

정보요구, 정보시스템 기획유형, 그리고 정보시스템 기획 효과성에 관한 실증적 연구

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요 약

정보시스템 기획(IS planning)은 경영환경의 변화로부터 야기되는 조직의 정보요구를 제대로 파악함으로써 새로운 정보시스템의 구축이나 실행과정에 반영하는 중요한 과업중의 하나이다. 하지만, 아직까지 정보요구를 반영한 정보시스템 기획유형에 관한 연구나 정보시스템 기획의 효과성에 관한 영향에 대한 실증적인 연구가 없었다. 그리하여, 본 연구에서는 기업의 경쟁력 강화 목표를 달성하기 위해 필요한 정보시스템의 효율적인 관리와 활용을 위하여 정보시스템 기획에 관한 상황이론적 접근을 시도하였다.

본 연구는 과업환경을 중심으로 발생하는 정보요구의 유형에 따라 정보시스템 계획을 어떻게 추진하는 것이 바람직한 것인지를 파악하고, 정보시스템을 기획시 정보요구 수준과의 적합성(fitness)에 따라 정보시스템 기획의 효과성은 어떻게 달라지는 지를 파악하고자 한다. 이를 위하여 본 연구에서 사용된 Construct과 변수들은 기존의 정보시스템 기획관련 문헌을 이용하였다.

본 연구를 위하여 국내 매출액 1000대 기업을 대상으로 설문지를 우송하였으며, 그 중 187부가 회수되었다. 자료분석의 결과, 정보요구 수준과 정보시스템 기획유형간의 관련성은 긍정적으로 관련되어 있었으며, 정보요구 수준에 따른 기획의 효과성에는 차이가 없었으나, 정보시스템 기획유형에 따른 기획의 효과성은 유의한 차이가 있었다. 특히, 정보요구 수준과 정보시스템 기획유형간의 적합성에 의한 정보시스템 기획의 효과성에 대한 t-test결과는 적합한 조직(fit organization)보다는 적합하지 않은 조직(unfit organization)의 성과가 더 높은 것으로 나타났다.

Information Requirements, IS Planning Typology, and IS Planning Effectiveness : An Empirical Study

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1. Introduction

IS planning has been considered by IS practitioners to be among the more important IS issues since the 1980s[Ball & Harris, 1982; Dickson & Leitheiser & Wetherbe, 1984; Hartog & Herbert, 1986; Brancheau & Wetherbe, 1987; Watson, 1990; Niedermann & Brancheau & Wetherbe, 1991; Brancheau & Janz & Wetherbe, 1996]. Dickson et al.[1984] requested leading IS professional to identify and rank ten key IS management issues for the 1980s, they ranked improved IS planning as number one.

In Hartog & Herbert's study[1986] and Brancheau & Wetherbe's study[1987] of key IS management variables, strategic planning was at the top of ten key issues. In Niedermann et al.[1991] research, IS strategic planning is ranked by IS professional as number three issue. In Brancheau et al.[1996] research, IS strategic planning is ranked 10 by IS professional. They suggest that its drop in rank may be due to more to the current focus on implementation and execution rather than to having "solved" the problems relating to this issue. When a survey by Han & Park & Moon[1995]

requested Korean firms' IS managers to identify and rank thirty key IS issues for the future two or three years, they overwhelmingly ranked improved IS planning as number one.

The benefits of IS planning have been claimed and prescribed widely in a number of studies[Ragunathan & King, 1988; Bowman & Davis & Wetherbe, 1983]. Most of these studies, however, have tended to focus on the relationship between the existence of formal IS planning and IS performance. While such analyses are important, they assumed a context-oriented approach to identify the formality of IS planning or existence of a IS planner.

Various approaches to information systems planning have evolved [King, 1978; Bowman & Davis & Wetherbe, 1983; McFarlan, 1981; Wetherbe & Davis, 1982]. Some of these approaches are documented and employed in the development of information systems in the real world. Recent issues in IS planning say that information systems planning should be carried out strategically so as to make information systems more effective and strategically useful.

This new role of IS has brought into focus the necessity of planning for the IS function, so that its plans are in alignment with the firm's business plans [King, 1988; McFarlan & McKenney & Pyburn, 1983]. IS planning is being increasingly used to explicate the organization's business plans and strategies, to identify IS opportunities that support the business plans, to develop information architectures based on user's information needs, and to develop long-term developmental plans for the IS function [Premkumar & King, 1992].

In order to identify the organization's strategies and IS opportunities, it is essential to analyze the organizational information requirements. To be able to provide appropriate information to managers, the planning process must be well executed when developing information systems. Even though the value of planning is well understood in the development of information systems, many organizations do not plan or do it poorly. Thus, information systems have been developed in an individual system rather than under an organization-wide master plan. The result was high cost in data processing and low performance in information support.

Thus, using the selection and interaction between information requirements of an organization and IS planning typology, this study investigates empirically the relationship between IS planning process and IS planning effectiveness across various organizations.

