The Effects of Training for Computer Skills on Outcome Expectations, Ease of Use, Self-Efficacy and Perceived Behavioral Control

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ABSTRACT

Previous studies on user training have largely focused on assessing models which describe the determinants of information technology usage or examined the effects of training on user satisfaction, productivity, performance, and so on. Scant research efforts have been made, however, to examine those effects of training by using theoretical models. This study presented a conceptual model to predict intention to use information technology and conducted an experiment to understand how training for computer skill acquisition affects primary variables of the model. The data were obtained from 32 student subjects of an experimental group and 31 students of a control group, and the information technology employed for this study was a university's electronic mail system. The study results revealed that attitude toward usage and perceived behavioral control helped to predict user intentions; outcome expectations were positively related to attitude toward usage; and self-efficacy was positively related to perceived behavioral control. The hands-on training for the experimental group led to increases in perceived ease of use, self-efficacy and perceived behavioral control. The changes in those variables suggest more causal effects of user training than other survey studies.

I. Introduction

User training plays a significant role in accepting and using a new information technology (IT). In order to assimilate new IT into an organization effectively, training potential users is an essential managerial practice to be established (Lenard-Barton, 1987). Studies of IT implementation and end-user computing have shown that training is an essential contributor to systems success (e.g., Benson, 1983; Fuerst and Cheney, 1982; Igbaria, et al., 1989; Leonard-Barton and Deschamps, 1988).

In other words, user training has positive effects on their IT usage, productivity, information satisfaction, and decision making process.

Cronan and Douglas (1990) reported that a training program for end users resulted in an increase in their productivity and satisfaction with the systems. Yaverbaum and Nosek (1992) reported that education and training lead to an increase in user information satisfaction, which refers to "the sum of one's feelings and attitudes towards a variety of factors (components) related to the delivery of information products and services" (Doll, et al. 1995, p. 178). Mykytyn (1988) found that training decision support systems (DSS) users is positively correlated with the use of a DSS to improve decision making. Green and Hughes (1986) found that there is an interaction between training and cognitive style, which affects decision process attributes such as number of alternatives considered and amount of data considered. Igbaria's (1993) field survey revealed that training as an individual characteristic influences computer anxiety and perceived usefulness, which ultimately affect user acceptance of microcomputer technology. The results of Nelson and Cheney's (1987) field study showed that computer-related training is positively associated with computer-related ability, which is, in turn, positively related to use of IT. While the results of these studies present why user training is required for effective utilization of IT, less research efforts have been made for understanding how training influences user acceptance from theoretical standpoints.

A variety of theoretical models have recently been proposed and assessed to explain the determinants of IT usage (Adams, et al., 1992; Davis, et al., 1989; Mathieson, 1991; Taylor and Todd, 1995). Intention-based models, such as the Theory of Reasoned Action (Ajzen and Fishbein, 1980) and the Theory Planned Behavior (Ajzen, 1985, 1991) from social psychology, use behavioral intention to predict individual behavior. The Theory of Planned Behavior is an extension of the Theory of Reasoned Action in that it contains perceived behavioral control in addition to attitude toward behavior and social norm. The Technology Acceptance Model, which is an adaptation of the Theory of Reasoned Action, suggests two belief-based factors affecting system usage: perceived ease of use and perceived usefulness (Davis, et al., 1989). The Social Cognitive Theory proposes outcome expectations and self-efficacy as its cognitive determinants of individual behavior (Bandura, 1986).

The purpose of this research is to assess the effects of user training on major variables of these theoretical models to explain individual behavior. Particularly, this research suggests a conceptual model to understand how training for computer skills influences such variables as outcome expectations, perceived ease of use, self-efficacy and perceived behavioral control. Since these variables are considered as the determinants of user acceptance, it will help to understand the role of user training in predicting user intentions to examine those effects of user training by conducting an experiment. This experimental study will have an implication on how effectiveness of an IT training program can be evaluated and what benefits could be obtained from user training.

The paper proceeds as follows. In the next section, relevant theories in which the conceptual model in this study is ground are explained. The conceptual models are, then, introduced and research hypotheses are generated, followed by a discussion about research methodology in the study. The results of data analysis are presented

and hypotheses are tested. Finally, the final section provides concluding comments and discusses limitations of the study and future research issues.

Ⅱ. Theoretical Background

2.1. Social Cognitive Theory

The Social Cognitive Theory, a widely accepted, empirically validated model of individual behavior, posits a triadic reciprocal causation model in which human behavior, personal factors, and environmental events all influence each other in a dynamic fashion (Bandura, 1986). Exponents of environmental determinism theorize about how behavior is controlled by situational influences, whereas exponents of personal determinism seek the causes of human behavior in dispositional sources in the form of instincts, traits and other motivational forces within the individual. In the social cognitive view, human behavior is neither determined by inner forces nor automatically controlled by external environments. Unlike the theorists favoring one-sided interactionism which views human behavior as a product of personal and situational influences, the Social Cognitive Theory favors a conception of interaction based on triadic reciprocality. According to the Social Cognitive Theory, individuals choose their environments, which also influence them; human behavior in a given situation is affected by environmental factors, which are in turn affected by behavior; and cognitive and personal factors influence behavior, which also influences the personal factors.

This research is particularly concerned with two specific cognitive determinants of individual behavior in the Social Cognitive Theory: outcome expectations and self-efficacy. Outcome expectations refer to the beliefs about the consequences of undertaking a particular behavior. Individuals are more likely to undertake behaviors which they believe will result in valued outcomes than those which will not result in favorable consequences. Expected positive outcomes of using a computer would increase the person's feeling of its usefulness. If one believes that using a spreadsheet software will lead to increased work productivity, for example, the software is considered as a useful tool for the individual.

Self-efficacy, another cognitive factor influencing individual behavior and performance, is defined as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura 1986, p. 391). Self-efficacy is not concerned with the component skills necessary to undertake a particular behavior, but concerned with the beliefs about one's ability to perform the behavior. Computer self-efficacy, thus, represents one's perceived ability to use computers in performing a task, rather than specific computer skill components such as saving files and uploading files. Gist and Mitchell (1992) differentiate self-efficacy from other related concepts such as self-esteem and effort-performance expectancy. Self-esteem is an individual's "affective evaluation of the self," but self-efficacy is "a judgment about task capability that is not inherently evaluative" (Gist and Mitchell 1992, p. 185). Compared with the effort-performance expectancy, self-efficacy is a more comprehensive concept incorporating the rationale underlying the expectancy theory construct, and it has generative capability of

influencing thought patterns, emotional reactions and performance.

Both outcome expectations and self-efficacy will influence individual behaviors. Using Harvard graphics software, for example, will be affected by the individual's expectations about the outcomes which may be attained by using the software and the potential user's perceptions of his or her ability to use the software in the accomplishment of a task. Whereas the concept of outcome expectations has been used by many information systems researchers (e.g., Davis et al., 1989; Desanctis, 1983, Lucas, 1978), self-efficacy has recently been considered by information systems researchers. Compeau and Higgins (1995) found that computer self-efficacy influences outcome expectations, affect, anxiety, and actual computer use. Igbaria and Iivari (1995) reported that self-efficacy has a significant effect on computer anxiety and perceived ease of use, and is influenced by computer experience and organizational support. Continued research is required to clarify the determinants of self-efficacy and its influences on information systems user behavior and performance.

2.2. Theory of Planned Behavior

The Theory of Planned Behavior (Ajzen 1985, 1991), an extension of the Theory of Reasoned Action (Fishbein and Ajzen, 1975), has been proposed to deal with situations where individuals have only limited control over the factors influencing their behavior. The predictive accuracy of Theory of Reasoned Action diminishes when individuals have not complete volitional control over their behavior because they lack requisite information, skills, and other resources. The additional block of perceived behavioral control of the Theory of Planned Behavior reflects such incomplete control situations.

According to the Theory of Planned Behavior, a person's behavior (B) is predicted by behavioral intention (BI) and perceived behavioral control (PBC), and behavioral intention is predicted by attitude toward the behavior (A), subjective norm (SN), and perceived behavioral control (PBC). Attitude toward a behavior is a person's general feeling of favorableness or unfavorableness for performing the behavior (Ajzen and Fishbein, 1980). Subjective norm reflects perceptions that significant referents desire the individual to perform or not perform the behavior in question. Perceived behavioral control reflects perceptions of the internal interferences (e.g., skills, abilities, knowledge, adequate planning) and external interferences (e.g., time, opportunity, cooperation of other people) with control over intended behavior. The model
can be formally expressed by a weighted function of the variables:

$$B = w_1 BI + w_2 PBC$$

$$BI = w_3 A + w_4 SN + w_5 PBC.$$

Attitude toward a behavior, subjective norm, and perceived behavioral control are determined by their corresponding belief structures: behavioral beliefs (bb), normative beliefs (nb), and control beliefs (cb). Attitude toward a behavior (A) is a function of behavioral belief strength and outcome evaluations. A behavioral belief (bb) strength is the subjective probability that the behavior will lead to a salient outcome of the behavior. An outcome evaluation (oe) reflects desirability of the outcome of the behavior. One may believe, for example, that using E-mail will lead to improved communication with his/her coworker, and that it is very desirable to improve

communication with coworker. Attitude toward a behavior can be shown as:

$$A = \Sigma\ bb_i\ oe_i.$$

Subjective norm (SN) is a function of normative belief concerning a particular referent and motivation to comply with the referent. A normative belief (nb) is the individual's perception of the opinion of a person or group whose beliefs about the behavior may be important to him/her. Motivation to comply (mc) refers to how much the individual generally wants to comply with the wishes of social referents. One may believe, for example, that his/her coworkers think that he/she should use voice-mail, and that complying with the wishes of the coworkers is relatively unimportant. Subjective norm can be expressed as:

$$SN = \Sigma\ nb_j\ mc_j$$

Perceived behavioral control (PBC) is a function of control belief and perceived facilitation. A control belief (cb) is the person's perception of the availability of skills, knowledge, resources, time, and opportunities. Perceived facilitation (pf) is the person's assessment of the importance of those resources to performing the behavior. For example, one may feel that it is hard for him/her to find a computer to use a spreadsheet package, but availability of a computer is important for using it. Perceived behavioral control can be expressed as:

$$PBC = \Sigma\ cb_k\ pf_k$$

Compared to the Theory of Reasoned Action, which has a longer history, the Theory of Planned Behavior has been received relatively few empirical tests. Schifter and Ajzen (1985) applied the Theory of Planned Behavior to the prediction of weight loss behavior. Ajzen and Madden (1986) applied the theory to investigate students' behaviors such as class attendance and getting a good grade, and found that perceived behavioral control was a significant predictor of intention. In the information systems context, researchers have recently started to pay their attention to applying the theory for explaining IT usage behavior. Mathieson's (1991) experimental study showed that perceived behavioral control had a significant effect on behavioral intention. Taylor and Todd's (1995) research, based on student data collected from potential users of a computer resource center, revealed that the decomposed Theory of Planned Behavior provides a fuller understanding of behavioral intention, when compared with the Technology Acceptance Model and the original model of Theory of Planned Behavior.

