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PLANNING SYSTEM SUCCESS: A CONCEPTUALIZATION

AND AN OPERATIONAL MODEL

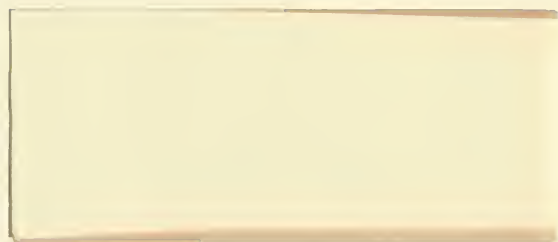
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This paper is based on data obtained from a larger research project conducted in early 1984 by the authors in collaboration with Jonn C. Camillus, Graduate School of Business, University of Pittsburgh.

PLANNING SYSTEM SUCCESS: A CONCEPTUALIZATION
AND AN OPERATIONAL MODEL

Abstract

Research on strategic planning has been handicapped by lack of an appropriate operationalizing scheme for measuring the success of planning systems. In this paper, an operational model for measuring planning system success is developed in terms of two interrelated dimensions -- improvements in the capabilities of the planning system and extent of fulfillment of key planning objectives. Multiple items reflecting these dimensions are proposed. Construct validity of the two dimensions are evaluated by applying Jöreskog's analysis of covariance structures approach on data on the planning practices of 202 strategic planning units. Validated measurement schemes for the two model dimensions are offered for use in future research efforts on strategic planning effectiveness.

KEY WORDS: Planning systems, strategic planning, measurement models, scales for measuring strategic planning effectiveness, strategic management.

Formal approaches to strategic planning occupy a central role in the development of the strategic management field (Schendel and Hofer, 1979). For more than a decade, researchers have been focusing their attention on the financial payoffs from formalized approaches to strategic planning. But the results of this rather extensive body of research (see Hofer and Schendel, 1978; and Lorange, 1979 for reviews) have been far from conclusive (Armstrong, 1982). Although many conceptual and definitional reasons can be offered for the inconclusive results, a major methodological reason appears to be the inadequate attention given to operationalizing the key concepts employed.

For example, the degree to which a firm is "formalized" in its strategic planning practices has been typically operationalized in terms of categorical variables such as "planner vs. non-planner" (e.g., Thune and House, 1970; Karger and Malik, 1975) or "programmed vs. improvised" planner (Fulmer and Rue, 1973). Such classifications have neither the required discriminatory power (Kudla, 1980) nor meet generally accepted standards of reliability and validity (Nunnally, 1978). Similarly, the benefits of strategic planning have been typically evaluated using financial criteria such as return on investment, return on equity, etc. (Thune and House, 1970), although many have emphasized the non-financial benefits (Camillus, 1975; Steiner, 1979) or the "process" benefits of planning (King and Cleland, 1978; King, 1983). As Wood and LaForge (1979) remarked, "It is time to...abandon the smorgasbord use of financial measures as dependent variables and to try to match up the appropriate performance criteria with the primary objectives of the organization being studied" (p. 526). In general, it is recognized that more rigorous operationalizations of the complex constructs related to strategic planning

systems are a necessary prerequisite for theory development and testing in this area.

Increased attention to the concept of planning system success can be defended on theoretical, empirical, and pragmatic grounds. Theoretically, the concept is important since notions of "administrative success" underly most discussions of managerial processes in large complex organizations. As we move towards a theory of formal planning and administrative systems which is capable of not only explaining variations in managerial actions across contexts but also predicting likely outcomes of important actions, it becomes necessary to define the concept of planning system success. Empirically, this concept occupies an important role in research studies by serving as a more relevant dependent variable than surrogate indicators such as ROI or ROE. This concept has also pragmatic significance since organizations continue to evaluate the role played by their systems in the overall strategic management processes, with a view to adapting the systems' role and design to accomodate changing conditions.

Given its importance to the strategic management field, and recognizing that a broader conceptualization (with a valid measurement scheme) is needed, this paper describes a study aimed at developing and testing an operational model of planning system success. Development of the two-dimensional conceptual model with corresponding operational indicators is discussed first. Subsequently, the analytical details and results of testing this model using Jöreskog's analysis of covariance structures approach on data on the strategic planning practices of 202 planning units are presented. Finally, the potential use of this model for other researchers interested in furthering strategic planning systems research is elaborated.

