HOW THE INTERNAL ENVIRONMENT IMPACTS INFORMATION SYSTEMS PROJECT SUCCESS: AN INVESTIGATION OF EXPLOITATIVE AND EXPLORATIVE FIRMS[1]

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ABSTRACT

Problems impacting information systems (IS) projects are well recognized. However, there has been limited research on how a positive internal environment impacts successful IS planning implementation and, in turn, IS-oriented organizational success. This paper addresses these questions using structural equation modeling and data provided by 269 CIOs. A positive internal environment was represented by top management support of IS and business managers' participation in IS planning. This support was found to increase the likelihood of successful IS project implementation which also created the likelihood that IS would result in organizational success. Data were also tested for firms that used IS in an exploitative versus an explorative sense. Model fit for explorative firms was significantly higher. Results suggest that management behavior is vital to creating a positive IS environment for the successful project implementation and that exploitative firms may be less successful in creating such an environment. IS project planning and the absence of top management related implementation problems, but not the absence of other implementation problems, predicted IS-oriented organizational success.

Keywords: Strategic information systems planning, project performance, top management support, firm performance, structured equation modeling.

INTRODUCTION

Despite improvements in the understanding of project planning management, a majority of information systems (IS) related projects fail or are abandoned because of cost overruns, delays, and reduced functionality (74). These failures cost the U.S. economy alone in excess of $85 billion each year (21). This excludes the associated opportunity costs to businesses that rely upon the successful completion of IS for competitive advantages (44, 77).

A central role of top management is to create an internal environment that "supports and cultivates professional project management practices" (83, p. 286). This requires top management support and business managements' participation in IS planning. However, evidence of how a positive internal environment shapes the IS project planning and implementation capability to improve organizational performance has not been well established.

Another role of top management is making resource choices between two uses of IS technology — exploitative and explorative. Thus, companies may avoid risks by refining and leveraging known and existing technologies or exhibit a willingness to assume higher risks by seeking out innovative and unfamiliar systems and technologies (53). Exploitative use is characterized by greater certainty in the short-term while explorative use is characterized by higher rates of failure and realization of benefits over the long-term (18).

The exploration/exploitation dichotomy has found use as an analytical construct in various research areas including strategic management (82) and organization theory (33). Katila and Ahuja (43) argue that both exploitation and exploration are needed in order to explore new capabilities and enhance existing capabilities. In fact, an imbalanced strategy can lead to lower sales growth (32). Despite theoretical support for the need to balance both exploration versus exploitation, there is no empirical evidence relating how this balance influences the relationship between IS project implementation and IS-oriented organizational performance.

This paper seeks to make two contributions. First, to further understanding of the relationships between 1) the internal IS environment, 2) IS project planning and implementation, and 3) IS-oriented organizational success. Second, to examine the affect of an exploitation or exploration IS strategy on the aforementioned relationships. These relationships are depicted in the theoretical model shown in Figure 1.

BACKGROUND AND HYPOTHESES

Considerable attention has been given to the link between IS capability and organizational performance. Research based in strategic management, industrial economics, and organizational theory has explored the contingency effects of various relationships. Theoretical works, for example, have shown a link between top management support and IS success (36), while empirical works have established positive associations between both IS investment and top management participation in IT resource allocation with improved organizational performance (45, 69).

This paper contends that IS capability is determined largely by the success of IS project planning and implementation because failed implementations, by definition, cannot yield positive capabilities. Therefore, IS-oriented organizational success is not possible without IS project success and managements' focus should be on the factors contributing to that success.

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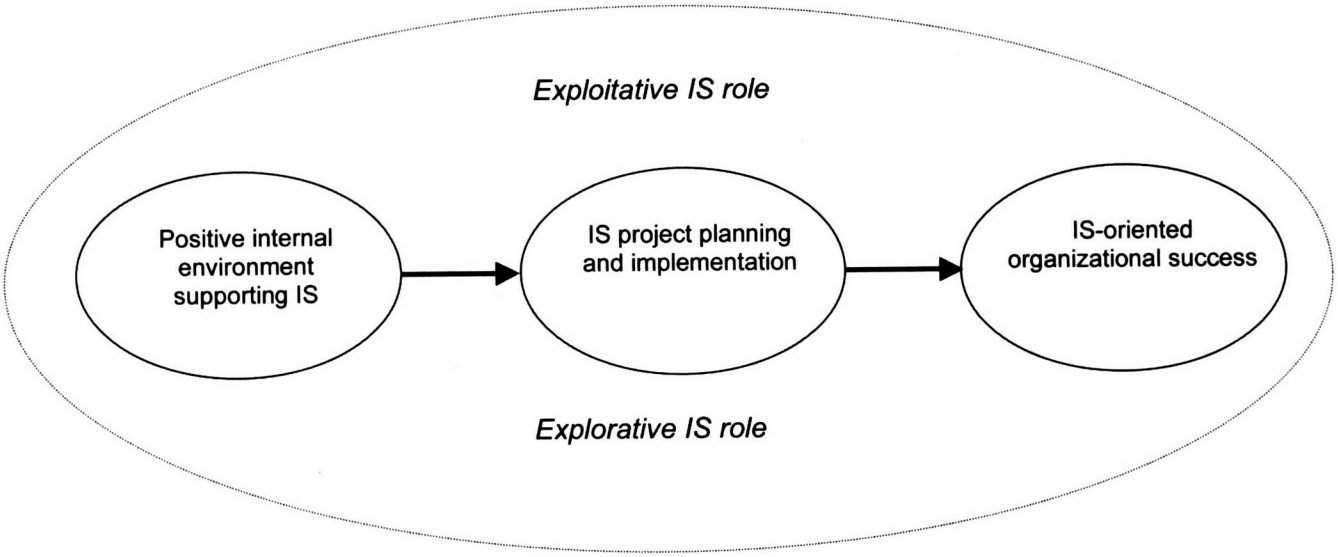
Figure 1. Theoretical Model



Creating a Positive Internal Environment for IS

Various studies have focused on the importance of the internal environment to IS capability. Applegate, McFarlan and McKenney (5, p.57) stated that "in different settings" IS can have profound organizational affects "sometimes simply improving effectiveness." Ward and Peppard (79) identified organizational culture as an important explanatory variable for IS success while Graham and Englund (26) found that organizations might have to change their culture in order to succeed at project management. Wallace, Keil and Rai (77) found evidence that negative management politics and the absence of a project planning methodology increase IS project implementation risks.

