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The Impact of Information Systems Integration on Organization**

전 성 현*

A Causal Transition Model of the IT impact on organization is proposed. The model is based upon the premise that the IT impact is a multi-phase, multi-realm phenomenon, and that the IT impact in one organizational realm logically transpires to another realm, thus forming complex causal webs among them. Two exploratory research studies, the one qualitative and the other quantitative, were conducted to validate the model in a setting involving major structural reorganization of the organizations' IT function. The research results provide support for the general theory structure of the model. The findings include: i) the IT impact manifests on multiple organizational realms, with different degrees of strength, ii) the impact on the realms follow a particular causal transition path among them, and iii) the IT impact manifests on and through the information processing aspect of work. The results, however, indicate that people's perception of the IT impact is strongly mitigated by the IT relevance of work, and that the organization is affected as much by the structural arrangement surrounding and accompanying the IT as by the technology itself, suggesting that the IT impact is an organizational phenomenon as well as a technological phenomenon. The implications of the research results are discussed at the end.

* 국민대학교 경상대학 정보관리학부

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I . Background

The impact of the information technology (IT) on organization has been a primary research concern in the information systems (IS) field. The IT impact has been reported in various organizational realms such as individual decision making [Dickson, Senn, and Chervany, 1977], communication patterns [Fulk and Steinfield, 1990], and organization structure [Leavitt and Whisler, 1958; Whisler, 1970; Kling, 1980; Foster and Flynn, 1984], to name but a few. The IT impact has also been explained with different theory structures: Those drawn upon recently include transaction cost economics [Malone, Yates, and Benjamin, 1987], structuration theory [Barley, 1986; Orlikowski, 1992; DeSanctis and Poole, 1994], and the incomplete contract theory [Brynjolfsson, 1994], among others.

The IT impact research, however, despite the continued efforts of the IS research community, fails to produce a consistent, comprehensive theory of IT impact. Various theoretical and empirical issues undermine the research; For instance, the research constructs are under defined [Bakopoulos, 1985], elusive and not agreed upon [DeLone and McLean, 1992], thereby producing inconsistent, contradictory research results [Markus and Robey, 1988; Swanson, 1987]; The research results are also highly fragmented: most extant IT impact research effort is confined to a single realm of inquiry, seeking only an immediate, direct impact of the IT, and to a single explanation theory structure, with little integration among them [Swanson and Ramiller, 1993; Banville and Landry, 1989; Culnan, 1987]. The various IT impacts on organization thus are either not related to, or linked too prematurely with one another, with few of the intervening causal processes specified [Kauffman and Weill, 1989].

The research also suffers empirical inadequacy: The IT's employed in the extant IT impact research have often been too primitive, too trivial, to have a material impact on the organization: Only a single technology with limited scope and functionality has been subjected to the IT impact research.

And the impact of the IT in its entirety, i.e., the impact of an organization-wide, full-scale, multi-functionality IT infrastructure, on the other hand, has rarely been subject to investigation.

This paper proposes and tests a Causal Transition model of the IT impact. The model is motivated by the need to provide an integrative framework within which to identify, account for, and logically relate various kinds of IT impact on organization, and to ultimately produce a theory of the IT impact. The model is based upon a thesis that the IT impact on organization is a multi-phase, multi-realm phenomenon, and that the IT impact on one realm of the organization logically transpires to another realm, thereby forming a complex causal webs among them. The model, therefore, identifies the realms of the organization the IT impact manifests itself and specifies a particular causal transition path among them.

This research is also motivated empirically by a research setting involving a strong, non-trivial instance of the IT at work: Since the early 1990's, a great many organizations have attempted a structural reshuffling of their IT function, such as outsourcing.

This has generated significant turmoil, and often some structural changes, in the organizations, thereby providing a rare opportunity and research setting for investigating the relationship between the IT as a cause variable and the organizational change as the effect phenomena. This paper reports the results of two exploratory research studies, the one interpretive and the other quantitative, for validating the Causal Transition Model of the IT impact. The two research approaches were employed to arrive at a fuller understanding of the phenomena on hand [Lee, 1991; Jick, 1983].

Both the general plausibility of the model and the specifics of the model were examined through the two research approaches and the results compared and integrated.

The paper is organized as follows. In the next section, a research model, which specifies the multi-phase, multi-realm nature of the IT impact, is presented and discussed. In Section III,

several research questions concerning the IT-Organization relation are drawn from the model and their implications discussed. In Section IV, the research setting is described. In Section V and VI, the results of the interpretive and the quantitative research are presented and discussed, respectively. In Section VII, conclusions are drawn and the implications of the research discussed.

Ⅱ. A Causal Transition Model of the IT Impact Research

This research envisages IT impact as a multi-phase, multi-realm phenomenon.

An organization is a complex reality involving multiple realms of phenomena, with an intricate set of interrelationships among them [Behling, 1978; Morgan, 1986]. The IT impact on organization, therefore, is likely to manifest in multiple such realms, and an impact on one realm is to logically transpire to an impact on another realm. In this section, we specify a model of such multi-phase, multi-realm nature of the IT impact. The specification involves: i) an identification of the set of organizational realms relevant to the IT impact research, and ii) a specification of a series of causal transitions among the realms.

1. Realms of Organizational Phenomena

The realms of organizational phenomena relevant to the IT impact research may be delineated along two dimensions. The first dimension is concerned with the IT orientation of the phenomena, i.e., the extent to which the phenomena are IT-driven. This dimension dichotomizes the organizational phenomena realms into two broad categories - the IT domain and the non-IT (organizational) domain. The IT domain consists of those IT-driven phenomena that directly manipulate, are induced by, or surround the IT. Examples include the design and development of information systems, the IT usage behavior pattern, the end-user computing trend, and the IT-based business reengineering moves, among others. Recently such IT-driven phenomena tend to flourish as the IT

increases its influence on the organization. The organizational domain phenomena, on the other hand, are non-IT-driven. They bear relatively little, or only remote pertinence to the IT and are not specifically accounted for in the IT domain.

The distinction between the IT domain and the organizational domain effectively grounds the IT impact research: It specifically acknowledges that the IT impact research may begin with a phenomenon in the IT domain, for the IT impact is obvious, conspicuous, and more directly observable in the IT domain. The distinction also specifies the main research issue of the IT impact research as that of seeking, identifying, and proving relation between the IT domain phenomena and the organizational domain phenomena, wherein the IT impact tends to be more obscure, latent, and hidden.

The second dimension along which to delineate the organizational phenomena realms is the level of analysis dimension. The organizational phenomena appear not only in multiple realms but in multiple levels as well [Rousseau, 1985]. The phenomena, therefore, can be effectively classified in terms of the levels they take on. Generally two analysis levels are distinguished in the literature - macro and micro [c.f. Alexander, Giesen, and Smelser, 1987]. The macro level of analysis is concerned with phenomena involving collectives of individuals and their behaviors and interactions. *Structure* is the most prominent aspect of this macro level phenomena. The micro level of analysis, on the other hand, is concerned with individual actions and behaviors. These individual actions and behaviors may be termed *Practice* for they often represent enacting of structurally imposed norms and behavior rules [Giddens, 1984]. [1]

The macro and micro levels are distinguished because the IT impact, like any other organizational phenomenon, incarnates in both levels. The IT participates in various macro

1 The level of analysis, in fact, is a multi-faceted concept, meaning: i) the level at which phenomena of interest are drawn and observed, ii) the level at which a unit of analysis is selected, iii) the level at which an explication is attempted, and iii) the level to which generalization is made [Munch and Smelser, 1987; Rousseau, 1985].

and micro level phenomena in various capacity; as a design factor for organization structure [Lucas and Baroudi, 1994], as a trigger for a structural change in organization [Barley, 1986], as a behavior inducer in the group interaction [DeSanctis and Scott Poole, 1994], and as a cognitive facilitator in individual decision making [Dickson, Senn, & Chervany, 1977], etc. More importantly, however, the levels are distinguished because an understanding of a multi-level phenomenon, such as the IT impact on the organization, involves transition between the levels: Coleman [1986, 1990] has argued that research on a multi-level level phenomenon involves two transitions - the macro-to-micro transition and the micro-back-to-macro transition. The macro-to-micro transition is to ground the research on an empirically observable and measurable realm. The micro-back-to-macro transition is to aggregate the observations and measures to a macro level generalization. The impact of the IT on, say, the structure of an organization thus may be investigated in terms of: i) how the IT affects the individual practices of people (the macro-to-micro transition) and ii) how the individual practices aggregate to produce a particular organization structure (the micro-back-to-macro transition). This transition between levels will be discussed further later.