PLANNING SYSTEM SUCCESS: A CONCEPTUALIZATION

Approaches to Evaluating Planning Systems

Multiple approaches exist for evaluating the success of planning systems. Based on the work of Cameron and Whetten (1983) in relation to organization effectiveness measurement, four different but equally important approaches can be identified as being relevant for planning system success. The first approach, termed as goal-centered judgement, seeks to assess the degree of attainment in relation to the targets. A typical question in this mode would be: To what extent are the multiple objectives of planning fulfilled? Such an approach has been stressed in the planning literature by many writers. In King's (1983) framework on evaluation of planning systems, this is termed as "effectiveness of planning," while Steiner (1979; p. 307) refers to this as "measurement against purpose."

The second approach, labeled as comparative judgement, aims to compare the effectiveness of a particular system with other "similar" systems (typically those set up in comparable organizations). The third approach is termed as normative judgement, where a relevant assessment question may be: "How does our system compare against the theoretical ideal system?" Here, the bench mark, instead of being the unique planning goals of the firm, is the general "standards of the field of planning" (King, 1983; p. 270). The fourth approach is to ascertain the degree of improvement due to certain actions taken, and is termed as improvement judgement. A typical question in such a mode of assessment is: "How much has the system

improved due to a certain action x or a set of actions (x_1 through x_n) specifically taken to improve the system?"

All these are legitimate approaches, some relevant for specific managerial contexts, while others may be relevant for varied research purposes. In the present context of developing a general operational model (i.e., a measurement scheme), a combination of the goal-centered and comparative judgement approaches using a set of context-free goals (considered to be generically important across a broad cross-section of planning systems) was selected as the most logical and appropriate. Within this broad evaluation approach, a two dimensional conceptual model of planning success is proposed in this paper. The model is discussed in detail next.

A Two-Dimensional Model

One of the model dimensions reflects the extent of improvement in the Capabilities of the system to effectively support the key activities of strategic management and the other focuses on the degree of fulfillment of planning objectives. These two dimensions can be conceptualized as broadly representing the "means" and the "ends" of planning system success respectively. Figure 1 is a diagrammatic representation of the model.

INSERT FIGURE 1 ABOUT HERE

Improvement in the Capabilities of Planning System (CAPABILITIES). A planning system can be visualized as an administrative system which provides support for the efficient and effective management of the enterprise. The capabilities of the system then become the key influences on its effectiveness. In a review and critique of the appropriateness of

various measures of planning effectiveness, Lorange noted that, "... many [or these] measures were based on some surrogate variable, when it probably would have been more relevant to measure effectiveness as a function of how well the formal planning system's capabilities were able to meet the specific planning needs ..." (1979, p. 230, emphasis added).

If one takes the above view strictly, the system's capabilities should be considered in relation to the specific needs of the context. However, a broad conceptualization of a system's major capabilities is developed here for large-scale comparative studies by focussing on a few generic capabilities of planning systems, which have been emphasized in normative and descriptive writings on strategy and strategic planning. These capabilities are required of every formal administrative system. They include, but are not limited to, the system's ability to anticipate surprises and crises (Ansoff, 1975), its flexibility to adapt to a dynamic environment (Thompson, 1967), its ability to facilitate effective management control (Anthony, 1965; Lorange & Vancil, 1977), its role in the identification of new business opportunities (Steiner, 1979), its ability to enhance creativity and innovation (Taylor & Hussey, 1982), and so forth.

Based on a review of the literature on strategic planning, 12 key capabilities tapping the above requirement areas were identified. The 12 items of CAPABILITIES (with appropriate theoretical/literature support) are provided in Table 1.

INSERT TABLE 1 ABOUT HERE

Extent of Fulfillment of Planning Objectives (OBJECTIVES). While the degree of improvement in the system's CAPABILITIES reflect the "means" or the process dimension of the concept of planning system success, this dimension is intended to tap the "ends" or outcome benefits of planning. Six key objectives of planning constitute the OBJECTIVES dimension.

Planning aims to fulfill both tangible and intangible objectives (King & Cleland, 1978; Lorange & Vancil, 1977; Steiner, 1979). Using a goal model of planning success or planning effectiveness, the ultimate success of strategic planning can be expected to be reflected in the extent of fulfillment of key planning objectives. These include predicting future trends (Paul, Donovan and Taylor, 1978), enhancing management development through the educational value of the planning process (Hax and Majluf, 1984), evaluating alternatives based on more relevant information (King and Cleland, 1978), and bringing about improvements in financial performance. Here again, the focus was on identifying context-free planning objectives with a balanced mix of both financial and non-financial objectives. The list of six important planning objectives (with the appropriate theoretical/ literature support) is shown in Table 2.

