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# Strategic Information Systems Planning: Planning System Dimensions, Internal Coalignment, and Implications for Planning Effectiveness

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## ABSTRACT

Improving strategic information systems planning (SISP) remains a critical concern of both practitioners and academics. To date, a rather large number of studies have examined or proposed analytical techniques, frameworks, and tools for developing strategic plans. As a direct consequence of this emphasis, methodologies have often become the basis for characterizing the entire process of SISP within the information systems literature. Recent theoretical work suggests that such characterizations are unnecessarily narrow and that planning activities within organizations can be more accurately conceptualized as systems of behaviors, agendas, or process dimensions. Working within this contemporary theoretical perspective, the findings of this study suggest that SISP can be operationalized along distinct dimensions of comprehensiveness (extent of solution search), formalization (rules and procedures to guide activities), focus (creativity or control), flow (top down, bottom up), participation (number and variety of planners), and consistency (frequency of planning cycles). Similar to previous theoretical work and case studies, higher order factor modeling of these dimensions suggests that planning systems that exhibit aspects of rationality (high comprehensiveness, high formalization, control focus, top-down flow), and adaptation (high participation, high consistency) are positively associated with planning effectiveness.

***Subject Areas: MIS/DSS and Computer Systems, Strategic Planning, and Structural Equation Modeling.***

## INTRODUCTION

Within information systems (IS) literature, a considerable amount of research effort has been devoted to the development of frameworks and methodologies for conducting strategic planning. A number of these methodologies aid IS planners in aligning their strategies with those of the organization (King & Teo, 1997; King, 1988); others help planners discover opportunities to utilize IT for competitive advantage (Porter & Millar, 1985); still others assist planners in the analysis of internal processes and patterns of data dispersion throughout the organization (Goodhue, Kirsch, Quillard, & Wybo, 1992). Largely due to this emphasis on technique development and description, a strong tendency exists within IS research to conceptualize the process of planning by choice of known methodology (Lederer & Sethi, 1988). Though this approach can provide valuable insight into the types of organizations and environments in which planning tools and techniques are used effectively (or ineffectively), it ignores many aspects of the strategic planning proc-ess that govern how planning occurs and how a technique may actually be implemented. For example, a firm's process for SISP can easily be characterized as critical success factors.

Although such a description certainly provides some insight into planning approach, many important dimensions of SISP are ignored. How many people participate in the planning process? Do rules and policies govern the process? Who initiates the planning process? Is planning a sporadic or continuous activity? Broader dimensions such as these are a function of managerial values, beliefs, and experiences regarding strategic planning and, therefore, represent a planning infrastructure upon which tools, techniques, and methodologies are adopted, modified, or scuttled. These dimensions also offer unique insight into how planning occurs across varying organizational and environmental contexts. Therefore, it seems that additional insight into the nature and effectiveness of SISP can be gained through theoretical development and operationalization of process dimensions that may capture institutionalized attitudes and beliefs about strategic planning.

Through field studies, Earl (1993), Pyburn (1983), and Sullivan (1985), as well as Byrd, Sambamurthy, and Zmud (1995), approached the task of describing planning by identifying institutionalized planning dimensions, actions, and behaviors. Das, Zahra, and Warkentin (1991) adopted a similar theoretical perspective in developing process and content dimensions through extensive literature review. Sabherwal and King (1995) framed strategic IS decision making as groups of activities, beliefs, and behaviors. As noted in each of these studies, the variety of planning profiles uncovered reflect "structures" of process characteristics that describe how the task of strategic IS planning is accomplished. Within the literature base of strategic management, similar studies describe these structures as planning systems (Chakravarthy, 1987; Dutton & Duncan, 1987; Fredrickson, 1984; Lorange & Vancil, 1976). However, unlike the aforementioned studies in IS, research within strategic management has more fully developed theoretical and operational dimensions of planning systems that can be used to reconcile findings and facilitate common dialogue across research efforts. As demonstrated in these studies, combinations of process dimensions reveal distinct profiles in planning among organizations (Chakravarthy). Further, when associated with effectiveness measures, the coalignment or covariation among process dimensions can reveal normative systems of strategic planning (Venkatraman, 1990; Ramanujam, Venkatraman, & Camillus, 1986; Dyson & Foster, 1982).

Drawing upon the theoretical and operational perspectives of IS and strategic management literature, the purpose of this study is to develop theoretically and operationalize empirically dimensions of planning systems within the realm of SISP. The development of these dimensions extends previous work in the area by providing a means of synthesizing the varied labels and descriptions surrounding the process of SISP. Using these dimensions along with a measure of planning effectiveness, a profile of SISP design is derived empirically as a means of testing and reconciling "best performing" planning profiles proposed in prior research efforts. In the following section, contemporary definitional and process perspectives of SISP are developed. This is followed by a section that theoretically develops process dimensions of SISP as well as a model of planning system coalignment. The next sections outline the analytical technique, operationalization of research variables, and method of data collection. The final sections present the results of empirical testing along with implications and limitations.

## STRATEGIC INFORMATION SYSTEMS PLANNING: DEFINITIONAL AND PROCESS PERSPECTIVES

Since its inception, the agenda of SISP has grown dramatically (King & Teo, 1997). In its initial form, SISP focused primarily on the alignment of IS strategy with corporate strategy (King & Zmud, 1987; King, 1988; King & Cleland, 1977). As information technology gained recognition as a strategic resource, the agenda of SISP expanded from supporting strategy to enabling initiatives for gaining competitive advantage (Lederer & Mendelow, 1986; Porter & Millar, 1985). With the emergence of end-user computing and client-server architectures, the contemporary agenda of SISP has expanded even further to include the development of organizational and interorganizational architectures for the sharing of data and integration of technologies (Henderson, Rockart, & Sifonis, 1987; Goodhue et al., 1992; Henderson & Sifonis, 1988). Along with this ever-broadening agenda, SISP can be distinguished from other forms of IS planning (such as implementation planning) by the context within which it is performed (Lederer & Sethi, 1996; Bowman, Davis, & Wetherbe, 1983). These defining context characteristics include scope, perspective, time frame, and level of abstraction.

### SISP: A Definitional Perspective

In contrast to the narrower focus of other forms of IS planning, the *scope* of SISP efforts is broad. For instance, SISP would include the development of broad organizational information requirements but would not include development of information requirements for an isolated application (King & Zmud, 1987; Bowman et al., 1983). The *perspective* of SISP is that of the highest levels of management. In other words, these activities are performed at the highest level within the organization's planning hierarchy. Such planning provides the foundation and direction upon which planning activities at lower levels (e.g., implementation planning) are based (Reich & Benbasat, 1996; Lederer & Sethi, 1996; McLean & Soden, 1977). SISP efforts also have a longer *time frame* than that associated with planning at lower levels within the organizational hierarchy. Strategic IS planners must focus far into the future to ensure that adequate technological resources are available to exploit market opportunities or fight off the technological initiatives of competitors (Reich

& Benbasat; Das et al., 1991; McLean & Soden). Finally, SISP is associated with higher levels of abstraction than other IS planning processes. In essence, SISP deals with conceptual planning issues in contrast to the "attention to detail" inherent in implementation planning (Lederer & Sethi, 1996; Boynton & Zmud, 1987; McLean & Soden). Utilizing these context dimensions along with the agenda previously identified, a formal definition of SISP can be framed. SISP is defined as a process conducted within the previously developed contexts of scope, perspective, time frame, and level of abstraction, with any or all of the following agenda: (1) supporting and influencing the strategic direction of the firm through identification of value-adding computerized information systems, (2) integrating and coordinating various organizational technologies through development of holistic information architectures, and (3) developing general strategies for successful systems implementation.

### SISP: A Process Perspective

Although a definitional perspective can provide insight into the "what" of SISP, a process perspective captures the "how" of SISP (Sabherwal & King, 1995). As first noted by Mintzberg (1978), every business maintains some degree of strategic planning. However, the defining characteristics of the strategic planning process may vary significantly from one firm to the next. As initially defined in strategy literature by Lorange and Vancil (1977) and more recently in IS literature by Lederer and Sethi (1996), a *strategic planning system* is an emergent pattern of process dimensions (or characteristics) that organizes and coordinates the activities of the managers who accomplish the planning. Within IS literature, variations among patterns of process characteristics and, hence, differences in strategic planning systems have been noted in studies by Sabherwal and King, Earl (1993), and Pyburn (1983). A central theme throughout these studies as well as studies in strategic management (Venkatraman & Camillus, 1984) is that process characteristics of the planning system should be structured or internally coaligned such that the system as a whole is greater than the sum of its individual parts (Segars, 1994). Working within this theoretical vein and within the context of SISP, the following sections formally identify dimensions that describe important process characteristics of planning and, when examined as patterns or structures, describe cohesive systems of planning. Further, a criterion measure is developed in order to identify an internally coaligned set of process dimensions that is related to higher levels of planning effectiveness. As noted in several studies, the process of SISP shares many similarities with corporate strategic planning and is itself a strategic planning system (Das et al., 1991; Hufnagel, 1987; Venkatraman, 1985). Therefore, the nature and prescribed patterns of strategic planning systems identified within the strategic management literature are drawn upon as a means of forging a solid foundation for structuring and testing similar concepts within the area of SISP.

## PROCESS DIMENSIONS OF SISP, INTERNAL COALIGNMENT, AND PLANNING EFFECTIVENESS

Many studies within the area of strategic management have as their primary purpose the examination of planning system dimensions and the structure or internal coalignment of design dimensions (Kukalis, 1991; Venkataraman & Prescott, 1990;

Fredrickson & Iaquinto, 1989; Chakravarthy, 1987; Ramanujam & Venkataraman, 1987; Fredrickson, 1984, 1986; Fredrickson & Mitchell, 1984; Lindsay & Rue, 1980). Although less explicit and far less evolved in terms of empirical testing, research within IS has also begun to investigate general design characteristics of SISP and the importance of internal coalignment in achieving measures of planning effectiveness (Sabherwal & King, 1995; Byrd et al., 1995; Earl, 1993; Sambamurthy, Venkataraman, & DeSanctis, 1993; Das et al., 1991; Raghunathan & Raghunathan, 1989; Pyburn, 1983). Through extensive analysis of both of these research streams, six important process dimensions of SISP seem emergent. These dimensions are robust in describing SISP design, extending far beyond methodologically based and less generalizable descriptions of planning while complementing and further structuring general approach-based descriptions. These dimensions are: comprehensiveness, formalization, focus, flow, participation, and consistency. In the sections that follow, these characteristics and their associated supporting literature are discussed.

### Comprehensiveness

A basic feature of strategic planning processes is the emphasis placed on being comprehensive in making and integrating decisions (Fredrickson, 1984, 1986; Fredrickson & Mitchell, 1984). Janis and Mann (1977) suggested that this construct has a multitude of behaviors, including: (1) thoroughly canvassing a wide range of alternatives; (2) surveying a full range of objectives; (3) carefully weighing the costs and risks of various consequences; (4) intensively searching for information to evaluate alternative actions; (5) objectively evaluating information or expert judgment regarding alternative actions; (6) re-examining the positive and negative consequences of all known alternatives; and (7) making detailed plans, including consideration of contingencies, for implementing a chosen action. Utilizing these and other multifaceted characterizations of the construct, Fredrickson (1984) formally defined comprehensiveness as "the extent to which an organization attempts to be exhaustive or inclusive in making and integrating strategic decisions" (p. 402). This definition, widely adopted among researchers in strategic management, has also been utilized by researchers in IS to describe the extensiveness or scope of solution search in SISP efforts (Lederer & Sethi, 1996; Sabherwal & King, 1995; Sambamurthy, Zmud, & Byrd, 1994; Sambamurthy et al., 1993; Das et al., 1991). In general, organizations must balance the benefits of consistency and integration associated with thorough decision analysis with the costs of inaction, managerial time, and financial resources. As suggested by observers in both IS and strategic management (Sabherwal & King; Sambamurthy et al., 1994; Eisenhardt, 1989; Mintzberg, 1978; Quinn, 1978), in some competitive contexts it may be more appropriate to "satisfice" rather than optimize in identifying and evaluating strategic alternatives.