As IS projects have become larger and more strategically oriented, the importance of implementation has increased. IS project failure can be expensive. In 2004, the Inspector General of the Department of Veterans Affairs criticized management of the Bay Pines VA Medical Center in St. Petersburg, Florida, for a failed IS installation which incurred costs of $278 million (80). Faulty management was cited as the chief source of the implementation problems that led to project abandonment.

Top Management Support of IS planning is particularly important when there is "an expectation of future IS importance" (37, p. 63) and is more likely when IS is critical (47). When IS is critical, top management should set the stage for project implementation success by establishing a clear vision, clarifying communications, and reducing organizational resistance (57). This support predicts IS planning objectives (8), and a deficiency is a major impediment to IS planning success (17, 45). Without top management support competitive benefits of IS projects may not be fully understood and communicated which can heighten organizational resistance (67). Top managements' attitude towards IS can influence the absorptive capacity of other managers and their ability to assimilate and share knowledge. Thus, top management support of IS would be expected to have a positive influence on IS project planning (48).

Proper project funding, availability of key personnel, and quality of communications also depend on support from the top (21, 70). When top management values IS, it is more likely to exercise formal control over the cost, time, and functionality aspects of IS projects (41), and is more likely to possess greater knowledge of IS capabilities (38).

Projects also risk other implementation problems that are not related to top management. Lack of talented IS employees, poor communications among project participants, and unclear project goals have all been negatively associated with performance (29, 73). This leads to the following set of hypotheses:

H1A: *Top management support of IS planning is positively associated with IS project planning.*

H1B: *Top management support of IS planning is negatively associated with other IS project implementation problems.*

H1C: *Top management support of IS planning is negatively associated with top management related IS project implementation problems.*

Business managements' participation in IS planning is an important mechanism for integrating business knowledge into IS plans (24, 30). It helps IS managers who need direction about business needs (60); it helps to identify opportunities for IS to support business objectives (49, 59); and it helps to establish a shared set of values and beliefs among managers (46). Business managements' participation is more likely when top management champions the IS project (56).

Effective implementation requires a high level of IS knowledge and a deep knowledge of business requirements (16). IS managers depend upon managements' inputs in order to ascertain the proper scope of the project and gain reliable estimates of the time duration for project activities. Information exchanges between IS and business managers increases the likelihood of successful project implementation (14) and improves the effectiveness of IS project planning (27). This leads to the following set of hypotheses:

H2A: *Business managements' participation in IS planning is positively associated with IS project planning.*

H2B: *Business managements' participation in IS planning is negatively associated with other IS project implementation problems.*

H2C: *Business managements' participation in IS planning is negatively associated with top management related IS project implementation problems.*

IS-Oriented Organizational Success reflects the view of CEOs and other managers that IS is a critical resource that is important to organizational success (25). Bharadwaj (9) found that firms with superior IS capabilities outperformed the industry average while Feng, Chen, and Liou (22) found that firm performance improved after implementing knowledge management systems. A superior IS capability has also been linked to higher organizational financial performance (69, 73). An IS capability can be developed by improving business managements' IS knowledge. Firms in which managers have developed a higher level of IS knowledge, for example, use IS to create new products and services and to establish electronic linkages with suppliers and customers (41).

Establishing a direct link between IS investment and firm profitability is made difficult by a variety of confounding variables that are external to the theoretical model. For this reason, research frequently adopts an indirect approach by using a surrogate measure for IS-oriented organizational performance (61, 63). A popular method is to query the Chief Information Officer (CIO) about how IS applications have produced organizational benefits in their companies. A high level of education plus familiarity with the industry, the company, and its applications, qualify the CIO to make estimates about the level of IS performance achieved within his or her company. In this study, three measures were used to operationalize the construct based on the use of IS to increase ROI, increase market share, and increase sales revenues.

IS Project Planning is considered essential to a strong IS capability (60). IS project planning is a primary contributor to project success and has been linked to organizational performance factors including increases in ROI, sales, and market share (1, 61, 81). Successful planning involves consideration of project scope, cost, activity scheduling, and resource requirements (62).

Business managements' participation in IS planning enables intersubjective interpretation that provides for a greater depth of understanding of business needs (54). Without this participation, poor communication diminishes the ability to estimate and obtain project resources (78). Participation also increases the IS managers' business knowledge and improves the chance for organizational success (19). Information systems projects that are strategic in nature are more likely to contribute to organizational performance. Such systems are not strategic per se but become so as a result of organizational knowledge that facilitates the use of the system in a strategic manner. Management commitment and participation facilitate the formation of this organizational knowledge (2). Karlsen and Gottschalk, for example, found that "the strategic transfer of knowledge is positively related to project success" and that "sometimes senior-level managers have to be involved in IT projects to define the knowledge that is needed to complete the project." (42, p. 117).

Support from a top management champion is critical to project implementation because top manager's can set priorities, motivate other managers to participate, eliminate obstacles, and marshal resources (66). In order for IS projects to achieve success at the organizational level, alignment must exist between the business and IS strategies. A primary reason for alignment gaps has been identified as lack of collaborative strategy development and a poorly articulated vision (65). Conversely, political problems at the top can create barriers to implementation (13). Failure to champion a project or engaging in politics over project resources can impede implementation and reduce system scope (52).