INSERT TABLE 2 ABOUT HERE

PLANNING SYSTEM SUCCESS: AN OPERATIONAL MODEL

The conceptual model of planning system success, with its two interrelated dimensions, as developed above would not be operationally useful unless it is tested against data to establish its measurement

properties. Hence, an empirical test was undertaken to validate the model. The specific research questions to be addressed in the context of testing the operational model were: (a) Can the two dimensions be treated as being independent? and (b) Does the CAPABILITIES dimension have a positive and significant effect on the OBJECTIVES dimension?

These questions were addressed using Jöreskog's analysis of covariance structures (Jöreskog, 1969; 1971; Jöreskog and Sörbom, 1978; 1979). Basically, analysis of covariance structures enables one to test the degree of correspondence between a theoretical model and its operationalization, and can be used to assess reliability and different components of validity such as convergent and discriminant validity, predictive validity, etc. This analytical scheme has been employed to test a variety of measurement models in marketing (Bagozzi, 1980) and in other disciplines (Fornell, 1982). Increasingly, it is also being adopted in strategy research for testing measurement models (Farh, Hoffman, and Hegarty, 1984) as well as substantive relationships (cf. Phillips, Chang, and Buzzell, 1983).

Data for Model Testing

The data for this study were drawn from a larger project on the changes and effectiveness of strategic planning systems of large North American corporations. Data were collected using a structured self-administered mail questionnaire from 202 planning units between February and April 1984. This represents a response rate of about 33 percent of the 600 target planning units randomly selected from the Fortune 500 list of manufacturing and Fortune 500 list of service firms.

Content validity of the dimensions CAPABILITIES and OBJECTIVES was assured as follows. Prior to questionnaire finalization, the list of their constituent indicators was presented to a group of 15 senior planning

executives who participated in a seminar on strategic planning at the University where the research was conducted. They were invited to comment on the exhaustiveness of coverage as well as context-independent of the items. This exercise confirmed that the lists were reasonably comprehensive and that the item descriptions were unambiguous and clear.

Overview of Model Testing

The testing of the operational model involved two steps. First, the adequacy of the two dimensions was independently assessed. Next, the relationship between the two dimensions was evaluated. Four models were evaluated in this two-step process. Model 1 was aimed at ascertaining the extent to which the 12 indicators reflect the theoretical dimension CAPABILITIES. Model 2 was a similar examination of the theoretical dimension, OBJECTIVES. Thus, Models 1 and 2 explored the convergent validity of the two dimensions. Model 3 examined whether these dimensions are indeed distinct dimensions, and this is a test of discriminant validity. Finally, Model 4 examined the nature of the relationship between the two dimensions, i.e., it tested the predictive validity of the two dimensions. The analytical details of testing these models (with the results) are provided below.

Unidimensionality and Convergent Validity of the CAPABILITIES Dimension

Following Jöreskog's work and the conventions of structural equation modeling (e.g., Bagozzi, 1980; 1981), the model for unidimensionality and convergent validity is written as:

$$X = \Lambda\xi + \delta \quad (1)$$

where X is a vector of p measurements, ξ is a $k < p$ vector of traits, δ is a vector of unique scores (random errors), and Λ is a $p \times k$ matrix of

factor loadings. With the assumptions of $E(\xi) = E(\delta) = 0$; $E(\xi\xi') = \phi$, and $E(\delta\delta') = \psi$, the variance-covariance matrix of X can be written as

$$\Sigma = \Lambda\phi\Lambda' + \Psi \quad (2)$$

where Σ is the variance-covariance matrix of observations, ϕ is the matrix of intercorrelations among the traits, and ψ is a diagonal matrix of error variances (θ_{δ}) for the measures. For Model 1, $k=1$, and $p=12$ as shown in Figure 2.

INSERT FIGURE 2 ABOUT HERE

Maximum likelihood (ML) parameter estimates for Λ , ϕ , ψ , and a χ^2 goodness-of-fit index for the null model implied by equations (1) and (2) can be obtained from the LISREL Program (Jöreskog and Sörbom, 1978). The probability level associated with the given χ^2 statistic indicates the probability (p) of attaining a larger χ^2 value given that the hypothesized model (Figure 2) is supported. The higher the value of p , the better is the fit, and as a rule of thumb, values of $p > 0.10$ are considered as indications of satisfactory fit (Lawley and Maxwell, 1971). Since exclusive reliance on the χ^2 statistic is criticized for many reasons (see, Fornell and Larcker, 1981), researchers increasingly complement this statistic with Bentler and Bonnett's (1980) incremental fit index Δ --which is an indication of the practical significance of the model in explaining the data. The Δ index is represented as follows:

$$\Delta = (F_U - F_k)/F_U \quad (3)$$

where F_U = chi-square value obtained from a null model specifying mutual independence among the indicators, and F_k = chi-square value for the specific model. The general rule of thumb is that Δ should be greater than

0.90 (Bentler and Bonnett, 1980) although some argue that it should ideally exceed 0.95 (Bearden, Sharma, and Teel, 1982).