### Formalization

Another distinct characteristic of strategic planning systems is formalization. Formalization refers to the existence of structures, techniques, written procedures, and policies that guide the planning process (Lederer & Sethi, 1996; Das et al., 1991;

Dutton & Duncan, 1987). A highly formalized planning system is a more rationalized process for constructing strategic plans (Sabherwal & King, 1995; Premkumar & King, 1994; Camillus, 1982; Pyburn, 1983; Quinn, 1978). Such systems are characterized by written policies that structure the process of planning, formalized techniques adopted for the purpose of conducting strategic planning, or known procedures for initiating the planning process. Ideally, formalization produces efficiency gains for both receipt and processing of information. Formalized planning processes systemize information collection and dissemination, thus facilitating the identification and storage of strategic issues. These efficiency gains translate into an organizational capacity to consider a greater number of strategic issues. However, gains in efficiency accruing from a formalized process must be balanced against reduction in issue flexibility. In other words, a formalized process retards prompt and efficient elimination of strategic issues once they become unimportant or resolved (Lederer & Sethi, 1996; Sabherwal & King; Earl, 1993; Dutton & Duncan).

## Focus

Focus refers to the balance between creativity and control orientations inherent within the strategic planning system (Chakravarthy, 1987). Studies within strategic management (Chakravarthy; Lorange & Vancil, 1976) as well as IS (Lederer & Sethi, 1996; Sabherwal & King, 1995; Byrd et al., 1995) describe this distinction in terms of innovation versus integration. The *innovative* orientation nurtures creativity. Its purpose is to help planners systematically look for opportunities and threats in the environment and then generate innovative or novel solutions for competitive survival. Conversely, an *integrative* orientation focuses more on control. Such a system is closely tied to the regular accounting and budgetary systems of the organization and is concerned with issues such as resource allocation, cost-performance measures, and controlled diffusion of assets within the organization (Byrd et al.; Bowman et al., 1983; Chakravarthy).

## Flow

Planning flow refers to the locus of authority or devolution of responsibilities for strategic planning; in other words, the roles played by corporate and divisional managers in the initiation of the planning process (Byrd et al., 1995; Chakravarthy, 1987; Earl, 1993; Dutton & Duncan, 1987). Flow is usually described in both IS and strategic management literature as "top down" (from top management to lower levels of the organization) or "bottom up" (from lower levels of management to higher corporate levels). A top-down planning flow is characterized by limited participation of lower level managers in the initiation of the strategic planning process. In essence, top management and corporate staff assume responsibility for formulating all new strategic moves. Therefore, the role of functional or business unit managers within such a system is post hoc strategy implementation. A bottom-up planning flow conversely is characterized by high levels of functional management involvement in the initiation of strategic planning. Here, the planning process begins with ideas and proposals submitted by operational and functional managers as inputs into the overall corporate plan (Pyburn, 1983). The role of top management is that of overseer or gatekeeper, reconciling the proposals of various organizational subunits into an overall plan for the organization.

### Participation

Whereas planning flow is concerned with the vertical orientation of the planning system, participation captures the breadth of involvement in strategic planning. Firms may vary in the number of planners involved, representation from various functional areas, and amount of lateral communication in the planning process (Lederer & Sethi, 1996; Sabherwal & King, 1995; Byrd et al., 1995; Das et al., 1991; Dyson & Foster, 1982). Systems with narrow participation profiles foster an isolated approach to plan formulation with little involvement or interaction among various functional or operational managers. Such an approach may be deemed necessary due to a lack of business or "strategic" knowledge among lower level managers. An alternative rationale may be the stability and number of strategic issues that must be considered in formulating the strategic plan. If such issues are few and relatively stable, then the participation of many managers may slow examination of alternatives and, subsequently, decision speed (Lederer & Sethi, 1996; Byrd et al.; Eisenhardt, 1989). In contrast, broader participation profiles would emphasize many planning participants from a variety of functional and operational areas. Such an approach may be necessary to offset the "bounded rationality" of top managers inundated by the complexity and dynamic nature of the competitive environment (Sabherwal & King; Das et al.).

### Consistency

Consistency is concerned with the frequency of planning activities or cycles and, relatedly, the frequency of evaluation/revision of strategic choices (Lederer & Sethi, 1996; Sabherwal & King, 1995; Kukalis, 1991; Judge & Miller, 1991; Chakravarthy, 1987; Eisenhardt, 1989). Some organizations engage in planning activities infrequently. In such instances, the time frame of strategic plans is likely to be longer, face-to-face meetings among planning participants will typically be ad hoc or sporadic, and planning cycles may be year-to-year phenomena versus a continuous or consistent process (Byrd et al., 1995; Judge & Miller). Such an approach may be justified in contexts in which strategic issues are relatively few and stable (Sabherwal & King; Premkumar & King, 1994). In contrast, high levels of consistency are characterized by a continuous planning process with frequent meetings, constant communication among planning participants, and frequent assessment and revision of strategic direction. Such planning consistency may be necessary to adapt to unexpected changes in the internal organizational environment or external competitive environment (Das et al., 1991; Eisenhardt).

## INTERNAL COALIGNMENT

### The Internal Coalignment of Process Dimensions

The prevailing structure of multiple process dimensions that are acting collectively as members of a common system is referred to as internal coalignment (Segars, 1994).

Internal coalignment provides greater insight into systems of planning by measuring the extent to which the effectiveness of the collective dimensions are greater than each individual dimension. For example, broad participation itself may not lead to more effective planning. The same may hold true for top-management initiation (top-down flow) of planning. However, if an organization exhibits both characteristics, these dimensions may reinforce each other. As noted earlier, several key studies within the realm of SISP have identified emergent planning systems based on the internal coalignment of process dimensions. Table 1 formally reconciles the theoretically derived process dimensions of comprehensiveness, formalization, focus, flow, participation, and consistency with several of these identified systems of strategic IS planning.

As shown in Table 1, Pyburn (1983) identified three diverse planning systems among his case firms. Within the *written-formal* system, a very rational (structured) process of written rules and procedures, comprehensive solution search, top-down flow, and infrequent planning cycles seems present. In contrast, the *personal-informal* system reflects a more incremental (adaptable) process of few guidelines or policies, bottom-up planning flow, creativity focus, and wide participation profiles. A hybrid system, *personal-formal*, reflects aspects of rationality and adaptability. In these organizations, strategic IS planning is a structured process that includes many participants and is continually undertaken in order to adapt managerial actions to changing competitive conditions. Pyburn noted that this system performs particularly well relative to a completely rational or completely incremental approach.

Similar to Pyburn, Earl (1993) distinguished SISP approaches based on amounts of rationality and adaptability built into the planning system. To be specific, the *organizational* approach is reflective of a hybrid system similar to Pyburn's (1983) *personal-formal* approach. In this planning system, IS strategies seem to emerge from ongoing organizational activities such as trial and error changes to business practices, continuous enhancement of existing applications, and system experiments within the business. In essence, organizational themes as well as policies, participation, and consistent planning exercises are used to formulate IS strategy. In contrast, the administrative approach exhibits completely rational characteristics of rules and procedures, budgetary control, narrow participation profiles, and annual or semiannual planning activities. Other approaches identified by Earl (*method, business*, and *technological*) also tend to follow a rational profile. Consistent with observations by Pyburn, Earl noted that the hybrid *organizational* system of planning seems to be a more effective form of planning than the highly structured and less adaptable rational approaches. Studies by Sullivan (1985) and more recently by Sabherwal and King (1995) also seem to suggest that planning systems vary along a continuum from completely rational to completely adaptive. Further, these studies also imply that the most effective forms of planning are those that exhibit a combination of rational and adaptive dimensions. Sullivan noted that "complex" systems of SISP rely on formal structures and guidelines as well as constant reconciliation, thereby allowing the firm to adapt more effectively to ever-changing competitive and technological environments. Sabherwal and King noted this same effect in "planned" and "incremental" systems of planning.

**Table 1:** Planning systems and coalignment of process dimensions.*

| Planning System | Description | Coalignment of Process Dimensions: Comprehen-siveness | Form-alization | Focus | Flow | Partici-pation | Consistency |
|---|---|---|---|---|---|---|---|
| **Pyburn (1983)** | | | | | | | |
| Personal Informal | Verbal and informal system of planning activities | Low | Low | Creativity | Bottom Up | High | High |
| Personal Formal | Verbal and formalized system of planning activities | Moderate | Moderate | Control | Top Down | High | High |
| Written Formal | Written and formalized system of planning activities | High | High | Control | Top Down | Low | Low |
| **Earl (1993)** | | | | | | | |
| Business Led | Planning system driven by business planning | Low | Low | Creativity | Bottom Up | Low | Low |
| Method Led | Planning system driven by techniques and tools | Moderate | Moderate | Creativity | Bottom Up | Low | Low |
| Administrative | Planning system driven by firm's budgeting systems | High | High | Control | Top Down | Low | Low |
| Technological | Planning system driven by analytical modeling | High | High | Control | Top Down | High | Low |
| Organizational | Planning system driven by continuous decision integration | High | High | Control | Top Down | High | High |
| **Sullivan (1985)** | | | | | | | |
| Traditional | Planning system driven by Stages of Growth | High | High | Control | Bottom Up | Low | Low |
| Backbone | Planning system driven by Business Systems Planning | High | High | Creativity | Bottom Up | High | Low |
| Federation | Planning system driven by Critical Success Factors | Low | Low | Creativity | Top Down | Low | Low |
| Complex | Planning system driven by Eclectic (hybrid) approaches | High | High | Control | Top Down | High | High |
| **Sabherwal & King (1995)** | | | | | | | |
| Planned | Methods, policies, and tools structure the planning system | High | High | Control | Top Down | High | High |
| Provincial | Informality and heuristics structure the planning system | Low | Low | Control | Top Down | Low | Low |
| Incremental | Adaptive, disjointed procedures structure the planning system | Low | Low | Creativity | Bottom Up | High | High |
| Fluid | Velocity and focused analysis structure the planning system | Low | Low | Creativity | Bottom Up | Low | Low |
| Political | Bargaining and negotiation structure the planning system | Low | High | Control | Bottom Up | High | Low |

*In some instances, planning process dimensions are not fully developed within these studies. Therefore, the mapping of planning systems with the process dimensions developed in the present study should be interpreted as "estimated" rather than "actual" systems of internal process coalignment.