2.3. Technology Acceptance Model

The Technology Acceptance Model (Davis 1989, 1993; Davis et al., 1989), based on the Theory of Reasoned Action (Fishbein and Ajzen, 1975), has been developed to help to explain and predict user acceptance of end-user computing technologies. The Technology Acceptance Model posits that two beliefs, perceived usefulness and perceived ease of use, determine IT acceptance and usage. Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance," and perceived ease of use is defined as "the degree to which a person believes that using a particular system would be free of effort" (Davis 1989, p. 320).

In the Technology Acceptance Model, IT usage behavior (B) is predicted by

behavioral intention to use the IT (BI), which is, in turn, jointly determined by the person's attitude toward using the IT (A) and perceived usefulness (U), with relative weights estimated by regression. Attitude (A), which reflects positive or negative feelings about using the IT, is a weighted function of perceived usefulness and perceived ease of use (E). Finally, perceived usefulness is influenced by perceived ease of use. These relationships can be stated formally as below:

$$BI = w_1 A + w_2 U$$
$$A = w_3 U + w_4 E$$
$$U = w_5 E.$$

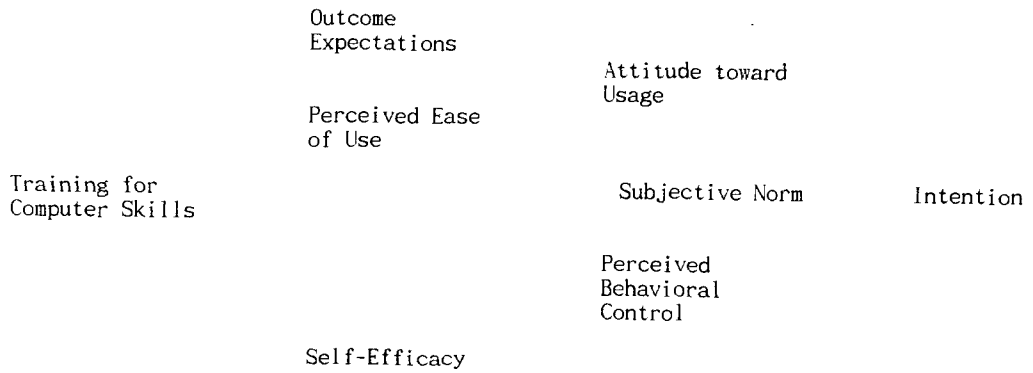
There has been empirical studies which supported the Technology Acceptance Model in the information systems area. Davis et al. (1989) found that perceived usefulness strongly influenced intention to use software, and attitudes only partially mediated the effects of these beliefs on intentions. Other studies also showed that the model has reasonable explanatory power (Davis, 1989; Davis, 1993; Mathieson, 1991). The model is relatively simple and specific, but is less comprehensive than the Theory of Planned Behavior.

Ⅲ. Conceptual Model and Research Hypotheses

3.1. Conceptual Model

This research employs the Theory of Planned Behavior as a basic model to predict intention to use IT, and combines the model with the concepts of self-efficacy, outcome expectations, and perceived ease of use, which are assumed to be affected by training for computer skills (Figure 1). The Theory of Planned Behavior suggests that attitude toward using IT, subjective norm, and perceived behavioral control determine behavioral intention. These determinants of intention are not independent of outcome expectations and self-efficacy, which are also predictors of human behavior in the Social Cognitive Theory. Outcome expectations, which are similar to perceived usefulness, should be associated with attitude toward using IT, and self-efficacy determines perceived behavioral control. As the Technology Acceptance Model explains, perceived ease of use should be related to attitude toward using IT.

<Figure 1> Conceptual Model



Consistent with the Decomposed Theory of Planned Behavior (Taylor and Todd, 1995), the conceptual model does not include behavioral beliefs, normative beliefs and control beliefs which are often elicited by a sample of group, but incorporates the theoretical concepts of outcome expectations, self-efficacy, and perceived ease of use. This makes the model more generally applicable to various situations. Although the theoretical concepts are not a complete set of variables associated with the determinants of intention in the Theory of Planned Behavior, incorporation of such concepts helps to understand how external variables, such as training for computer skills, can be related to the Theory of Planned Behavior, without eliciting salient beliefs which are situation specific. Instead of assessing the effects of user training on the belief-based measures of attitude and perceived behavioral control, it is possible to examine those effects on self-efficacy, outcome expectations and perceived ease of use. Since a training program is often designed so that users can acquire computer-related skills, training is also directly associated with perceived behavioral control in the model. As the Technology Acceptance Model does not contain a direct relationship between external variables such as user training and attitude toward IT usage, such a relationship is not shown in the model in Figure 1.

3.2. Research Hypotheses

As the Theory of Planned Behavior postulates, there are three conceptually independent variables influencing intention to use an IT: attitude toward the behavior, subjective norm, and perceived behavioral control. In general, the more favorable attitude toward using an IT a person has, the stronger intention to use the IT. The more favorable subjective norm with respect to using an IT a person has, the stronger the persons intention to use the IT. Finally, the greater the perceived behavioral control over using an IT, the stronger intention to use the IT. Previous empirical tests of the Theory of Reasoned Action and the Theory of Planned Behavior showed that, though the effect of subjective norm was not consistent, attitude and perceived behavioral control were positively correlated with behavioral intention (e.g., Ajzen and Madden, 1986; Schifter and Ajzen, 1985). Accordingly, it is hypothesized that:

Hypothesis 1: Attitude toward using an IT is positively related to intention to use the IT.

Hypothesis 2: Subjective norm with respect to using an IT is positively related to intention to use the IT.

Hypothesis 3: Perceived behavioral control over using an IT is positively related to intention to use the IT.

Since outcome expectations are behavioral beliefs that a particular behavior will result in favorable or unfavorable outcomes, they should be positively correlated with attitude toward the behavior. Outcome expectations about using an IT are analogous to perceived usefulness in the Technology Acceptance Model (Davis, 1989; Igbaria and Iivari, 1995). A person who believes that using a particular IT leads to mostly positive outcomes will possess a favorable attitude toward using the IT. One the other hand, if a person believes that mostly negative outcomes will result from using

the IT, he she will have a negative attitude toward it. Thus, we hypothesize that:

Hypothesis 4: Outcome expectations about using an IT are positively related to attitude toward using the IT.

The Technology Acceptance Model suggests that perceived ease of use influences attitude toward the behavior (Davis et al., 1989). If an IT can be used with less efforts, in general, people will have more favorable attitude toward using the IT. A set of belief dimensions related to attitude can be derived from perceived characteristics of innovation (Hoffer and Alexander, 1992; Moore and Benbasat, 1991). Perceived complexity, one such characteristic of an innovation, represents the degree to which an innovation is perceived to be difficult to understand, learn, and operate (Rogers, 1983). As perceived complexity decreases, attitude toward IT usage becomes more favorable (Tornatzky and Klein, 1982). Perceived ease of use, as a belief dimension analogous to perceived complexity, should also be correlated positively with attitude toward using the IT (Taylor and Todd, 1995). Thus, we hypothesize that:

Hypothesis 5: Perceived ease of use is positively related to attitude toward using the IT.

Control beliefs, which determine perceived behavioral control, reflect facilitating conditions and self-efficacy. Taylor and Todd (1995) decomposed control beliefs into self-efficacy, resource facilitating conditions and technology facilitating conditions. Resource conditions refer to time and money, and technology conditions refer to technology compatibility issues that may constrain IT usage. Ajzen and Madden (1986) point out that self-efficacy beliefs are very similar to perceived behavioral control. Individuals, with higher computer self-efficacy, i.e., greater ability to use computers, will perceive that they have greater control over using computers. Users with greater confidence in their ability to use an IT will anticipate fewer obstacles or impediments to using the IT. Thus, we hypothesize that:

Hypothesis 6: Self-efficacy is positively related to perceived behavioral control over using the IT.

In the Technology Acceptance Model, perceived ease of use and perceived usefulness are influenced by external variables such as system features (e.g., menus, icons, touch screens), training, documentation, and user support consultants (Davis et al., 1989). An examination of the effects of these external factors on perceived ease of use and usefulness may clarify the reason why a particular system is accepted or unaccepted by potential users. Outcome expectations are analogous to the perceived usefulness construct (Davis, 1989). Training for computer skills is considered, thus, as an external variable influencing perceived ease of use and outcome expectations. People who understand how to use a particular system will find it easier to use it, because less efforts are required for the trained people. And they also understand how the system can be utilized to improve task performance. Thus, we hypothesize that:

Hypothesis 7: Training for computer skills will increase perceived ease of use of the trainees.

Hypothesis 8: Training for computer skills will increase perceived outcome expectations of the trainees.