The model specified in Figure 2 was estimated using LISREL, and the resulting statistics were: χ^2 (df: 54) = 189.16; $p < 0.01$, and $\Delta = 0.83$. Although these numbers imply that the model should be rejected, an examination of the residual matrix¹ (the difference between the sample variance-covariance matrix and the model-fitted variance-covariance matrix) indicated that the model fit could be improved by allowing correlated measurement errors as long as theoretical justifications can be offered for such specifications.

Theoretical justifications can be provided for only eight sets of covariation in error terms, where the entries in the residual matrix exceeded 0.10. These are indicated by (2,1), (3,2), (10,2), (8,3), (6,4), (8,5), (12,6) and (8,7), where the numbers refer to the corresponding indicators in to Table 1. By referring to Table 1, one can readily see that each of these sets of items shares a common theme. As an illustration, items 2 and 1 both refer to environmental shifts, while items 3 and 2 reflect a firm's ability to exploit opportunities presented in the environment by adapting to environmental changes. The rationale for introducing such correlated errors into the model is that the original assumption of treating the 12 indicators as independent of one another may be too restrictive, and may not truly represent the underlying model structure (Jöreskog and Sörbom, 1979).

¹Correlation matrix and residual matrices are available on request from the first author.

The model presented in Figure 2 was therefore re-estimated by incorporating the additional specification of these eight sets of correlated errors. This model provided a better fit to the data, with the associated model statistics of $\chi^2(df:46) = 62.27$; $p = 0.06$; $\Delta = 0.94$. The χ^2_{df} value was 126.89, statistically significant at $p < 0.01$. A p-value of 0.06 indicates a "marginal" fit and has been previously used to accept models (cf. Bagozzi, 1981; Phillips, Chang, & Buzzell, 1983). The p-value of 0.06, a significant value of χ^2_{df} , and Δ index of 0.94 all taken together provide strong support to accept this revised model (i.e., Figure 2 with the additional specification of eight sets of correlated errors). Table 3 presents a summary of the model statistics and the ML parameter estimates for the indicators.

INSERT TABLE 3 ABOUT HERE

As examination of Table 3 indicates, all the factor loadings are significant, using the t-values of the ML estimates. T-values (calculated as ML estimates divided by standard error), greater than 1.96 are generally regarded as evidence for the statistical significance of the parameter (Bagozzi, 1980). Additionally, ML estimates can be used to calculate the composite measure reliability (ρ_c) of the dimension (Werts, Linn and Jöreskog, 1974) as follows:

$$\rho_c = \frac{\sum_{i=1}^n \lambda_i^2 \text{var}(A)}{\sum_{i=1}^n \lambda_i^2 \text{var}(A) + \sum \text{Error Variance}} \quad (4)$$

Where, ρ_c = composite measure reliability; n = number of indicators, λ_i is the factor loading relating item i to the underlying theoretical dimension;

and $\text{var}(A)$ is the variance of the underlying dimension (A) explained by the indicators.

In a practical sense, ρ_c represents the ratio of trait variance to the sum of trait and error variances. ρ_c for this model was 0.887 indicating an acceptable level of measure reliability of the CAPABILITIES dimension (Werts et. al, 1974).

Unidimensionality and Convergent Validity of the OBJECTIVES Dimension

The model for the OBJECTIVES dimension is also based on equations (1) and (2), and is similar to the model for the CAPABILITIES dimension, except that $\rho=6$ (see Table 2). The measurement model is diagrammatically represented as Figure 3.

INSERT FIGURE 3 ABOUT HERE

Results for the base model were: $\chi^2(\text{df}:9) = 19.23$; $p < 0.05$; $\Delta = 0.93$. An examination of the residuals matrix indicated that the model could be improved by correlating errors between two of the indicators, viz., "evaluating alternatives based on more relevant information," and "avoiding problem areas." The revised model statistics were: $\chi^2(\text{df}:8) = 7.78$; $p < 0.50$; and $\Delta = 0.97$.² Three model criteria, i.e., a significant value of $\chi^2_{\text{d}} = 11.544$, $p < 0.01$, the model statistic's corresponding p-level > 0.10

²An alternative representation to the base model, hypothesizing that OBJECTIVES is a two-dimensional model, with financial objectives and non-financial objectives modeled as separate, but correlated dimensions. The estimation of this model yielded $\chi^2(\text{df}:8) = 18.6781$; $p < 0.17$; $\Delta = 0.930$. The difference between this model and the base model was $\chi^2_{\text{d}}(\text{df}:1) = 0.5473$, not significant. Hence the alternative model of separately specifying financial objectives and non-financial objectives was rejected.

