative Pressures	-.730	.570
Mimetic Pressures	-.582	.453
Number of Cases in Each Cluster		
Cluster 1	35	
Cluster 2	45	
Valid Cases	80	
Missing Cases	0	

ANOVA Table

	Cluster		Error		F value	Sig.
	Mean Square	d.f.	Mean Square	d.f.		
Coercive	22.797	1	.733	78	31.086	.000
Normative	33.092	1	.601	78	55.035	.000
Mimetic	21.088	1	.755	78	27.920	.000

〈Appendix C〉 Variables and Measurement Instruments

Second-Order Construct	First-Order Construct	Measurement Instruments	Sources
IT Capabilities	IT Infrastructure Capabilities	IT-based (e.g., IOS, BPM, SCM, EDI, CRM, homepage) entrepreneurial collaboration with external business partners; Appropriateness of network architecture; Adequacy of architectural flexibility; Technology-based links with suppliers; Technology-based links with customers; Efficiency and reliability of IT operations	Bharadwaj *et al.* [1998]
	IT Management Capabilities	Restructuring IT work processes to leverage opportunities; Restructuring work processes to leverage opportunities; Appropriateness of IT application portfolios for business processes; Multi-disciplinary teams to blend business and technology expertise; Relationship between line management and IT service providers	Bharadwaj *et al.* [1998]
	IT Strategy Capabilities	Funding for scanning and pilot-testing "next-generation" IT; Integration of strategic business planning and IT planning; Clarity of vision regarding how IT contributes to firm value; Environment that encourages risk-taking behavior and experimentation with IT; Consistency of IT Policies throughout the firm	Bharadwaj *et al.* [1998]
Firm performance	Growth	Sales growth relative to competitors; Satisfaction with the sales growth rate; Market share gains relative to competitors	Venkatraman [1989]
	Profitability	Satisfaction with return on investment; Net profit position relative to competitors; ROI position relative to competitors; Satisfaction with return on sales; Financial liquidity position relative to competitors	Venkatraman [1989]
N/A	IT Innovation Success	Successful implementation of IT-related innovations; Commercially successful IT-related innovations; Satisfaction with the impact of IT-related innovations on sales	Gatignon *et al.* [2002]
The Institutional Context	Coercive Pressures	Dominance of investors; Dependence on suppliers' IT-related decision making; Pressures from related industry associations; Dominance of labor unions	Teo *et al.* [2003]; Liang *et al.* [2007]
	Normative Pressures	IT-related decision making on a collective basis; Importance of professional certification and education in employment; Participation in conferences sponsored by professional vendors; Participation in industry trade associations; Affiliation with associations for standardization both inside and outside Korea	DiMaggio and Powell [1983]; Miranda and Kim [2006]
	Mimetic Pressures	Perceived profitability of IT-related decision making of competitors; Perceived dominance of competitors' IT-related decision making; Perceived reputation of competitors' IT-related decision making by suppliers; Perceived reputation of competitors' IT-related decision making by customers; Perceived success of competitors' IT-related decision making; Frequent benchmarking of competitors' best practices	Teo *et al.* [2003]; Liang *et al.* [2007]

〈Appendix D〉 Overview of Respondents

Firms by Industry		
Industry	Number of Firms	Percentage (%)
Manufacturing	35	43.8
Business Service	18	22.5
Finance and Insurance	13	16.3
Other	14	17.4
Firm Characteristics		
	Mean	Std. Dev.
Number of Employees	3,014	6,177
Sales (in Billion KRW)	2,350	4,346
Respondent Characteristics		
	Mean	Std. Dev.
Tenure (Years)	14.18	8.82
IT Management Experience (Years)	5.58	1.30
Respondent Position		
Title	Frequency	Percentage (%)
CEO/Chairman	16	20.00
CIO	4	5.00
Vice President	11	13.75
(Managing) Director	25	32.50
General Manager	12	15.00
Other	12	15.00