In its "Chaos" report, the Standish Group (74) identified top management involvement as fundamental to IS project success. Salmela, Lederer and Reponen (68) showed that a lack of involvement can lead to IS project failures. This leads to the following set of hypotheses:

H3A: *IS project planning is positively associated with IS-oriented organizational success.*

H3B: *Other IS project implementation problems are negatively associated with IS-oriented organizational success.*

H3C: *Top management related IS project implementation problems are negatively associated with IS-oriented organizational success.*

Exploitative versus Explorative Role for IS

In selecting IS investments, management faces the problem of building on existing and tested knowledge or exploring untested paths that could lead to new competencies (50). Leveraging existing competencies and skill sets is an exploitative strategy generally favored by adaptive organizations (53). Continued successes create core competencies that decrease the rewards of exploring new alternatives. In the face of environmental changes, however, these can become core rigidities that inhibit development of new systems. Existing competencies with older systems and technologies might also inhibit development of more sophisticated systems with which management has little experience (31). Vested knowledge in legacy systems, for example, may lead to resistance of enterprise level systems that disrupt existing routines and change job responsibilities. Managements' choice of an exploitation or exploration strategy requires different organizational structures, processes, and capabilities and can have differing impacts on performance (3, 11). Firms may adopt a balance between the fundamentally different logics of exploitation and exploration. Firms that lean towards explorative uses of IS are more likely to commit resources to new and unknown technologies and assume higher risks (37). A failed explorative strategy, on the other hand, can interfere with existing profitable routines (55). Excessive focus on existing technologies can turn core capabilities into core rigidities (51). Counterbalancing the two might be more productive. Firms that combine exploitation of existing technologies with the exploration of new technologies, for example, are innovators and are more likely to create strategic applications and improve organizational performance (6, 20). This leads to the following hypothesis:

H4: *Organizations that choose to balance the use of IS in an exploitative/ explorative sense will exhibit higher project planning — organizational performance relationships than those who choose either the exploitative or explorative sense.*

RESEARCH METHODOLOGY

The questionnaire was purified in a two-stage process in which a draft was initially reviewed by IS professors at a major research university to provide a pilot instrument that was then evaluated by 20 local senior IS officers whose comments and suggestions were used to produce the final instrument.

Questionnaires were mailed to the chief information officers (CIOs) of 1,100 corporations in the United States that were selected randomly from a larger list of 9,000 medium to large companies. Survey questions, shown in the Appendix, were based on a seven-point scale anchored at "Strongly Disagree" and "Strongly Agree", for responses of 1 and 7 respectively.

Because perceptive data can be biased by exaggeration and self-promotion, respondents were informed that reported study results would be completely anonymous. In addition, several questionnaire design strategies were used to minimize the problems inherent in self-report data. These strategies were: avoid implying that one response is more acceptable than another, make all responses of equal effort, pay attention to item wording, reverse-code some items so that one end of a Likert scale is not always associated with positive outcomes, and avoid socially desirable responses (58).

Survey Measurement Items

Management participation (PART) was measured using four items reflecting the participation of business managers in IS planning adapted from Ranganathan and Sethi (64). Top management support (SUPP) was measured by five items that reflected top management's support for the IS function (36) and recognition of IS as a strategic tool (14). IS project planning (PLAN) was measured using four items suggested by Nidumolu (57). Other project implementation problems (OPRB) and top management related project implementation problems (MPRB) were measured using four items and three items, respectively, adapted from Kargar and Blumenthal (40). IS related organizational success was measured by three items adapted from King and Teo (47) reflecting a ROI perspective. The MPRB and OPRB measurement items differed from the other items in that high responses indicated negative rather than positive behaviors. Both of these measures used the phrase "difficulty in implementing major IS projects" in order to focus attention on projects that would more likely impact organizational results (see Appendix).

Because CIOs are highly experienced IS professionals and are expected to have regular contact with other members of top management, they were considered the most knowledgeable person for questions regarding the use of IS within the organization (35). On the other hand, perceptual data can reflect the individual bias and judgment of the respondent. To reduce the influence of single informant bias, the CIOs were assured that all responses would be kept confidential and that only summary results would be reported without revealing the actual company names.

Survey Results

A total of 204 usable surveys were returned in the first mailing. Phone calls were made to about 400 randomly selected non-respondents but fewer than 90 direct contacts were made. Where possible, voice mail messages were left explaining the nature of the survey and requesting that the contact complete the survey being sent in a second mailing. An additional 70 usable surveys were finally received from a second mailing providing a total of 269 respondents for a 25 percent response rate which is considered high when sampling from a senior member of management (15). Five questionnaires were incomplete and, because the respondents had not disclosed their identities, these were discarded. A profile of respondent companies is shown in Table 1. The respondents were highly educated and had extensive experience in IS and their industry. This qualified them as knowledgeable reporters of issues relating to IS and the company. The majority of the companies were medium to large with over 70 percent reporting annual revenues in excess of $1 billion.

TABLE 1
Characteristics of Respondent Companies

Industry	**Number**	**%**
Manufacturing	112	40.8
Computers/Communications	26	9.5
Finance/Insurance/Legal	25	9.1
Utilities	24	8.7
Wholesale/Retail	21	7.7
Oil/Petroleum	18	6.6
Health/Pharmaceuticals	16	5.9
Transportation	14	5.1
Other	13	4.8
Total	269	100.0
2001 Annual Revenue ($ millions)	Number	%
>8,000	53	19.4
>5,000 to 8,000	26	9.5
>1,000 to 5,000	117	42.7
> 200 to 1,000	52	19.0
< 200	21	7.8
Total	269	100.0
Total Employees	**Number**	**%**
> 20,000	64	23.4
> 10,000 to 20,000	41	15.0
> 5,000 to 10,000	52	19.0
> 1,000 to 5,000	85	31.0
< 1,000	27	10.0
Total	269	100.0