Self efficacy may change over time, because the efficacy judgment changes as new information and experiences are acquired (Gist and Mitchell, 1992). Increased training programs may strengthen confidence in one's ability to use computers in his/her work (Gist, et al., 1989). Compeau and Higgins (1995) found that people who received behavior modeling training had higher self efficacy than people who received traditional, lecture based training in Lotus 1 2 3. By the same token, people who participate in an effective IT training program will have higher self efficacy after the training. Hence, it is hypothesized that:

Hypothesis 9: Training for computer skills will increase self efficacy of the trainees.

Training for computer skills is considered as an external variable influencing perceived behavioral control in the Theory of Planned Behavior. People may not be willing to use an IT, because they lack requisite skills, facilities, opportunities or funds. An IT training program may be designed to eliminate a portion of potential users' barriers to using the IT by changing their skills and knowledge. Potential users may increase their ability to use an IT by learning how to operate the system (Nelson and Cheney, 1987). People who acquire computer skills required to operate a system by participating in a training program, therefore, will perceive higher control over using it after the training. Thus, it is hypothesized that:

Hypothesis 10: Training for computer skills will increase perceived behavioral control over using the IT.

Ⅳ. Research Methodology

4.1. Subjects and Experimental Procedures

A laboratory experiment was conducted using 63 student subjects from undergraduate classes including data communications, systems analysis and design, and management information systems at a university in Korea. The IT used for this study was the university's electronic mail (E-mail) system, and all variables in this study should be interpreted by presuming use of the system. Thirty-two students were randomly selected to receive a high degree of training as an experimental group, and the other 31 subjects received a low degree of training as a control group. The two groups were not significantly different in terms of possession of facilities for using E-mail, such as personal computer, modem and telephone ($t = -0.51$, $p = 0.611$) and number of computer-related courses taken ($t = 0.42$, $p = 0.673$). And they had no opportunities for using the university's E-mail system before.

In order to measure the effects of training for computer skills, a pretest-posttest design was employed as below:

Time	:	1st week	2nd & 3rd week	4th week
Experimental group	:	O_1	X	O_2
Control group	:	O_1		

The experiment lasted for a period of four weeks during which the subjects were not told about the hypotheses being tested. Both the control group and the experimental group initially received a minimal level of E-mail training for the first week, i.e., a five minute lecture about how to use the university's E-mail system. After this short explanation about how to read and send E-mail messages, the subjects of both groups completed a questionnaire (O_1) prepared to measure the variables of the study. Since the subjects had an average of six computer-related course experiences, there is every reason for them to understand how E-mail can be used in organizations.

Only the experimental group received an additional training (X), and responded to a post training questionnaire (O_2) containing the same items as the initial questionnaire. The subjects were required to write their identification numbers to compare O_2 with O_1. The questionnaire was not distributed to the subjects of the control group during the fourth week. No opportunities were available, except for the training in this study, for students to learn and use the university's E-mail system on campus. The high level of training (X) consisted of a half-hour demonstration of E-mail use in classes and an individualized hands-on practice on the E-mail system. It was a course requirement to the students of the experimental group to participate in this hands-on training and an E-mail practice test, but it was not to respond to the questionnaires. It took about two weeks for the subjects of the experimental group to finish the hands-on E-mail practice. During each subject was using the E-mail system for about 25 minutes, a two-page E-mail manual and an assistant were available to help his/her practice. The tasks the subjects practiced include connecting to a host computer by modem, reading new and old messages, mailing a message, transferring a file prepared by a word processor in a personal computer to the host computer, downloading a file in the host computer to a personal computer and reading the file, and so on. Since the host computer is running the UNIX operating system, the subjects also had to comprehend basic UNIX commands concerning saving, listing, and deleting files. While a subject is working on the E-mail system, a few other subjects had opportunities for watching what the subject is doing. When each subject finished the practice, he/she took an E-mail practice test, which included downloading a message from a host computer, and preparing a return message using a word processor and uploading to the host computer to send it to the destination. It took about 3 to 5 minutes for each subject to complete the assignment. During the fourth week, the subjects in the experimental group responded to the second questionnaire.

4.2. Variables and Measurement

Based on a review of the relevant literature, the questionnaire items were prepared and translated into Korean. Previously used items were adapted to reflect the situations of the present study, and a few students with the same academic background as the subjects checked if they could understand the questionnaire. The values of -3 to 3 were assigned to the scales (bipolar scoring) for intention, attitude, subjective norm, perceived behavioral control, outcome expectations, and ease of use. Each of the measures used in the study is described in detail below.

Development of the scales to measure behavioral intention, attitude, subjective norm and perceived behavioral control were based on the suggestions provided by Ajzen

and Fishbein (1980), Ajzen (1985, 1991), and Trice and Treacy (1988). Intention to use E-mail this year, particularly the university's E-mail system, was measured by summing over three items: willingness to be a frequent user, an active user, and a user rather than a nonuser. Attitude toward using E-mail was obtained by summing over a set of four evaluative scales: *useful-useless*, *wise-foolish*, *like-dislike*, and *helpful-not helpful*. Subjective norm was measured by summing over two items: the people who influence me would think that I should use E-mail; the people who are important to me would think that I should use E-mail. Perceived behavioral control over using E-mail was obtained by summing over three questions concerning the degree to which subjects have any problem with using the university's E-mail system, can use the system easily, and feel in complete control over using the system.

A four-item measure of outcome expectations was developed based on the measures of Davis' (1989) usefulness and Compeau and Higgins' (1995) outcome expectations about using a computer. The expected consequences that might be associated with using E-mail include easier communication with professors, easier communication with classmates, asking questions to a professor more conveniently, and improved course performance. Respondents were asked to indicate how likely they thought it was that each of these outcomes would result from using E-mail.

The construct of ease of use was operationalized based on the work of Taylor and Todd (1995). The items for this construct were concerned with difficulty of learning the system because of complexity; difficulty of using computers, modem and software related to the system; and level of knowledge required to use the system. The first two items were reverse scales.

For the self-efficacy construct, the measure developed by Compeau and Higgins (1995) was used. The respondents were asked to indicate whether they could use the university's E-mail system under a variety of conditions. For each condition that the subjects answered that they could use the system ("yes" response), they rated their confidence by circling a number from 1 to 10, where 1 indicates "Not at all confident," 5 indicates "Moderately confident," and 10 indicates "Totally confident," The conditions include: if there was no one around to tell me what to do as I go; if I had only the system manuals for reference; if I had seen someone else using it before trying it myself; if I could call someone for help if I got struck; if someone else had helped me get started; if I had a lot of time for using the system; if I had just the built-in help facility for assistance; and if someone showed me how to do it first. The responses on the confidence scale were scored by counting 0 for not being able to use the system ("No" response) and 10 for Totally confident, thus encompassing both self-efficacy magnitude and strength.

Training for computer skills was operationalized by the nature of experimental treatment. A minimal level of training was provided to inform the subjects of the procedures for using the system. A high level of hands-on training to teach the subjects of the experimental group how to use the E-mail system involved watching E-mail demonstration and hands-on practice, and user training for computer skills in the present study refers to this additional high level of training (X), which was hypothesized to affect self-efficacy, outcome expectations, perceived ease of use and perceived behavioral control.

V. Results

5.1. Descriptive Statistics

A profile of the subjects participated in the study is shown in Table 1. More than half of the subjects were female and under the age of 24. Most of the subjects were juniors and seniors majoring in management information systems or business administration. Eighty-four percents of the subjects reported that they had no prior experience with E-mail, and 46 percents reported that they did not have facilities necessary for using E-mail at home.

<Table 1> Profile of the Subjects

	Frequency	Percent
(a) Sex		
Male	27	42.9
Female	36	57.1
(b) Age		
20-21	5	7.9
22-23	29	46.0
24-25	7	11.1
26-28	22	35.0
(c) Department		
MIS	47	74.6
Business Admn.	14	22.2
Other	2	3.2
(d) Year		
Sophomore	5	7.9
Junior	22	34.9
Senior	36	57.1
(e) Prior E-mail Experience		
Yes	10	15.9
No	53	84.1
(f) Possession of Facilities for E-mail At Home		
Yes	34	54.0
No	29	46.0

Means and standard deviations of the variables are summarized in Table 2. The variables seem to have positive means and have sufficient variations for examining their relationships. The positive means of outcome expectations and attitudes indicate that students appear to believe that using E-mail is beneficial, and they have favorable attitudes toward using E-mail. Similarly, they generally think that people who are important to them expect them to use E-mail, and tend to have a certain degree of self-efficacy and perceived behavioral control.

<Table 2> Descriptive Statistics (n=63)

Variable	Possible Range	Mean	Standard Deviation
Outcome Expectations	(-12, 12)	6.27	3.87
Ease of Use	(-6, 6)	0.74	2.95
Self-Efficacy	(0, 80)	58.20	15.31
Attitude	(-12, 12)	7.47	3.71
Subjective Norm	(-6, 6)	1.66	2.68
Perceived Behavioral Control	(-9, 9)	3.17	4.24
Intention	(-9, 9)	4.73	3.23

5.2. Reliability and Validity of the Measures

The reliability of the measures are shown in Table 3. A magnitude of 0.5 to 0.6 for the alpha coefficients is sufficient in the early stages of basic research, but a value greater than 0.8 is more desirable (Nunnally, 1978). Each item in Table 3, except for an item for ease of use, is highly correlated with its corresponding total, and all variables possess sufficient reliability measured by Cronbach's alpha. An item for ease of use with a low item-to-total correlation of 0.07 was eliminated, resulting in an alpha coefficient of 0.74.

<Table 3> Cronbach's Alpha

A factor analysis for all items was conducted to assess the construct validity of the variables in the study (Table 4). To decide the number of factors to extract, the Kaiser criterion, which suggests retention of factors with eigenvalues greater than one, was used. Six factors emerged from the varimax rotation explained 80.28% of the total variance. For a factor loading to be significant, it should exceed 0.5 (Hair, et al., 1992). Each item in Table 4 loaded very significantly on only a single factor it was supposed to measure.