The purpose of this study is to test a four-fold proposition: 1) to identify the relationship between information requirements and IS planning typology; 2) to identify the influence of the level of information requirements on IS planning effectiveness; 3) to identify the influence of the type of IS planning on IS planning effectiveness; 4) to identify the influence on IS planning effectiveness by the interaction of two constructs, using fitness concept of contingency theory.

II. Research Background

Planning is an ongoing organizational function that provides the framework for operational activities and decision making. The organizational mission is translated into operational objectives through an organizational hierarchy of planning activities. The reasons for formal organizational planning are to focus the energies and activities of the organization on the achievement of its objectives, to reconcile differences in objectives and plans of subareas and individuals within the organization, and to remove ambiguities about what the organization should do [Davis & Olson, 1985].

Traditionally, IS has been viewed by IS practitioners and researchers as playing only a support role [Eindor & Segev, 1978; Ives & Hamilton & Davis, 1980]. Recently, however, due to significant declines in the cost of information technology and the greatly improved speed and power of computers, IS is beginning to move from its traditional role as an application of back

office support to one offering opportunities to gain significant competitive advantages[McFarlan, 1984]. It is being increasingly viewed as having the capability to alter core organizational directions, reorient corporate strategy and redefine industry structure[Benjamin & Rockart & Scott-Morton & Wyman, 1984; Parsons, 1983; Rockart & Scott-Morton, 1984; Porter & Miller, 1985].

This change in the role of the organizational IS has brought about an increased emphasis on the planning aspects of IS management. While justifying the importance of planning, Brancheau & Wetherbe[1987] point out that "effective planning requires the discipline and vision to foresee problems and opportunities within a turbulent and complex environment" and "the rapidly changing business environment's increased involvement of end-users, accelerated technological change, and lack of reliable methods" have created a continuing need to improve IS planning. IS managers should focus on those aspects of planning systems which contribute to their effectiveness.

The need to develop a proper "fit" between the characteristics of the information requirement and IS planning capability has been emphasized by few researchers[Weill & Olson, 1989; Cash et al., 1992; Ramanujam & Venkatraman & Camillus, 1986; Premkumar & King, 1992, 1994]. The concept of "fit" has been extensively used in strategic management to describe linkages in strategy-structure[Chandler, 1962], technology-structure[Woodward, 1965], organization-environment[Thompson, 1967; Lawrence &

Lorsch, 1967], and organizational structure-IS structure[Leifer, 1988]. Sanders & Courtney[1985] found the organizational factors to influence on the success of Decision Support Systems(DSS). Tait & Vessey[1989] performed the study on the effects of user involvement to influence on systems success using contingent approach.

Past research on IS planning has examined the relationship between the organizational factors and IS planning to a limited extent. various organizational factors such as the quality of business planning, organizational support mechanisms, top management and user involvement, the resources devoted to planning, organization size, and management style have been found to influence IS planning[Pyburn, 1983; Cash et al., 1984; Earl, 1993; Premkumar & King, 1992].

These studies follow the general contingency theory paradigms that relate technology, innovation, organizational and IS functional characteristics, organizational and IS effectiveness to their organizational contexts. These studies have, however, some limitations in generalization of the results. Drawbacks of past studies in IS planning are as follow: 1) few large-scale empirical studies; 2) lacking clarity of the dimensionality of IS planning process and performance; 3) limitations of the generalizability of the results. There is a need for a comprehensive framework that examines the relationship among a broad set of organizational factors and IS planning processes and IS planning performance.

A few studies on the influence of IS planning on organizational effectiveness were performed[Ramanujam et al., 1986; Venkatraman & Ramanujam, 1987; Raghunathan & Raghunathan 1991; Premkumar & King, 1992; Raghunathan & Raghunathan 1994]. However, because of poor explanation of the dimensions of IS planning construct, the explanation of the influence of IS planning process on IS planning effectiveness still remains incomplete.

2.1. Information Requirements

Generally, information requirements in a organization are changed by the change of task environment. When the environment is perceived as hostile, competitive, rapidly changing, or when the organization depends heavily on the environment for resources, the organization gathers more data about the environment[Pfeffer & Salancik, 1978]. 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[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 three level at which information requirements need to be established in order to design and implement computer-based information

Table 1. Three Types of Information Requirements for IS Planning

Level of Information Requirement	Description	Focus	Approaches (model)
Application Level	Information Requirement for Development of an Individual System	Operational Information	Socio-technical Analysis(DFD)
Database Level	Information Requirement for Information Sharing of Department or Division	Managerial Information	Data Analysis (ERD)
Organizational Level	Information Requirement for Decision Making to obtain Competitive Advantage	Strategic Information	Critical Factor Analysis(CSF)

systems: 1) the organizational information requirements to define an overall information systems structure and to specify a portfolio of applications and databases; 2) the requirements for each database defined by data models and other specifications; 3) the detailed information requirements for an application. Some methods of requirements determination are more suitable for the less-detailed, broad-scope, organization-level information requirements, whereas other methods may be more suitable for the more detailed application information requirements.