## Internal Coalignment as a System of Rational Adaptation

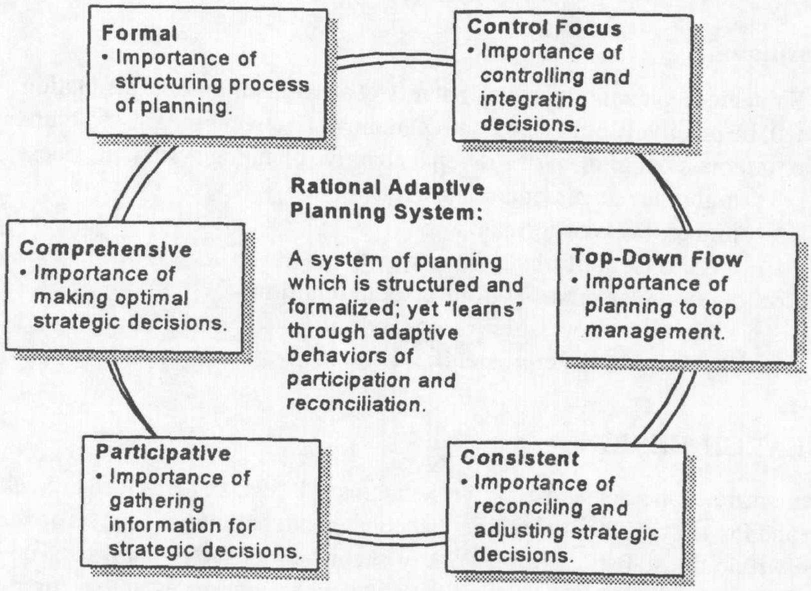
Within both strategy and IS research, the degree of rationality built into planning systems has been interpreted as the importance or value of planning activities to organizational effectiveness (Sabherwal & King, 1995; Premkumar & King, 1994; Kukalis, 1991; Chakravarthy, 1987). As organizations become technologically or geographically complex, the importance of planning activities rises. A planning culture often emerges accordingly in the form of highly structured systems for planning (Byrd et al., 1995). Rationality may be built into strategic planning systems through higher levels of comprehensiveness (Sabherwal & King; Sambamurthy et al., 1994; Fredrickson, 1984), higher levels of formalization (Lederer & Sethi, 1996; Byrd et al.; Das et al., 1991; Dutton & Duncan, 1987), a focus on control (Byrd et al.; Boynton, Jacobs, & Zmud, 1992), and top-down planning flow (Byrd et al.; Chakravarthy). Together, this coalignment provides a structure for planning that reflects the importance of making optimal decisions and coordinating planning activities, and the importance of planning to top management.

Adaptability refers to the ability of the planning system to "learn" (Reich & Benbasat, 1996; Lederer & Sethi, 1996; Sabherwal & King, 1995). In other words, the planning system should contain design characteristics that will alert managers to changing organizational and environmental conditions, which in turn may require changes in strategy. Adaptability may be designed into a strategic planning system through wide participation profiles (Byrd et al., 1995; Sambamurthy et al., 1993; Das et al., 1991; Dyson & Foster, 1982) and through higher levels of planning consistency (Judge & Miller, 1991; Eisenhardt, 1989). Such characteristics reflect the importance of gathering information from a number and variety of sources, and the importance of constantly reconciling strategic decisions with environmental conditions. As implied in field studies by Earl (1993), Sabherwal and King, Sullivan (1985), and Pyburn (1983), high performing systems for SISP seem to contain aspects of both adaptation and rationality. Research by Boynton and Zmud (1987), Zmud, Boynton, and Jacobs (1986), as well as Lederer and Sethi (1996) also implied that such systems may be necessary in order to effectively manage increasingly diverse and dispersed technologies across the organization. Zmud et al. (1986) developed a system of planning for IS similar to that of the federal government. This *information economy* relies on an overall structure of control and coordination while dispersing many planning and managerial activities to organizational units closest to business and environmental activity. Hence, the system is rational with respect to a structure of overall control but adaptable with respect to the participation of numerous entities in the planning process. Integrating the rich background of prior field-based and theoretical literature, Figure 1 illustrates a theoretically derived profile of "normative" coalignment among the developed process dimensions. This model is based on the theoretical perspective of rational adaptation, thereby reflecting the hybrid nature of "best performing" planning systems identified in past research.

## Internal Coalignment and Planning Effectiveness

As implied in the preceding discussion, a central tenet underlying strategic coalignment is that its presence is strongly associated with planning effectiveness

**Figure 1:** Strategic planning as a system of rational adaptation.




(Lederer & Sethi, 1996; Sambamurthy et al., 1993; Chakravarthy, 1987; Lorange & Vancil, 1977). In other words, if dimensions of strategic planning systems favorably align, the planning system as a structure should be more successful than its individual dimensions. Therefore, to fully assess the implications of coalignment, a measure of the planning system's contribution to organizational effectiveness must be identified. As noted by observers in both strategic management and IS, planning effectiveness is not a well-developed concept and is likely more complex in terms of description and dimensions than aggregated measures or financial ratios (Lederer & Sethi, 1996; Byrd et al., 1995; King, 1988; Ramanujam et al., 1986). However, effective SISP, like any administrative process, should contribute to the overall performance of the organization (Chan & Huff, 1992; King; Lederer & Sethi, 1988. Therefore, although it seems that capturing the contribution of SISP in terms of bottom-line figures such as ROI, ROE, etc., may be significantly confounded by many uncontrollable business, economic, and environmental factors, other less confounded contributions of SISP may provide insight into the value-added aspect of this process (King). Such contributions may include: improved managerial decision making (McLean & Soden, 1977), lower costs of development (King & Cleland, 1977), and benefits beyond the financial and managerial resources necessary for sustaining SISP (King). Other contributions may include: plans that are actionable and implemented (King), generation of new or novel ideas for employing IT (Porter & Millar, 1985), and useful inputs into the overall strategic planning process (King & Zmud, 1987). These criteria are not tied to the fluctuations in financial ratios, yet they provide a foundation for determining SISP's relative contribution to organizational effectiveness. Therefore, it is against these criteria of performance that the efficacy of the rational adaptive model of SISP will be assessed. Stated in the form of a proposition for research:

### *Proposition*

> Strategic IS planning systems that reflect a profile of rational adaptation will be positively associated with planning effectiveness. The structure or internal coalignment of a rational adaptive planning system includes:
>
> higher levels of comprehensiveness,
> higher levels of formalization,
> a focus on control versus creativity,
> a top-down versus bottom-up planning flow,
> higher levels of participation, and
> higher levels of consistency.

## RESEARCH DESIGN

As demonstrated in prior studies by Venkataraman (1989a, 1990) as well as Venkataraman and Prescott (1990), the theoretical concept of coalignment can be operationalized within the statistical framework of second-order factor analysis. The logic behind this modeling scheme is that the pattern of covariances among first-order factors (in the present instance, process dimensions of SISP) can be explained by a separate and unobservable construct of coalignment. In essence, the view within this perspective is that any one dimension will be insufficient in describing a system of planning. Instead, all dimensions are necessary for adequate modeling of the phenomena, and, therefore, it is critical to assess the entire pattern of covariation rather than isolated associations. Specification of coalignment in terms of covariation requires the explication of the underlying logical linkage among dimensions. General linear models such as regression analysis miss the concept of a central thread or internal logic underlying a phenomenon because the regression coefficient may have statistical significance but may indicate no apparent logical linkage among independent variables (Venkataraman, 1990). Therefore, the most robust and operationally valid framework for assessing coalignment is that of structural equation modeling through maximum likelihood estimation (Jöreskog & Sörbom, 1989).

### The Measurement of Internal Coalignment

The analytical approach for establishing coalignment involves specification and testing of two competing models for explaining the covariances among first-order factors and the influence of coalignment on performance (Appendix A). The first of these models, a baseline or "direct effects" model, specifies no second-order factor for explaining first-order correlations. This model implies that each correlated dimension directly impacts the criterion (or performance) construct. In other words, each dimension is independent of the others in predicting performance. The alternative or coalignment model specifies a second-order factor of coalignment that governs the correlations among first-order factors. Because the second-order factor is merely explaining the covariation among the first-order factors in a more parsimonious way (more degrees of freedom), the goodness of fit can never be better than a first-order model, even when the second-order factor is able to explain effectively the factor covariances. Therefore, comparison of fit between first- and second-order models is accomplished through examination of the Target ($T$) coefficient (Marsh & Hocevar, 1985). This incremental fit measure is identical to Bentler and Bonnet's (1980) $\Delta$ in formulation and interpretation. If the model statistic of the coalignment model is not statistically different from the direct effects model ($T \geq .90$), then the coalignment model is chosen because of its parsimonious representation. Otherwise, the existence of internal coalignment is rejected. A complementary set of statistics is given by the significance of the parameters reflecting the second-order factor loadings. If these are statistically significant, then they provide additional support for the existence of the "second-order construct" of coalignment. Therefore, if the study's research proposition is supported, a second-order factor of coalignment should exhibit strong positive loadings to the criterion variable of planning effectiveness as well as the first-order factors of comprehensiveness, formalization, focus, flow, participation, and consistency. The following sections outline the methodology and resulting scales used to operationalize these constructs.

## A Framework for Developing Measures of Research Constructs

A widely accepted framework for developing measures of complex research variables was suggested by Churchill (1979, 1982). Although this framework was initially presented in the context of developing marketing constructs, its general nature has made it applicable to a variety of studies in both strategic management and IS (Premkumar & King, 1992; Venkataraman, 1989b; Venkataraman & Grant, 1986). As noted by Churchill (1979, 1982), many variables of interest are inherently complex in nature; therefore, they cannot be accurately measured with a single scale. Single measures typically have considerable uniqueness and subsequently low correlation with the attribute being measured. In addition, single items tend to frame concepts narrowly, resulting in considerable measurement error. Multi-item measures overcome these difficulties. The specificity of individual items can be averaged out and more robust conceptualizations of complex variables can be developed, thereby reducing measurement error.

The initial step in developing multi-item measures involves specifying the domain of the construct. The researcher must be exacting in delineating what is included, and what is not included, in the definition of research constructs. Such definition is structured through intense review of relevant literature. Within this study, the previously developed frames of planning system dimensions and planning contribution provide the theoretical underpinning for initial conceptual definition. Using this definitional domain, a sample of items was generated for each construct of interest. This task was accomplished through analysis of existing measurement scales, relevant literature, and expert opinion. As noted by Churchill (1982), when at all possible, the researcher should use or adapt existing measurement scales for his or her research purpose. The unnecessary use of new scales makes it difficult to compare and accumulate findings, thereby inhibiting synthesis of what is known. For situations in which scales have yet to be developed, relevant literature should indicate how the variable has been defined and how many dimensions or components it contains (Venkataraman & Grant, 1986). Finally, a panel of experts (academics, practitioners in the area) can offer valuable ideas and insights into the phenomenon of interest. Within the present study, each of these mechanisms is employed in the development of construct measures. When possible, planning system dimensions are operationalized from preexisting scales. In such cases, the scales have been modified to make them relevant for strategic IS planning. In all cases, a panel of experts including IS academics and strategic IS planners reviewed and refined the initial item sets along with their associated constructs.

Upon development of an initial item set, the researcher should then purify each measure. This step is undertaken to insure that the meaning associated by the researcher with each item is the same as that associated by the targeted respondent. Further, this step insures the "completeness" of construct operationalization. Leading questions, ambiguous items, double meanings, and unnecessary jargon can seriously inhibit the validity of reported findings. In addition, aspects of constructs that may have been omitted can hamper the measurement value of research variables. Future respondents and panels of experts can offer much insight into these potential problems. The Q-sort technique (Moore & Benbasat, 1991), in which experts or potential respondents group items according to their similarity, also can provide a powerful means of establishing construct validity. This technique is especially recommended when new scales are being developed. In the present study, Q-sorting was conducted among a panel of 12 IS executives and five IS academics as a means of item purification. These experts were given one-paragraph descriptions of each planning dimension and a list of randomly ordered item measures. They were then asked to identify the description that was most likely reflected by each item. Correct classification rates of over 90% were realized for 80% of the initial items; these items were retained for further analysis.