(Lawley and Maxwell, 1971) and $\Delta > 0.95$ (Bearden et. al, 1982) are all satisfied indicating the acceptance of the model shown in Figure 3 with correlated errors between indicators 6 and 5. Table 4 presents a summary

INSERT TABLE 4 ABOUT HERE

of the model statistics, the ML estimates for the parameters, as well as the value of ρ_C for the model. All the individual model parameters are statistically significant as indicated by the corresponding t-values being larger than 1.96.

The analyses conducted thus far enable us to address the first research question, i.e., that the two dimensions can be treated as each being unidimensional. The multiple indicators chosen to reflect each construct appear to be important as indicated by the magnitude and significance levels of the λ parameters. Now we need to test that they are indeed separate dimensions. This is discussed next.

Examining Independence of the Two Dimensions

Thus far, we have treated the two hypothesized dimensions of the model separately and evaluated whether the different indicators reflect the respective dimensions or not. A rival explanation could be that the indicators of both dimensions together reflect a "super" construct, and that they should not be considered as distinct dimensions. Since the indicators have shades of common meaning, one could conceivably argue that the improvement in system's capabilities and objective fulfillment are not distinct dimensions. In other words, a test of discriminant validity is necessary for rejecting this rival explanation. In fact, the strongest

evidence of discriminant validity is obtained when maximally (conceptually) similar traits are used (Bagozzi, 1980).

Discriminant validity is achieved when the measures of each dimension converge on their corresponding true sources which are unique from other dimensions. Stated differently, it is the degree to which a theoretical dimension in a theoretical system differs from other dimensions in the same theoretical system. This will be achieved when the correlations between the dimensions (ϕ_s) are significantly lower than unity. This requires a comparison of a model shown in Figure 4 with a similar model with the correlation (ϕ_{21}) constrained to be equal to unity. A significantly lower χ^2 value for the model with the unconstrained correlation when compared with the constrained model provides support for discriminant validity. A χ^2 difference value (χ_d^2) with an associated p-value less than 0.05 (Jöreskog, 1971) supports the discriminant validity criterion. Figure 4 represents both models (i.e., constrained and unconstrained) with their model statistics.

INSERT FIGURE 4 ABOUT HERE

As indicated in Figure 4, the χ_d^2 value of 94.19, $p < 0.01$ strongly supports the discriminant validity hypothesis and thus rejects the rival explanation that the two dimensions are to be treated as one composite dimension. Figure 4 also presents the results of an additional test conducted to eliminate this rival explanation. In this test, an overall composite model represented by 18 indicators was compared with the unconstrained model of Figure 4 that they are two separate, and related

dimensions but not one composite dimension. A $\chi^2_{df:1}$ value of 104.51, $p < 0.01$ further rejects the rival explanations of a composite model. These tests provide strong support to the conceptualization of planning system success in terms of the two separate dimensions as shown in Figure 1.

Now, we proceed to test the second research question, i.e., that the CAPABILITIES dimension has a positive and significant effect on the OBJECTIVES dimension.

An Examination of the Impact of CAPABILITIES on OBJECTIVES

While a two-dimensional operational model of planning system success has been developed and tested for their unidimensionality and independence based on criteria of convergent and discriminant validity, the nature of the relationship between them has not yet been examined. This can be tested by hypothesizing that an improvement in system's CAPABILITIES will result in higher levels of OBJECTIVE fulfillment, and is termed as an examination of predictive validity. The theoretical support for expecting such a relationship can be derived from discussions on the central role of strategic planning in realizing organizational objectives (see especially, King and Cleland, 1978; Lorange and Vancil, 1977) as well as the specific notions of system's capabilities (Lorange, 1979) and strategic capability (Lenz, 1980) which influence an organization's strategic actions, which in turn results in the attainment of organizational objectives.

Predictive validity is tested using the model shown in Figure 5. The structural equation for this model is written as:

$$\eta = \Gamma\xi + \zeta \quad (5)$$

where, η = endogenous theoretical construct, Γ = matrix of structural coefficients relating exogenous theoretical construct to endogenous theoretical construct, ζ = residuals of endogenous theoretical construct.