Rhyne[1985] examined empirically on 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. He also suggested the following propositions: 1) as the planning process becomes more

sophisticated, external and environmental types of information will become more important; 2) as the planning process becomes more sophisticated, informal sources of information will become more important. As a result, a continuum of planning system sophistication was constructed based on the level of openness to outside influences combined with the planning horizon, and future-oriented, external, and environmental types of information were found to be strongly correlated with increased planning sophistication.

2.2. IS Planning Typology

In the initial stage of research on IS planning, it is necessary to formally recognize the existence of multiple levels of analysis in conceptualizing IS planning. In the absence of a reasonable agreement on the meaning of terms employed in research,

Table 2. Planning Typology and its Benefit

Level	Type of Planning	Description	Approaches for evaluating MIS Planning Benefits
0	Planning for the technical Capability of Individual Systems	Focus on technical issues	Comparison with technical parameters
1	Planning for Informational Efficiency for an Individual Systems	Informational Support for Decision Making using Principles of Information Requirement Analysis	Indicators such as user satisfaction
2	Planning for Informational Effectiveness for Integrated Systems	Issues of Compatability of Individual Systems for Overall efficiency and effectiveness	Systems Resources Perspectives
3	Strategic Planning for MIS	Identifying the role of MIS and the ways for exploiting Information Systems for Competitive Advantage	Goal-centered View in terms of the Fulfillment of MIS Objektivies

*source: Venkatraman[1986]

it is nearly impossible to accumulate research findings across different studies in any meaningful fashion. In strategic planning research such a problem has seriously limited the possibility of arriving at a "unified theory of strategic planning"[Venkatraman, 1986].

Venkatraman[1986] identified at least three different levels of analysis in IS planning: IS planning on individual systems, IS planning on integration of individual systems, IS planning on linkage between IS plan and strategic plan. Mclean & Sodan[1977] classified IS planning into three different planning typology.: conceptual MIS planning for future MIS architecture, managerial MIS planning for application project portfolio, operational

MIS planning for individual application development plan. Also, Lucas & Turner[1982] identified three levels of IS planning: independent system planning for operational efficiency, policy support system planning for decision support, fully integrated system planning for critical resource to create new product, market, direction. Obrien(1992) classified IS planning into three levels: operational IS planning, tactical IS planning, strategic IS planning.

2.3. IS Planning Effectiveness

Raghunathan & King[1988] assessed the impact of IS planning on the IS performance. He separately measured the

Table 3. Dimensions of IS Planning Effectiveness

Dimensions	Description	Key Supporting Literature
Fulfillment of IS Planning Objectives	The degree of provision in the form of IS directions to align IS strategy with business planning	Ramanujam et al.[1986] Raghunathan et al.[1990] Premkumar & King[1992]
Contribution to Organizational Performance	The degree of long-term performance to organizational growth and survival	Ramanujam et al.[1986] Venkatraman et al.[1987] Premkumar & King[1992] Raghunathan et al.[1994]

three phases of IS planning (IS strategic planning, systems planning, and planning implementation) for 140 firms and correlated them with the user satisfaction measure. They found that strategic planning for IS does not significantly correlate with user satisfaction, and systems planning is significantly and positively correlated with user satisfaction, and planning implementation is significantly and positively correlated with user satisfaction. For the lack of the significant correlation between IS strategic planning and user satisfaction, he suggested two possible explanations: 1) the concept and application of strategic planning is a recent phenomenon whose full benefits have not yet reached the user community; 2) there is no benefit from strategic planning in terms of achieving greater user satisfaction.

While studies of this variety have served to evaluate the effectiveness of IS planning, they have tended to ignore the organizational context within which IS planning takes place. The primary weakness of such studies is that they assume no organizational constraints on the

IS planning process. Premkumar & King[1992] suggested that the levels of IS planning performance were evaluated at three level: planning effectiveness as the planning level, performance of the IS function as the functional level, and IS contribution to organizational performance as the organizational level [Hamilton & Chervany, 1981]. As a result, they found that performance of the IS function as the functional level was not significantly different between strategic/turnaround group and factory/support group in strategic grid.

In this study, performance is evaluated at two level: the planning level, and the organizational level. The variables are respectively termed: 1) fulfillment of IS planning objectives; 2) IS contribution to organizational performance.

III. Research Model and Hypothesis

A number of studies concerning

the relationship between IS planning and IS performance have been increasing more and more since the 1980s. This includes such as McFarlan[1984], Pyburn[1983], Ramanujam & Venkatraman[1987], Raghunathan & King[1988], etc. IS planning research issues have been developed through conceptual studies[Mclean & Soden, 1977; King, 1978; Henderson & Sifonis, 1988] and empirical studies[Lederer & Mendelow, 1987; Ramanujam & Venkatraman, 1987; Raghunathan & Raghunathan, 1990; Premkumar & King, 1994].

Pyburn's study[1983] addressed the linkage between the three types of IS planning(personal-informal, personal-formal, written-formal) and IS planning performance. It was an exploratory study to explain the difference of IS planning performance according to the typology of IS planning. It did not, however, provide empirical validity of the proposed relationship between IS planning and its performance.