## Item Measures of Research Constructs

As noted earlier, planning system design dimensions have been widely operationalized within the area of strategic management (Kukalis, 1991; Chakravarthy, 1987; Reid, 1989). In addition, recent literature within IS has conceptualized dimensions of planning systems for SISP (Byrd et al., 1995; Das et al., 1991). Combining these perspectives, the following paragraphs outline operationalizations and the theoretical underpinnings for these unobservable planning characteristics. The outlined measures are those that resulted from the extensive rounds of literature review, interviewing, Q-sorting, and pretesting described in the previous section.

### *Planning Comprehensiveness*

Planning comprehensiveness has been widely studied within strategic management literature. Early studies conceptualized this measure as extent of planning completeness (Lindsay & Rue, 1980) or planning extensiveness (Wood & LaForge, 1981). Fredrickson (1984) further developed and tested multiple indicators of this construct as a measure of solution search in the planning process. These scales have been refined and subsequently used in works by Fredrickson and Mitchell (1984), Fredrickson and Iaquinto (1989), and Kukalis (1991). Studies within IS (Lederer & Sethi, 1996; Byrd et al., 1995; Das et al., 1991; Sambamurthy et al., 1993) have also conceptualized the scope of SISP in terms similar to that of Fredrickson (1984). Within this study, a subset of these measures is adapted for the context of SISP. Table 2 lists these specific item measures.

### *Formalization*

Planning system formalization has been conceptualized and empirically tested in works by Dutton and Duncan (1987), Lindsay and Rue (1980), and Chakravarthy (1987). In each of these studies, multiple indicators have been used with varying degrees of reliability. Within this study, the measures utilized by Chakravarthy as well as Dutton and Duncan are adopted. In both of these studies, the indicators of this planning construct exhibited strong measurement properties and were closely associated with theoretical work within IS, which described the formality of SISP (Lederer & Sethi, 1996; Byrd et al., 1995; Das et al., 1991; Pyburn, 1983). Using these theoretical studies, the scales are slightly reworded to conform them to the context of SISP. Table 3 lists these item measures.

### *Focus*

As noted by several observers in strategic management (Chakravarthy, 1987; Lorange & Vancil, 1977) and IS (Byrd et al., 1995; Sabherwal & King, 1995; Bowman et al., 1983), planning systems may emphasize either creativity or control. Within SISP, a focus on control would be typified by budgetary concerns such as resource allocation, cost-performance considerations, and controlled diffusion of technology within the organization. In contrast, a focus on creativity would imply searching for innovative ways to enhance organizational effectiveness with IT. Several studies within strategic management have successfully operationalized this latent characteristic of planning (Chakravarthy; Lenz & Lyles, 1983; Lindsay & Rue, 1980). Using these operationalizations and theoretical studies within IS (Lederer & Sethi, 1996; Byrd et al.), the items in Table 4 are adopted as indicators of this construct.

### *Planning Flow*

Planning flow has been identified by several IS observers as an important characteristic of SISP (Lederer & Sethi, 1996; Reich & Benbasat, 1996; Earl, 1993; Sambamurthy et al., 1993). Reflecting this importance, operationalizations of this construct are now beginning to appear in empirical SISP studies (Byrd et al., 1995; Premkumar & King, 1992; Raghunathan & Raghunathan, 1988). Although this planning characteristic has not exhibited the strong measurement properties associated with other dimensions of planning systems within strategic management literature, it is still perceived as a major component of planning system design (Chakravarthy). The measures adopted here are drawn from empirical studies by Chakravarthy as well as Dutton and Duncan (1987). The recasting of these measures for the context of SISP is based on work by Byrd et al.; Earl; Das et al. (1991); and King (1988).

### *Participation*

Studies by Dutton and Duncan (1987), Fredrickson and Iaquinto (1989), Chakravarthy (1987), and Kukalis (1991) have each examined and operationalized measures

**Table 2:** Item measures of planning comprehensiveness.

| Variable | Description |
|---|---|
| x1 | We attempt to be exhaustive in gathering information relevant for IS planning. |
| x2 | Before a decision is made, each possible course of action is thoroughly evaluated. |
| x3 | We attempt to determine optimal courses of action from identified alternatives. |
| x4 | There is little trial and error in our strategic decision process. |
| x5 | We will delay decisions until we are sure that all alternatives have been evaluated. |

for planning participation. Premkumar and King (1991, 1992, 1994), Lederer and Sethi (1996), as well as Byrd et al. (1995) in their studies of SISP also developed and utilized multiple measures for gauging breadth of planning participation. King and Cleland (1977) operationalized this construct within the realm of systems planning and development. The measures outlined in Table 6 are adopted from each of these works.

### *Consistency*

Frequency of plan review or planning cycles has been an important planning variable within strategic management (Lorange & Vancil, 1977). Eisenhardt (1989) examined this characteristic within the context of improving the speed of strategic decision making. Wood and Laforge (1981) included this characteristic in development of a planning "completeness" or "extensiveness" scale. Studies by Lindsay and Rue (1980), Dutton and Duncan (1987), and Kukalis (1991) operationalized and related this planning characteristic to various organizational and environmental contexts. Within IS literature, theoretical work by Das et al. (1991) and Boynton and Zmud (1987), as well as empirical work by Sabherwal and King (1995) and Lederer and Sethi (1996), described consistency along the same lines as that operationalized within strategic management. The indicators included in Table 7 are based on measures developed in strategic management and are recast for the context of SISP based on these works.

### *Planning Effectiveness*

As noted earlier, effective SISP should contribute to the overall effectiveness of the organization (Lederer & Sethi, 1996; Chan & Huff, 1992; King, 1988). Such measurement must be specific enough to capture the essence of SISP's contribution, yet remain beyond the confounding effects of business cycles, environmental trends, and organizational dynamics. Representations from this criterion domain are listed in Table 8 and are adopted from the works of Lederer and Sethi (1996); King; Premkumar and King (1991); McLean and Soden (1977); as well as King and Zmud (1987). These criteria are not tied to the fluctuations in financial ratios, yet they provide a foundation for determining SISP's relative contribution to organizational effectiveness.

**Table 3:** Item measures of planning formalization.

| Variable | Description |
|---|---|
| x6 | Policies and procedures greatly influence the process of SISP within our firm. |
| x7 | We utilize formalized planning techniques (e.g., BSP) in our SISP process. |
| x8 | Our process for strategic planning is very structured. |
| x9 | Written guidelines exist to structure strategic IS planning in our organization. |
| x10 | The process and outputs of strategic IS planning are formally documented. |

## DATA COLLECTION

The use of key informants has been a popular approach within empirical IS studies. Studies in the field typically rely on the responses of Chief Information Officers (CIO), Vice Presidents of Operations, or Directors/Heads of IS groups regarding strategic, organizational, or managerial issues (Munro & Wheeler, 1980; Pinsonneault & Kraemer, 1993; Premkumar & King, 1992; Raghunathan & Raghunathan, 1989). For issues pertaining to system development or use, systems analysts, programmers, or end users are utilized as key respondents (Pinsonneault & Kraemer). Although such practice has become an accepted norm in the field, it is important to provide a formal rationale for choosing the key respondent and then employing structured procedures to insure that responses of key informants are as accurate as possible. In the absence of a strategy to obtain accurate data, results are likely to be confounded and conclusions erroneous. Huber and Power (1985) proposed several guidelines for improving the accuracy of reports gathered from key respondents. Appendix B relates these coping strategies with potential sources of data inaccuracy and also outlines the tactics utilized in the present analysis to improve respondent accuracy.

### Sampling Frame and Sampling Procedure

As noted by Lederer and Sethi (1988, 1996), research designs within the domain of SISP do not lend themselves to scientific sampling techniques. The reason for this assertion lies in the fact that not all firms participate in SISP activities. For some firms, information technology is not a large enough component of organizational functioning to conduct formal planning exercises. Others may outsource all of their IT operation and development activities. Still others may simply believe that SISP produces no organizational benefits. Therefore, in the context of SISP, a sample of firms randomly drawn from a sampling frame of all business entities does not imply that the criteria of a scientific random sample have been met (Scheaffer, Mendenhall, & Ott, 1990).

Within this study, a nonscientific method of sampling is employed. The sampling frame adopted is the East Edition of *The Directory of Top Computer Executives* (1994). This index contains the names, titles, addresses, and phone numbers of top computer executives in the eastern half of the United States. The entities represented in the directory include Fortune 2000 firms (manufacturing and service),

**Table 4:** Item measures of planning focus.

| Variable | Description |
|---|---|
| x11 | The primary focus of IS planning is controlling cost through extensive budgeting. |
| x12 | In our IS planning process we encourage creativity and idea generation over control. |
| x13 | Strategic IS planning is viewed as a means of controlling the growth of technology. |
| x14 | Control systems are used to monitor variances between planned actions and outcomes. |
| x15 | Our IS planning process is tightly integrated with the firm's normal financial planning or capital budgeting routine. |

educational institutions, hospitals, and governmental agencies. In developing the desired subframe, all hospitals, educational institutions, and governmental agencies were eliminated from further consideration. The rationale for their removal lies in the fundamental difference in profit motive and subsequent focus of planning activities between public and private firms (Byrd et al., 1995; Lederer & Sethi, 1988). Next, the job titles of respondents remaining in the frame were examined as a means of determining the level of planning activity. As empirically shown by Raghunathan and Raghunathan (1989), the existence and importance of SISP is directly related to the status of the top IS executive. Therefore, firms whose senior IS manager had job titles of Chief Information Officer, Vice President, Director of Strategic Planning, or Director of MIS were retained. The resultant subframe consisted of 1,000 business entities. From this frame, 550 firms were chosen at random. Although it is problematic to generalize sample results to all business entities, such designs are considered entirely appropriate in explanatory studies that examine complex phenomena (Pinsonneault & Kraemer, 1993).

## Response Profile

The response rate of the sampled firms was a rather high 47.63%. This rate likely reflects the inclusion of a monetary incentive (dollar bill attached to the cover letter), promise of a tailored research summary, as well as the targeting of the survey to principals involved in SISP. Of the returned responses, nine contained incomplete data or were otherwise unsuitable for analysis. These surveys were dropped from further consideration, yielding an effective response rate of 46.8%. Given this response rate and the high number of usable surveys (253), no follow-up mailing was deemed necessary. The majority of respondents were manufacturers, representing 48.2% of the sample. The next highest representation was finance and insurance entities, representing 17.4% of the sample. The remaining categories exhibit a modest range of representation, from a minimum of 0.8% (agriculture) to a maximum of 7.5% (wholesale). The sample was almost evenly split between sales levels of 0 to 500 million dollars (45.3%) and sales of greater than 501 million dollars (53.7%). The overwhelming majority of respondents (72.2%) were

**Table 5:** Item measures of planning flow.

| Variable | Description |
|---|---|
| x16 | Strategic planning for IS is initiated at the highest levels of the organization. |
| x17 | The planning flow within our organization can be characterized as "top down." |
| x18 | Planning for IS is initiated by requests/proposals from operational/functional managers. |
| x19 | Those who formulate strategic IS plans are most responsible for their implementation. |
| x20 | The primary role of upper management is to endorse rather than formulate IS plans. |

either one or two levels below the Chief Executive Officer (CEO). Therefore, it seems that the collected data was provided by respondents of larger business entities who are knowledgeable about the issues of interest within the present study.