The two dimensions above, combined, produce 4 different realms of organizational phenomena, as illustrated in Fig. 1. The realms each represent a field of inquiry wherein to look for the IT impact. The realms are briefly described below.

IT Infrastructure:

This is the realm representing the macro structural aspect of an organization's IT domain.

Outwardly, IT infrastructure consists of a particular amalgamation and configuring of various information processing hardwares, softwares, models and procedures, and policies, of the organization. Inwardly, IT infrastructure, like any other form of structure, manifests a particular set of action rules, behavior norms, and resources for action that the organizations

develop over time to govern behavior [Giddens, 1984]. DeSanctis and Scott Poole [1994] terms such behavior governing properties the *structural potentials* of the IT. An IT infrastructure, therefore, represents a technological platform with a particular set of structural potentials, inducing and generating particular behavioral practices from the individuals. The resulting practice, however, may be more emergent than intended [Markus and Robey, 1988].

IT Practice:

This is the realm representing individual practices in the organization's IT domain. The practices consists of those directly manipulating the IT and those surrounding the IT. Here individuals design and develop the technology, interact with and respond to the technology, and form particular perception about and attitude toward the technology. These practices may be influenced by the set of action rules, behavior norms, and resources for action, embedded in the IT infrastructure, as indicated above. Many of the research constructs and phenomena in the IS field, such as the user information satisfaction, user attitude, end user computing, etc., fall in this realm.

Organizational Practice:

This is the realm representing individual, non IT-specific practices in the organization. The practices in the realm are diverse, conducted with a wide variety of goals and motives, and cover all kinds of both task and non-task behaviors in the organization. An important point to be made about this organizational practice realm is that the practices in the realm possess both physical and information processing aspects. Galbraith [1973, 1977] suggests that information processing is the most critical aspect of the organization, with the design of which critically determining the effectiveness of the organization. Porter [1984] suggests that any organizational activity contains both information processing element and physical element, and that the information processing element should be managed properly with the IT for

competitive advantage. As will be discussed shortly, this information processing aspect of the organizational practice realm provides a logical basis for linking the realm with the IT practice realm.

Organization Structure:

This is the realm representing the structural aspect of the organizational domain. Structure is a multi-faceted concept carrying a wide variety of meanings. Textbooks discuss structure in terms of centralization, formalization, and complexity of the organization. Mintzberg [1979] specifies division of labor and coordination mechanism as key elements of structure.

Giddens [1984] defines structure as particular sets of structuring properties - action rules, behavior norms, power relations, and resource allocation patterns - that constantly shape and are recursively reinforced by people's practices in the organization. A common denominator in all conceptions of structure, however, is that it represents an enduring, social, collective aspect of the organization, with significant influence over individuals.

2. Causal Transitions between Realms

The four realms of organizational phenomena delineated above each constitute a legitimate field of inquiry for the IT impact research. They contain different phenomena for investigation, specify different levels of analysis, and provide different nomological networks from which to compose research questions and generate theory structures. But the realms also possess some logical relationships among them, thereby rendering the IT impacts on the realms to be causally connected: an IT impact in one realm may logically transpire to an impact in another realm.

We suggest, based upon Coleman [1986, 1990], that the IT impact on organization follows a particular causal transition path. This is shown in Figure 2. Coleman has argued that an explication of a macro level phenomenon involves first a transition to the micro level where actual observations can be made of individual

behaviors and a transition back to the macro level to demonstrate how the individual behaviors aggregate to produce the macro level phenomena. Thus, if we follow the Coleman's argument, the impact of the IT on organization manifests in three phases; i) the IT affects the IT practices of people; ii) the effect on the IT practice transpire to corresponding organizational practices; and iii) the organizational practices immerse into and become codified in the structure of the organization. Some notes on the three causal transitions are in the following:

1) Transition#1: From IT Infrastructure to IT Practice:

This transition involves the influence of the IT infrastructure on the IT practice of people.

An organization's IT infrastructure, as indicated above, contains a particular set of structuring properties - action rules, behavior norms, and resources for action - that the organization develops over time to govern behavior. These structuring properties are expected to actually facilitate as well as constrain individual actions [Giddens, 1984; Orlikowski, 1992; Orlikowski and Robey, 1991].

DeSanctis and Scott Poole [1994], drawing upon the Giddens' structuration theory [1979, 1984], proposes that the influence from the IT infrastructure to the IT practice is realized through an appropriation process wherein people internalize and put to practice the behavior governing properties of the IT infrastructure. The appropriation process, however, is not a mechanical process, blindly copying whatever is codified in the IT infrastructure. Rather people continuously reinterpret and reconstruct the action structures from the technology [DeSanctis and Scott Poole, 1994; Giddens, 1984]. Markus [1994], for instance, has demonstrated that the e-mail usage behavior of people is as much a result of social interpretation and construction as of the technical features of the technology.

The technology is only a socially constructed artifact [Bijker, Hughes, and Pinch, 1987].

2) Transition#2: From IT Practice to Organizational Practice:

This transition involves the impact of IT practice on the organizational practice. As most IT impact on the organizational practice is remote, latent, and hidden, the transition is the most critical, yet the most difficult one to establish in the IT impact research. The most logical dimension along which this transition may be established is the information processing aspect of work. As indicated above, any structure or activity in the organizational domain contains an information processing aspect. And as IT is essentially an information processing apparatus, the impact of the IT on the organizational practice is likely to materialize on and through the information processing aspect of the work. Barley [1986] aptly demonstrates this by showing that the impact of an IT transpires to the organizational domain by changing the information processing aspect of the organizational practice - the communication patterns.

3) Transition#3: From Organizational Practice to Organization Structure:

This is the transition involving how individual practices become codified into and embedded in the structure of organization. As such, it involves a transition of levels back from the micro to the macro levels. The transition has been explained in terms of a wide variety of mechanisms such as aggregation [Munch and Smelser, 1987], social constructionism [Berger and Luckmann, 1966], and structuration [Giddens, 1984]. Barley [1986, 1990] has shown how the IT produces structural change by affecting first the non-relational and then the relational aspects of the individuals' work, thus changing the role structure of the organizaiton.

To recapitulate, we presented above a Causal Transition Model of the IT impact research. The model is based upon the premise that IT impact is a multi-phase, multi-realm phenomenon, and that for the realms are logically related, the IT impacts causally transpire from one realm to another.

A particular causal transition path is specified for the manifestation of the IT impact on the organization - from the IT infrastructure to IT practice to organizational practice to organization structure. The logical bases of the

causal transition path are discussed in terms of the macro-micro level transition and the information processing aspect of the organization.

The Causal Transition Model above provides an integrative framework within which to conduct and develop a theory for the IT impact research: The model provides an enriched conceptualization of the IT impact phenomenon, as one spanning over multiple organizational realms with different nomological networks: The model provides a process view of the IT impact, specifying a particular causal transition path among the realms: Lastly, the model, as it deals with multiple realms with different nomological networks, invites and accommodates multiple theory structures with different ontology and epistemology for explicating the phenomenon.