Raghunathan & King's study[1988] attempted to analyze the link between performance and the different phases of planning such as strategic planning and IS planning. Raghunathan & Raghunathan's study[1991] proposed and tested an empirical model of IS planning performance, to explain the influence of five dimensions in IS planning systems using discriminant analysis.

Except for a few studies[Ramanujam & Venkatraman, 1987; Raghunathan & Raghunathan, 1991, 1994], empirical research in the area of IS planning has not, to date, provided a model to identify the characteristics of effective IS planning. Thus, this present study proposes a

research model to test the linkage of IS planning process to IS planning performance. Specifically, this study proposes that the success of planning systems will depend on the emphasis placed upon certain important design dimensions.

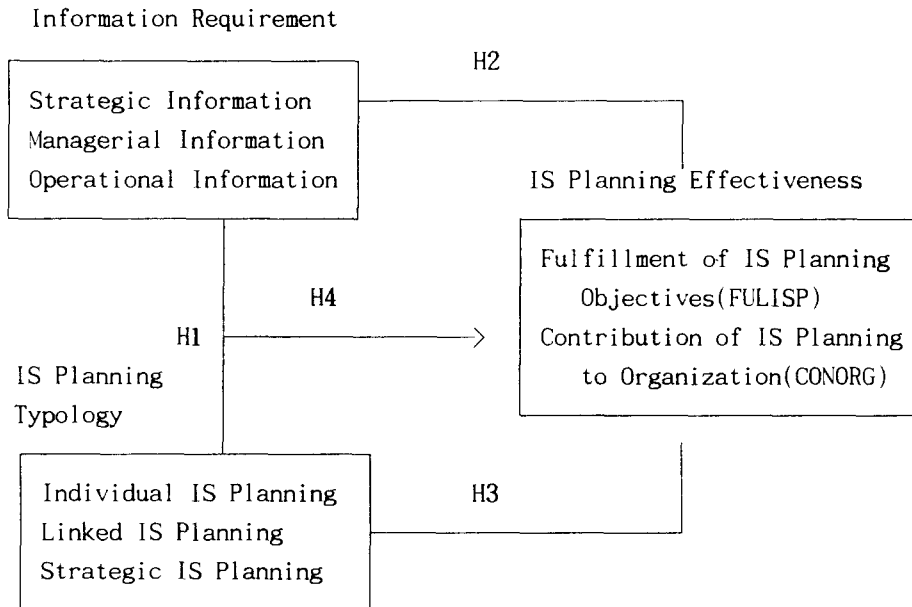
While the degree of improvement in the planning system reflects the means or the process aspect of the concept of planning system success, the dimension of IS planning performance is intended to tap the ends or outcome benefits of planning[Venkatraman & Ramanujam, 1987].

3.1. Research Model

Since IS planning is conducted in an organizational context, various organizational factors have naturally been studied and believed to influence the efficiency of the IS planning system[Pyburn, 1983; Davis et al., 1984; Cash et al., 1984]. It is increasingly being recognized that IS planning approaches must be adapted to fit with the characteristics of the organization[Cash et al., 1984]. The study of the relationship between organizational factors and IS planning is particularly important since there is no "one best way" to perform this important organizational activity[Ein-dor & Segev, 1978; Pyburn, 1983; Premkumar & King, 1994].

Several methodologies in strategic IS planning were suggested to guide IS planners. The best known are IBM's Business Systems Planning(BSP), Critical Success Factor, and Information Engineering. While somewhat different in orientation and scope, these top-down planning approaches were distinctly more

Figure 1. Research Model



proactive than earlier methods, calling attention to the need for greater management participation in the IS planning process. Although issues of resource allocation and development priorities were of greater concern, they were clearly subordinate to and guided by management's view of the future direction of the business enterprise. Perhaps the most significant contribution of these methodologies was the elevation of IS to a new level of importance[Hufnagel, 1987].

McFarlan & Mckenney & Pyburn[1983], related the range of planning activities, engaged the firm's IS developmental stage, they defined a continuum along which a firm moves as it assimilates IS technology. During the first phase, planning activities are expected to be minimal as the firm seeks to acquire new technology, to develop an understanding of its potential use, and to prepare to plan the computerization of

primary activities within organizations. As more widespread acceptance of technology and a more forward-looking orientations is adopted, IS planning begins to receive more attention. The company's approach to IS planning should be a function of the extent to which existing applications have strategic impact and the potential impact of applications in the development portfolio.

The purpose of this study is to identify the association between organizational information requirement and IS planning typology, and to analyze the influence of the fitness of two constructs on IS planning effectiveness, as shown in Figure 1.

Despite a number of research efforts that attempt to elucidate the linkage between planning and performance, the results of study like this are fragmented. Specifically, past research on the influence of IS planning capability on IS planning performance were performed

rigorously in the studies of Venkatraman & Ramanujam[1987], Raghunathan & Raghunathan [1994]. However, because it poorly explains the construct on the dimensions of IS planning processes, it needs to identify and to retest the distinctive variables on the influence of IS planning process on IS planning performance, using information requirements typology and planning typology.