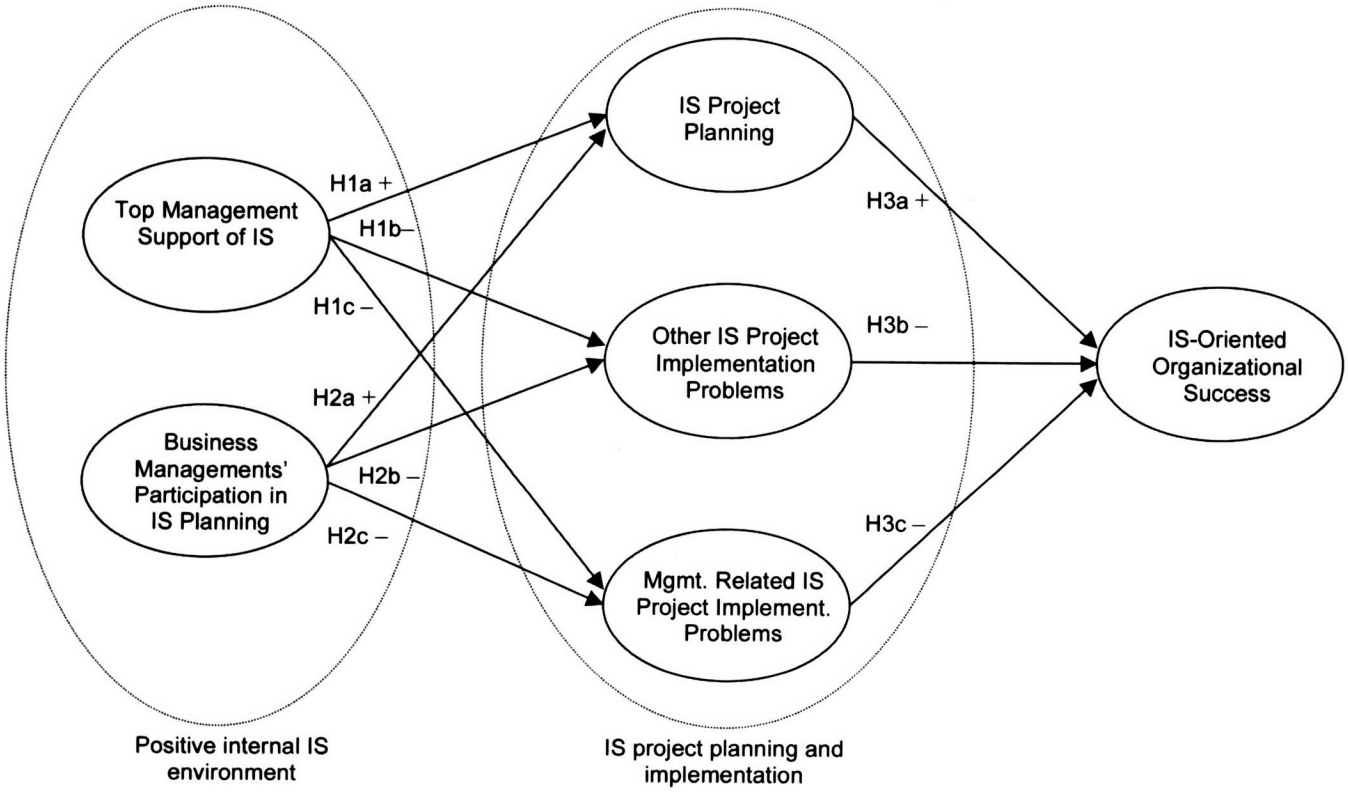
Non-Response Bias

In order to test for the possibility that respondent data were not truly representative of the overall population, a comparison was made between the data received in the first mailing and the second mailing following a process suggested by Armstrong and Overton (7). The assumption is that the later mailing, which would not have been forthcoming without additional requests, was representative of the non-respondent population. Two-tailed t-tests were used to measure the mean difference between the six constructs and between reported company assets in the initial and final mailings. No significant differences were revealed in either the constructs or assets for the two mailings ($p<.05$). These tests were accepted as establishing that non-response bias was unlikely in this study.

Data Analysis

Data analysis followed a confirmatory factor approach in which data were analyzed using structural equation modeling

Figure 2. Research Model with Hypothesized Relationships



(SEM) (39). EQS Version 6 multivariate analytical software was employed for testing using the maximum likelihood estimation (MLE) method that allows for the testing of reliability, validity, and measures of fit. EQS also allows for the reporting of the robust Satorra-Bentler scaled chi-square statistics (34) that provide more accurate measures in the presence of multivariate non-normality and has been demonstrated in prior IS research (39, 64, 72).

A two-phase approach outlined by Anderson and Gerbing (4) was followed in which a measurement model is used to measure the fit between the theorized model and the observed data and to establish measures of reliability and convergent and discriminant validity (75). In the second phase, results from the measurement model are used to create a path or structural model in order to test the hypothesized associations among the constructs.

The measurement model was comprised of six constructs. Two independent variables represented a positive internal IS environment: top management support of IS and business managements' participation in IS planning. The dependent variable was IS-oriented organizational success.

Zahra and Das (84) showed that the impact of organizational variables on performance is best measured by first identifying the intermediary variables through which the impact of the independent variables is transmitted. Path models that incorporate these intermediary variables are likely to perform better and provide richer information than the reduced model. The three intermediary variables that represented IS project planning and implementation in the model were: IS project planning, other IS project implementation problems, and top management related IS project implementation problems. The research model in Figure 2 shows the associations and related hypotheses.

The six constructs were measured using a total of 23 items. The Appendix shows the individual measurement items, metrics, and standardized factor loadings that are generally high and provide very good to excellent fit (76). Data were initially analyzed to determine if the items loaded on the *a priori* factors. As shown in Table 2, using a principal components factor analysis and varimax rotation, the 23 items loaded cleanly onto the six constructs as predicted.