## RESULTS

Following the procedure suggested by Anderson and Gerbing (1988), measurement models of each research construct were estimated and refined before formal estimation of path coefficients. The rationale for the two-stage approach lies in the need for accurate representation of the reliability of indicators. As suggested by Jöreskog (1993), this is best accomplished by (1) estimating and, if necessary, respecifying the measurement model for each construct separately; (2) assessing discriminant validity through estimation and formal testing of measurement models for each pair of constructs within the same theoretical network; and (3) examining fit and parameter stability among paired model estimates. In the presence of good model fit for each construct, these paired estimates should exhibit nearly identical factor loadings with the construct submeasurement models (Anderson, 1987; Anderson & Gerbing; Jöreskog). These loadings should then be "fixed" in subsequent estimation of structural equation models (Burt, 1976). By fixing the reliability of each observed indicator, the researcher forces an indicator to have the amount of variance appropriate for the construct, thereby maintaining a specific meaning for the construct. In complex modeling situations, this approach also provides the MLE algorithm with starting values facilitating the generation of converged and more stable parameter estimates (Bollen, 1989; Segars, 1997; Segars & Grover, 1993). The formal testing of the structural model is then accomplished through use of incremental and parsimonious fit measures.

### Measurement Modeling: Dimensions of Strategic IS Planning Systems

The comprehensiveness of the strategic IS planning effort is hypothesized to be captured by a scale of five items. These items, along with all other items associated with constructs of planning system design, were cast on a 7-point Likert scale anchored by the phrases strongly agree and strongly disagree. Parameter estimates,

**Table 6:** Item measures of planning participation.

| Variable | Description |
|---|---|
| x21 | Top management is actively involved in strategic IS planning. |
| x22 | A variety of functional area managers participate in the process of IS planning. |
| x23 | Our process for strategic IS planning includes numerous participants. |
| x24 | Strategic IS planning is a relatively isolated organizational activity. |
| x25 | The level of participation in SISP by diverse interests of the organization is high. |

fit indices, and observed residuals imply that this initial model is a good fit for the observed covariances (Segars, 1997; Jöreskog, 1993; Anderson & Gerbing, 1988). Table 9 outlines the observed measures of fit as well as indicator reliabilities. The likelihood $\chi^2$ is 9.97 ($df = 5$; $p = .08$) and the Goodness of Fit Index (GFI) and Adjusted Goodness of Fit Index (AGFI) are .97 and .92, respectively. Root Mean Square Residual (RMSR) is .04, and all indicator reliabilities are sufficiently high and statistically different from zero. The residual matrix contains no values significantly different from zero, further supporting the fit of the specified model. The calculated composite reliability is a moderate .78, suggesting that the scale captures a significant amount of variation in this unobservable variable (Segars, 1997). Like comprehensiveness, five items are hypothesized to be indicators of planning formalization. The maximum likelihood estimates of this initial model suggest that it also is a good fit for the item covariances observed in the sample. As shown in Table 9, the observed $\chi^2$ is 9.22 ($df = 5$; $p = .10$), the GFI is a rather high .96, and AGFI is .88. RMSR is .04, and all indicator reliabilities are sufficiently high and statistically different from zero. The residual matrix contains no values significantly different from zero, lending further support for the fit of the hypothesized model. The composite reliability of this construct is .82, providing further evidence of the scale's strength in capturing key aspects of this latent variable.

The emphasis on creativity or control within the strategic IS planning process is referred to as planning focus and is hypothesized to be captured by a scale of five items. Parameter estimates, fit indices, as well as observed residuals suggest that this initial model is not an adequate fit for the item covariances observed in the sample. The observed $\chi^2$ is 15.11 ($df = 5$; $p = .01$), and the GFI and AGFI are .86 and .75, respectively. The RMSR is a rather high .06, further implying a lack of model fit. Through examination of indicator reliabilities and the residual matrix, the source of model misspecification was found. To be specific, the observed reliability of the indicator, "The primary focus of IS planning is controlling costs through extensive budgeting," was significantly lower (.16) than that of other scale items (ranging from .48 to .75). Further, the $t$-value associated with this loading suggested that it was not significantly different from zero. This inconsistency was also manifest in the substantial error associated with the modeling of this item's covariance with other items. Thus, this item was eliminated and a four-indicator model was estimated. Observed fit indices as well as factor loadings suggest that the reduced model of planning focus is an adequate representation of the covariances

**Table 7:** Item measures of planning consistency.

| Variable | Description |
|---|---|
| x26 | We constantly evaluate and review conformance to strategic plans. |
| x27 | We frequently adjust strategic plans to better adapt them to changing conditions. |
| x28 | Strategic IS planning is a continuous process. |
| x29 | We frequently schedule face-to-face meetings to discuss strategic planning issues. |
| x30 | We formally plan for information systems as the need arises. |

observed among scale items. As shown in Table 9, the likelihood $\chi^2$ is 4.22 ($df = 2$; $p = .07$) and the GFI and AGFI are .92 and .80, respectively. RMSR is .05, and all indicator reliabilities are sufficiently high and statistically different from zero. The residual matrix contains no values significantly different from zero, also supporting the adequacy of the reduced model. The calculated composite reliability of this construct is a moderate .71, suggesting that the scale is adequate, although not particularly strong, in capturing the characteristics of this latent variable.

Five items are hypothesized to be parallel measures of planning flow. This initial model proved to be a poor fit for the observed item covariances. The observed $\chi^2$ is 19.11 ($df = 5$; $p = .01$), the GFI is a moderate .89, and the AGFI is .77. The RMSR is a rather high .06, further suggesting a need for model respecification. Similar to the construct of planning focus, examination of indicator reliabilities and the residual matrix suggested the elimination of a single scale item. In particular, the indicator, "Those who formulate strategic IS plans are most responsible for their implementation," exhibited a rather low reliability (.17) relative to other items in the scale (ranging from .83 to .50). Further, the *t*-value associated with this loading suggested that it was not significantly different from zero. This inconsistency was also observable through the high residuals between the covariances of this and other items in the scale. Therefore, this item was eliminated and a respecified four-indicator model was estimated. Observed fit indices as well as factor loadings suggest that the respecified model of flow is an adequate representation of the covariances observed among scale items. As outlined in Table 9, all measures of model fit indicate sufficient congruence between observed and model-implied covariance matrices. The likelihood $\chi^2$ is 5.85 ($df = 2$; $p = .07$), and the GFI and AGFI are .98 and .89, respectively. RMSR is .05, and all indicator reliabilities are sufficiently high and statistically different from zero. The residual matrix contains no values significantly different from zero, also supporting the adequacy of the reduced model. The calculated composite reliability of this construct is a moderate .71, suggesting that the scale is adequate, though not particularly strong, in capturing the characteristics of this unobservable variable.

The level and breadth of participation inherent within the strategic IS planning effort is hypothesized to be captured by a scale of five items. These items were also cast on a 7-point Likert scale anchored by the phrases *strongly agree* and *strongly disagree*. Parameter estimates, fit indices, and observed residuals imply that this hypothesized model is a good fit for the observed covariances. As shown

**Table 8:** Item measures of planning effectiveness.

| Variable | Description |
|---|---|
| y1 | SISP contributes significantly to the financial performance of the firm. |
| y2 | SISP enables us to make better managerial decisions. |
| y3 | We are able to identify new IT-based opportunities before our competition. |
| y4 | The time, money, and effort devoted to SISP is more than justified by its benefits. |
| y5 | SISP provides valuable input into the planning process of top management. |
| y6 | SISP allows us to generate new and novel ideas. |
| y7 | The plans generated through our SISP process have almost always been implemented. |

in Table 9, the likelihood $\chi^2$ is 9.66 ($df = 5$; $p = .10$), the GFI is .96, and the AGFI is .88. RMSR is .03, and all indicator reliabilities are sufficiently high and statistically different from zero. The residual matrix contains no values significantly different from zero, further supporting the fit of the specified model. The calculated composite reliability of this scale is a very high (.89), suggesting strong measurement properties among the member items.

Five items are hypothesized to be parallel measures of planning consistency. Although fit indices and RMSR suggest that this model is a good fit for the data, the overall $\chi^2$ as well as residuals and pattern loadings suggest the need for model respecification. The observed $\chi^2$ is 20.11 ($df = 5$; $p = .01$) whereas the GFI and AGFI are .94 and .83, respectively. The RMSR is a low .04. However, the reliability of the indicator, "We formally plan for information systems as the need arises," is markedly lower than that of other items within the scale (.14 versus a range of .60 to .83) and not significantly different from zero. Although such effects may be due to unmodeled correlations among error variances, such respecification is a direct violation of modeling assumptions. Therefore, this item was eliminated and a reduced four-indicator model was estimated. Observed fit indices as well as factor loadings suggest that the reduced model of planning consistency is an adequate representation of the covariances observed among scale items. As shown in Table 9, the likelihood $\chi^2$ is 4.73 ($df = 2$; $p = .07$), and the GFI and AGFI are .98 and .89, respectively. RMSR is .04, and all indicator reliabilities are sufficiently high and statistically different from zero. The residual matrix contains no values significantly different from zero, also supporting the fit of this four-indicator model. The calculated composite reliability of consistency is a strong .86, suggesting that the scale captures a significant portion of variance in this latent construct of planning.

### Discriminant Validity: Dimensions of Strategic IS Planning Systems

In order to establish the discriminant validity of the scales within this theoretical system, it is necessary to estimate 30 MLE models (15 constrained, 15 unconstrained) and conduct 15 $\chi^2$ difference tests. Table 10 contains the results of this analysis. As shown, all $\chi^2$ differences are significant at $p < .001$. This suggests that

**Table 9:** Results of measurement modeling: Planning system constructs.

| Item | ML Estimate (λ) | *t*-Value |
|---|---|---|
| **Comprehensiveness** | | |
| x1 | .64 | 8.01 |
| x2 | .89 | 12.13 |
| x3 | .65 | 8.23 |
| x4 | .43 | 5.15 |
| x5 | .60 | 7.43 |
| | $\chi^2$ (5) = 9.97 ($p$ = .08)<br>Goodness of Fit = .97 | Adjusted Goodness of Fit = .92<br>Composite Reliability = .78 |
| **Formalization** | | |
| x6 | .42 | 5.16 |
| x7 | .83 | 11.66 |
| x8 | .87 | 12.58 |
| x9 | .68 | 8.93 |
| x10 | .59 | 7.50 |
| | $\chi^2$ (5) = 9.22 ($p$ = .10)<br>Goodness of Fit = .96 | Adjusted Goodness of Fit = .88<br>Composite Reliability = .82 |
| **Focus** | | |
| x12 | .51 | 5.26 |
| x13 | .71 | 7.31 |
| x14 | .75 | 7.63 |
| x15 | .48 | 5.22 |
| | $\chi^2$ (2) = 4.22 ($p$ = .07)<br>Goodness of Fit = .92 | Adjusted Goodness of Fit = .80<br>Composite Reliability = .71 |
| **Flow** | | |
| x16 | .83 | 4.21 |
| x17 | .49 | 3.11 |
| x18 | .52 | 3.91 |
| x20 | .59 | 4.52 |
| | $\chi^2$ (2) = 5.85 ($p$ = .07)<br>Goodness of Fit = .98 | Adjusted Goodness of Fit = .89<br>Composite Reliability = .71 |
| **Participation** | | |
| x21 | .74 | 10.09 |
| x22 | .87 | 12.57 |
| x23 | .85 | 12.22 |
| x24 | .66 | 8.68 |
| x25 | .75 | 10.56 |
| | $\chi^2$ (5) = 9.66 ($p$ = .10)<br>Goodness of Fit = .96 | Adjusted Goodness of Fit = .88<br>Composite Reliability = .88 |

**Table 9:** (continued) Results of measurement modeling: Planning system constructs.

| Item | ML Estimate (λ) | *t*-Value |
|---|---|---|
| **Consistency** | | |
| x26 | .58 | 7.46 |
| x27 | .81 | 11.42 |
| x28 | .85 | 12.24 |
| x29 | .83 | 11.96 |
| | $\chi 2$ (2) = 4.73 ($p$ = .07)<br>Goodness of Fit = .98 | Adjusted Goodness of Fit = .89<br>Composite Reliability = .86 |

each scale captures a unique aspect of planning system design or, alternatively stated, exhibits properties of discriminant validity. In addition, each of the $\chi^2$ values associated with the estimates of unconstrained models is low relative to its respective degrees of freedom. In all instances, the normed $\chi^2$ value is well below the suggested cutoff of 5.0. Such results suggest that the constructs contain properties of external consistency, further supporting the adequacy of measurement developed in the estimation and respecification of the individual measurement models. Observed reliabilities of indicators are virtually invariant (± .01) across the estimated unconstrained models, providing additional evidence of solution stability for this system of constructs.