<Table 4> Factor Loadings for Items

Items \ Factors	SE	A	OE	PBC	SN	EU	
SE1: No one around to tell me	**0.73**	0.16	0.22	0.30	0.06	0.06	
SE2: Manuals for reference	**0.77**	0.19	0.19	0.24	0.18	0.12	
SE3: See someone else using it		**0.87**	0.12	0.10	0.16	0.11	0.15
SE4: Call someone for help	**0.86**	0.10	0.21	0.17	0.16	0.20	
SE5: Help me get started	**0.88**	0.03	0.23	0.04	0.09	0.13	
SE6: A lot of time to use	**0.75**	0.16	0.28	0.24	0.10	-0.01	
SE7: Built-in help facility			**0.65**	0.24	-0.08	0.40	0.02 -0.22
SE8: Someone show me how	**0.85**	0.21	0.08	0.09	0.08	0.01	
A1: Useful-Useless		0.15	**0.78**	0.33	0.23	0.16	0.08
A2: Wise-Foolish		0.15	**0.84**	0.34	0.06	0.02	0.06
A3: Like-Dislike		0.25	**0.78**	0.19	0.20	0.24	0.03
A4: Helpful-Not Helpful	0.21	**0.82**	0.12	0.15	0.35	-0.02	
OE1: Communication - Prof.	0.32	0.30	**0.70**	0.14	0.07	0.16	
OE2: Comm. - classmates.	0.25	0.18	**0.68**	0.11	0.40	-0.06	
OE3: Asking questions to Prof.	0.15	0.24	**0.79**	0.10	-0.08	0.12	
OE4: Improved Performance	0.20	0.29	**0.65**	0.17	0.31	-0.29	
PBC1: Use without problems	0.28	0.18	0.17	**0.85**	0.06	0.12	
PBC2: Use without difficulty	0.32	0.20	0.25	**0.76**	0.14	0.21	
PBC3: Feel in control		0.29	0.15	0.08	**0.80**	0.16	0.17
SN1: People influencing me	0.17	0.22	0.20	0.18	**0.88**	0.08	
SN2: People important to me	0.23	0.39	0.13	0.10	**0.84**	0.11	
EU1: Hard to learn	0.22	0.11	0.07	0.13	0.00	**0.85**	
EU2: Difficult to use	0.05	-0.01	-0.03	0.18	0.13	**0.83**	
Eigenvalues		10.46	2.67	1.81	1.25	1.23	1.01
Cumulative % of explained variance	45.52	57.14	65.01	70.47	75.86	80.28	

Note: SE = Self-Efficacy
A = Attitude toward usage
PBC = Perceived Behavioral Control
OE = Outcome Expectations

5.3. Hypothesis Testing

Multiple regression models were formulated to test hypothesis 1 to 6. The regression, reliability and factor analyses were done by using a total of 63 questionnaire responses which consist of 32 responses obtained after hands-on training for the experimental group and 31 responses obtained after a lower level of training for the control group. Hypothesis 7 to 10 were tested by the t-test for a paired sample for the experimental group.

Table 5 presents the estimated coefficients and related statistics for the multiple regression model for predicting intention to use E-mail. The coefficient of multiple determination (R-square) for the model is 0.600, which means that 60.0% of total variations of intention is explained by attitude, subjective norm and perceived behavioral control. The data analysis supported Hypothesis 1 which proposed a positive relationship between attitude toward using E-mail and intention to use it ($t = 3.48$, $p = 0.001$) and Hypothesis 3 which posited that a positive relationship between perceived behavioral control and intention ($t = 5.43$, $p < 0.001$). On the other hand, the results did not support Hypothesis 2 concerning the relationship between subjective norm with respect to using E-mail and intention to use it ($t = 0.23$, $p = 0.812$). There is a statistical basis for concluding that attitude toward using E-mail and perceived behavioral control over using it significantly help to estimate the mean of intention to use it. We cannot say, however, that subjective norm make a significant contribution to the prediction of intentions.

<Table 5> Multiple Regression Model for Predicting Intention

Variable	Parameter Estimate	Standard Error	Standardized Estimate	t	*p*-value
Intercept	1.087	0.625	0.000		
Attitude	0.312	0.093	0.358	3.48	0.001
Subjective Norm	0.029	0.124	0.024	0.23	0.812
Perceived Behavioral Control	0.396	0.072	0.519	5.43	0.000
R-square = 0.6000					

Table 6 expresses the prediction of attitude toward using E-mail by a regression model containing outcome expectations and ease of use. Hypothesis 4, which posited a positive relationship between outcome expectations and attitude toward using E-mail, was supported ($t = 6.27$, $p < 0.001$), but Hypothesis 5, which proposed a positive relationship between ease of use and attitude toward using E-mail, was not supported ($t = 0.96$, $p = 0.338$). We can say that the more positive outcome expectations people have, the more favorable attitude toward using E-mail. There is insufficient information, however, to say that the easier to use the university's E-mail system, the more favorable attitudes people are likely to have.

<Table 6> Multiple Regression Model for Predicting Attitude

Variable	Parameter Estimate	Standard Error	Standardized Estimate	t	*p*-value
Intercept	3.634	0.697	0.000		
Outcome Expectations	0.598	0.095	0.624	6.27	0.000
Ease of Use	0.120	0.125	0.095	0.96	0.338
R-square = 0.4133					

The results of multiple regression in Table 7 also supported Hypothesis 6, which posited a positive relationship between self-efficacy and perceived behavioral control ($t = 4.83$, $p < 0.001$). The variable of "training" in Table 7 represents the difference between a high degree of hands-on training for the experimental group and a low degree of training for the control group. There is a statistical basis to say that the higher self-efficacy for using the university's E-mail system, the higher perceived behavioral control over using it.

<Table 7> Multiple Regression Model for Predicting Perceived Behavioral Control

Variable	Parameter Estimate	Standard Error	Standardized Estimate	t	*p*-value
Intercept	-6.138	1.652	0.000		
Self-Efficacy	0.141	0.029	0.509	4.83	0.000
Training	2.144	0.887	0.254	2.41	0.018

R-square = 0.4154

The results of testing hypothesis 7 to 10 are shown in Table 8. The dependent variables were measured before training for computer skills (i.e., E-mail demonstration and hands-on practice) and after the training, and the t-test was performed to assess if there were significant differences in the paired values of the variables. Hypothesis 7, which proposed that ease of use will increase as a result of training for computer skill acquisition, was supported by *p*-value of 0.022 ($t = 2.09$). Subjects tend to believe that it is easier to use the university's E-mail system when they had a chance to receive hands-on training for using the system. Hypothesis 8 was not supported by the results of data analysis ($t = 1.61$, $p = 0.058$). Training the subjects did not result in a significantly higher degree of outcome expectations.

<Table 8> The Effects of Training for Computer Skill Acquisition

Variables	Types of Groups	Means	Difference	t	*p*-value (one-tailed)
Ease of Use	Before	0.53	1.06	2.09	0.022
	After	1.59			
Outcome Expectations	Before	6.34	0.84	1.61	0.058
	After	7.18			
Self-Efficacy	Before	47.46	15.96	5.72	0.000
	After	63.43			
Perceived Behavioral Control	Before	2.00	2.96	3.84	0.000
	After	4.96			
Attitude toward usage	Before	7.25	0.62	0.85	0.198
	After	7.87			
Subjective Norm	Before	1.50	0.50	1.02	0.167
	After	2.00			
Intention	Before	4.62	0.87	1.25	0.110
	After	5.50			
Test Score	Before	2.40	6.46	14.55	0.000
	After	8.87			

Note: Before = Before Hands-on Training
After = After Hands-on Training

Typothesis 9, which posited that training for computer skills will increase self-efficacy, was supported by the results of the t-test in Table 8 ($t = 5.72$, $p < 0.001$). Self-efficacy with respect to using the university's E-mail system significantly increased as a result of the hands-on E-mail training. The results of the t-test also supported Hypothesis 10, which stated that training for computer skills will increase perceived behavioral control ($t = 3.84$, $p < 0.001$). It can be concluded that the hands-on training to teach how to use the university's E-mail system has increased perceived behavioral control over using it. The results in Table 8 also

showed that significant changes were not made for attitude toward using E-mail (t = 0.85, p = 0.198), subjective norm (t = 1.02, p = 0.167), and intention (t = 1.25, p = 0.110).

<Table 9> Comparison Between Control Group and Experimental Group

		Means		t		p-value (one-tailed)	
Variables	Types of Groups	Before	After	Before	After	Before	After
Ease of Use	Control	-0.12	-0.12	-0.97	-2.39	0.168	0.009
	Experimental	0.53	1.59				
Outcome Expectations	Control	5.32	5.32	-1.02	-1.95	0.155	0.027
	Experimental	6.34	7.18				
Self-Efficac	Control	52.80	52.80	1.33	-2.91	0.094	0.002
	Experimental	47.46	63.43				
Perceived Behavioral Control	Control	1.32	1.32	-0.59	-3.75	0.278	0.000
	Experimental	2.00	4.96				
Test Score	Control	1.77	1.77	-1.11	-15.37	0.135	0.000
	Experimental	2.40	8.87				
Number of Computer-Related Courses	Control	6.45	6.45	0.42	0.42	0.337	0.337
	Experimental	6.06	6.06				

The results of testing hypothesis 7, 9 and 10 were consistent with those of the t-tests to compare the experimental group with the control group in terms of ease of use, self-efficacy and perceived behavioral control in Table 9. There were no significant differences in the values of ease of use (t = -0.97, p = 0.168), self-efficacy (t = 1.33, p = 0.09) and perceived behavioral control (t = -0.59, p = 0.278) between two groups when they were measured before the hands-on training. However, the value of self-efficacy for the experimental group, when measured after hands-on training, was greater than that of the control group (t = -2.91, p = 0.002), and the results were the same for perceived behavioral control (t = -3.75, $p < 0.001$) and ease of use (t = -2.39, p = 0.009). For outcome expectations associated with hypothesis 8, the results were not consistent. Though the training did not increase significantly the outcome expectations of experimental group, the subjects of the experimental group had higher outcome expectations than those of the control group after training (t = -1.95, p = 0.027).