Measures establishing reliability and validity were various. First, to improve fit and reduce multicollinearity, the measurement model was respecified by dropping two items: V9 and V13. Both of these items loaded well on their respective constructs (.89 and .67, respectively) but cross-loaded on other constructs. Dropping these items did not affect overall validity because each of the six constructs was measured by at least three of the remaining 21 items. Goodness-of-fit was established by the use of multiple indices (10, 28). These were the average absolute standardized residual (AASR), the normailized Chi-square (χ^2/df), the non-normed fit index (NNFI), the comparative fit index (CFI), the adjusted goodness-of-fit index (AGFI), and the root mean-square error of approximation (RMSEA).

For the final measurement model, all indices were within the prescribed ranges. The CFI of .96, NNFI of .94 were well above the suggested minimum of .90, the AGFI of .85 was greater than the suggested minimum .80, the normalized Chi-square ratio of 2.1 was below the prescribed limit of 3, and the RMSEA of .06 was below the prescribed limit of .08. These indices indicated acceptable fit of the actual data to the hypothesized model (4, 12). The robust measures were slightly higher indicating some extent of non-normality in the data.

Model reliability was established by the composite reliability coefficient and Cronbach's alpha coefficient, shown in Table 3.

TABLE 2
Rotated Component Matrix

Item	Factor F1	F2	F3	F4	F5	F6
PART1	.805					
PART2	.828					
PART4	.880					
SUPP1		.839				
SUPP2		.876				
SUPP3		.870				
SUPP4		.790				
SUPP5		.853				
PLNG1			.823			
PLNG2			.618			
PLNG3			.535			
PLNG4			.582			
OPRB1				.874		
OPRB2				.831		
OPRB3				.773		
OPRB4				.859		
MPRB1					.740	
MPRB2					.676	
MPRB3					.830	
SUCC1						.841
SUCC2						.774
SUCC3						.789

Principal component analysis using varimax with Kaiser normalization. Rotation converged in 7 iterations.

For all six constructs, the coefficients were high suggesting overall reliability of the 23 measures.

Convergent and discriminatory validity were established by a variety of tests. Convergent validity, the degree by which study items measure the underlying latent factor, was established by three ad hoc tests (4). First, alpha coefficients and composite reliabilities, as shown in Table 3, all exceeded the recommended minimum of .70 (23, 58). Second, the standardized factor loadings (see Appendix), which indicate the level of association between the item and the latent factor, were generally high (all exceed .60) and were all highly significant. Third, of the six average variance extracted estimates, which measure the variation in the latent factor relative to random error, only one (F3) fell below the recommended minimum value of .50 (23). The remaining five ranged from .65 to .73. Results are shown in Table 3.

Discriminant validity was assessed using three tests. First, confidence intervals of ± 2 standard errors were constructed around the correlations for each of the factors to determine if the value 1, indicating perfect correlation, fell within any of the intervals. None of the intervals contained the value 1. Second, it is desirable that the average variance extracted estimates exceed the squared correlations for any two constructs. The lower-half of Table 4 shows the Pearson pair-wise correlations among the six constructs and the upper-half shows the squared correlations. For each construct, squared correlations with other constructs all fall below the variance extracted estimate.

Finally, chi-square difference tests between the unconstrained measurement model and constrained models for each pair of factors indicated that the unconstrained model, in which the factors were distinct but correlated constructs, provided a fit that was

TABLE 3
Final Measurement Model Measures of Reliability and Validity

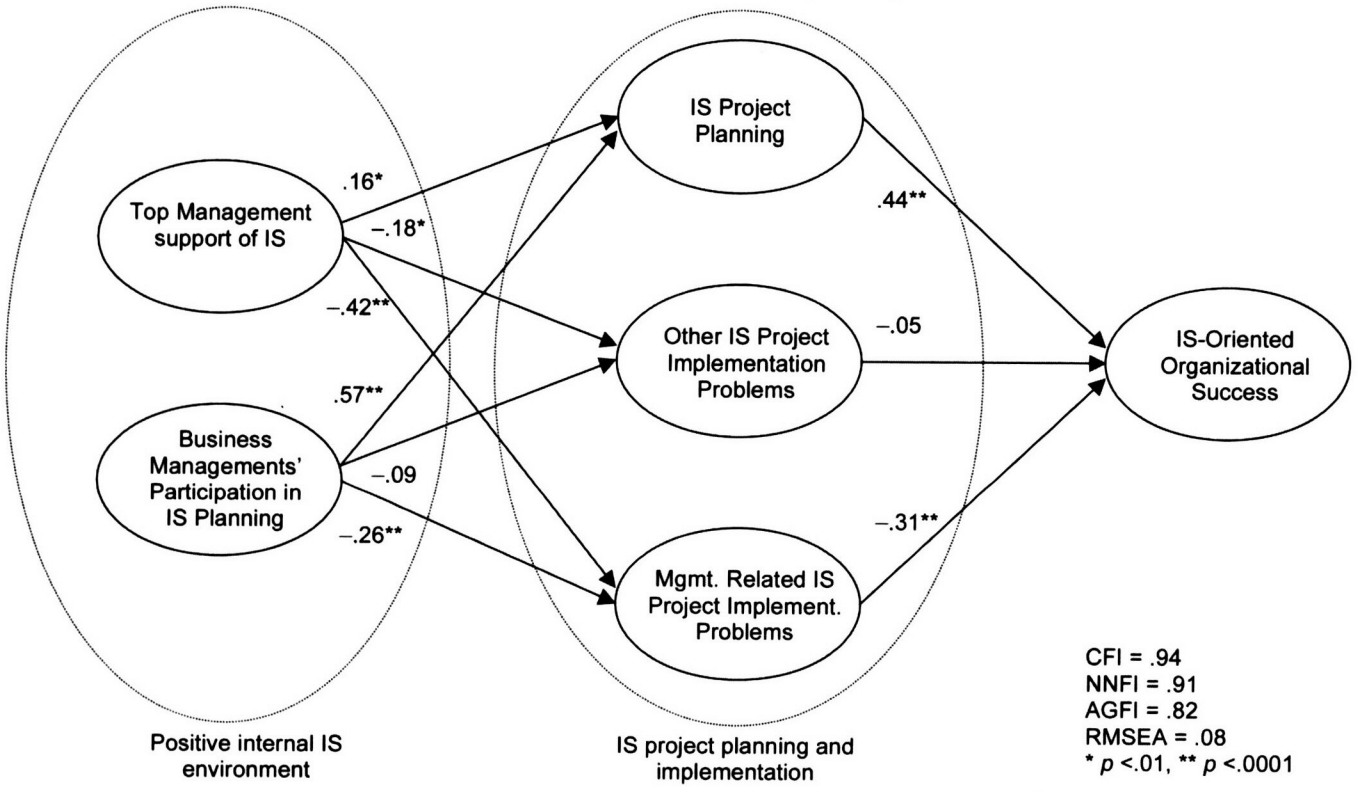
Construct		Composite Reliability Coefficient	Cronbach's Alpha Coefficient	Average Variance Extracted Estimate
F1	Top management support of IS planning	.91	.91	.73
F2	Business mgmts' participation in IS planning	.87	.93	.69
F3	IS project planning	.77	.77	.46
F4	Other IS project impl. problems	.89	.88	.66
F5	Mgmt. related IS project impl. problems	.86	.85	.68
F6	IS-oriented organizational success	.85	.84	.65