The estimated correlations among planning system constructs reported in Table 10 provide an interesting insight into patterns of planning within the sampled organizations. As shown, it seems that each of the observed correlations among these planning dimensions is highly significant. The only noticeable exception is the correlation between planning flow and planning consistency. Nonetheless, this reported correlation is marginally strong (.26) and significant. Such results suggest that the process for strategic IS planning may be thought of as a continuum ranging from one extreme of high comprehensiveness, high formalization, control focused, top-down flow, high participation, and high consistency to another extreme, which exhibits opposite emphases. In other words, patterns of planning may range from an incremental approach, which de-emphasizes a structured orientation for planning to a synoptic or rational approach, which emphasizes structure and process in planning activities. These approaches to strategic planning are well developed within strategic management literature (Camillus, 1982; Quinn, 1978) and, as these correlations suggest, seem applicable to strategic planning processes within IS.

## Measurement Modeling: Planning Effectiveness

Planning effectiveness measures the influence of the planning activity on broader organizational-level criteria. In other words, this construct is not a particular measure of planning system success but is instead a state that should, but may not always, follow successful planning activities. In accordance, the seven items hypothesized as parallel measures of this construct are cast on a 7-point Likert scale anchored by the phrases *strongly agree* and *strongly disagree*. As shown in Table 11, fit measures as well as parameter estimates suggest that the hypothesized

**Table 10:** Results of discriminant validity tests: Planning system constructs.

| Test | ML Estimate | *t*-Value | Constrained Model $\chi^2$ | Unconstrained Model $\chi^2$ | $\chi^2$ Difference |
|---|---|---|---|---|---|
| Comprehensive with... | | | | | |
| Formalization | .70 | 12.38*** | 146.29 (35) | 82.58 (34) | 63.71*** |
| Focus | .47 | 5.46*** | 119.64 (27) | 62.67 (26) | 56.97*** |
| Flow | .35 | 3.03** | 119.61 (27) | 97.64 (26) | 21.97*** |
| Participation | .43 | 5.37*** | 226.37 (35) | 89.66 (34) | 136.71*** |
| Consistency | .44 | 5.62** | 206.20 (27) | 72.33 (26) | 133.87*** |
| Formalization with... | | | | | |
| Focus | .70 | 11.13*** | 89.32 (27) | 59.23 (26) | 30.09*** |
| Flow | .37 | 3.18** | 73.56 (27) | 52.56 (26) | 21.00*** |
| Participation | .54 | 7.87*** | 230.84 (35) | 72.45 (34) | 158.39*** |
| Consistency | .55 | 7.97*** | 237.13 (27) | 105.16 (26) | 131.97*** |
| Focus with... | | | | | |
| Flow | .54 | 4.91** | 80.65 (20) | 64.71 (19) | 15.94*** |
| Participation | .53 | 7.15*** | 114.88 (27) | 59.59 (26) | 55.29*** |
| Consistency | .64 | 9.28*** | 170.37 (20) | 128.98 (19) | 41.39*** |
| Flow with... | | | | | |
| Participation | .53 | 4.74** | 92.28 (27) | 70.99 (26) | 21.29*** |
| Consistency | .26 | 1.83* | 84.01 (20) | 52.87 (19) | 31.14*** |
| Participation with... | | | | | |
| Consistency | .74 | 15.57*** | 140.95 (20) | 61.29 (19) | 79.66*** |

*$p < .01$
**$p < .001$
***$p < .0001$

model is a good fit for the item covariances observed in the sample. The observed $\chi^2$ is 23.66 ($df = 14$; $p = .05$), the GFI is a rather high .93, and AGFI is .86. RMSR is .04, and all indicator reliabilities are sufficiently high and statistically different from zero. The residual matrix contains no values significantly different from zero, lending further support for the fit of the hypothesized model. The calculated composite reliability of this construct is a strong .89, suggesting that the items of the developed scale sufficiently capture the variation of this latent variable.

### Structural Equation Modeling: The Strategic Coalignment of Planning System Dimensions

As developed earlier, the strategic coalignment of planning system dimensions can be modeled within the empirical framework of higher order factor analysis. As hypothesized, the first-order factors of comprehensiveness, formalization, focus, flow, participation, and consistency should be consistent and mutually dependent in their prediction of planning effectiveness. The baseline or "direct effects" model for establishing the existence of strategic coalignment implies that each dimension

**Table 11:** Model fit statistics of planning effectiveness.

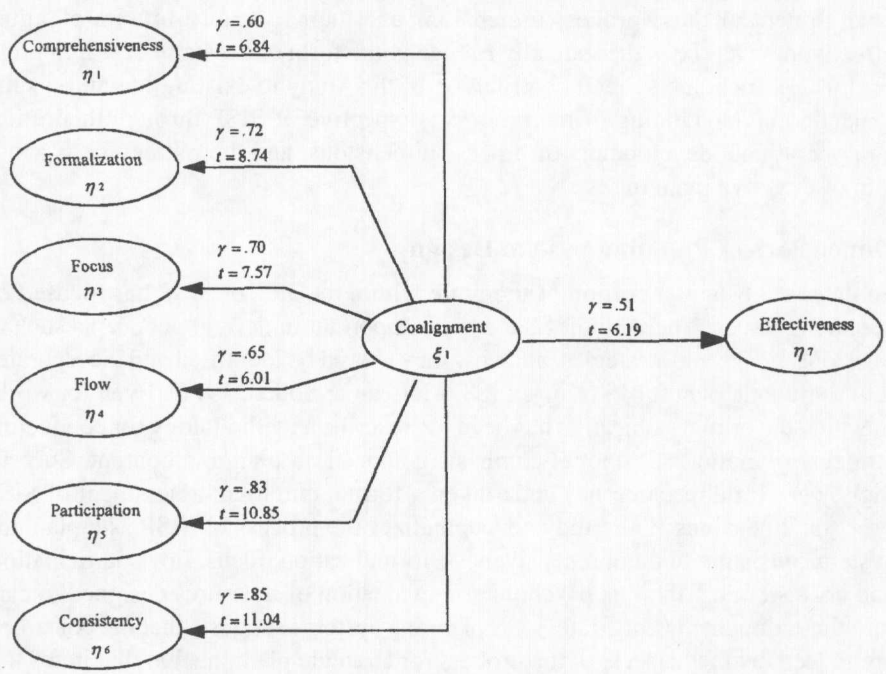
| Parameter | ML Estimate ($\lambda$) | $t$-Value |
|---|---|---|
| y1 | .72 | 9.88 |
| y2 | .83 | 12.18 |
| y3 | .76 | 10.66 |
| y4 | .77 | 10.87 |
| y5 | .77 | 10.88 |
| y6 | .74 | 10.22 |
| y7 | .58 | 7.53 |

of the strategic IS planning system has a direct causal influence on planning system contribution. This baseline model was estimated using observed covariances among construct indicators. The observed $\chi^2$ for the baseline model is 890.83 ($df$ = 574). The hypothesized or alternative factor structure posits a second-order factor, which governs the correlations among the first-order factors of planning system design and is directly related to planning system success. The theoretical interpretation of this second-order factor is coalignment or internal consistency among the process characteristics of the planning system. In accordance, this hypothesized model was estimated using observed covariances of construct indicators. The observed $\chi^2$ for the coalignment model is 959.63 ($df$ = 588). Adjusting this value for degrees of freedom results in a normed $\chi^2$ of 1.63, indicating good overall fit and no evidence of model overfitting. Formal comparison of the $\chi^2$ values between the baseline and coalignment models results in a target coefficient of .93. This value suggests strongly that the direct effects model be rejected in favor of the more parsimonious coalignment model.

Figure 2 illustrates the structure of the coalignment model and contains estimated coefficients and associated $t$-values of paths among constructs. As shown, all standardized estimates between planning system dimensions and coalignment are positive and of high magnitude. In essence, these paths represent the measurement of internal coalignment by the first-order constructs. Therefore, their magnitude and statistical significance provide empirical evidence of convergent validity and unidimensionality for the second-order construct. In turn, these results provide additional motivation for acceptance of this model as an accurate depiction of the structure underlying the covariances of the first-order constructs. This structure implies that each of these planning system dimensions is a distinct but mutually dependent aspect of the strategic planning process for information systems.

As expected, the path estimate between coalignment and planning contribution is moderately strong and positive. This implies that as planning systems tend toward a coalignment of rational adaptation (Figure 1), higher levels of planning success are likely. A final metric of model efficacy, the coefficient of determination, is a very strong .90, suggesting that a large amount of variation among the observed covariances is captured by the structural equations. In sum, these results strongly support the conceptualization of strategic planning systems across the hypothesized dimensions and the existence of a normative coalignment structure, which mirrors theoretically developed profiles of rational adaptive or "hybrid"

**Figure 2:** Internal coalignment model.




Note: In general, $t$-values greater than |2.00| are considered significant at the $p < .05$ level (Jöreskog, 1993).

models of strategic planning. The overall implication of the reported effects is that the structure (or coalignment) of the planning dimensions is a more effective predictor of planning contribution that any single dimension or selected subset. In sum, the research proposition set forth in this study seems strongly supported by the empirical evidence. The final sections reconcile these findings with previous theoretical and empirical work, and highlight some potential limitations of the study.

## SUMMARY, IMPLICATIONS, AND LIMITATIONS OF RESEARCH FINDINGS

Although there is currently a lack of empirical work that examines process and success dimensions of SISP, there is no shortage of theory regarding these phenomena. In addition, there is general agreement among observers that literature within the area of strategic management provides a useful source of reference for conceptualizing and operationalizing aspects of SISP. Therefore, studies within the area of SISP need not be exclusively exploratory. In fact, given the large amount of theoretical work and case studies, theory testing is needed as a mechanism of reinforcement or rethinking within this literature base. In accordance, the orientation of this study is one of deductive theory testing. In essence, process dimensions of planning systems for SISP have been derived and operationalized from the literature bases of IS and strategic management. Further, the expected structure or coalignment of these process dimensions and their relationship with planning effectiveness has been theoretically framed in the form of a testable research proposition. As such, the general contribution of this study to existing literature is the expanded understanding of the process perspective of SISP through theoretical and operational development of process dimensions, and their structure as a system of effective planning.

## Dimensions of Planning System Design

To date, a substantial portion of literature within the area of SISP has focused on "content" issues. These studies have been important in defining concepts such as missions, goals, and strategies, and how they should be identified and incorporated into a strategic plan for IS (King, 1988; McLean & Soden, 1977). Even for works in which the primary objective has been to prescribe a methodology for conducting strategic planning, substantial emphasis is placed on planning content. Surprisingly, very little research has undertaken a formal empirical assessment of SISP process dimensions. This study conceptualizes the process of SISP as a planning system consisting of comprehensiveness, formalization, focus, flow, participation, and consistency. Rigorous psychometric evaluation of measures designed to capture these dimensions of strategic IS planning systems suggests that the constructs are indeed distinct aspects of the process for strategic planning and that items that measure the constructs are internally consistent and unidimensional. These results lend credence to the concept of planning systems within the context of SISP and confirm many theoretical aspects of planning process dimensions developed in previous literature. The theoretically derived content domain and empirically tested construct validity of these process dimensions also provide a sound foundation for structuring dialog in the area in addition to an operational basis for conducting future research endeavors.