Ⅲ. Research Questions

The Causal Transition Model presented above is subject to scrutiny and validation. In this research, we examine both the general structure and the specifics of the model. The general structure of the model is the proposition that the IT impact is a multi-phase, multi-realm phenomenon. The specifics of the model are that the IT impact on organization occurs through a particular causal transition path, with the transitions occurring between the macro structure level and the micro practice level and between the IT domain and the organizational domain. The three research questions drawn from the model, therefore, are:

1. Does a change in the Structure of IT lead to a change in the Practice of IT?

2. Does a change in the organization's IT practice lead to a change in the organizational practice?

3. Does a change in organizational practice lead to a change in the structure of the organization?

The first and third research questions above are concerned with the relation between Structure and Practice. The IT phenomenon this research deals with, which will be described in the following section, involves a major

structural reshuffling in the organization's IT infrastructure. The first question thus examines whether such a change in the structure may lead to a change in the practice of people, and the third question whether the change in practice culminates in a change in the structure of the organization. The questions carry important implications for the age-old debate in social theory between what takes primacy in determining human action, the structure or the agency.[2]

The second research question, on the other hand, is concerned with the relationship between the IT practice and the organizational practice. The two practices are assumed, as discussed in the previous section, to be logically related through the information processing aspect of the organizational practice.

The research question, therefore, concerns none other than the relationship between an IT phenomenon and an information processing (IP) phenomenon. Two contrasting arguments have been made regarding the IT-IP relationship. One argument is that an IT phenomenon naturally extends to an IP phenomenon. There is assumed a strong logical continuity between an IT phenomenon and an IP phenomenon, with the IT phenomenon being always logically associated with and causally responsible for an overt response in the information processing realm of the organization [Barley, 1986, 1990].

An opposing argument regarding the IT-IP relationship, however, is that the relationship is not as direct nor straightforward as presumed.

Swanson [1987], after reviewing the information systems-organizational structure research literature, has indicated that the relationship between the *information system use* and *information use* in organizations is surprisingly weak. The causal continuity between an IT phenomenon and an IP phenomenon, despite its logical plausibility, is not supported empirically.

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2 The structuralism in Durkheim's tradition has emphasized the preeminence of the social whole, the structure, over its constituent parts, the human actors, whereas the structural- unctionalism in Parson's tradition has emphasized the subjective will and intention of human actors. See Craib [1984, 1992] for a review and summary of the history of social theories.

The social constructionism view of technology provides further support for this argument, with a proposition that the effect of the IT on the organization is not dictated by the IT alone, but more mitigated by the social, non-IT factors [Bijker, Hughes, and Pinch, 1987; Markus, 1994].

An investigation of whether an IT phenomenon necessarily leads to an IP phenomenon, therefore, is an important research issue, carrying several implications for the IT impact research. First of all, it helps illuminate the pathway through which the IT manifests its effect on the organization: a causal continuity between the IT and IP phenomena, if found, means the IT impact manifests not directly but through its effect on the information processing aspect of the organization. It also supports the multi-phase nature of the IT impact phenomena, with the first phase being concerned with the IT effect on the information processing realm of the organization and the next phase with the relationship of the information processing phenomena to other organizational phenomena.

Ⅳ. Research Setting and Approach

This research was conducted in Korea. In the early 1990's, a number of major corporations in Korea have launched a series of reorganization and restructuring moves for their information processing function. We term these moves the System Integration (SI) Initiative, for they all involved SI efforts. The corporations involved in the SI Initiative were all member firms of the so called *Chaebul* groups, which each consist of multiple firms that share corporate identity, strategy, and resources, and are owned and dominated by a handful of individuals and families.[3] [4]

The Chaebul groups, as they operate in multiple industries, were each big enough to be included in the Fortune 500. Table 1 illustrates the Chaebul groups' profiles that were involved in

3 As such, they resemble the institutional arrangement of the pre-war Japanese Zaibatzsu. In fact, the Chaebul and Zaibatzsu share the same Chinese characters, but are pronounced differently.

4 It was pointed out by one of the reviewers that the term Chaebul carries unnecessarily negative connotation unrelated to this research. I agree to his point. The term Conglomerate may be a more apt term.

this research.

The reorganization and restructuring moves of the corporations were of two kinds. The first was the structural separation of their information processing units: the Chaebuls each have established a new legal entity, usually referred to as an SI firm, which had consolidated and put under its control all the information processing resources - staff, hardware, and software - of the member firms.

The information processing units of the member firms, which had been controlling those resources, were absorbed by the SI firms. The information processing staffs have been relocated to the new SI firm, most likely with different positions, roles, and reward structures.

The second aspect of the reorganization and restructuring moves was the outsourcing of their information processing function. The development, operation, and maintenance of the information systems in the member firms were contracted out to an outside service provider, most likely the SI firms the Chaebuls have established. Indeed, it was the original intention of the Chaebuls that all the information processing function of their member firms be planned, designed, and carried out by and through their SI firms. The member firms thus have had but no choice to turn to the SI firms for their information processing needs.

The above reorganization and restructuring moves of the firms have demanded adaptation of unprecedented degree, scope, and magnitude on the part of the people and the organizations involved. And as such, it provided a strong causal antecedent for investigating the IT-Organization relations.

This research has employed both qualitative and quantitative approaches for the investigation of the IT impact on organization. The use of multiple research approaches followed Lee's recommendation [1991], which proposed that an integration of interpretive and positivistic approaches leads to a fuller understanding of the phenomena involved. The results of the two research studies are reported in the

following sections.

V. Qualitative Research Study

1. Method

The qualitative research study involved interviews and observations.

A total of 21 interviews were conducted in 5 Chaebul groups which launched the SI Initiative. The interviews were with both the user firms and the SI firms of the Chaebul groups. The interviewees from the user firms were those interacting with and thus experiencing relatively directly the effect of the SI Initiative. The interviewees from the SI firms were those involved in implementing and supporting the SI Initiative. The Table 2 shows the number of interviews conducted.

During the interviews, about 5 classes of information were sought: an overall perception about the SI initiative, the impact of the SI initiative on IT and IP practices, on work procedure, and on structure. The interviews were conducted in a relatively free format, and lasted on average about 45 minutes to an hour, although, due to time and other constraints, some ended in less than 30 minutes.

2. Results and Discussions

A summary of the responses from the interviews is presented in Table 3. Tables 4 and 5 tally the most common responses and consolidate them into a single table for the user firms and for the SI firms, respectively. Some noteworthy results from the interviews are as follows:

1. First of all, we note there exist strong ontological differences about the nature, role, and effect of SI between the organizations and between those from the user firms (the User groups) and those from the SI firms (the IT groups). Some organizations were more positive and optimistic about the SI Initiative than others. (D Group vs. S Group). Also the IT groups generally showed more enthusiasm about and projected greater influence of the SI Initiative on the organization. (e.g., the user vs. IT groups within the S Group). Those from the same organization, however, showed to share a distinctly similar view of reality. (e.g., H3 and H4, S1 and S3, L4

and L5, D4 and D5, each as a group extends similar comments on the reality.)

2. The interview results show the SI Initiative has had a strong influence on the organizations' IT and IP practices. Most users acknowledge that the SI Initiative has had an effect on their system usage and information processing, allowing more data sharing and use and faster work speed. (H3, H4, L4, L5, D4, D5). The IT groups also shared the perception. (H2, S2, S4, S5, Y1, Y2).

3. The results, however, are mixed on the effect of the SI Initiative on the organizational practices of the users. While many of them acknowledged an increase in work speed due to the SI (H4, L4, L5, D4, D5, Y3), few of them related it to a. significant overall impact on their work. Some users responded outright negatively on whether the SI Initiative had a significant impact overall on their work procedure. (H3, H4, S1). Some of them sensed more general effects of the SI Initiative, such as dehumanization of work. (L4, L5, D5). However, they were quick to add that the effects were felt ones rather than measured ones. The IT group, on the contrary, acknowledged a stronger influence of the SI initiative on their work. (S2, S4, S5). However, the influence did not translate to a noticeable impact on structure. (S2, S4, S5, S6)

4. The results show that the SI Initiative had relatively little impact on organization structure. Few of the users have felt the SI Initiative has a significant impact on their communication patterns, reporting structures, or unit boundaries. (H3, H4, S1, S3, L4, L5).

5. The structural separation of the IT unit, on the other hand, seemed to leave a strong footprint on the work relationships, inducing more communication among organizational units. (L5, D4, Y1). It also had a material impact on the user-IT relationship, making it more formal, and inducing higher customer orientation from the IT group. (H3, D5, H2, D1, D2, D3, Y1, Y2). The IT unit also became more proactive. (H2).