3.2. Research Hypothesis

Planning involves identification of objectives, goals, and strategic options. The product of the planning effort includes a determination of the direction of change and control[Kotteman & Konsynski, 1984]. When IS is viewed as strategically important to the organization, the extent of these changes should be even more pronounced because of the critical need to foresee and incorporate these concerns into current planning. This line of reasoning suggests that there would be more significant changes in the planning process for firms in strategic IS planning environment in comparison to firms in individual IS planning environment [Raghunathan & Raghunathan, 1990].

In view of the research aims, research variables selected reflect relationships originating for the some part in Venkatraman & Ramanujam's theoretical framework[1987]. This research framework was felt to be an appropriate way to confirm prior claims and provide additional insight on the impact of IS planning capability upon IS planning performance.

The fundamental aim of an organizational IS planning is to improve organizational IS planning performance.

Pyburn's exploratory study[1983] addressed the linkage between planning typology and planning performance. Venkatraman & Ramanujam[1987] proposed an operational model for measuring planning system success in term of two interrelated dimensions: improvements in the capabilities of the planning system and extent of fulfillment of key planning objectives. Raghunathan & Raghunathan[1991] attempted to analyze the link between design dimensions of IS planning and the performance of IS planning using discriminant analysis. Also they retested and validated the planning systems success model of Venkatraman & Ramanujam[1987] [Raghunathan & Raghunathan, 1994].

Brancheau & Wetherbe[1987] point out that effective IS planning requires the discipline and vision to foresee problems and opportunities within a turbulent and complex environment. In this study, it is considered to classify three types of information requirements within a organization. Generally speaking, information requirements of a organization can be defined as three levels of information types such as strategic information to support the critical decision making for strategic management, managerial information to support management control of a department or a division, and operational information to be used for routine operation within organization.

As an organization moves to more sophisticated planning, 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.

In traditional organization theory, it is said that there is an association between environmental uncertainty and organizational information requirements. That is, the higher the uncertainty, the more information required [Galbraith, 1977; Daft & Lengel, 1984; Tushman & Nadler, 1978; Davis, 1982; Davis & Olson, 1985; Rhyne, 1985].

As an organization moves to more sophisticated planning, 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. Until now, there are no results of empirical studies about the relationship between the level of organizational information requirements and the level of IS planning. This seems to fit well with today's uncertain and fast changing characteristics of information technology research. Thus, in this study, it needs, first of all, to identify the association between organizational information requirements and IS planning type.

Hypothesis 1

The higher the level of organizational information requirements, the higher the level of IS planning.

An information systems 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. The importance of linking planning activities to organizational considerations has been documented in both the strategic planning and IS planning literature [Ein-Dor & Segev, 1978; Mclean & Sodan, 1977]. This focus on linkages is important to ensure that the control and sophistication of information systems match the sophistication of organizational information needs [Raghunathan & Raghunathan, 1991]. Especially, the attention paid to the alignment of IS with corporate systems can be a key planning factor affecting the effectiveness of IS planning. Second hypothesis is taken from Davis & Olson's model [1985]. It needs to identify the association between organizational information requirements and IS planning effectiveness.

Hypothesis 2

The higher the level of organizational information requirements, the higher the level of IS planning effectiveness.

One of the main reasons for undertaking IS planning is to improve IS performance. In addition to the goal of improving performance, the IS plan also serves as a control mechanism in that it furnishes goals and objectives for later evaluation of performance. Both IS researchers and practitioners who are interested in the evaluation of IS have considered user satisfaction as an important

dependent variables[Baroudi & Orlikowski, 1988]. However, it depends on the level of IS planning. According to the level of IS planning, the level of IS planning effectiveness may be changed. Given the significance as an indicator of IS planning success, this study includes fulfillment of IS planning objectives and contribution of IS planning to organization as the effectiveness variables.

Hypothesis 3

The higher the level of IS planning, the higher the level of IS planning effectiveness.

Eir-Dor & Segev[1978] argued that there is no one optimal strategic plan for MIS, and each organizations must develop that strategy which best fits its particular situation. Venkatraman[1986] argued that the quest for establishing the link between the level and degree of strategic planning and organizational performance had hardly waned. Strategic planning research, until now, has been concerned with the role and benefits of formalized systems and processes adopted by organizations as an integral part of their strategic management processes. IS planning as an emerging research stream today is concerned with similar theme such as the appropriate mechanism for organizing IS planning efforts, the dimensions of IS planning process, the impact of IS planning efforts to organizational effectiveness, by the fitness between the level of information requirements and the level of IS planning[Venkatraman & Ramanujam, 1987; Raghunathan & Raghunathan, 1994].

It can be expected that IS planning process, which matches the level of information requirements and the level of IS planning, have high expectations for planning effectiveness.