TABLE 4
Pearson Correlations and Squared Correlations

Construct		**F1**	**F2**	**F3**	**F4**	**F5**	**F6**
F1	Top management support of ISP	**1**	.13	.08	.04	.19	.09
F2	Business managements' participation in ISP	.36	**1**	.38	.02	.18	.10
F3	IS project planning	.28	.62	**1**	.02	.13	.26
F4	Other IS project implementation problems	-.20	-.14	-.12	**1**	.26	.08
F5	Mgmt. related IS project implement. probs.	-.43	-.42	-.36	.51	**1**	.19
F6	IS-oriented organizational success	.30	.31	.51	-.29	-.44	**1**

Pearson correlations appear below the diagonal. Squared correlations appear above the diagonal. All correlations significant at p<.01.

Figure 3. Structural Model of IS Project Planning and Implementation



significantly better (p<.001) than the constrained model for each case. Taken together, these tests showed that it was unlikely that any of the six constructs were measuring the same underlying phenomenon. The several tests were accepted as supporting the overall reliability and validity of the measurement model.

The structural model was specified by using the results from the measurement model and adding structural paths representing the theorized relationships. Each path tested a study hypothesis with the exception of H4 which was tested separately. Beginning test values were provided by the final measurement model. Results indicated a good fit of the study data to the hypothesized model and all indices were within the prescribed ranges. The CFI of .94, NNFI of .91 exceeded the suggested minimum of .90, the AGFI of .82 was greater than the suggested minimum .80, the normalized Chi-square ratio of 2.5 was below the prescribed limit of 3, and the RMSEA of .08 satisfied the prescribed limit of .08. Thus, overall fit was good providing support for the final structural model as shown in Figure 3.

Path coefficients for the structural model were both positive and negative and largely support the original hypotheses. As expected, the two constructs representing IS project implementation problems had negative associations with the other constructs. All but two paths were significant at p<.01. The association between business managements' participation in IS planning and IS project planning (H1a) was positive and significant while the associations with other IS project implementation problems (H1b) and management related project implementation problems (H1c) were both negative but significant. The relationship between top management support for IS and IS project planning (H2a) was positive and significant while the associations with other IS project implementation problems (H2b, not significant) and management related project implementation problems (H2c, significant) were both negative. IS project planning had a strong, positive association with IS-oriented organizational success (H3a, significant) while other IS project implementation problems (H3b, not significant) and management related IS project implementation problems (H3c, significant) had negative associations with IS-oriented organizational success. Thus, the model supported seven of the first nine hypotheses and provided evidence of IS project planning and implementation as important to organizational success. Questions remained about the two hypotheses, H2b and H3b, that were not significant.

Exploitative versus Explorative IS Role

A test of the exploitative versus explorative dimension (H4) was created based on four survey questions: two measuring the extent of exploitative firm behavior and two measuring the extent of explorative firm behavior towards investment in IS technologies. It was assumed that most companies would represent both behaviors but in varying degrees with some reflecting higher exploitative and some higher explorative.

By reverse coding the two explorative questions and averaging over all four, a single index was created to measure the extent of each behavior. High values for the index would indicate that the firm behaved in an exploitative sense while low values would indicate that it behaved in an explorative sense. The mean value for the index was 4.64 and responses ranged from 3 to 7. The questions and index development are shown in Table 5.

Using the index, three data sets were created by taking average responses greater than 4.75 to indicate exploitative behavior (n=97) and average responses of less than 4.5 to indicate explorative behavior (n=89). Average responses in the range 4.50 - 4.75 inclusive represented a balanced approach (n=88). Measure-

TABLE 5
Exploitative and Explorative Measures

	Measurement item	Mean	SD
X1	We commit more resources to exploiting current IS technologies rather than exploring new ones.	5.35	1.14
X2	We are continuously looking for ways to exploit existing and known IS technologies.	5.80	.87
X3	We are continuously looking for ways to use new and unknown technologies.	4.41	1.20
X4	Management is willing to take risks in adopting new technologies.	4.18	1.42
	Average response by reverse coding X3 & X4	4.64	.73
	Exploitative index: responses > 4.75 (n=97)	5.19	.54
	Balanced index: responses 4.50-4.75 (n=88)		
	Explorative index: responses < 4.50 (n=89)	4.08	.40
	Chi-square difference tests	χ^2	
	a. High exploitative index test (n=138)	388.1	
	b. Balanced index test (n=88)	370.2	
	c. High explorative index test (n=136)	313.4	
	χ^2 differences: a-b = 17.9, a-c = 74.7, b-c = 56.8 (p<.0001)		

ment models were used to generate Chi-square statistics. Using a Chi-square difference test, both balanced and exploratory approaches demonstrated a significantly better fit than the exploitative approach. However, the largest difference was with the exploratory approach which yielded the greatest differences (p<.0001). Thus, H4 was rejected indicating that, for explorative firms, the model relationships were stronger. Thus, a positive internal environment might be more critical to the efficacy of project planning for firms pursuing either a balanced or an exploratory strategy.