The above results provide several findings about the IT impact on organization. First of all, the results show that the IT impact manifests in different realms of the organization with different degrees of strength. While the IT impact is the strongest in the IT practice realm, the impact in the organizational practice and structure

realm appears to be relatively weak.

From a causal transition point of view, this means the IT impact in the IT practice realm may not necessarily transpire to other realms.

The causal transition between the IT practice and the organizational practice and structure realms appears to be neither direct nor visible.

Secondly, the weakness of the causal transition between the IT practice and the organizational practice realms suggests that information processing is perhaps not as predominant an aspect of work as we have presupposed. While the users readily acknowledge the impact of the SI initiative on the way they use the IT and process information, they did not feel it to be a significant overall impact on work. An implication is that the users perceive work not so much in terms of its information processing aspect. Rather, they seem to perceive work along a completely different set of dimensions, such as in terms of the goals, task procedures, or interpersonal relations involved in the work.

Information processing, not touching upon those relevant aspects of work, seems to constitute only a small, negligible part of the work.

The IT groups, on the other hand, display a different relation between the IT and organizational practice realms, acknowledging their work to be strongly affected by the IT.

This suggests that the effect of IT on work is strongly mitigated by a third factor, such as the IT relevance of work. Different work carry different levels of IT relevance. It seems that the IT groups perceive their work to be much more IT and IP relevant, and therefore more affected by the IT, than the users do.

Thirdly, the results suggest that the IT impact on organization is as much an organizational phenomenon as it is a technological phenomenon: The IT impact materializes not just through its technological features but more through the organizational, structural arrangement that surrounds and accompanies the IT. Thus the users, while displaying relatively little overt responses to changes in information processing aspect of the work, responded more sensitively to the structural rearrangement of the SI

Initiative - the structural separation of the IT units - acknowledging that it has had a material impact on and significantly changed their work procedures and work relationships. The results also carry a further implication in that the IT concept employed in this research as well as the extant IT impact research may have been too narrowly conceived: the IT is not merely a set of information processing technology, as currently conceived, but more an amalgamation of various organizational and structural arrangements surrounding, supporting, and facilitating the technology. The IT seems rarely to be perceived by its technological features alone but more to be perceived contextually, in terms of its organizational, structural surroundings.

The above research results provide mixed support for the theory structure of the Causal Transition Model of the IT impact: i) the results provide support to the basic tenet of the model, which specify a multi-phase, multi-realm nature of the IT impact, showing that the IT impact manifests in multiple organizational realms; ii) as for the transition from the IT infrastructure to the IT practice realm, the results provide strong support, showing that the SI Initiative has a direct, visible impact on the IT practices of people; iii) as for the transition from the IT practice to the organizational practice realms, the results are mixed, suggesting the transition is contingent upon the IT relevance of the work; iv) as for the transition from the organizational practice to organization structure realms, the results are inconclusive, demonstrating little of the IT impact on structure.

VI. Quantitative Research Study

1. Method

The Causal Transition Model of the IT impact was also tested for validity using a quantitative research approach. The validation was made in terms of whether the IT impact process follows a particular causal transition path as specified in the model. Specifically the model was examined in terms of: i) whether the causal transition path starts in a realm other than the IT practice

realm, and ii) whether the causal transition path takes a free flowing form, rather than following a fixed transition path as in the model. A questionnaire survey was conducted for the validation. The questionnaire contained questions measuring the perceived impact of the SI on the three organizational realms - the IT practice realm, the organizational practice realm, and the organization structure realm. A total of 186 people from the user firms and the SI firms of the Chaebul group corporations participated in the survey.

The results were analyzed using the Simultaneous Equation Modeling techniques [Joreskog & Sorbom, 1988]. Table 6 illustrates the questionnaire respondents' demographics, in terms of organization, business type, and functional area.

Research Constructs:

The IT impact was measured in terms of the impact on the IT practice, on the organizational practice, and on the organization structure. The impact on organizational practice was operationalized, based upon Barley [1986, 1990], in terms of the impact on non-relational (Problem Solving) and the relational (Interaction Pattern) aspects of work: Barley has argued that the IT impact on organization manifests first in the non-relational aspect of work, which then transpires to the relational and ultimately to the structural aspects of the organization. The 4 impact measures were measured with 18 question items, all presented in 5 point Likert scale. Table 7 illustrates the 18 question items and their reliability measures. As shown in the table, the items exhibit appropriate reliability levels, all exceeding 0.8.

Research Models:

For the validation of the Causal Transition Model, 4 competing models of the IT impact with different causal transition paths were constructed and tested. Figure 3 illustrates the models: Model A is the basic Causal Transition Model: the IT impact originates in the IT practice realm, transpiring to the organizational practice realm (problem solving and interaction pattern), and terminating in the organization

structure realm. Models B, C, and D, on the other hand, negates various aspects of Model A: Model B specifies that the IT impact starts not in the IT practice realm, but rather in the organization structure realm. Model C specifies an unconstrained flow path for the IT impact, with the impact freely flowing from the IT practice to the other realms with no causal constraints among them. Model D specifies likewise for Model B.

2. Results and Discussions

The four research models were tested for goodness of fit with the data using the structural equation modeling tools (LISREL).

Figure 4 illustrates the path coefficients for the models. The lambda coefficients for the latent to observed variables are shown in Table 8. The Chi square values and various fit measures for the models are shown in Table 9.

The results indicate that the Causal Transition model as originally proposed as in Model A has a reasonably good fit with the data: (the Chi-square value = 197.71 (p=.000027) and the Goodness of Fit (GFI) index = 0.90). All the path coefficients prove to be significant above the .05 level, suggesting a causal path among the latent variables. Model C, which specifies an unconstrained flow path for the IT impact by setting additional paths among the Model

A's latent variables, on the other hand, seems less well fitting: While the model maintains the fit level of Model A (GFI=0.90), many of the path coefficients turn out to be insignificant: this means the additional paths set in the model are spurious and adds little to the model fit. In fact, the LM test on Model A suggested no modification to the model structure.

Model B, which specifies a different starting point for the manifestation of the IT impact than the IT practice realm, however, shows the best fit of the four models: (the Chi-square value = 158.11 (p=0.0011) and the GFI = 0.92).

The path coefficients prove to be all significant above the .05 level. The LM test conducted on Model C suggested no modification to be made on the model's path structure. And Model D,

like Model C, turned out to be problematic with insignificant path coefficients among the latent variables.

The data were further examined to see if the results may vary by organization, business type, or functional area. In particular, it was examined if the user group and the IT group may, as in the qualitative research results, vary in their responses. The IT group was coded and included as 'else' in the functional area demographics. An Analysis of Variance test results indicated that there was little difference in the IT impact measures between the organizations, between the business types, or between the functional areas. Table 10 shows this.

The above results provide several findings about the nature of the IT impact process. First of all, the results indicate that the IT impact does follow a particular causal transition path in its manifestation. The models A and B, which each specify a particular causal transition path from one realm of the organization to the next, turn out to be superior models to the models C and D which relax such specification. The unconstrained flow paths in the models C and D all turned out to be spurious. This finding provides support for the general theory structure of the Causal Transition Model - that the IT impact is a multi-realm, multi-phase phenomenon, with the IT impact in one realm causally transpiring to another realm. The presence of a particular causal transition path is an evidence for such a multi-phase, multi-realm nature of the IT impact.

Secondly, the results indicate that the IT practice and the organizational practice are logically related. As both Model A and Model B demonstrate, the IT impact in the IT practice realm transpire to the organizational practice realm by affecting the problem solving practices of people and their interaction patterns. The path coefficients from the IT practice to Problem Solving to Interaction Pattern were all significant above the .05 level. This finding thus supports the IT practice - organizational practice transition proposed in the Causal Transition Model - that the IT practice and the organizational practice are logically connected and such a logical continuity is provided along the

information processing aspect of work. This finding also confirms Barley's [1986, 1990]
proposition that the IT impact manifests first in the non-relational, and then in the relational aspects of the organization. The finding, however, need to be qualified with the qualitative research result that the IT impact on work is strongly mitigated by the IT relevance of work.