The standardized gamma (γ) value of the impact of CAPABILITIES on OBJECTIVES is 0.63 lending strong support to the positive effect of CAPABILITIES on OBJECTIVES. The relatively high value of χ^2 (df:125) = 237.12, $p < 0.01$, $\Delta = 0.85$ indicates that there are factors in addition to CAPABILITIES which influence the fulfillment of objectives. This is consistent with the theory that many facets of strategic planning have important roles in ensuring planning effectiveness. However, since the present focus is on examining the relationship between these two dimensions, rather than modeling planning effectiveness, the focus is on the magnitude (and its associated significance) of γ_{11} and not on the overall model fit.

INSERT FIGURE 5 ABOUT HERE

DISCUSSION

In this study, we attempted to develop and test an operational model of Planning System Success. The model is based on two dimensions, (i) improvements in the capabilities of the strategic planning system (CAPABILITIES) and (ii) the extent of fulfillment of key planning objectives (OBJECTIVES). Generic and context-free indicators of CAPABILITIES and OBJECTIVES were employed to develop and test a model which can be applied in large sample studies. The specific research questions focused on whether the two dimensions can be treated as being independent and whether process benefits (CAPABILITIES) lead to outcome benefits (OBJECTIVES).

The discussion in this section focuses on four issues. First, the results provide strong support for the measurement properties of the two dimensions. Specifically, the operational model was evaluated in terms of (i) reliability criterion (ρ_c), (ii) convergent and discriminant validity (Models 1, 2, and 3), and (iii) predictive validity (Model 4). Since all these criteria were found to be satisfied, the measurement schemes presented here could either be directly employed in future research on strategic planning systems or can be used as the basis for further refinement and extensions. Such tests provide strong support for the scheme depicted in Figure 1.

Second, this two-dimensional measuring scheme for planning system success should be of value and use to other researchers interested in strategic planning effectiveness. It is believed that these operationalizations are more appropriate and valid than the use of surrogates, which have not been shown to be construct valid. Although the CAPABILITIES dimension emerged as a strong predictor of objective fulfillment, we urge that both dimensions be employed simultaneously since they represent different, but related, notions of planning success. However, measurement schemes are merely first steps towards testing substantive relationships, and by presenting a set of reliable and valid scales for planning system success, we hope that we would have stimulated researchers to address a broader, and more important, question: What are the key determinants of planning system success? Such research efforts may enable one to examine if the determinants of the two dimensions are the same or different. While this study established that the capabilities dimension is distinct from the objectives dimension, and that the first is a significant determinant of the second, further support for the

two-dimensional scheme can be derived if the determinants of these dimensions are indeed different.

The third issue relates to a limitation of the study in terms of employing a single respondent per unit of analysis. Although the respondents were senior-level managers such as Presidents, Vice Presidents - Corporate Planning, and Vice President of functional areas of large corporations (over 60% had sales in excess of \$1 billion), measurement focused at an organization-level of analysis would be better served if data were collected from multiple respondents. This is noted as an area for future research.

Finally, and perhaps, most importantly, the parameter estimates and model statistics need to be related to some of the more commonly used indices. For example, the internal consistency of the two dimensions was assessed using ρ_c , while the more common index is perhaps the Cronbach α . The values of Cronbach α for the two dimensions are: CAPABILITIES -- 0.87; and OBJECTIVES -- 0.75. They represent acceptable levels (Nunnally, 1978). In addition, it needs mention that while parameter estimates were obtained using the LISREL program (Jöreskog and Sörbom, 1978), other analytical schemes such as Wold's (1982) partial least square (PLS) estimation methods are available. Researchers are urged to compare alternate schemes prior to adopting one for their research.

CONCLUSION

By noting that an appropriate operationalization of the theoretical construct of planning system success is necessary for theory development and testing in the area of strategic planning systems, this paper developed and tested a two-dimensional measurement scheme. Based on data on the

planning practices of 202 planning units, and adopting a data-analytic framework rooted in Jöreskog's analysis of covariance structures, key measurement criteria for the operational model were found to be satisfied. This should serve as a useful guide for future strategy researchers interested testing various theoretical propositions on strategic planning effectiveness.