Performance is an important training outcome (Galletta, et al., 1995). Two types of training performance were measured to check the effectiveness of the hands-on training. The performance of a practice test after the hands-on training was measured by the time taken to finish the given assignment. Eighty-four percents of the subjects could finish the practice test in 4 minutes. And a test consisting of 10 questions about the specific commands for using the E-mail system was administered before the hands-on training and after the training. Examples of the multiple choice test items include "What is the command for listing new messages arrived?" and "Select the command for uploading a file." The hands-on training in this study

significantly increased the test score from 2.40 to 8.87 in Table 8 ($t = 14.55$, $p < 0.001$). After training, the subjects of the experimental group understood an average of 88.7% of the questions. These results of performance tests indicate that the type and amount of hands-on training in the study were sufficient for the subjects to understand how to use the university's E-mail system.

Ⅵ. Discussion and Conclusion

The results of the present study should be interpreted with the understanding that the IT examined was a university's E-mail system. The computer skills in the present study, thus, refer to the skills necessary for using the E-mail system. This research supports that attitude toward IT usage and perceived behavioral control help to predict user intentions. The more favorable attitudes toward IT usage people have, the greater their intentions to use it. The greater perceived behavioral control over using an IT people have, the greater their intentions. Although subjective norm was not a significant factor, the Theory of Planned Behavior appeared as a useful model for explaining user acceptance of IT. These results are similar to Taylor and Todd (1995) and Mathieson (1991).

Outcome expectations were significantly related to attitude toward IT usage. People who expect positive outcomes from using an IT tend to have more favorable attitude toward it. Unlike the previous studies (e.g., Davis, 1989; Kleintop, et al., 1996) focused on the Technology Acceptance Model, the study results did not support that perceived ease of use was related to attitude toward usage. Self-efficacy was positively related to perceived behavioral control. People who believe that they have greater ability to use an IT are more likely to think that there are no interferences with their control over using the IT.

Training for computer skills led to increases in perceived ease of use, self-efficacy and perceived behavioral control. After hands-on training, the subjects perceived that it would be easier to use the university's E-mail system, believed that they had greater ability to use the system, and felt less impediments to using the system. Consistent with Igbaria, et al.'s (1995) field survey, user training was positively related to perceived ease of use. Compeua and Higgins (1995) found that behavioral modeling training , which provided the subjects with an opportunity for observing someone else operating a software package, developed higher perceptions of computer self-efficacy than subjects who receive nonmodeling training. The results of this experimental study, on the other hand, showed that the hands-on training for potential users increased their perceived behavioral control and self-efficacy. This implies that user training for computer skills may directly change perceptions about their abilities to use an IT and control over using it, which, in turn, help to predict their intentions.

A possible explanation for the reason why user training did not lead to changes in outcome expectations in this study is that the user training was not directed toward changing attitudes or outcome expectations, but it focused on only computer skill acquisition, i.e., teaching how to use the system to read and send E-mail messages. Perhaps, another reason is that, after training, the subjects thought that the university's E-mail system was not useful as they expected, because it was not convenient to send messages in Korean and the professors and students in other

classes were not using E-mail.

Although training for computer skills did not appear to be associated with outcome expectations, it influenced indirectly user intentions in the sense that it led to increases in self-efficacy, perceived behavioral control and perceived ease of use. The increases in those factors are the benefits of user training for computer skills, and reflects the success of a training program. No other factors than training seemed to cause those changes in this study. Before the hands-on training, there were no statistically significant differences in ease of use, outcome expectations, self-efficacy, perceived behavioral control, test score and number of computer-related courses between the two groups. Perceived behavioral control, along with attitude toward usage, contributed to predicting user intentions. Hence, it is valuable to invest in user training, particularly a type of hands-on training for computer skill acquisition employed in this study, to improve user acceptance of an IT.

Although the results of this experiment might not be generalizable to other groups of people and settings, it is possible to make more causal inferences on the effects of user training than other field survey studies (Igbaria, et al., 1995). Future studies may plan a different experimental design and compare the effects of different training methods on the variables of interest. Furthermore, an alternative research model based on a particular theory may be developed to test the direct and indirect effects of training and other external variables such as organizational support and individual differences. In addition to studies comparing different theoretical models to predict IT usage and field studies to test proposed research models, much research is still needed to clarify causal effects of different types of user training.

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Few study on the influence of information requirements on IS planning capability was performed.[Davis & Olson, 1985; Venkatraman & Ramanujam, 1987; Premkumar & King, 1992; Raghunathan & Raghunathan 1994], However, because of poor explanation of the dimensions of IS planning construct, the explanation of the influence of information requirements on IS planning capability still remains incomplete.

Most changes in organizational information requirement is originated from changes in environmental factors such as customers, suppliers, and competitors. The better the understanding is about the business environment being faced, the better the chance of developing a solution that uses a information technology creatively. If the user's underlying business problem will be addressed by a new requirement, it must be clearly stated and understood through requirement analysis for IS adoption.

Galbraith[1973, 1977] explained the observed variations in organizational form based upon the amount of information needed to reduce task related uncertainty and thereby attain an acceptable level of performance. He proposed that specific structural characteristics and behaviors would be associated with information requirements, and a line of research and theorizing has provided support for this relationship.

Daft & Lengel[1984] suggested that the two answers to the question, why do organizations process information?, are to reduce uncertainty based on several studies[Galbraith, 1973, 1977; Burns & Stalker, 1961; Lawrence & Lorsch, 1967; Thompson, 1967] and to reduce equivocality based on Weick's study[1979]. Uncertainty and equivocality may arise from departmental technology, from coordination of departments to manage interdependence, or from the external environment[Tushman & Nadler, 1978].

An information system should meet the needs of the organization it serves, and applications should meet the needs of their users. The requirements for the information system are therefore determined by the strategies, goals, procedures, and behavior of individuals within the organization acting individually and collectively. There are four major reasons why it is difficult to obtain a correct and complete set of requirements[Davis & Olson, 1985]: 1) the constraints on humans as information processors and problem solvers; 2) the variety and complexity of information requirements; 3) the complex patterns of interaction among users and analysts in defining requirements; 4) unwillingness of some users to provide requirements for political or behavioral reasons.

Davis[1982] proposed two levels of information requirements: 1) organizational-level information requirements; 2) application-level information requirements. After three years, Davis & Olson[1985] suggested three types of information requirements: 1) organization-level information requirements, 2) database-level information requirements, 3) application-level information requirements.

First, information requirement determination at the organization or enterprise level is a key element in developing an information systems master plan. The requirements are factored into databases and subsystems(a portfolio of applications) that can be scheduled for development. Second, database requirements arise both applications and ad-hoc queries. The overall architecture for the databases to meet these requirements can be defined as part of organizational information requirements. Major classes of data through data modeling procedures are defined and associated with organizational processes that

require them. Third, the process for the determination of information requirements at the application level defines and documents specific information content plus design and implementation requirements. These types of information requirements are associated with data presentation format, screen design, user interface, and response time.

Table 1. Dimensions of IS Planning Capability

Dimensions	Description	Key Supporting Literature
IS Planning Resources	The degree of organizational support in the form of budget, duration, involvement of top management and end user, IS staff in planning, etc.	King & Cleland[1978] Ramanujam et al.[1986] Raghunathan et al.[1990] Premkumar & King[1992]
Quality of Business Planning	The degree of provision in the form of documentation to show strategic directions for the IS function	Premkumar & King[1991] Pyburn[1983] Premkumar & King[1994]
Internal Capability	The degree of attention to organizational factors(leadership, planning capability, functional coverage, communication, etc. structure ill defined, strategic problem.	Ramanujam et al.[1986] Venkatraman et al.[1987] Premkumar & King[1992] Raghunathan et al.[1994]
IS Maturity	The degree of maturity to the existing IS to support organizational information requirements	Nolan[1979, 1982]
IS Planning Methodologies	The degree of emphasis given to the use of planning methodologies to structure ill defined, strategic problem.	Ramanujam et al.[1986] Premkumar & King[1991]
Change Management	The need to anticipate and overcome resistance to planning and to create a favorable climate for IS planning	Steiner et al.[1975] King[1983] Ramanujam et al.[1986]

Despite of several research efforts that attempt to elucidate links between information requirements and planning capability, the results of this body of research are fragmented. This state of affairs has arisen because most previous research on planning systems has suffered from two major conceptual shortcomings. First, most studies have used rather simplistic conceptualizations of the notion of planning[Camillus, 1975; Steiner & Schollhammer, 1975; King, 1978]. Thus, researchers have attempted to show differences in financial performance between "planners" and "nonplanners" or "formal planners" and "informal planners." Second, most studies have essentially focused on developing better conceptual models for IS planning[Zani, 1970; McFarlan, 1971; King, 1978; King, 1983; Bowman et al., 1983]. Because of these shortcomings, a broader concept of IS planning capability is needed, as shown in table 1.

The present study is an attempt to explore the contingent nature of IS planning-related factors in the context of the strategic relevance of an organization's IS. The literature in the IS planning area has been extensively used in the choice of variables and in the formulation of questions to capture the underlying constructs.

Thus, using the relationship between the typology of information requirments and IS planning capability of an organization, this study investigates the causal relationship for the

IS planning processes across various organizations. Generally, relatively more strategic information requirement will differ from relatively less strategic ones in relation with ihe dimensions of IS planning capability.

The purpose of this study is to test a two-fold proposition: 1) to identify the typology of information requirements and the dimensions of IS planning capability; 2) to identify the relationship between the typology of information requirments and IS planning capability.