Thirdly, the results indicate that the IT impact may start in the organization structure realm as well as in the IT practice realm. As shown in Model A and Model B, which each specify different starting point for the causal transition path of the IT impact, the organization structure realm turns out to be not necessarily a realm where all the IT-induced changes ultimately culminates, as proposed in the Causal Transition Model, but a realm which rather instigates and triggers those changes. This is contrary to our expectation. In fact, it presents a rather bewildering doubt to the extant IT impact research, which takes the IT - Organization Structure relation as its most basic research concern. The qualitative research results above, however, provide a possible explanation: the IT impact starts in the organization structure realm because the IT impact rarely comes in technology alone but is often accompanied by some overt structural rearrangement (e.g., change in the reporting or reward structure), and people are more affected, at least initially, by those structural rearrangement than by the technology itself.

And the organization structure impacts this research has measured may have been those accompanying, rather than those caused and induced by, the IT. This again indicates, as discussed in the qualitative research section, the need for a much richer conceptualization of the IT impact, from that of a technological phenomenon to that including organizational, structural phenomena. This finding also carries an implication for the Structure-Practice relationship: The Causal Transition Model has proposed that the manifestation of the IT impact involves transition between levels of analysis, from the macro structure to the micro practice and back to the macro

structure levels.

The above finding, however, suggests a strong, visible influence flow from the macro structure to the micro practice levels, but a much weaker, less visible flow in an opposite direction, from the micro practice to the macro structure level.

To recapitulate, the quantitative research results indicate that: i) the IT impact follows a particular causal transition path, ii) the causal transition path cuts across the IT domain - Organizational domain boundary along the information processing aspect of work, and iii) the IT impact often starts with, not ends in, the changes in the organization structure realm.

The findings above largely support the Causal Transition Model. As indicated above, they support the general theory structure of the model by showing that the IT impact manifests in multiple organizational realms and with a particular causal transition path among them. They also illuminate where and how such a causal transition takes place by demonstrating the transition through the information processing aspect of work and between the macro-micro levels. Table 11 summarizes both the qualitative and quantitative research results.

Ⅶ. Conclusion

In this paper, we presented a Causal Transition Model of the IT impact and reported the results of two research studies, qualitative and quantitative, conducted to validate the model. The results, as shown in Table 11 above, largely support the general theory structure of the model, and validate that the Causal Transition Model is a good first step forward toward the development of a theory of the IT impact. The model provides a conceptual framework within which to identify and relate the various impacts of the IT on organizations and to develop a comprehensive explanation theory set.

The results carry several implications for the IT impact research. First of all, the results raise an issue with the validity of the IT construct in the IT impact research: The ontological assumption prevailing in the IT impact

research is that the IT is a potent enough stimulus to generate overt responses from the organization.

The results, however, suggest this may not always be the case: unless their work maintains a strong IT relevance, people seem little conscientious of the effect of the IT on their work but more affected by the structural arrangement surrounding and accompanying the IT. The results also demonstrate the value of an integrative research strategy in the IT impact research. Combining the qualitative and quantitative research strategies, this research was able not only to generate more focused research questions, but to provide better explanations for the results, as in the case of the IT impact starting with, not ending in, the organization structure realm.

This research presents some future research issues, such as the effect of the IT relevance on people's perception of the IT impact and the need for a proper characterization of organization structure in the theory structure of the IT impact research.

〈REFERENCES〉

Alexander, J.C., B. Giesen, R. Munch and N.J. Smelser, *The Micro-Macro Linkage*, Berkerly, CA: University of California Press, 1987.

Bakopoulos, J.A. Yannis, "Toward a More Precise Concept of Information Technology," *Proceedings, Sixth International Conference on Information Systems*, Indianapolis, 1985, pp. 17-24.

Banville, C. and M. Landry, "Can the Field of MIS be Disciplined?," *Communications of the ACM*, V32, N1, 1989, pp. 48-60.

Barley, S., "Technology as an Occasion for Structuring: Evidence from Observation of CT Scanners and the Social Order of Radiology Departments," *Administrative Science Quarterly*, V31, 1986, pp. 78-108.

Barley, S., "The Alignment of Technology and Structure through Roles and Networks," *Administrative Science*

Quarterly, V35, 1990, pp. 61-103.

Behling, O., "Some Problems in the Philosophy of Science of Organization," *Academy of Management Review*, 1978, 3, pp. 193-201.

Berger, P.L. and T. Luckmann, *The Social Construction of Reality*, New York, Anchor Books, 1967.

Bijker, W.E., T.P. Hughes and T. Pinch (Eds), *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, Cambridge, MA, MIT Press, 1987.

Boland, R.J. and R.A. Hirschheim, ed., *Critical Issues in Information Systems Research*, John Wiley & Sons, New York, 1987.

Brynjolfsson, E., "Information Assets, Technology, and Organization," *Management Science*, V40, N12, December 1994.

Coleman, J.S., "Social Theory, Social Research, and a Theory of Action," *Amer. J. Sociology*, 91 (1986), 1309-1335.

Coleman, J.S., *Foundations of Social Theory*, Harvard University Press, Cambridge, 1990.

Craib, I., *Modern Social Theory*, Harvester Press, 1984.

Craib, I., *Modern Social Theory*, Harvester Press, 2nd Ed., 1992.

Culnan, M.J., "Mapping the Intellectual Structure of MIS, 1980-1985: A Co-Citation Analysis," *MIS Quarterly*, V11, N3, 1987, pp. 340-353.

DeLone, W.H. and E.R. McLean "Information System Success: The Quest for Dependent Variable," *Information Systems Research*, 3:1, 1992..

DeSanctis, G., & M. Scott Poole, "Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory," *Organization Science*, V5, N2, May 1994, pp. 121-147.

Dickson, G.W., J.A. Senn and N.L. Chervany, "Research in Management Information Systems: The Minnesota Experiment," *Management Science*, 23:9,

May 1977, pp. 913-923.

Foster, L.W. and D.M. Flynn, "Management Information Technology: Its effects on Organizational Form and Function," *MIS Quarterly*, V8, 1984, pp. 229-236.

Fulk, J. and C. Steinfield (Eds.), *Organization and Communication Technology*, Newbury Park, CA, Sage Publication, 1990.

Galbraith, J.R., *Designing Complex Organization*, Reading, Mass.: Addison-Wesley, 1973.

Galbraith, J.R., *Organization Design*, Reading, Mass.: Addison-Wesley, 1977.

Giddens, A., *Central Problems in Social Theory: Action, Structure and Contradiction in Social Analysis*, Berkerly, CA: University of California Press, 1979.

Giddens, A., *The Constitution of Society: Outline of the Theory of Structure*, Berkerly, CA: University of California Press, 1984.

Huber, G.P., "A Theory of the Effects of Advanced Information Technologies on Organizational Design, Intelligence, and Decision Making," *Academy of Management Review*, V15, N1, 1990, pp. 47-71.

Jick, T.D., "Mixing Qualitative and Quantitative Methods: Triangulation in Action," in John Van Maanen (Ed.), *Qualitative Methodology*, Newbury Park, CA: Sage Publications, 1983, pp. 135-148.

Joreskog, K.G. and D. Sorbom, *LISREL* 7: A Guide to the Program and Application*, Joreskog and Sorbom/SPSS Inc., 1988.

Kauffman, R.J. and P. Weill, "An Evaluative Framework for Research on the Performance Effects of Information Technology Investment," *Proceedings, Tenth International Conference on Information Systems*, Boston, December 1989.

Kling, R., "Social Analyses of Computing: Theoretical Perspectives in Recent Empirical Research," *ACM Computing Surveys*, V21, N1, March 1980, pp. 61-110.

Leavitt, H., and T., Whiler, "Management in the 1980's," *Harvard Business Review*, November- December, 1958.

Lee, A.S., "Integrating Positivist and Interpretive Approaches to Organizational Research," *Organization Science*, 2:4, 1991, pp. 342-365.

Lucas, H.C. and J. Baroudi, "The Role of Information Technology in Organization Design," *Journal of Management Information Systems*, V10, N4, Spring 1994, pp. 9-23.