Hypothesis 4

Organizations matching the level of information requirements and the level of IS planning will have higher IS planning effectiveness than those not matching

IV. Research Design

4.1. Independent Variables

In this study, three types of organizational information requirements - strategic information, managerial information, operational information-are used for support for the three levels of the hierarchy of management planning and control. Operational information means routine information for efficient operation of individual systems with detailed and frequent information characteristics. Managerial information means management control information to monitor performance within a department or a division with aggregated and often pattern. Strategic information means organizational information needs for decision making to obtain competitive advantage within strategic business units(SBU).

Also, in this study, it is classified IS planning typology into three level of IS planning: individual IS planning, linked IS planning, strategic IS planning. Individual IS planning focuses on the

Table 4. Three Types of Information Requirement in this Study

Typology of Info Req't	Operational Information	Managerial Information	Strategic Information
Description	Routine Information for Efficient Operation of Individual Systems	Performance Information for Management Control of Department or Division	Organizational Information Need for Decision Making to obtain Competitive Advantage
Scope	Functional	Departmental (Divisional)	Corporate (SBUs)
Information Characteristic	Detailed & Frequent	Aggregated & Often	Strategic & Ad-hoc
Approaches	Bottom-up	Top-down & Bottom-up	Top-Down
Techniques	Socio-technical Analysis(DFD)	Data Analysis (ERD)	Decision Analysis

specific needs of user group using bottom-up approach. Linked IS planning focuses on the integration of individual systems for information sharing using middle-out approach. Strategic IS planning focuses on the strategic use of IS for obtaining competitive advantage.

4.2. Dependent Variables

Planning aims to fulfill both tangible and intangible objectives [King & Cleland, 1978; Lorange & Vancil, 1977; Steiner, 1979]. The ultimate performance of IS planning can be expected to be reflected in the extent of fulfillment of key planning objectives [Venkatraman & Ramanujam, 1987; Raghunathan & Raghunathan, 1991]. This study

Table 5. Typology of IS Planning In this Study

Planning Type	Method	Focus	Target	Evaluation Criteria
Individual IS Planning	Bottom-up	Specific needs of User group	Operational Efficiency of Individual System	User Satisfaction
Integrative IS Planning	Middle-out	Integration of Individual Systems for Info Sharing	Management support & Control (suboptimization)	IS Resources Efficiency
Strategic IS Planning	Top-down	Strategic Use of IS for Competitive Adv.	Strategic IS Portfolio (global optimization)	IS Effectiveness

Table 6. Dimensions of IS Planning Effectiveness

Dimensions	Description	Key Supporting Literature
Fulfillment of IS Planning Objectives	The degree of provision in the form of IS directions to align IS strategy with business planning	Ramanujam et al.[1986] Raghunathan et al.[1990] Premkumar & King[1992] Raghunathan et al.[1991] Premkumar & King[1994]
Contribution to Organizational Performance	The degree of long-term performance to organizational growth and survival	Ramanujam et al.[1986] Venkatraman et al.[1987] Premkumar & King[1992] Raghunathan et al.[1994]

prescribed twelve parameters to be used as dependent variables.

IS planning effectiveness is the construct of dependent variables for assessing IS planning performance which are evoked by varying degrees of IS planning process. Most empirical studies in the past relied exclusively on measuring the performance of IS planning through economic benefits such as return on investment(ROI), return on equity(ROE), earning per share(EPS), and sales revenues, etc. Different approaches for evaluating IS planning performance should attempt to conceptualize and measure IS planning performance.

Recognizing the inadequacy of using only a single measure to measure multi-dimensional construct like planning performance, this study confirmed two variables of IS planning effectiveness for assessing planning success according to the result of factor analysis using VARIMAX rotation. These two dependent variables will respectively test for the differences among three levels of information requirements and IS planning.

4.3. Instrumental Design

This study intends the corporate-level to be in the unit of analysis, which requires data for firms. Because it is important to validate the framework and generalize the results across a wide cross-section of organizations. Large-scale field survey was chosen as the appropriate methodology for data collection. This study undertook the feedback process, which questionnaires were sent to IS managers who have an overall understanding of the firm's corporate status, and received from them.

The questionnaire for this study has an introduction explaining the goals of the study and three survey sections. Existing measures from past studies of IS planning were adapted for most sections. This study used 55 items(43 items for independent variables and 12 items for dependent variables), extracted from the IS literature, in order to measure the degree of attention to each variable; through a five-point Likert-type scale ranging from "Very Insufficient" to "Very Sufficient". The operationalization procedure and the variable names from which these three constructs were

Table 7. 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)	$SINFO = \sum(\text{score}) / 7 \text{ items}$
	Managerial Information(MINFO)	$MINFO = \sum(\text{score}) / 7 \text{ items}$
	Operational Information(OINFO)	$OINFO = \sum(\text{score}) / 6 \text{ items}$
Independent	Strategic IS Planning(SISP)	$SISP = \sum(\text{score}) / 5 \text{ items}$
	Linked IS Planning(LISP)	$LISP = \sum(\text{score}) / 6 \text{ items}$
	Individual IS Planning(IISP)	$IISP = \sum(\text{score}) / 6 \text{ items}$
Dependent	IS Planning Effectiveness(ISPEFF)	$ISPEFF = (FULISP + CONORG) / 2$
	Fulfillment of ISP Objectives(FULISP)	$FULISP = \sum(\text{score}) / 6 \text{ items}$
	Contribution to Org. Performance(CONORG)	$CONORG = \sum(\text{score}) / 6 \text{ items}$

derived are described, as shown in Table 7.