〈Appendix E〉 Factor Loadings, Cronbach's Alpha, CR, and AVE

Construct Indicators	Loading	Cronbach's α	CR	AVE
IT Capabilities[b]		**.942**	**.963**	**.896**
IT Infrastructure Capability[a]	.9537(86.955**)	**.935**	**.951**	**.763**
(INFCAP 1)	.9314(60.037**)			
(INFCAP 2)	.9136(43.748**)			
(INFCAP 3)	.8931(39.213**)			
(INFCAP 4)	.7793(11.204**)			
(INFCAP 5)	.7910(13.375**)			
(INFCAP 6)	.9199(52.401**)			
IT Management Capability[a]	.9345(56.555**)	**.940**	**.955**	**.809**
(MANCAP 1)	.9184(44.440**)			
(MANCAP 2)	.8895(27.880**)			
(MANCAP 3)	.9093(33.640**)			
(MANCAP 4)	.9373(57.873**)			
(MANCAP 5)	.8395(21.263**)			

Construct Indicators	Loading	Cronbach's α	CR	AVE
IT Strategic Capability[a]	.9509(85.211**)	**.928**	**.948**	**.783**
(STRCAP 1)	.9269(58.474**)			
(STRCAP 2)	.8663(22.622**)			
(STRCAP 3)	.8926(27.908**)			
(STRCAP 4)	.8280(17.640**)			
(STRCAP 5)	.9082(48.605**)			
Coercive Pressures[a]		**.754**	**.824**	**.549**
(COE 1)	.6208(3.0100**)			
(COE 2)	.5354(1.9738*)			
(COE 3)	.8659(5.0722**)			
(COE 4)	.8801(6.5866**)			
Normative Pressures[a]		**.834**	**.869**	**.533**
(NOR 1)	.7494(7.5883**)			
(NOR 2)	.6366(4.3287**)			
(NOR 3)	.5396(3.5881**)			
(NOR 4)	.8887(26.280**)			
(NOR 5)	.8617(13.721**)			
(NOR 6)	.6376(5.4715**)			
Mimetic Pressures[a]		**.924**	**.941**	**.727**
(MIM 1)	.8695(20.795**)			
(MIM 2)	.9102(31.700**)			
(MIM 3)	.8967(28.944**)			
(MIM 4)	.7645(12.842**)			
(MIM 5)	.8829(20.713**)			
(MIM 6)	.7794(13.738**)			
Firm Performance[b]		**.731**	**.881**	**.788**
Growth Dimension[a]	.8877(28.341**)	**.915**	**.947**	**.857**
(FPG 1)	.9261(32.948**)			
(FPG 2)	.9276(35.998**)			
(FPG 3)	.9239(61.449**)			
Profitability Dimension[a]	.8877(28.341**)	**.925**	**.944**	**.772**
(FPP 1)	.9154(36.841**)			
(FPP 2)	.9046(40.222**)			
(FPP 3)	.9309(66.262**)			
(FPP 4)	.8715(24.828**)			
(FPP 5)	.7596(11.925**)			
IT Innovation Success[a]		**.915**	**.946**	**.854**
(ITIS 1)	.9277(65.646**)			
(ITIS 2)	.9516(75.836**)			
(ITIS 3)	.8923(30.652**)			

Note) ** indicates significance at the $p < 0.01$ level; * indicates significance at the $p < 0.05$ level; [a] reflective measure; [b] second-order construct.

〈Appendix F〉 Discriminant Validity

	INF	STR	MAN	COE	NOR	MIM	ITIS	FPG	FPP
INF	**.874**	.831	.875	-.063	.398	.585	.676	.298	.367
STR		**.885**	.824	-.053	.412	.585	.681	.285	.457
MAN			**.899**	-.147	.369	.571	.725	.294	.474
COE				**.741**	.318	.039	-.133	.060	-.122
NOR					**.730**	.548	.254	.321	.175
MIM						**.853**	.424	.306	.179
ITIS							**.924**	.444	.637
FPG								**.926**	.576
FPP									**.879**

Note) Square root of the AVE along the diagonal.
INF: IT Infrastructure Capabilities; **STR**: IT Strategic Capabilities; **MAN**: IT Management Capabilities; **COE**: Coercive Pressures; **NOR**: Normative Pressures; **MIM**: Mimetic Pressures; **ITIS**: IT Innovation Success; **FPG**: Firm Performance (Growth Dimension); **FPP**: Firm Performance (Profitability Dimension).

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