## Internal Planning System Coalignment

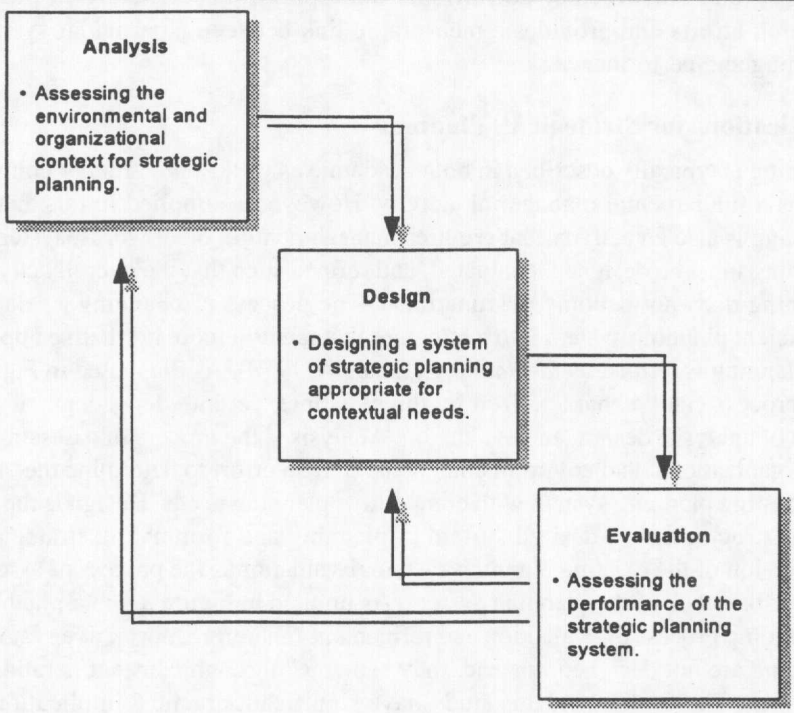
Among the design dimensions developed in this study, theory suggests that systems of *rational adaptation* will be directly related to planning effectiveness. This structure implies that the planning system should exhibit rational planning tendencies of extensive alternative generation and solution search, formalized procedures and policies for planning, a focus on control, and top-down planning flow. It should also exhibit adaptive tendencies of wide participation profiles and high levels of planning consistency. In sum, the planning system should be a structured process of opportunity search that "adapts" through consistent feedback and wide participation. The results of this analysis confirm the existence of this internal planning system coalignment and further suggest that the rational adaptive model of planning system design is directly related to planning effectiveness. This finding tends to confirm recent theoretical and empirical work within strategic management and IS that suggests that successful strategic planning systems contain aspects of both formalism and incrementalism. In a more direct sense, this finding suggests that successful systems for SISP are structured, ongoing processes of planning and evaluation. In sum, the concept of internal coalignment as developed in this study adds further definitional and operational structure to previous research efforts and provides a measurable link between a particular system of planning and performance.

## Implications for Strategic IS Planning

Planning is typically described in both academic as well as practitioner communities as a fundamental managerial activity. However, as implied in this analysis, planning is also an activity that requires management. In other words, systems for planning must be designed, evaluated, and refined such that the overall activity of planning does not become dysfunctional. The process of changing a relatively inefficient planning system into a structure that meets a more normative approach for planning is termed *meta-planning* (Emshoff, 1978). As illustrated in Figure 3, this process can be characterized by three distinct, yet interdependent, subprocesses of analysis, design, and evaluation. Analysis is the process of assessing both the organizational and environmental context in an effort to determine the "fit" of the existing planning system with competitive planning needs. Design is the process of structuring the desired system of planning and formulating strategies for conversion of the existing planning system. Evaluation is the process of assessing the performance of the planning system. As implied in Figure 3, meta-planning is an ongoing process of evaluation and refinement. Therefore, normative systems of planning are not designed; instead, they "emerge" through constant iteration and feedback. The findings of this study have significant practical implications for guiding managers through each of the subprocesses associated with meta-planning. In addition, the framing of SISP as a structure of process dimensions that may be influenced through the process of meta-planning has significant research implications for those developing research agendas in the study of SISP as an evolving system of management.

Although not directly addressed by this study, a potentially interesting implication of process coalignment may be that emergent systems of planning should reflect the environmental and organizational context within which they function. In other words, although the results of this study imply that effective systems of planning tend toward a rational adaptive model, the structuring of planning systems within individual organizations may call for "situational design." A useful starting point for assessing planning system fit is the external competitive environment of the firm. Relevant considerations may include the complexity of the environment (number of competitors, number of products) as well as the dynamism of the environment (changing competition, changing consumer tastes). Together, these phenomena provide a means of determining the amount of uncertainty that may be inherent within the strategic decision process. High environmental uncertainty may signal a need for planning systems that are structured yet able to gather information from a variety of sources. This context may also require a planning process that is capable of refining strategic direction in light of changing environmental conditions. Absence of this "fit" may lead to strategic decision making that is based on incomplete information or adherence to a strategic plan that is no longer appropriate. Environments of low uncertainty conversely may be conducive to less

**Figure 3:** The process of meta-planning.




structured and less adaptive systems of planning. In these instances, an absence of fit may lead to excessive planning and, subsequently, to dissatisfaction with the return on resources devoted to the planning system.

Similar to external environmental context, the internal organizational context of structural complexity, strategy, and technological infusion should be objectively reconciled with existing systems of planning. Structural complexity can be characterized by the amount of formalized rules and policies for directing organizational activities as well as the amount of centralization inherent in organizational decision processes. High levels of both formalization and centralization are characteristic of structurally simple organizations. Opposite structural tendencies are characteristic of structurally complex organizations. Organizations that are structurally simple may require a planning system that is structured, yet able to gather and route information to top corporate decision makers. If planning systems are unstructured or unable to accurately sense changes in the competitive environment, top-level managers may forge strategy based on erroneous assumptions. Further, the planning system may not favorably align with other formalized systems of management, thereby limiting its usefulness. In structurally complex environments, systems of planning that are more incremental may be required. In such contexts, planning activities and decision making are likely to be diffused across a variety of business units, departments, and/or managers. Therefore, an ill-fitted system of high structure and high consistency may not complement existing systems of management and control. These considerations within the analysis phase of meta-planning challenge IS managers to assess the fit of SISP with respect to other organizational systems of planning and management. For researchers, the challenge is to identify contextual and organizational factors that influence patterns of planning system coalignment. The theoretical and operational aspects of SISP developed in this study provide a useful foundation for such efforts.

Upon assessment of organizational and environmental contexts as well as the existing system of planning, the focus of meta-planning shifts to the design of a system that is appropriate for organizational needs. In other words, the task becomes one of conversion from an existing system of planning to a normative or "best fitting" system of planning. As strongly suggested by this study, high performing systems of planning contain aspects of rationality as well as aspects of adaptability. Therefore, the design process can be viewed as a search for planning activities that "build in" these desired characteristics.

The planning system dimensions developed in this study provide a useful metric for striking desired balances of rationality and adaptability. To be specific, higher levels of comprehensiveness and formalization as well as a focus on control and top-down planning flow are all indicative of planning rationality. Therefore, the scales associated with each of these dimensions provide a useful means of structuring behaviors closer to a desired norm. Higher levels of comprehensiveness are manifest through exhaustive information gathering, little trial and error in decision making, and exhaustive examination of alternatives. Higher levels of planning formality are indicated through structured methods or procedures, invariance in planning activities over time, and written guidelines or formal documentation for conducting planning. An SISP system focused on control is characterized by extensive budgeting, tight integration with existing organizational financial systems, and a lack of creativity in the planning process. Finally, top-down planning flow is characterized by high levels of top management involvement in strategic planning, the initiation of strategic planning by top managers, and a role of endorser versus formulator among top-level managers. In essence, levels of rationality can be incorporated into the existing planning system through appropriate emphasis along all indicators of any or all of these planning design dimensions.

Adaptability is built into the planning system through increased levels of participation and consistency. Indicators of participation include the number of participants involved in SISP, the diversity of representation across managerial hierarchy, and the diversity of representation across functional areas. Planning consistency is manifest through the amount of evaluation and review of strategic plans, the amount of actual adjustment in strategic plans, and the frequency of scheduled meeting regarding SISP. In accordance, desired levels of planning adaptability can be incorporated into existing systems of planning through emphasis along all indicators of these dimensions. It is the combination or coalignment of both rational and adaptive planning dimensions that gives the planning system a structure and, most important, determines the fit of the system to context. This study strongly implies that dimensions characteristic of rationality and adaptation are interdependent in successful planning systems. Therefore, in order to realize higher levels of one dimension, higher levels of activity along other dimensions may be necessary. For example, high levels of comprehensiveness require extensive information gathering and generation of numerous alternatives. These inputs may be provided through broad participatory profiles across departments and managerial levels, as well as a formalized procedure of planning, which is designed to systematically assess numerous planning issues.

A continuous activity associated with meta-planning is formal evaluation of the strategic planning system. Unfortunately, the contributions of managerial activities such as planning are many times difficult to quantify in practice. Yet, for the activity of planning to be formally and accurately evaluated, desired outcomes must be constantly reconciled with realized outcomes. In many contexts, a planning system may fail to evolve because no formal reconciliation of its performance-to-objectives is undertaken. This study has shown that strategic planning effectiveness can be captured through aspects such as its benefits relative to inputs, contribution to improved decision making, and inputs to the decision process of top management. Managerial planners should find the scales associated with this effectiveness dimension a useful tool for rationalizing the process of planning as well as refining existing systems of planning.

A final consideration in the process of meta-planning is the development of strategies for conversion. This may be especially problematic for organizations in which the culture of planning is inconsistent with that of a "best fitting" SISP system. In general, the task of the planning system designer becomes one of creating a "felt need" for change, and acquiring the resources and support necessary for successfully implementing the change. Again, the developed design dimensions coupled with a thorough assessment of organizational context can provide a means of fulfilling this daunting task. To be specific, design dimensions and relevant contextual dimensions can be organized as a grid that illustrates the current and normative profile of the strategic IS planning system. Using the scales of dimensions that need refinement, a general estimate of required resources for realizing a normative process of planning can be formulated. Although this tool may not solve all the problems that might occur during conversion, it does provide a quantitative basis for securing both political and resource commitments from top management. Within IS research, a promising field of inquiry may lie in examining how managers orchestrate the transition from dysfunctional systems of planning to systems that are better fitted to the needs of the organization.

## Limitations

Consistent with all studies that address managerial processes, this research has attempted to bring a theoretical and operational definition to a rather complex concept. Such endeavors are ambitious in nature and therefore contain some inherent limitations. Perhaps the most significant potential limitation of the present study is the range of developed constructs for the process of SISP. In general, no claim is (or can be) made by this study to have captured every aspect of this rather complex phenomenon. To its credit, the research design of this study has incorporated multiple rounds of theory building through literature review and expert opinion. In addition, a rigorous methodological approach of theory testing has been adopted, which seems to confirm the adequacy of measurement. However, no psychometric technique can adequately address the completeness or breadth of measurement.

Therefore, it is entirely possible that other process dimensions of SISP exist but are not conceptualized in the presented model.