The population of this study was defined as large private sectors companies found in the 1994 Corporate 1000 lists, a directory of the 1000 largest manufacturing and service companies in Korea, 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 its business boundary, as compared to the public sector and small business.

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.

The characteristics of the sample are shown in Table 8. 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.

Table 8. Sample Characteristics

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

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.

Table 9. Reliability Test

Variables	Mean	Std. Dev.	Cronbach-Alpha
Strategic Information	3.03	0.75	0.8346
Managerial Information	3.45	0.50	0.5847
Operational Information	3.59	0.56	0.6604
Strategic IS Planning	3.72	0.63	0.7758
Linked IS Planning	4.00	0.54	0.6519
Individual IS Planning	3.74	0.53	0.6543
IS Planning effectiveness	3.38	0.52	0.8724
Fulfillment of ISP Objectives	4.45	0.48	0.7982
Contribution to Organization	3.40	0.56	0.7747

In this study, two constructs on independent variables exhibited significant convergent validity. 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 9. All the constructs, except managerial information marginally short by 0.02, had a value greater than the cutoff value 0.6, which is commonly accepted for empirical research in social science[Premkumar & King, 1992]. Therefore, the constructs were considered to exhibit adequate reliability.

The correlation matrix shown in

Table 10 supports all the positive relationships between nine variables of three constructs, from an alpha level of 0.05 to 0.001, except for the relationship between Individual IS planning(IISP) and Strategic IS planning(SISP), and the relationship between Individual IS planning(IISP) and Strategic Information (SINFO).

5.3. Results of Hypothesis Testing

In order to test H1, which is hypothesized the positive association between the level of information requirements and the level of IS planning, Pearson correlation analysis was employed. As a result, correlation coefficient of the level of information requirements on the level of IS planning, was shown in Table 10. Results of hypothesis testing showed the positive association between the level of information requirements and IS planning type, except the association between IISP and SINFO. Also, The results revealed

Table 10. Correlation Analysis of Variables

	SINFO	MINFO	OINFO	SISP	LISP	IISP	ISPEFF	FULISP
MINFO	0.38553 0.0001**							
OINFO	0.27711 0.0002**	0.46631 0.0001**						
SISP	0.38632 0.0001**	0.30643 0.0001**	0.27766 0.0002**					
LISP	0.40605 0.0001**	0.45469 0.0001**	0.40779 0.0001**	0.64223 0.0001**				
IISP	0.11995 0.1171	0.24204 0.0015*	0.21352 0.0050*	0.10224 0.1833	0.34361 0.0001**			
ISPEFF	0.34678 0.0001**	0.30466 0.0001**	0.32210 0.0001**	0.54690 0.0001**	0.47746 0.0001**	0.20591 0.0072*		
FULISP	0.33277 0.0001**	0.32256 0.0001**	0.24670 0.0012*	0.54380 0.0001**	0.43508 0.0001**	0.18530 0.0159+	0.89272 0.0001**	
CONORG	0.27696 0.0002**	0.22945 0.0027*	0.34611 0.0001**	0.45071 0.0001**	0.43117 0.0001**	0.21009 0.0058*	0.92844 0.0001**	0.68276 0.0001**

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

that, the higher the level of organizational information requirements, the higher the level of IS planning, except IISP and the level of information requirements. Hypothesis 1 was partially supported by the positive association of IS planning with information requirements.

For testing H2, which is hypothesized influence of the level of information requirements on two dimensions of IS planning effectiveness, the correlation matrix was examined. As shown in Table 10, all six variables of information requirements are correlated with each other at a very high level of significance ($p < 0.01$). This correlation matrix shows that there is significantly positive relationship between the level of information requirements and IS planning success. Hypothesis 2, which predicted that

higher level of information requirements would exhibit a higher level of IS planning effectiveness, was supported.

Results of testing H3, which is hypothesized the positive association between the level of IS planning and IS planning effectiveness, was shown in Table 10. Results of hypothesis testing showed the positive association between the level of information requirements and IS planning type with high significance level. The results revealed that, the higher the level of IS planning, the higher IS planning effectiveness. This provide support for hypothesis H3.

In order to test Hypothesis 4, as organizations matching information requirements and IS planning type have higher IS planning effectiveness than those not matching, first of all, it needs to

Table 11. Types by Fitness between Information requirement and IS Planning

Type	SISP	LISP	IISP	Total
SINFO	11 (7%)	12 (8%)	3 (2%)	26 (17%)
MINFO	9 (8%)	27 (18%)	14 (9%)	50 (34%)
OINFO	17 (11%)	30 (20%)	28 (17%)	73 (49%)
Total	37 (25%)	69 (46%)	43 (29%)	149 (100%)

* Chi-Square Value=9.145 (Significance level=0.058)

classify the organizations surveyed according to the level of information requirements and IS planning type, as shown in Table 11. Organizations matching the level of information requirements and the level of IS planning are 66 firms in this study, organizations not matching are 83 firms. The result of Chisquare test was significant. at the level of significance ($p < 0.1$).