DISCUSSION AND CONCLUSIONS

The primary contribution of this paper is the examination of the relationships between the internal IS environment, IS planning and implementation, and IS-oriented organizational success. A structural equation model revealed relationships that confirmed the value of a positive internal environment on IS project planning and implementation. Top management support of IS and management participation in IS planning were found to positively influence IS planning practices and to reduce management related IS project implementation problems.

While top management support of IS worked to reduce other IS project implementation problems, management participation did not. Apparently, input from business managers was not viewed as a necessary element for addressing problems relating to a clear vision, communications, organizational resistance, or the availability of key talent. This may imply that CIOs perceive these items as being more controllable or it could mean that, of the two factors, top management support had a higher degree of importance.

Similarly, both IS project planning and top management related IS project implementation problems had strong associations with IS-oriented organizational success but other IS project implementation problems did not. This could be interpreted in several ways. It could mean that the most critical IS project problems are management related and that they overshadow the other more commonly identified problems. It could also mean that the respondents had less concern about other implementation problems because they had the power to exert more control over those issues whereas they could exert little control over the management related problems. If so, it is possible that CIOs may feel sufficiently disassociated from top management that they see successful implementation of IS projects to be beyond the control of the project manager. Such defeatist attitudes could lead to avoidance of riskier IS projects such as enterprise level and customer relationship systems that have experienced higher failure rates.

The weak path associations for other project implementation problems were not anticipated. The item measures are commonly cited in project management theory (57, 71). In this study, the correlation with the dependent variable was strong and significant (-.29, p<.001). Thus, the items were perceived as important to IS-based organizational success but relatively much less important than the two other factors. Two reasons emerge. First, the existence of top management related problems could lessen the importance of the other problems. Other problems could ultimately be addressed and controlled by the project manager with the addition of resources and positive practices. Top management related problems, on the other hand, were outside the control of the project manager and could produce harmful consequences irregardless of any positive actions. Failure to champion a project, for example, could result in a loss of resources or even the shelving of the project. Second, the existence of positive PM practices could obviate the other problems. By controlling scope, time, and cost, the other implementation problems would become less serious.

Another contribution is the use of the model to analyze the influence of an explorative or exploitative strategy upon the ability of IS project planning and implementation to impact IS-oriented organizational performance. Levinthal and March (50, p. 105), noted that "The basic problem confronting an organization is to engage in sufficient exploitation to ensure its current viability and, at the same time, to devote enough energy to exploration to ensure its future viability." In the present study, an index composed of four items measuring an explorative versus exploitative choice for IS technology was derived. Unexpectedly, companies with balanced and high explorative indices demonstrated a better fit

TABLE 6
Support for Hypotheses

Hypothesis	Supported	Basis
H1A: Top management support of IS planning is positively associated with IS project planning.	Yes	r = .16 (p < .01)
H1B: Top management support of IS planning is negatively associated with other IS project implementation problems.	Yes	r = -.18 (p < .01)
H1C: Top management support of IS planning is negatively associated with top management related IS project implementation problems.	Yes	r = -.42 (p < .0001)
H2A: Business managements' participation in IS planning is positively associated with IS project planning.	Yes	r = .57 (p < .0001)
H2B: Business managements' participation in IS planning is negatively associated with other IS project implementation problems.	No	r = -.09
H2C: Business managements' participation in IS planning is negatively associated with top management related IS project implementation problems.	Yes	r = -.26 (p < .0001)
H3A: IS project planning is positively associated with IS-oriented organizational success.	Yes	r = .44 (p < .0001)
H3B: Other IS project implementation problems are negatively associated with IS-oriented organizational success.	No	r = -.05
H3C: Top management related IS project implementation problems are negatively associated with IS-oriented organizational success.	Yes	r = -.31 (p < .0001)
H4: Organizations that choose to balance the use of IS in an exploitative/ explorative sense will exhibit higher project planning — organizational performance relationships than those who choose either the exploitative or explorative sense.	Partial	χ^2 differences exploitative — balanced = 17.9 balanced — exploratative = 56.8

between the actual data and the theorized model with explorative exhibiting a significantly better fit than either the exploitative or balanced. Thus, those companies seeking innovative approaches and willing to accept higher risks in introducing new technologies were more likely to create a positive internal environment for IS and also more likely to benefit from positive IS planning practices. Conversely, those companies seeking to leverage existing and known IS technologies did not require as high a level of management support or participation.

Thus, the study contributes to theory as follows. First, it extends existing theory underlying the planning-performance relationships by showing the internal environment as an important contextual variable for IS project planning and implementation. Second, it introduces a new exploitative/explorative construct for evaluating the strategic role of IS investments that could also serve as a contextual variable. Researchers can now compare performance for varying levels of IS investments in either the exploitative or explorative sense. A summary of the support for study hypotheses is shown in Table 6. Of the ten hypotheses, seven were supported by study data.

A major limitation of the study is the reliance on perceptual data. The use of a single informant was necessitated by sample size and response rate considerations. Study design and the use of a senior executive as the single informant were techniques used to mitigate bias. Although considered to possess the highest knowledge regarding IS-related questions, the CIOs' perception could be biased by higher expectations of IS project outcomes than other managers. Despite these limitations, study contributions to research are several.