A second potential limitation concerns the sample utilized in this analysis. As noted, the sampling method of this study is that of convenience. Our survey was targeted to organizations that were likely to have defined processes for SISP and senior executives with vested interest in process outcomes. Although the utilized sampling frame has been widely used in similar studies and contains organizations that likely participate in the activity of interest, no claim of external validity for this study's findings can be made. Instead, these findings can be generalized only to the population of firms within the sampling frame. This state of affairs in no way renders the results of the study irrelevant or limited. The firms within the sampling frame are members of either the Fortune 1000 manufacturing and/or Fortune 1000 service groupings, and are typically the entities of most interest in IS research due to their technological sophistication. However, the sample is limited to U.S. organizations and is biased toward larger manufacturing and service entities. Therefore, generalizing the observed patterns of planning and success to organizations of other nations or beyond the sampling frame may be problematic.

Other possible limitations of the study are potential response bias associated with the "single informant" and lack of model refinement through independent sample testing. Within this study, a single organizational respondent was used in this analysis as an informed source of information regarding levels of IS planning success. Although such practice is typical of IS survey research (Pinsonneault & Kraemer, 1993), it is by no means an ideal method of data collection. Multiple informants and structured methods of triangulation are perhaps the best method of obtaining the most accurate data regarding organizational properties. However, such methods potentially limit the number of issues that can be addressed and also limit the amount of useful data that can be collected. Nonetheless, possible biases associated with self-reporting by IS managers must be considered when interpreting the results of this study.

Finally, "true" confirmation of theoretical models is best obtained through model re-estimation on an independent or holdout sample. Due to the sophistication of the models examined in the present study (large number of indicators, factor complexity), re-estimation through a holdout sample is not feasible. Therefore, although the findings seem strong in terms of content and construct validity, the results of this study must be viewed as preliminary and in need of further confirmation. In addition, it should be noted that the findings of this study suggest that effective systems of planning tend to mirror a rational adaptive model. The presence of environmental and organizational contingencies may certainly alter the "ideal" pattern of strategic planning coalignment for groups of organizations within and between industries. Although potentially complex, studies that address this issue seem to be a needed and potentially valuable complement to the results reported in this research.

## Concluding Remarks

As strategic planning for information technologies gains wider acceptance among organizations, research that accurately describes and measures aspects of the process as well as contribution to organizational effectiveness will become increasingly important. Fortunately, there is no shortage of theoretical works from which these important variables can be identified. However, there does exist a shortage of studies that attempt to empirically test proposed theory and further its definitional aspects through empirical operationalization and formal testing. This analysis is, hopefully, a substantial step in that direction. Through theoretical conceptualization of strategic planning systems and their associated metrics of success, this study frames SISP within a larger framework of organizational structure, behaviors, and beliefs. This lens of analysis provides perhaps a more accurate view of the process and its state of performance within the organization. [Received: March 15, 1996. Accepted: June 6, 1997.]

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## APPENDIX A

### Coalignment: The Covariation Perspective

The operationalization of coalignment within the perspective of covariation is based on the principle of factor analysis. Such analyses seek to explain covariation among a set of indicators (items) in terms of a smaller set of first-order factors. The covariation among first-order factors is explained by an even smaller set of second-order factors. The analytical approach for establishing coalignment involves specification and testing of two competing models for explaining the covariances among first-order factors and the influence of coalignment on performance. The first of these models, a baseline or "direct effects" model, specifies no second-order factor for explaining first-order correlations. An example of this model for three posited coaligned constructs ($\xi$) and a performance construct ($\eta$) is depicted in Figure A1. As shown, this model implies that each correlated dimension directly impacts the criterion (or performance) construct. In other words, each dimension is independent of the others in predicting performance.

The alternative or coalignment model specifies a second-order factor, which governs the correlations among first-order factors. An example of this model is depicted in Figure A2. As shown, the three correlations among the first-order coalignment factors ($\phi$) are now represented by a second-order factor ($\xi$). This second-order factor is directly linked to the performance construct. It is important to note that the second-order factor is merely explaining the covariation among the first-order factors in a more parsimonious way (i.e., with more degrees of freedom). Therefore, even when the second-order factor is able to explain effectively the factor covariances, the goodness of fit can never be better than a first-order model. In the present example, three correlations among first-order constructs ($\phi_1$, $\phi_2$, $\phi_3$) are not estimated in the coalignment model. However, an additional structural parameter ($\gamma_4$) is estimated between the second-order factor ($\xi$) and the performance construct ($\eta$). Therefore, the coalignment model captures the observed covariances with two additional degrees of freedom (or two less estimated parameters) than the baseline model.

**Figure A1:** A direct effects model.

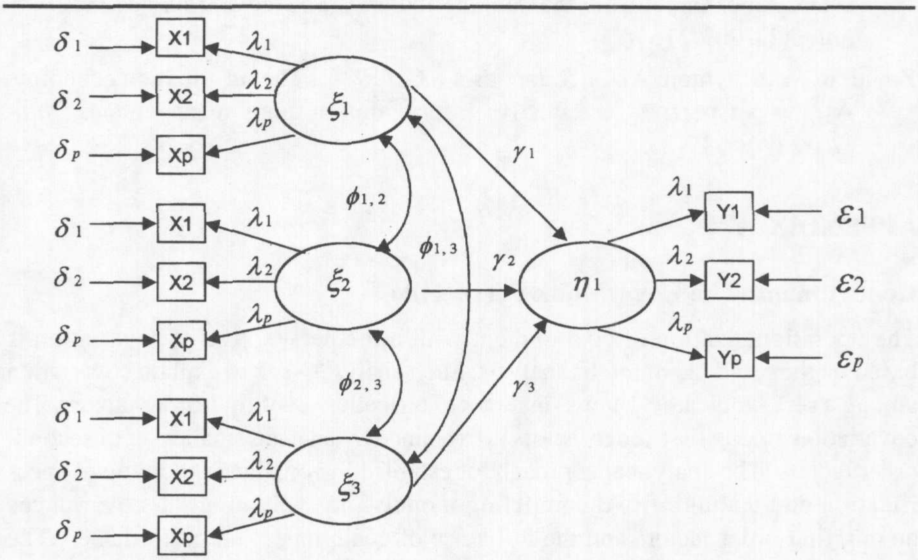
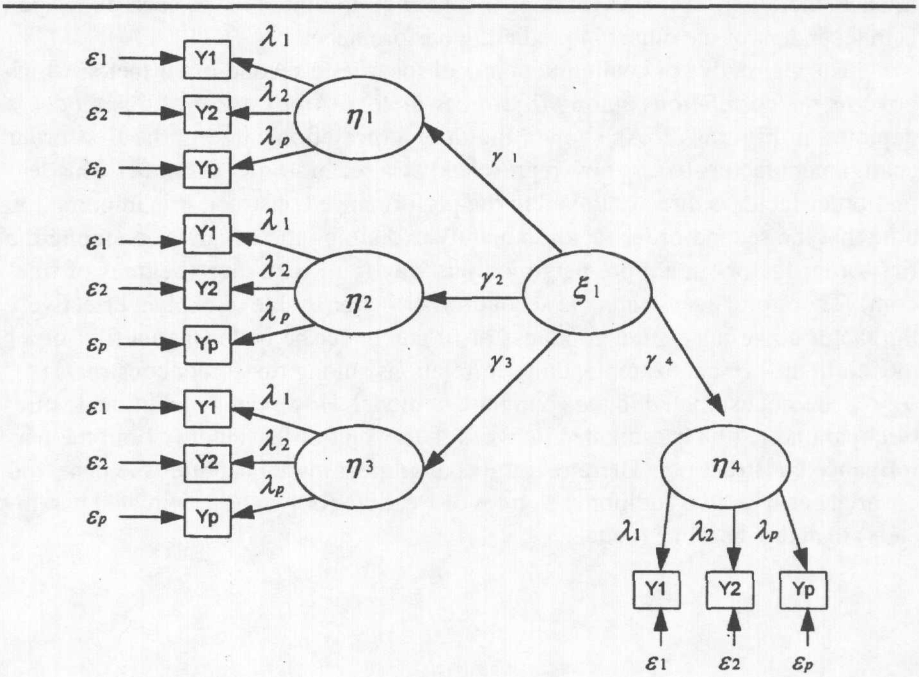



**Figure A2:** A coalignment model.



## APPENDIX B
## Sources of Data Inaccuracy and Coping Strategies

| Source of Data Inaccuracy | Coping Strategy | Tactic Utilized in Present Study |
|---|---|---|
| Lack of information or knowledge. | Identify person most knowledgeable about the issue of interest. | Field interviews. Literature review. |
| Imperfect recall. | Seek factual data from informants with higher emotional involvement. | Top-IS executives and planners surveyed. |
| Respondent not motivated to answer or answer correctly. | Attempt to motivate the informants to cooperate with the researcher. | Monetary incentive. Anonymity. "Tailored" research summary. |
| Inappropriate data elicitation procedures. | Use questions that are pre-tested, structured, and that impart an image of being rich in information content without being complex. | Pre-tested items. Pre-tested survey instrument. |

## APPENDIX C

### Check for Statistical Assumptions

In building and testing covariance models, it is important to formally assess: (1) the congruence of the data's distributional properties with the distributional assumptions of the technique, and (2) the identification of estimated models. Structural equation modeling generally is more sensitive than other multivariate techniques to departures in mutivariate normality and kurtosis. A lack of multivariate normality substantially inflates the $\chi^2$ statistic, creating an upward bias in critical values for determining significance. Model identification guarantees that the proposed model has a unique solution; that is, a separate and unique equation exists for the estimation of each path coefficient. Models that are not identified are "indeterminate." Therefore, resulting estimates are only one of an infinite number of feasible solutions.

Multivariate normality (the combination of two or more variables) implies that the individual variables are normal in a univariate sense and that their combinations are also normal. Therefore, if a variate is multivariate normal it is also univariate normal. However, the reverse may not always be true. Because multivariate normality is difficult to test, it is recommended that univariate normality among variables be initially tested. In essence, establishing univariate normality among a collection of variates helps gain, though not guarantee, multivariate normality. Such testing can be accomplished through examination of the moments around the mean of each variate's distribution. If a distribution is normal, its standardized third moment is 0 and its standardized fourth moment is 3. These statistics are available in the PRELIS program, which accompanies LISREL, and were examined for each of the study's variables. In general, no serious departures in univariate normality were detected. As a further test of statistical assumptions, PRELIS reports several of Mardia's (1970) multivariate tests of skewness and kurtosis. This statistic is based on the fact that if observed variables have a multinormal distribution, then the marginal distributions of each observed variable should have the kurtosis and skew of a normal variable. If any fail to exhibit the kurtosis and skew of a normal variable, then the multivariate distribution cannot be multinormal. Checks of these statistics for the variables of this study also revealed no serious departures from multivariate normality or excessive kurtosis.

### Model Identification

As structural models become complex, there is no guaranteed approach for ensuring that model identification has been obtained. However, there are a number of diagnostics that can be utilized in gathering evidence of identification. Perhaps the most readily obtainable measure comes from the LISREL program itself. LISREL performs a simple test for identification during the estimation process and alerts the user of possible identification problems. However, as noted by Jöreskog and Sörbom (1989), this test is not robust in capturing all instances of unidentified models. In all models estimated in the present analysis, no such warnings were observed.

Another method of testing identification involves multiple estimation of the structural model with differing starting values. Programs such as LISREL, which estimate parameters of structural models, provide the researcher with a means of specifying an initial value for any coefficient. If a starting value is not specified, the program automatically computes them through likelihood or least-squares techniques. If the model is identified, the solution of each model should converge at the same point each time. Such an approach was undertaken in each of the estimated models of this analysis. In all cases, solutions converged at the same point and were identical, providing strong evidence of model identification.

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