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TABLE 1
Key Capabilities of the Planning system^a

Indicator	Supporting Literature for its inclusion
1. Ability to anticipate surprises and crises.	Ansoff (1975, 1984)
2. Flexibility to adapt to unanticipated changes.	Ansoff (1975, 1984); Eppink (1978)
3. Ability to identify new business opportunities.	Ansoff (1965)
4. Ability to identify key problem areas.	Andrews (1971), Steiner (1979)
5. Ability to foster managerial motivation.	Hall (1977); Steiner (1979)
6. Ability to enhance the generation of new ideas.	Shank, Niblock and Sandalls (1973)
7. Ability to communicate top management's expectation down the line.	Lorange and Vancil (1977)
8. Ability to foster management control.	Anthony (1965), King and Cleland (1978)
9. Ability to foster organizational learning.	Shrivastava and Grant (1985)
10. Ability to communicate line managers' concerns to the top management.	Lorange and Vancil (1977), Steiner (1979)
11. Ability to integrate diverse functions and operations.	Grant and King (1982), Steiner (1979)
12. Ability to enhance innovation.	Taylor (1975); Taylor and Hussey (1982)

^aEach indicator was measured using a five-point interval scale ranging from much improvement to much deterioration, to capture the general trend of changes.

TABLE 2
Key Objectives of the Planning System^a

Indicator	Supporting Literature for its inclusion
1. Enhancing management development.	Hax and Majluf (1985), Steiner (1979)
2. Predicting future trends.	King and Cleland (1978), Paul, Donovan and Taylor (1978)
3. Short-term performance.	Steiner (1979)
4. Long-term performance.	Steiner (1979)
5. Evaluating alternatives based on more relevant information.	Camillus (1975), Grant and King 1982)
6. Avoiding problem areas.	Shrivastava and Grant (1985)

^aEach indicator was measured using a five-point interval scale ranging from entirely fulfilled to entirely unfulfilled.

TABLE 3

Summary Model-Testing Statistics for the CAPABILITIES Dimension

(A) Base Model

$$\begin{aligned}\chi^2(\text{df}:54) &= 189.1616 \\ p &= 0.0000 \\ \Delta &= 0.38\end{aligned}$$

(B) Model with Correlated Errors

$$\begin{aligned}\chi^2(\text{df}:46) &= 62.2686 \\ p &= 0.0551 \\ \Delta &= 0.94\end{aligned}$$

(C) ML Parameter Estimates

<u>Parameter</u>	<u>ML Estimate</u>	<u>t-value</u>	<u>Standardized Solution</u>
λ_1	1.00*	--	0.504
λ_2	0.996	7.527	0.502
λ_3	1.112	5.888	0.560
λ_4	1.293	6.406	0.651
λ_5	1.431	6.771	0.721
λ_6	1.449	6.799	0.730
λ_7	1.358	6.598	0.684
λ_8	1.209	6.171	0.609
λ_9	1.517	6.962	0.764
λ_{10}	1.239	6.281	0.624
λ_{11}	1.367	6.623	0.689
λ_{12}	1.282	6.378	0.646
ϕ_{11}	0.254	3.633	1.000

*Constrained parameter.

TABLE 4

Summary Model-Testing Statistics for the OBJECTIVES Dimension

(A) Base Model

$$\begin{aligned}\chi^2(\text{df}:9) &= 19.2254 \\ \rho &= 0.0234 \\ \Delta &= 0.927\end{aligned}$$

(B) Model with Corellated Errors

$$\begin{aligned}\chi^2(\text{df}:8) &= 7.7814 \\ \rho &= 0.4551 \\ \Delta &= 0.97 \\ \rho_C &= 0.750\end{aligned}$$

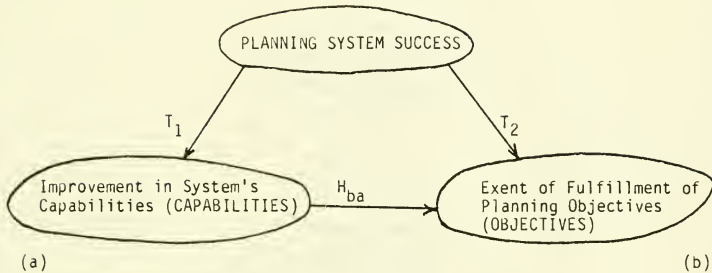
(C) ML Parameter Estimates

<u>Parameter</u>	<u>ML Estimate</u>	<u>t-value</u>	<u>Standardized Solution</u>
λ_1	1.00*	--	0.717
λ_2	0.804	6.621	0.576
λ_3	0.633	5.386	0.454
λ_4	0.927	7.334	0.665
λ_5	0.751	6.157	0.539
λ_6	0.779	6.363	0.559
ϕ_{11}	0.514	4.996	1.000