Implications for Research

The study presents researchers with a new and previously untested model describing the relationship between a positive internal environment and IS-oriented organizational success where IS project planning and implementation are intermediary variables. Future research can use this framework to increase our understanding of how vital management support and participation are in creating a positive internal environment for IS project planning. The strong relationship between the internal environment and top management related implementation problems raises potential questions. Given the strategic importance of IS, why is top management support lacking? What conditions lead to a loss of support? How can the CIO elicit greater support from top management and participation from business managers?

The model was extended to compare model results for exploitative versus explorative IS strategies. Little is known about how this choice of strategy impacts IS organizational effectiveness. The exploitative/explorative index could be used in future research to further measure this phenomenon. In this study, explorative choices exhibited a significantly higher model fit than exploitative. It would be interesting to see if future studies replicated this outcome. If so, then why do explorative firms perceive stronger relationships between the internal environment and IS project planning relationships? Do these firms derive greater benefits from IS? Also, do top managers actually understand and think in terms of the exploitative/explorative tradeoff and its implications? Or, do they only view IS projects in terms of how they support immediate business needs?

Researchers might also ask why the strong and significant relationship between top management related IS project implementation problems and IS-oriented organizational success existed but not with other IS project implementation problems. Do management related problems really eclipse the problems of unclear goals and poor communications? These are problems which have been identified as contributing to project failures. If so, more research on the nature of management support and participation in IS planning and the negative consequences of politics are warranted.

Researchers might also be interested in what other factors are necessary to create a positive IS environment besides top management support and business managements' participation. Finally, researchers could examine whether the exploitation/exploration focus was a function of industry. Manufacturing, for example, might pursue more explorative core-business strategies while exploiting existing information assets.

Implications for Management

The primary contribution for management is that the development of IS capabilities may not be fruitful without direct support from top management and planning participation by business managers.

Another managerial implication is the need for top management to become more explicitly aware of the tradeoffs between the exploitative and explorative IS choices and the possibility of balancing the two. Firms that choose a high explorative path should invest more time in management support of IS and participation in IS planning. Alternatively, viewing exploration and exploitation as fundamentally different logics, management might achieve a synergistic effect by balancing the two. It is possible that by managing the tradeoffs between the two strategies, creation of a positive internal environment could be even more conducive to IS-oriented organizational success.

The exploitative/explorative construct for IS presents a quandary for management decision making. Innovation and risk-taking is normally identified with the introduction of new products and processes. Adding the new IS dimension represents a new and more complex paradigm.

Study results suggest that management should also move to create a positive internal environment for IS by developing a knowledge about a company's IS assets and participating in the process of IS planning and the selection of IS investments. Differing management styles, however, could lead to internal conflicts. For this reason, top management must understand that corporate politics impact IS project implementation negatively and reduces IS-oriented organizational success.

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APPENDIX
Measurement Items and Metrics for Initial Measurement Model

Item	Measure	Mean	Std. Dev.	Std. Load.	t-value
	TOP MANAGEMENT SUPPORT (SUPP)				
	In our company, top managers generally ...				
V1	recognize the strategic potential of information systems.	5.43	.72	.76	13.8
V2	are knowledgeable about the company's IS assets and opportunities.	4.74	.95	.85	18.4
V3	are familiar with competitor's strategic use of IS.	5.27	.83	.81	13.9
V4	recognize IT as a tool to increase the productivity of clerical employees.	5.35	1.27	.98	22.0
V5	recognize IT as a tool to increase the productivity of professionals.	5.37	1.25	.81	15.8
	BUSINESS MANAGEMENTS' PARTICIPATION (PART)				
V6	A variety of business managers are actively involved in the process of IS planning.	4.51	1.14	.86	17.3
V7	The level of participation in IS planning by diverse interests of the organization is high.	4.71	1.17	.78	15.9
V8	A variety of business managers participate in setting IS objectives and strategies.	5.46	.90	.91	17.8
V9	Business managers are involved in the selection of major IS investments.	5.26	1.26	.51	11.1

APPENDIX *continued*

Item	Measure	Mean	Std. Dev.	Std. Load.	t-value
	IS PROJECT PLANNING (PLAN)				
	Our major IT projects …				
V10	have explicit communication plans.	4.53	1.72	.93	19.1
V11	have realistic and achievable resource estimates.	4.46	1.77	.87	17.3
V12	have realistic and achievable scope estimates.	4.40	1.74	.85	17.0
V13	have realistic and achievable time-lines.	4.55	1.59	.72	13.2
	OTHER IS PROJECT IMPLEMENTATION PROBLEMS (OPRB)				
	We have often experienced difficulty in implementing major IS projects due to …				
V14	unclear statement of overall goals.	3.76	1.60	.87	17.7
V15	lack of clear communication among participants.	3.98	1.38	.72	13.0
V16	organizational resistance to change.	4.56	1.22	.75	14.0
V17	insufficient talent of key employees.	3.67	1.36	.80	15.3
	TOP MANAGEMENT IS PROJECT IMPLEMENTATION PROBLEMS (MPRB)				
	We have often experienced difficulty in implementing major IS projects due to …				
V18	insufficient support of top management champion or sponsor.	3.69	1.59	.90	18.1
V19	lack of top management involvement in implementation.	3.89	1.69	.87	17.2
V20	political problems at the top management level.	3.85	1.36	.68	12.2
	IS ORIENTED ORGANIZATIONAL SUCCESS (SUCC)				
	In our organization, IS have been used successfully to …				
V21	increase the return-on-investment (ROI).	4.67	1.15	.70	11.5
V22	contribute significantly to increased market share of products/services.	4.95	1.03	.72	12.4
V23	contribute significantly to increased sales revenues.	3.64	.84	.88	17.8