Malone, T.W., J. Yates and R.I. Benjamin, "Electronic Markets and Electronic Hierarchies," *Communications of the ACM*, V30, N6, 1987, pp. 484-497.

Markus, M.L., "Electronic Mail as the Medium of Managerial Choice," *Organization Science*, V5, N4, November 1994.

Markus, M.L., and D. Robey, "Information Technology and Organization Change: Causal Structure in Theory and Research," *Management Science*, V34, N5, May, 1988.

Mintzberg, H., *The Structuring of Organizations*, Prentice Hall, Englewood Cliffs, NJ, 1979.

Morgan, G., *Images of Organization*, Sage Publications, Beverly Hills, CA, 1986.

Munch, R. and N.J. Smelser, "Relating the Micro and Macro," in Alexander, J.C., B. Giesen, R. Munch, and N.J. Smelser, ed., *The Micro-Macro Linkage*, Berkerly, CA: University of California Press, 1987.

Orlikowski, W.J., "The Duality of Technology: Rethinking the Concept of Technology in Organizations," *Organization Science*, V3, N3, August 1992.

Orlikowski, W.J. and D. Robey, "Information Technology and the Structuring of Organizations," *Information Systems Research*, 2:2, 1991.

Porter, M.E., *Competitive Advantage*, The Free Press, New York, 1984.

Rousseau, D.M., "Issues of Level in

Organizational Research: Multi-level and Cross-level Perspectives," in *Research in Organizational Behavior*, 7,JAI Press, Inc., Greenwich, CT, 1985, pp. 1-37.

Swanson, E.B., "Information Systems in Organiza- tion Theory: A Review," in Boland, R.J., and R.A. Hirschheim, ed., *Critical Issues in Information Systems Research*, John Wiley & Sons, New York, 1987.

Swanson, E.B. and N.C. Ramiller, "Information Systems Research Thematics: Submissions to a New Journal, 1987-1992," *Information Systems Research*, V4, N4, 1993, pp. 299-330.

Van Maanen, J. (Ed.), *Qualitative Methodology*, Newbury Park, CA: Sage Publications, 1983, pp. 135-148.

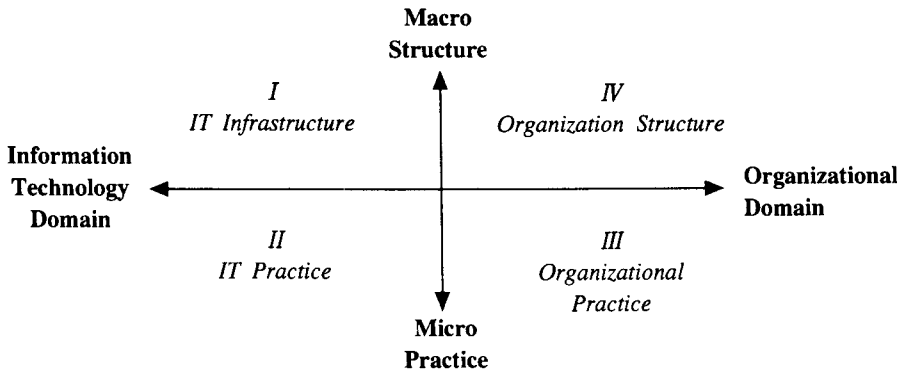
Walsham, G., "The Emergence of Interpretivism in IS Research," *Information Systems Reserch*, 6:4, December 1995.

Weill, P., "The Relationship Between Investment in Information Technology and Firm Performance: A Study of the Valve Manufacturing Sector," *Information Systems Research*, 3:4, 1992, pp. 307-333.

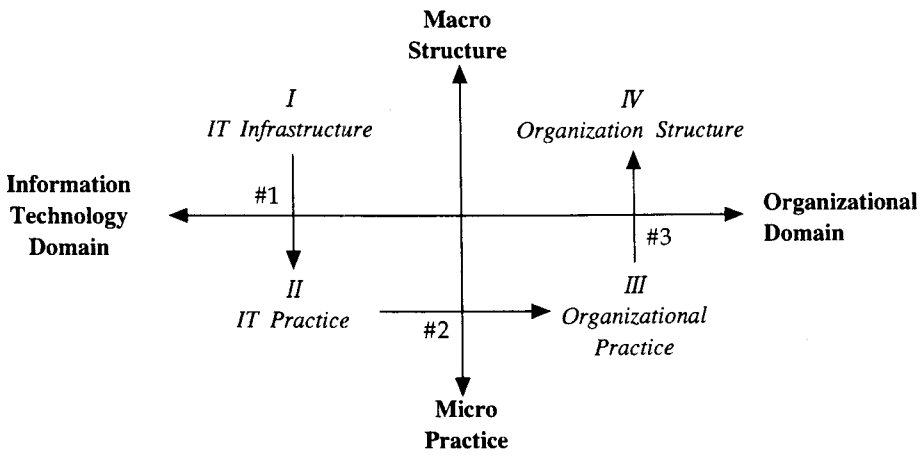
Whisler, T.L., *Information Technology and Organizational Change*, Wadworth, Belmont, CA, 1970.

Williamson, O.E., *Markets and Hierarchies: Analysis and Antitrust Implications.*, The Free Press, New York, 1975.

<Fig 1> The Realms of Organizational Phenomena



<Fig 2> The Causal Transitions between Organizational Realms



<Table 1> Profiles of the Chaebul Group

	H Group	S Group	L Group	D Group	Y Group
#Member Firms	48	50	54	24	23
Total Revenues (Billions of dollars)	$49	$43	$23	$3	$8
Major Business	Automobiles	Electronics	Chemical	Beverages	Cement

<Table 2> Interview Statistics

	#Users interviewed	#SI people interviewed
H Group	2(2)*	2
S Group	2(1)	4
L Group	2(1)	1
D Group	2(1)	3
Y Group	1(1)	2
	9(6)	12

*Numbers in the parenthesis indicates the number of interviewee firms

<Table 3> Summary of Interview Responses

Topics	Responses from User Firms (User Groups)	Responses from the SI Firms (IT Groups)
Overall Perception about the SI Initiative	-SI means a few more PC's on your desk. (S1) -SI means sharing of data. (L5)	-SI is for cost saving, for pursuing common goals, for Synergy effect. (H1) (D1) -SI means sharing resources. (D1) -SI means higher status for DP. (D2) -SI means connecting through LAN. (S2) (S5) -SI means efficiency and performance. (S4) -SI means data integration. (L1) -SI means a change in computer systems. (L1)
Impact on IT and IP Practices	-Share more HW and SW. (H3)	-System quality improves. (H2) -Users demand more. (H2) -Share more HW and SW. (H2) -DB's become relational. (S2)
	-Faster data access and retrieval. (H3) (H4) (L5) (D4) (D5) -More data usage/sharing. (H4) (L4) (L5) (D4) (D5) -No difference in data usage. (S1) (S3) -Fewer phone calls due to E-Mail. (D4) (D5) -Easier communication with the office. (D4)	-Faster data access and retrieval. (S4) (S6) -More data usage. (S2) (S5) (S6)(Y1) -Easier communication w/ office: (Y1) (Y2)

<Table 3> Continued

Impact on Work Procedure	-Little. (H3) (H4) (S1) -Little on work speed. (H3) -Faster work speed. (H4) (L4) (L5) (D4) (D5) -Slowed work speed. (S1) -We become IT's customers. (H3) -Work more specialized. (S1) -SI generates new tasks. (S3) -Dehumanization of work. (L4) (L5) (D5) -Higher productivity. (L4) (D5) -Fewer service requests to the IT due to change in charging system. (D4) (D5)	-Little. (H2) -Little on work speed. (S4) -Faster work speed. (S2) (S5) (S6) -Users now become customers, deserving more attention. (H2) (D2) -User communication becomes more formal. (H2) -More standardized work procedure. (D2) -IT becomes more proactive. (H2) -Significant. (S2) (S3) (S6) -Fewer manual jobs. (S2) (S6) -Structural change induces more communication between member firms and the SI firm. (D1) -Significant changes in system development procedure. (D1) -Slower system development. (D2) -Fewer user requests due to change in request procedure. (D1,D3)
Impact on Structure	-Little on who you communicate with for work. (H3) (H4) (S1) (S3) -Little on reporting structure. (H3) (H4) (S1) (S3) (L4) (L5) -Little on unit barrier. (H4) (S1) -Unit boundaries more clearly delineated. (D5) -Less interaction between organizational units. (D5) -Change in work appraisal process. (D5) -More communication and cooperation between people and organizational units. (L5) (D4)	-Little other than (IT) people now belonging to different units. (H1) -Little on reporting structure. (S2) (S4) (S5) (S6) -More team work and organic structure. (S4)
Difficulties encountered	-Resistance to SI. (L2) (L5)	-Low IT awareness in user firms. (H1) -Systems not used for users have too many different opinions. (S4) -Lack of SI know-how's. (S4)