Ⅲ. Research Model and Hypothesis

3.1. Research Model

Researches on the influence of IS planning capability on IS planning effectiveness were performed in the studies by Venkatraman & Ramanujam[1987], Premkumar & King[1992, 1994], Raghunathan & Raghunathan [1991, 1994]. However, there is yet no study on the impact of information requirement on IS planning capability, or the association between information requirements and IS planning capability.

Using the typology of information requirement adopted in Davis & Olson[1985], this study will identify the extent of the capability of IS planning, in the context of organizational information requirements. When the planner perceives that the organization requires the strategic information, it will be appropriate to consider IS planning capability for supporting strategic information. If the organization requires the operational information, the planner will attempt to consider IS planning capability for supporting operational information.

Anthony[1965] classified organizational hierarchy to three type of management activities, such as strategic planning, management control, operational control. Simon[1969] distinguished between two types of decisions: programmed and nonprogrammed. The first term refers to human decisions that could be simulated by a computer program. The second term refers to human decisions which can not be consistently replicated by a machine. Gorry & Scott Morton[1971] identified decision types by management activities, which is based on Anthony's classification framework for management activity and Simon's human decision model, and they argued that relevant information must be provided for them.

Galbraith[1973, 1977] explained the observed variations in organizational form based upon the amount of information needed to reduce task related uncertainty and thereby attain an acceptable level of performance. He proposed that specific structural characteristics and behaviors would be associated with information requirements, and a line of research and theorizing has provided support for this relationship.

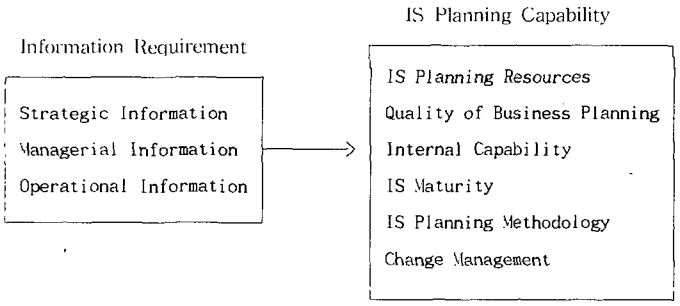
Organizational theorists have long believed that firms will institute more information requirements and invest in information systems planning to manage growth in size[Galbraith, 1973]. Generally speaking, information requirements within an organization are classified as three kinds of information requirements as strategic information for strategic management, managerial information for management control, operational information for routine operation.

Since IS planning has been defined as more open to outside influences, an

increase in the importance of strategic information would be expected. Empirical evidence support for such a relationship is likely to provide useful guidance to companies attempting to improve their IS planning process. Furthermore, data on the specific types of information used should be helpful in the planning of information systems to support a firm's objectives and strategies[Ahituv & Neumann, 1986; Kroeber & Watson, 1986].

As an organization requires more strategic information, in order to adapt to environmental uncertainty, a wider range of information is considered to be relevant, and the relative importance of different types of information shifts. The strategic level of new information may influence the nature of the planning system and, as a result, may alter that system. This means that the six dimensions of IS planning capability are different according to the types of information requirements. Rhyne[1985] empirically examined the relationship between corporate-level planning and information systems. He argued that data on the specific types of information used should be helpful in the design of information systems to support a firm's planning process.

Figure 1. Research Model



Environmental turbulence should not be viewed as acting directly on planning and information systems, but through the strategic choice of the executives in an organization[Child, 1972]. The importance of the chief executive officer's(CEO) active involvement in the planning process also has been emphasized by a number of authors[Andrews, 1971; Schendel & Hofer, 1978; King, 1983; Ramanujam & Venkatraman, 1987; Ramanujam & Venkatraman & Camillus, 1986; Premkumar & King, 1992; Lederer & Mendelow, 1993; Premkumar & King, 1994; Raghunathan & Raghunathan, 1994].

The purpose of this study is to identify the association between information requirements and IS planning capability. Rigorous studies on the influence of IS planning capability on IS planning effectiveness were performed by Venkatraman & Ramanujam[1987], Raghunathan & Raghunathan [1994]. However, there is at yet no study on the impact of information requirements typology to IS planning capability, or the association between information requirements and IS planning capability. Especially, there is no study on how much to change the capability of IS planning according to the types of information requirements.

3.2. Research Hypotheses

IS planning includes the use of information about the past, current and projected

performance to enable management to determine company missions, basic purposes, objectives, policies and program strategies[Mclean & Soden, 1977; Lederer & Mendelow, 1986]. IS planning design is a multifaceted management system that is contextually embedded. Hence, there are only several studies dedicated to IS planning process design[King, 1983; Ramanujam & Venkatraman & Camillus, 1986; Ramanujam & Venkatraman, 1987; Raghunathan & Raghunathan, 1990, 1994; Premkumar & King, 1992, 1994].

However, to date, there have been no studies testing the relationship between information requirement and IS planning processes. Bowman & Wetherbe & Davis[1983] suggested that strategic planning of the firm should be linked to resource allocation through the information requirement processes. In the end, designing IS planning capability is originated from organizational information requirements. Thus, it is very important to identify the relationship between information requirement and IS planning capability.

H1: Information requirement is positively related to IS planning capability needed.

This study considered three type of information requirement, as contingent variables for IS planning, which were needed from organizational goals, strategies, and the changes of task environment. The concerns of this study are twofold. One is what the design elements of IS planning capability are. The other is about the differences of IS planning capability by three types of information requirements.

Based upon an exploratory study of eight organizations which involved extensive interviews with IS and senior managers, Pyburn[1983] identified several factors which seemed particularly important to their planning success, or lack of it. These factors include such things as the style of senior management decision making, the volatility of the business(application portfolio), the complexity of the IS organization and management task, and the status and physical location of the IS manager. He found that the personal-formal and written-formal planning style had better performance, depending, in part, on a more formal general management style.

Hartman & White & Crino[1986] presented a prescriptive planning process model, based on information-processing research and strategies, which explicitly considered the linkages among the environment, the organization's adaptation to that environment, the type of planning, and information-processing strategies.

Rhyne[1985] examined empirically the relationship between corporate-level planning and information systems. He was interested in the specific types of information used for the design of information systems to support a firm's planning process. He found that, as the planning process becomes more sophisticated, external and environmental types of information will become more important. This means that the type of information requirements are a very important factor in the relationship between information requirements and IS planning capability.

H2 : Strategic information requirements have higher correlation with the capability of IS planning than other information requirements

Most researchers have emphasized two sets of influences on the design of IS

planning capability[King, 1978; Mclean & Soden, 1977; Davis, 1982; Ramanujam & Venkatraman, 1987]. They are the typology of information requirement and the design elements of IS planning systems.

Earl[1993] examined the strategic information systems planning(SISP) experience of 27 companies in England. He classified five different SISP approaches: Business-led, Method-driven, Administrative, Technological, and Organizational. Each approach has different characteristics and, therefore, a different likelihood of success. The results showed that the Organizational Approach appeared to be most effective. The taxonomy of the five approaches potentially provided a diagnostic tool for analyzing and evaluating an organization's experience with SISP.

Premkumar & King[1994] presented a research model, which was developed to link two dimensions of IS planning-the quality of IS planning and planning effectiveness-to a set of eight organizational factors derived from contingency research in IS planning (strategic business planning, organizational studies, and technology innovation). The results indicated that planning resources, the intended strategic impact of IS on future business operations, the quality of facilitation mechanisms, the quality of implementation mechanisms, and the quality of strategic business planning were significantly associated with the quality and effectiveness of IS planning.

Similar to these results, this study is interested in identifying the relationship between the types of information requirement and the dimensions of IS planning capability. So, a significant association is hypothesized.

H3 : Each type of information requirement have a different amount of association with each dimension of IS planning capability.

Ⅳ. Research Method

4.1. Independent Variables

In this study, three types of information requirements were identified as independent variables: strategic information, managerial information, and operational information. To test the overall relationship between information requirement and IS planning capability, information requirement(IR) was defined as the independent variable, to represent the organizational information requirement.

In order to test the extent of differences in the six dimensions of IS planning capability by the three types of organizational information requirements. This information requirement(IR) variable is identified as three independent variables again: strategic information(SINFO), managerial information(MINFO), operational information (OINFO). It is proposed that all three information requirements will influence the extent to which IS managers perceive the importance of designing the IS planning capability. Three variables of information requirements within a organization were provided in Table 2.

Table 2. Three Types of Information Requirement in this Study

Type of Information Requirement	The Content of Information
Strategic Information	Competitor's new product development and equipment
	Price policy of product
	Market share by product (by region)
	Performance of new product development
	Regulation and deregulation policy of government
	Merge & Acquisition of competitors
	Entrance strategy to new market
Managerial Information	Procurement of raw material and inventory control
	Sales performance by product (by region)
	Cost accounting about product and service
	Short term Cash flow
	Change of organizational management rule
	Operation performance in a department or a division
	Human relations and personnel management
Operational Information	Daily transaction with customers
	Daily product delivery and sales performance
	Bill of material by product
	Absence and vacation of employee
	Daily Cash flow
	Daily booking and closing

4.2. Dependent Variables

IS planning capability in this study represents the amount of capability which is caused by the typology of information in the task environment. This capability is perceived by a decision maker when he or she considers the six dimensions of IS planning capability: resources provided for IS planning, quality of business planning, IS maturity, internal planning capability, IS planning methodology, change management.

Most studies, on resources provided for IS planning, considered the degree of organizational support in the form of budget, duration, involvement of top management and end user, IS staff in planning, etc.[King & Cleland, 1978; Ramanujam et al., 1986; Raghunathan et al., 1990, 1994; Premkumar & King, 1992, 1994]. This study, also, uses 9 measurement items, to measure the degree of organizational support for the resources of IS planning; through a five-point Likert-type scale ranging from "Very insufficient" to "Very sufficient".