The result of t-test for hypothesis testing of H4, as shown in Table 12, indicates that organizations matching the level of information requirements and the level of IS planning type have not higher IS planning effectiveness than those not matching. This result does not support hypothesis 4.

5.4. Extended Analysis

This study performed post-hoc analysis for hypothesis 2 and 3. First, for hypothesis 2, it was extensively hypothesized that there would be a difference in IS planning effectiveness according to the types of information requirements. This study classified the surveyed organizations into the three types of information requirements for IS planning. The results of ANOVA analysis for extended H2, as shown in Table 13, indicate that there is no difference of IS planning effectiveness according to the type of information requirements. This means that the level of information requirements is not a important factor to determine the extent of IS planning effectiveness.

Also, this study tested the analysis

Table 12. t-test by Fitness between Information requirement and IS Planning

Variable	Fit Org. (N=64)	Unfit Org. (N=110)	t-Value (Significance)	
	Mean (Std Dev)	Mean (Std Dev)		
ISPEFF	3.24 (0.52)	3.46 (0.50)	2.74	0.0070**
FULISP	3.19 (0.63)	3.42 (0.53)	2.51	0.0131*
CONORG	3.27 (0.52)	3.49 (0.57)	2.57	0.0111*

* $P < 0.05$ ** $P < 0.01$

Table 13. ANOVA Analysis by the Level of Information Requirements

Variable	SINFO(N=29)	MINFO(N=55)	MINFO(N=81)	F-Value (Sig.)	
	Mean(Std Dev)	Mean(Std Dev)	Mean(Std Dev)		
ISPEFF	3.45 (0.45)	3.40 (0.54)	3.34 (0.54)	0.45	0.6371
FULISP	3.42 (0.51)	3.37 (0.63)	3.26 (0.59)	1.13	0.3269
CONORG	3.47 (0.50)	3.40 (0.54)	3.41 (0.60)	0.15	0.8578

for extended H3, which is extensively hypothesized that there would be a difference in IS planning effectiveness according to the types of information requirements. This study classified the surveyed organizations into the three types of IS planning: SISP, LISP, IISP. The results of ANOVA analysis for extended H3, as shown in Table 13, indicate that there is a difference of IS planning effectiveness according to the type of IS planning. This results mean that the higher the level of IS planning, the higher the level of IS effectiveness. Also, it concludes that the type of IS planning is a very important factor to determine the extent of IS planning effectiveness.

VI. Conclusion

Because of poor explanation of the dimensions of IS planning construct, the study on the influence of information requirements and IS planning typology on IS planning effectiveness, until now, remains incomplete. The results of this study is to identify the relationship between information requirements and IS planning typology, and to indentify the extent of the impact on IS planning effectiveness using fitness concept of two constructs.

The results of data analyses indicated that there is a positive association between the level of information requirements and IS planning type, except the association between IISP and SINFO. Also, there is significantly

Table 14. ANOVA Analysis by the Type of IS Planning

Variable	SISP(N=39)	LISP(N=73)	IISP(N=43)	F-Value (Sig.)	
	Mean(Std Dev)	Mean(Std Dev)	Mean(Std Dev)		
ISPEFF	3.57 (0.46)	3.38 (0.53)	3.17 (0.50)	6.09	0.0029**
FULISP	3.56 (0.58)	3.34 (0.57)	3.10 (0.54)	6.89	0.0014**
CONORG	3.57 (0.45)	3.41 (0.60)	3.25 (0.54)	3.95	0.0213*

* P < 0.05 ** P < 0.01 (Wilks' Lambda=0.9140, Significance=0.0097)

positive association between the level of information requirements and IS planning effectiveness. It means that higher level of information requirements would exhibit higher level of IS planning effectiveness.

Testing result of the positive association between the level of IS planning and IS planning effectiveness, revealed that the higher the level of IS planning, the higher IS planning effectiveness. Also, this study classified the organizations surveyed into nine groups using fitness concept, according to the level of information requirements and IS planning type. The result of test indicates that organizations matching the level of information requirements and the level of IS planning type have not higher IS planning effectiveness than those not matching.

These results provide some very useful implications for improving the IS planning success of an organization. These results suggest that the impact of information requirements on planning effectiveness is not serious, that the impact of IS planning typology is very important. In order to fulfill IS planning objectives and contribute to organization, first, it needs to choose the type of IS planning, such as SISP, LISP, IISP. Second, it needs to define the role of IS planning appropriate to the organization. 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 process. Specifically, the results of this study offer some useful insights, by directing appropriate attention to certain specific design aspects during implementation period of IS planning. In the end, the more strategic IS planning,

the more effective.

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