<Table 4> Summary of Responses from the User groups

Topics	Response Pool	H 3	H 4	S 1	S 3	L 4	L 5	D 4	D 5	Y 3
SI Impact on Information Processing	Share more HW and SW	y								
	Faster data access/retrieval	y	y				y	y	y	y
	More data usage/sharing		y	n	n	y	y	y	y	y
	Fewer phone calls (due to e-mail)							y	y	
	Easier communication (w/ office)							y		y
SI Impact on Work Procedure	Significant impact overall	n	n	n						
	Faster work speed	n	y	n		y	y	y	y	y
	Higher productivity					y			y	
	Work more specialized			y						
	Dehumanization of work					y	y		y	
	SI generates new tasks				y					
	Change in relationship w/ IT	y							y	
SI Impact on Structure	Change who you communicate w/	n	n	n	n					y
	Change reporting structure	n	n	n	n	n	n			n
	Change work appraisal process								y	
	Unit barriers removed		n	n						
	Unit boundaries become clearer								y	
	More interaction b/ units						y	y	n	y

(y: yes n: no)

<Table 5> Summary of Responses from the IT groups

Topics	Response Pool	H 1	H 2	S 2	S 4	S 5	S 6	L 1	D 1	D 2	D 3	Y 1	Y 2
SI Impact on Information Processing	Share more HW and SW		y										
	Faster data access/retrieval				y	y							
	More data usage/sharing			y	y	y						y	
	Fewer phone calls (due to e-mail)												
	Easier communication (w/ office)											y	y
	*Improved system quality		y										
SI Impact on Work Procedure	Significant impact overall		n	y	y	y							
	Faster work speed				n								
	Higher productivity												
	Work more specialized												
	Dehumanization of work												
	SI generates new tasks								y				
	Change in relationship w/ IT		y						y	y	y	y	y
	*Work more standardized									y			y
	*Fewer manual jobs			y			y						
	*IT becomes more proactive		y										
	*User communication becomes formal		y										
	*Change system development process							y	y				
SI Impact on Structure	Change who you communicate w/												
	Change reporting structure			n	n	n	n						
	Change work appraisal process												
	Unit barriers removed												
	Unit boundaries become clearer												
	More interaction b/ units				y								

*: New remarks not appearing in interviews with the users.

(y: yes n: no)

	Frequency	Percentage
H Group	38	20.4
S Group	40	21.5
L Group	56	30.1
D Group	25	13.4
Y Group	27	14.5
	186	100.0

Business Types	Frequency	Percentage
Manufacturing	64	34.6
Service	42	22.6
Finance/Banking	37	19.9
Retailing	19	10.2
Else	24	12.7
	186	100.00

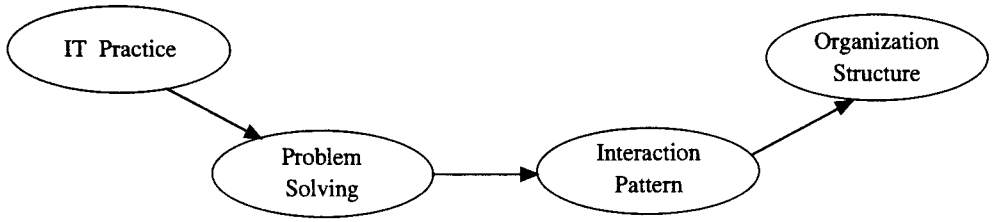
Functional Area	Frequency	Percentage
Sales/Marketing	48	25.8
Accounting/Finance	21	11.3
General Admin.	37	19.9
Else	80	43.0
	186	100.00

<Table 6> Respondent Demographics

<Table 7> Scale Items for the IT Impact Measures

Factors	Scale Items	Alpha if item deleted	Reliability Cronbach's Alpha
Impact on IT Practice	G1: Reduced data gathering time/effort	.8790	.8878
	G4: Data more accessible	.8693	
	G5: Provide more data analysis tools	.8731	
	G6: Increase data exchange/sharing	.8671	
	G7: Data more diverse	.8735	
	G8: Data more accurate	.8689	
	G9: Data of higher quality	.8694	
Impact on Problem Solving	G12: Quicker sensing of problem	.8342	.8666
	G13: Different interpretation of problem	.8352	
	G14: Less time for finding solution	.8153	
	G15: More creative solutions	.8327	
Impact on Interaction Pattern	G29: Meet more people for work	-	.8912
	G30: More interaction with people outside the department	-	
Impact on Organization Structure	G38: Fewer reporting layers	.9086	.9263
	G39: Simpler reporting process	.9029	
	G40: Clearer work authority/responsibility	.9047	
	G41: Clearer work boundaries	.9092	
	G42: Increased decision authority	.9220	

<Model A>



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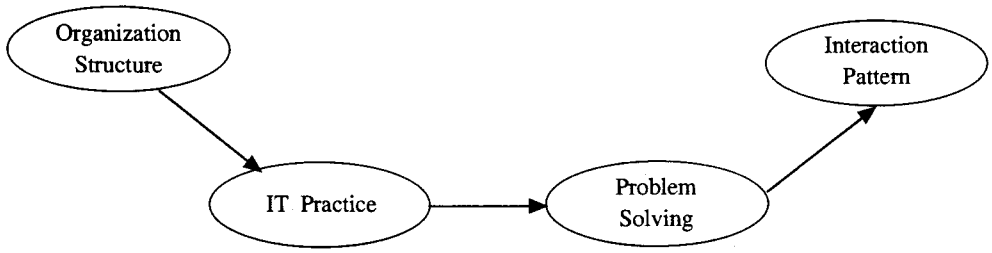

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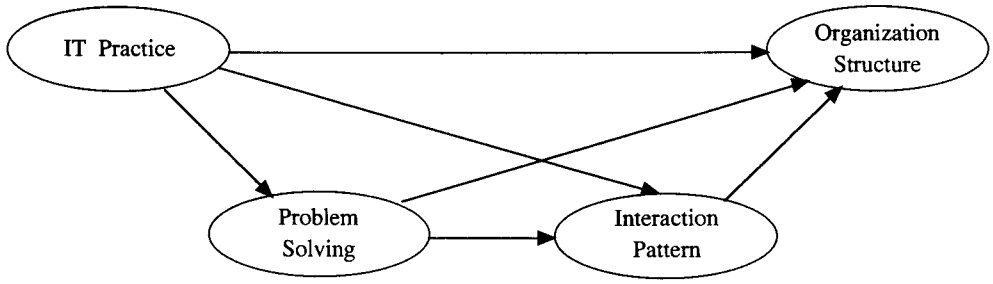