The business planning inputs for subsequent IS planning, in a top-down planning approach, is an important indicator of the impact to the quality of IS planning capability[King, 1978; Vitale et al, 1986; Johnston & Carrico, 1988; Goodhue et al, 1988; Martin, 1989, Raghunathan & Raghunathan, 1990]. Premkumar & King[1994] found that the quality of strategic business planning influenced the quality of IS planning processes and the effectiveness of IS planning. Thus, this study used 4 items, extracted from existing literature, in order to measure the degree of provision in the form of documentation to show strategic directions for the IS function; through a five-point Likert-type scale ranging from "Very insufficient" to "Very sufficient".

Internal capability refers to the degree of attention to organizational factors such as leadership, planning capability, functional coverage, communication, etc, in order to predict and formulate the strategic directions within the organization. Most research, in the area of internal capability, considered the degree of organizational aspects to

internal capability[Ramanujam et al., 1986; Venkatraman et al., 1987; Premkumar & King, 1992; Raghunathan et al, 1990]. They argued that plans often fail due to inadequate or incorrect assessment of an organization's internal aspects and internal capabilities[King & Cleland, 1978; Raghunathan et al, 1990]. Thus, this study used the 7 items, extracted from existing literature, in order to measure the degree of attention to internal considerations for IS planning; through a five-point Likert-type scale ranging from "Very insufficient" to "Very sufficient".

IS maturity in an organization may be an important variable influencing the direction for future IS. Nolan[1979] argued that the knowledge of the current stage of IS in the organization provides the foundation for developing appropriate strategies. Also, he suggested that an important part of the long-range plan is the technology plan, which identifies the computer-based technologies important to the company's competitive position[Nolan 1982]. Thus, this study used 5 benchmarks from Nolan[1979], with the exception of the IS budget ratio against sales revenue extracted from existing literature, as a measure of the degree of maturity of the existing IS to support organizational information requirements in IS planning process; through a six-point Likert-type scale.

A variety of IS planning methodologies have been developed to aid managers in identifying and dealing with strategic decisions and problems[Grant & King, 1979; IBM, 1984; Andersen, 1985; Martin, 1989; Rockart, 1979; Premkumar & King, 1991; Earl, 1993]. The extent of reliance on planning techniques is thus an important dimension of the planning system. Use of these techniques is one indication of the extend of formalization of a planning process[Ramanujam & Venkatraman & Camillus, 1986]. Thus, this study used the 13 items, customized as IS planning methodology or extracted from the IS existing literature, in order to measure the degree of emphasis given to the use of IS planning methodologies, through a five-point Likert-type scale ranging from "No Consideration" to "Very Useful".

Table 3. IS Planning Methodologies used in This Study

Planning Methodology	Vendor & Researcher
Business Systems Planning	IBM[1979, 1984]
Critical Success Factors	Rockart[1982]
Method/1	Andersen Consulting[1985]
Value Chain	Porter[1985]
Strategic Thrust	Ullrich et al.[1985]
Portfolio Approach	McFarlan & McKenney[1984]
Information Engineering	Martin[1989]
4 FRONT	Delloitte Consulting
NAVIGATOR	Earnst Young
SUMMIT	Cooper & Lybrand
Growth Stage Model	Nolan & Norton

Change management is a very important factor required in the IS development process as well as IS planning. Early studies on planning systems emphasized the importance of identifying and overcoming sources of resistance to organizational planning[Steiner, 1979; Steiner & Schollhammer, 1975; Ramanujam & Venkatraman &

Camillus, 1986]. Resistance to the idea and processes of planning can be expected to exert a negative influence on the IS planning process. Thus, this study used the 5 items, extracted from the IS literature, in order to measure the degree of resistance to planning and to create a favorable climate for IS planning; through a five-point Likert-type scale ranging from "Very Insufficient" to "Very Sufficient".

4.3. Instrument Design

This study uses the corporate-level as the unit of analysis, which requires data from firms. Because the selection of respondents for data collection is very important in this study, questionnaires were sent to IS managers who have an overall understanding of the firm's corporate status.

The questionnaire for this study had an introduction explaining the goals of the study and two survey sections. Existing measures from past studies of organization theory and IS theory were adapted for the IS planning capability section. The three types of information requirement are unique to this study.

The introduction provided the overall purpose of the study and the guidelines for filling out the questionnaire. The introduction also collected the respondents' current position, sales volume, number of employee, number of employee in the IS department, annual budget of the IS department, IS planning time horizon, user involvement in IS planning, cost of IS planning, IS plan report decision level, etc.

The first section of the questionnaire asked respondents to judge the type of information requirements within a organization through a five-point Likert-type scale. This study defined three types of information requirements: strategic information, managerial information, operational information. However, there are no available measures for information requirement in the current IS literature. Thus a new measurement scheme for this construct was developed for this study. To measure the extent of information requirements when considering IS planning within a organization, respondents were asked to answer five-point Likert-type scale ranging from "Never considered" to "Considered very important" for each item of information requirement.

The IS planning capability discussed earlier were operationalized using sets of multiple terms. Respondents were asked to indicate, one to five Likert-type scale, the extent to which there were changes(in emphasis, involvement, perception, usage, etc) with respect to the issues addressed in each question, when they performed IS planning in the past. The items used for the operationalization procedure and the prior research from which these items were derived are described, in Table 4.

The study population was defined as large private sectors companies found in the 1994 Corporate 1000 list, which was published by Korean Investors Service(KIS), Inc.. This population was selected for its importance, the availability of information and the relative homogeneity of the business boundary, as compared to the public sector and small business.

Table 4. Summary of Variables and Measures used in This Study

Variable Type	Variable Class(Variable)	Operationalization
Independent	Total Information Requirement(TIR)	TIR=(SINFO+MINFO+OINFO)/3

	Strategic Information(SINFO)	SINFO=∑(score)/7 items
	Managerial Information(MINFO)	MINFO=∑(score)/7 items
	Operational Information(OINFO)	OINFO=∑(score)/6 items
Dependent	IS Planning Capability(ISPCAPA)	ISPCAPA=(ISPRESO+QUALSTR +INTCAPA+ISMATUR +ISPMETH+CHNGMGT)/6
	IS Planning Resources(ISPRESO)	ISPRESO=∑(score)/9 items
	Quality of Business Planning(QUALSTR)	QUALSTR=∑(score)/4 items
	Internal Planning Capability(INTCAPA)	INTCAPA=∑(score)/7 items
	IS Maturity(ISMATUR)	ISMATUR=∑(score)/5 items
	IS Planning Methodology(ISPMETH)	ISPMETH=∑(score)/13 items
	Change Management(CHNGMGT)	CHNGMGT=∑(score)/5 items

V. Data Analysis

5.1. Sample Profile

The target population included 920 companies, chosen from the list of Corporate 1000. The survey instrument was mailed to the head of the IS department. One hundred and eighty seven respondents were received for a response rate of 20.3%. However, of the 187 respondents, 13 respondents were omitted from this study, because the same response was given for each question or too many nonresponse for question items. This leaves a final sample of 174 respondents for this study.

Table 5 Sample Characteristics

Profiles	Frequency	Percentage
Sales Revenue(Won-base, N=150)		
Less than 50 billion	10	6.7
50 million - 100 billion	32	21.3
100 billion - 200 billion	41	27.3
200 billion - 500 billion	28	18.7
500 billion - 1000 billion	19	12.7
Greater than 1000 billion	20	13.3
Number of Employee(N=174)		
Less than 200	18	10.3
200 employee - 500 employee	29	16.7
500 employee - 1000 employee	43	24.7
1000 employee- 2000 employee	47	27.0
2000 employee- 5000 employee	28	16.1
greater than 5000 employee	9	5.2
Industry(N=174)		
Manufacturing	89	51.1
Banking/Insurance	34	19.5
Wholesale/Distribution	27	15.5
Construction	24	13.8
Planning Time Horizon(N=172)		
within 6 months	15	8.7
within 1 year	38	22.1
within 2 year	46	26.7
within 3 -4 year	64	37.2
within 5 year	9	5.2
Title of Respondents(n=170)		
Supervisor	45	26.5
Manager	74	43.5
Senior Manager	32	18.8
General Manager	18	10.6
Director	1	0.6

The characteristics of the sample are shown in Table 5. Responses were received from 4 industries, and from organizations varying widely in size, thus providing greater validity to the findings and enhancing the ability to generalize the results to a wider cross-section of the population. Responses were received from 5 types of planning time horizons. This item means the scope of IS planning indirectly.

An analysis of the respondents who provided their organizational title(73.5%) indicates that an overwhelming proportion were indeed IS managers. Generally speaking, senior IS managers are responsible for firm's IS management in Korean firm.

These evidences provide greater credibility and validity to the survey data.

5.2. Reliability and Validity Assessment

The items used for measuring the various constructs were tested for validity and reliability using factor analysis and Cronbach-Alpha test procedure. While validity measures the extent to which the indicator measures the underlying construct, reliability measures the stability of the scale[Nunnally, 1978].

Content validity of the constructs, which evaluates if all the dimensions of the construct are being measured[Churchill, 1979], was established through the various phases of the pilot test. Construct validity was evaluated using factor analysis to determine if all the items measuring the construct cluster together and measure a single construct. Initially, the correlation matrix of the items measuring the construct was analyzed to identify outliers that have very low interitem correlations.

In this study, the construct on the content of information requirement and the construct on IS planning capability exhibited significant convergent validity. As a result of factor analysis on IS planning capability, nine factors were identified. In order to enhance the explanation capability of the construct on IS planning cpability, it is preferable to use six factors, by merging the related variables. Thus, the existing two construct were continuously utilized for the next test.