*Constrained parameter

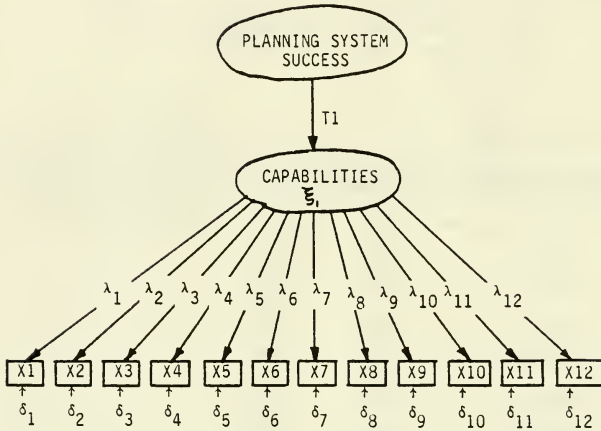
FIGURE 1

A Schematic Representation of A Two-Dimensional
Model of Planning System Success^a



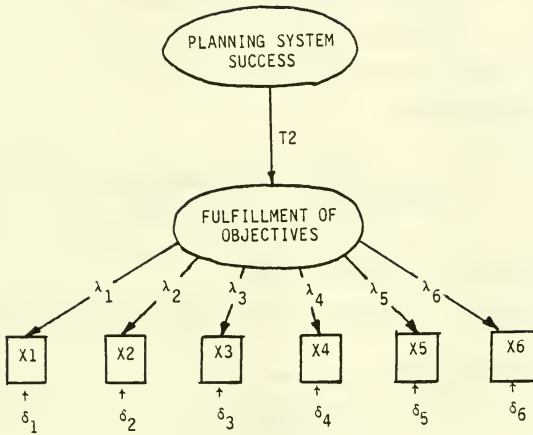
^a T_1 and T_2 indicate that the two theoretical concepts (a) and (b) have been theoretically derived from the conceptualization of planning system success (2) H_{ba} is a representation of nonobservational propositions relating antecedent concept (a) to be focal concept (b); notations are based on Bagozzi and Phillips (1982).

FIGURE 2

A Measurement Model of the CAPABILITIES Dimension^a

^aThe notations of structural equation modeling are followed in the diagram, where the latent (unobservable) variable or theoretical construct is drawn as an ellipse; observable indicators are presented as squares; measurement relations are shown as arrows; error factors are represented as arrows but without origin. λ s represent the degree of correspondence between observed indicators and unobserved theoretical construct. T_1 represents that the construct ξ is a theoretically-derived dimension of the overall planning system success conceptualization as shown in Figure 1.

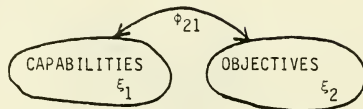
FIGURE 3

A Measurement Model of the OBJECTIVES Dimension^a

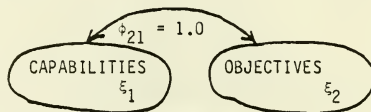
^aFor detailed explanation of the notation, see Figures 1 and 2.

FIGURE 4

Assessing Independence of the Two Dimensions

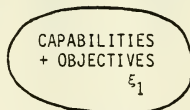
A. Unconstrained Model^a

$$\chi^2(df:125) = 247.1167; p = 0.000; \phi_{21} = 0.631$$

B. Constrained Model

$$\chi^2(df:126) = 331.3035; p = 0.000;$$

$$\chi^2_d(df:1) = 94.1868; p < 0.001 \text{ supports the unconstrained model}$$

C. Alternative Model

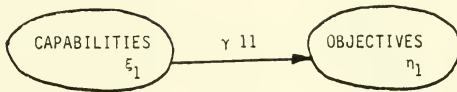
18 indicators

$$\chi^2(df:126) = 341.6312, \\ p = 0.00$$

^aOnly a skeletal diagram is drawn for schematic clarity. The respective models for the two dimensions are the same as shown in Figures 2 and 3 with relevant correlated errors discussed in the text.

FIGURE 5

An Examination of the Impact of CAPABILITIES on OBJECTIVES



$$\begin{aligned} \chi^2(\text{df}:125) &= 237.1167; \\ p &= 0.00 \\ \Delta &= 0.85 \end{aligned}$$

$$\begin{aligned} \gamma_{11} &= 0.631 \\ \text{std.} & \end{aligned}$$

^aOnly the skeletal diagram is drawn for schematic clarity; the respective models for the two dimensions are as shown in Figure 2 and 3 with relevant correlated errors discussed in the text.

BASEMENT Date Due

1970