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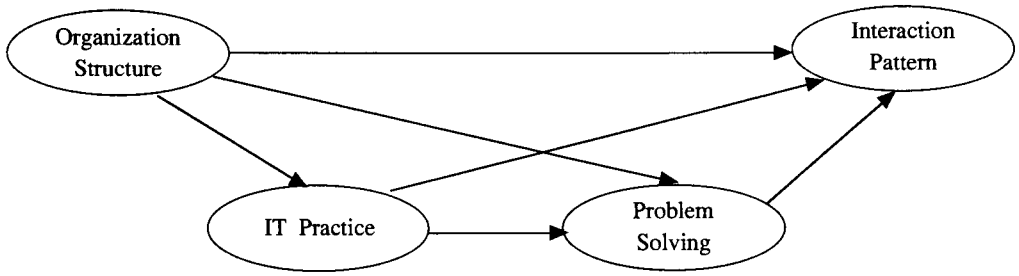
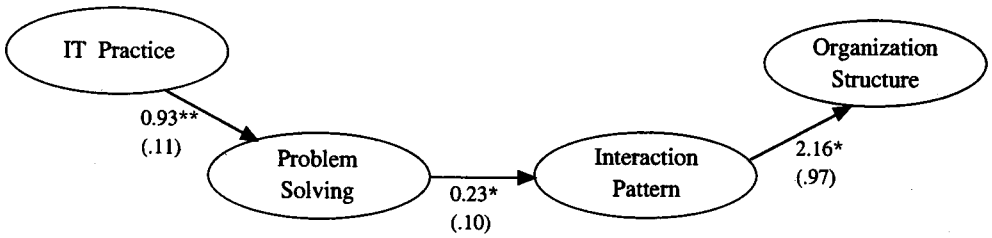


<Fig 3> Four Competing Models of the IT Impact

<Model A>



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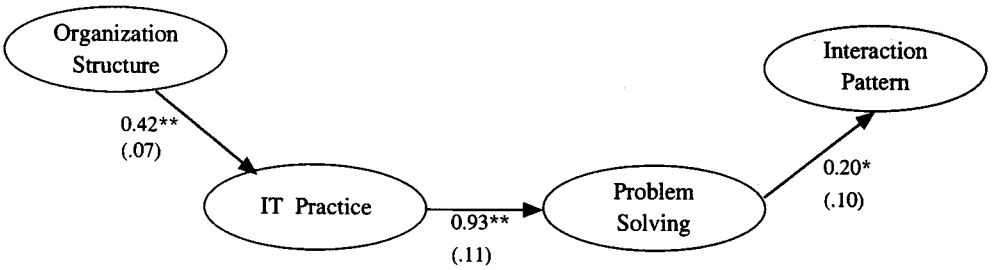

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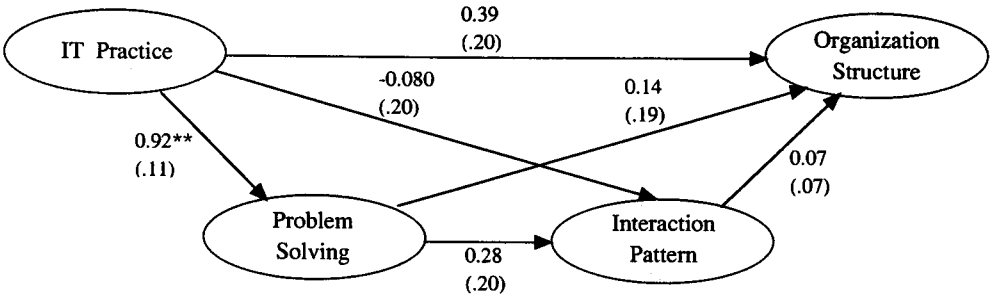

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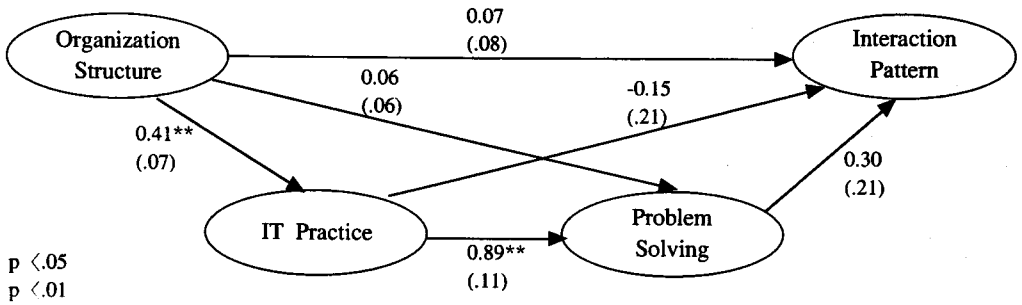

* p <.05
** p <.01

<Fig 4> Path Coefficients and Standard Errors for the Models

<Table 8> The Lambda Coefficients for the Latent to Observed Variables

Factors	Scale Items	Lambda Coefficient (S.E) (Model A)	Lambda Coefficient (S.E) (Model B)
Impact on IT Practice	G1: Reduced data gathering time/effort	1.00	1.00
	G4: Data more accessible	1.07**(.11)	1.07**(.11)
	G5: Provide more data analysis tools	1.06**(.11)	1.03**(.11)
	G6: Increase data exchange/sharing	1.04**(.11)	1.02**(.11)
	G7: Data more diverse	1.05**(.13)	1.04**(.13)
	G8: Data more accurate	1.03**(.11)	1.04**(.11)
	G9: Data of higher quality	1.01**(.11)	0.99**(.11)
Impact on Problem Solving	G12: Quicker sensing of problem	1.00	1.00
	G13: Different interpretation of problem	1.00**(.10)	0.99**(.09)
	G14: Less time for finding solution	1.11**(.10)	1.11**(.09)
	G15: More creative solutions	1.02**(.10)	1.02**(.09)
Impact on Interaction Pattern	G29: Meet more people for work	1.00	1.00
	G30: More interaction with people outside the department	1.25**(.31)	1.43**(.44)
Impact on Organization Structure	G38: Fewer reporting layers	1.00	1.00
	G39: Simpler reporting process	1.03**(.06)	1.03**(.06)
	G40: Clearer work authority/responsibility	1.11**(.09)	1.12**(.09)
	G41: Clearer work boundaries	1.07**(.09)	1.09**(.09)
	G42: Increased decision authority	0.96**(.08)	0.97**(.08)

<Table 9> The Goodness of Fit Indexes for the Models

	Model A	Model B	Model C	Model D
Chi-square (df: p)	196.71 (123: p=.000027)	158.11 (120: p=.011)	184.85 (120: p=.00014)	155.85 (117: p=.0095)
GFI	0.90	0.92	0.90	0.92
AGFI	0.86	0.88	0.86	0.88
PGFI	0.65	0.64	0.63	0.63
NFI	0.92	0.93	0.92	0.93
NNFI	0.96	0.98	0.96	0.98
CFI	0.97	0.98	0.97	0.98
IFI	0.97	0.98	0.97	0.98
Model AIC	292.71	260.11	286.65	263.85
Model CAIC	495.54	475.62	502.17	492.04

<Table 10> The Analysis of Variance Test Results

	F-ratio (F-prob)			
Groups	IT Practice	Problem Solving	Interaction Pattern	Organization Structure
By Organization	1.9446 (.1050)	0.9915 (.4136)	0.7343 (.5697)	2.8443 (.0256)*
By Business Type	1.7213 (.1473)	1.6700 (.1590)	0.6073 (.6579)	0.4619 (.7636)
By Functional Area	1.5382 (.1803)	0.6025 (.6981)	0.9919 (.4242)	1.2082 (.3072)

<Table 11> Summary of the Research Results

	Theory	Qualitative Research Results	Quantitative Research Results
Overall Theory Structure	IT Impact manifest in multiple organizational realms.	Support	Support
	IT Impact follows a particular causal transition path	Partially Support	Support
Realm Transitions	IT Infrastructure -> IT Practice	Support	Support
	IT Practice -> IP Practice	Support	Support
	IT Practice ->Organizational Practice	Partially Support: (Contingent upon IT Relevance of Work)	Support
	Organizational Practice -> Organization Structure	No Support	Partially Support
Additional Findings	Conception of the IT construct and the IT Impact phenomenon	-Users more affected by the structural rearrangement than by the IT. -IT Impact is as much an organizational phenomenon as a technological phenomenon.	-IT Impact may start from organization structure realm. -Macro->Micro influence flow is stronger than Micro ->Macro flow

◆ 저자소개 ◆

전 성 현 (Juhn, Sung-Hyun)

저자는 서울대학교에서 수학하였으며 미국 미네소타 대학에서 경영정보학으로 박사학위를 취득하였고 현재 국민대학교 정보관리학부 교수로 재직하고 있다. 주요 연구분야로는 정보기술과 조직, 정보전략, 프로세스 혁신 등이 있다.