Table 6. Reliability Test

Variables	Mean	Std. Dev.	Cronbach-Alpha
TIR	3.34	0.46	0.8207
SINFO	3.03	0.75	0.8346
MINFO	3.45	0.50	0.5847
OINFO	3.59	0.56	0.6604
ISPCAPA	2.97	0.48	0.9107
ISPRESO	4.02	0.73	0.7689
QUALSTR	3.43	0.72	0.7791
INTCAPA	3.28	0.59	0.8419
ISMATUR	3.77	0.80	0.6314
ISMETHO	2.14	0.75	0.8890
CHNGMGT	3.13	0.61	0.7559

Factor analysis was also used to test the discriminant validity of the constructs. All the items, measuring multi-item constructs, that are not expected to be correlated

were subjected to factor analysis to determine if the items were loaded onto the correct construct. Based on criteria of factor loading, eigenvalues, and explained variance[Zeller & Carmines, 1980], it was found that all the constructs exhibited significant discriminant validity.

Reliability, which measures the internal consistency of the instrument, was assessed using Cronbach-alpha, as shown in Table 6. As results of reliability test for each construct, Cronbach-alpha values were, 0.8207 for Information Requirement(TIR), 0.9107 for IS planning capability(ISPCAPA). Most of the variables, except managerial information marginally short by 0.02, had a value higher than a cutoff value of 0.6, the commonly accepted for empirical research in social science. Therefore, the constructs were considered to exhibit adequate reliability. The correlation matrix shown in Table 7 supports all the positive relationships for six dimensions of IS planning capability, with an alpha level of 0.001, with the exception of the relationship between IS maturity and IS planning methodology(r=0.14769, p=0.0539).

Table 7. Correlation Analysis of ISPC

	ISPCAPA	ISPRESO	QUALSTR	INTCAPA	ISMATUR	ISMETHO
ISPRESO	0.73628 0.0001***					
QUALSTR	0.71166 0.0001***	0.50411 0.0001***				
INTCAPA	0.71586 0.0001***	0.51080 0.0001***	0.61810 0.0001***			
ISMATUR	0.51364 0.0001***	0.27852 0.0003***	0.37974 0.0001***	0.38081 0.0001***		
ISMETHO	0.75957 0.0001***	0.36945 0.0001***	0.32423 0.0001***	0.27785 0.0002***	0.14769 0.0539+	
CHNGMGT	0.71725 0.0001***	0.52049 0.0001***	0.55102 0.0001***	0.55577 0.0001***	0.30553 0.0001***	0.37333 0.0001***

+ P < 0.1 * P < 0.05 ** P < 0.01 *** P < 0.001

5.3. Results of Hypothesis Testing

5.3.1. Results of Hypothesis 1, 2

In order to test H1, which is hypothesized the influence of organizational information requirements on IS planning capability, Pearson correlation analysis was employed. As a result, correlation coefficient of information requirements on IS planning capability was 0.46902, at a significance level of 0.0001, as shown in Table 8. The result shows that the relationship between information requirements and IS planning capability is very positive. The result supports rejection of the null for hypothesis 1.

Table 8. Correlation Analysis For H1, H2

Sample Characteristics	Correlation Coefficient	P-value
Information Requirement & IS planning capability	0.46902	0.0001 ***
Information Requirements		
Strategic Information	0.48697	0.0001 ***
Managerial Information	0.27376	0.0005 ***
Operational Information	0.25399	0.0011 **

* P < 0.05 ** P < 0.01 *** P < 0.001

For testing H2, which hypothesized the influence of three types of information requirements on IS planning capability, Pearson correlation analysis was also employed. As a result, correlation coefficient of strategic, managerial, operational information requirements on IS planning capability was 0.48697 (p=0.0001), 0.27376 (p=0.0005), 0.25399 (p=0.0011), respectively, as shown in Table 8. This results indicate that strategic information requirements have higher positive association with IS planning capability, relative to other infromation requirements. The result supports rejection of the null for hypothesis 2.

Table 9. Result of Regression Analysis for H1, H2

Regression Model	R square	Adjusted	F Value	Prob.>F
(1) ISPCAPA = 1.34 + 0.49 IR (0.00)	0.2200	0.2150	44.558	0.0001
(2) ISPCAPA = 1.60 + 0.28 SINFO + 0.05 MINFO + 0.09 OINFO (0.00) (0.52) (0.18)	0.2545	0.2401	17.749	0.0001

(1) Durbin Watson D = 1.956; 1st Order Autocorrelation = 0.021
(2) Durbin Watson D = 1.947; 1st Order Autocorrelation = 0.024

Additional regression analyses shown in Table 9 support the positive linear relationships between information requirements and IS planning capability. Specifically, strategic information requirements are positively correlated to IS planning capability, at a significance level of 0.001. As a result of testing, it is concluded that information requirments are positively associated with IS planning capability.

5.3.2. Results of Hypothesis 3

In order to test H3, which hypothesized the influence of three types of information requirements on six dimensions of IS planning capability, correlation analysis and regression analysis were employed. As the result of correlation analysis, correlation coefficients of information requirements on six dimensions of IS planning capability show positive relationships at a significance level($p < 0.05$), except for two relationships: the relationship between MINFO and ISMATUR, the relationship

between OINFO and ISMETHO, as shown in Table 10.

In the case of strategic information requirments, correlation coefficient on six dimensions of IS planning capability is higher than other types of information requirments. It means that the more strategic the infomation requirements are, the more IS planning capability is required.

Table 10. Correlation Analysis

	SINFO	MINFO	OINFO
ISPRESO	0.27466	0.18426	0.20153
	0.0003 ****	0.0171 *	0.0086 **
QUALSTR	0.44036	0.18557	0.18821
	0.0001 ****	0.0160 *	0.0140 *
INTCAPA	0.35562	0.17839	0.26803
	0.0001 ****	0.0203 *	0.0004 ****
ISMATUR	0.26668	0.10065	0.20262
	0.0004 ****	0.1942	0.0081 **
ISMETHO	0.34501	0.23470	0.09049
	0.0001 ****	0.0021 ***	0.2378
CHNGMGT	0.41424	0.24123	0.28698
	0.0001 ****	0.0016 ***	0.0001 ****

* P < 0.05 ** P < 0.01 *** P < 0.005 **** P < 0.001

The differences of managerial information requirements and operational information requirements appear in only two dimensions of IS planning capability: IS maturity and IS planning methodology. Because managerial information requirements are implemented through a integration process which integrate individual systems, IS planning methodology for systems integration is essential. Meanwhile, the more mature IS developments are, the more IS staffs are experienced, because operational information requirements require skill and capability needed for IS development, such as systems analysis and design techniques, programming skill, and so forth.

Table 11. Additional Analysis using Regression for H3

ISPCAPA	SINFO	MINFO	OINFO	R-square	Adjusted	F-Value	Prob.>F
0.029 0.144	0.0965	0.0791		5.552	0.0012		
	(0.00)	(0.77)	(0.12)				
② QUALSTR	0.407	-0.010	0.078	0.1901	0.1746	12.208	0.0001
	(0.00)	(0.94)	(0.48)				
③ INTCAPA	0.269	-0.058	0.210	0.1689	0.1529	10.565	0.0001
	(0.00)	(0.58)	(0.02)				
④ ISMATUR	0.280	-0.138	0.229	0.0894	0.0719	5.105	0.0021
	(0.00)	(0.36)	(0.08)				
⑤ ISMETHO	0.315	0.211	-0.074	0.1382	0.1216	8.337	0.0001
	(0.00)	(0.12)	(0.53)				
⑥ CHNGMGT	0.292	0.068	0.151	0.1947	0.1792	12.574	0.0001
	(0.00)	(0.52)	(0.11)				

* ① Durbin-Watson D = 1.613; 1st Order Autocorrelation = 0.186

① ISPRESO 0.173

(2) Durbin-Watson D = 2.154; 1st Order Autocorrelation = -0.078

(3) Durbin-Watson D = 2.270; 1st Order Autocorrelation = -0.136

(4) Durbin-Watson D = 2.040; 1st Order Autocorrelation = -0.025

(5) Durbin-Watson D = 1.983; 1st Order Autocorrelation = 0.004

(6) Durbin-Watson D = 2.042; 1st Order Autocorrelation = -0.023

Additional regression analyses shown in Table 11 support a positive or negative linear relationships between the three types of information requirements and six dimensions of IS planning capability. Specifically, strategic information requirments have positive linear relationships for all the six dimensions of IS planning capability. However, managerial and operational information requirements have insignificant relationships for each dimension of IS planning capability, except for a positive linear relationship between operational information requrements and internal capability(beta=0.210, p=0.02). As a result of regression analysis, it is concluded that strategic information requirments are positively associated with six dimensions of IS planning capability. The result supports partial rejection of the null for hypothesis 3.

Ⅵ. Conclusion

Because of poor explanation of the dimensions of IS planning construct, the study on the influence of the typology of information requirements on IS planning capability remains incomplete until now. The purpose of this study is to test a two-fold proposition: 1) to identify the typology of information requirements and the dimensions of IS planning capability; 2) to identify the relationship between the typology of information requirments and IS planning capability.

The results of data analyses indicated that the relationship between information requirements and IS planning capability was very positive. Also, strategic information requirements have higher positive association with IS planning capability, relative to other infromation requirements. Additional regression analyses support the positive linear relationships between information requirements and IS planning capability. Specifically, strategic information requirements are positively correlated to IS planning capability at high significance level.

The relationship of three types of information requirements with six dimensions of IS planning capability was positive at high significance level, except for two relationships: managerial information and IS maturity, operational information and IS planning methodology. Specially, the more strategic the infomation requirements are, the more IS planning capability is required. In additional regression analyses, strategic information requirments have positive linear relationships for all the six dimensions of IS planning capability. However, managerial and operational information requirements have insignificant relationships for each dimension of IS planning capability, except for a positive linear relationship between operational information and internal capability.

These results provide some very useful implications for improving the IS planning process design of an organization. In order to fulfill IS planning objectives, first, it needs to classify the organizational information requirements, such as top management's information needs. Second, it needs to design IS planning process

appropriate to the typology of organizational information requirements. This implies that an organization can prioritize its objectives and then provide a better focus to its IS planning efforts by emphasizing the design elements of IS planning that are more closely linked to those two objectives.

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