



The Role of IS and Its Effects on Information Systems Strategic Planning: An Investigation of South African Companies

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ABSTRACT

Contingency theory suggests that various environmental, organizational and managerial factors will influence an organization's approach to IT management. An empirical study of information systems strategic planning and the role of IS within 90 companies in South Africa was conducted. Results of a partial least squares analysis demonstrate the significant effect that perceptions of the future strategic role of IS within an organization has on the ISSP process. Moreover, it was found that those organizations in the strategic quadrant of the McFarlan grid emphasized ISSP activities, committed more resources to the ISSP process and attributed greater importance to ISSP-business strategic planning integration mechanisms, than those organizations in the other quadrants of the grid. The contribution of the IS function to the organization's strategic position was also, understandably, significantly higher for firms in the strategic IS environment.

INTRODUCTION

Despite Weill and Olson's (1989) criticism, contingency theory remains the dominant epistemological leverage (Ansoff, 1984) in studies of management and information systems (IS) management. In the study of information systems strategic planning (ISSP), contingency theory is particularly useful in understanding the various environmental, organizational and managerial factors that dictate the extent of IS planning taking place and the appropriateness of various IS planning systems (Cohen, 2001a).

The first and possibly most obvious ISSP contingency factor lies in the fact that information systems do not have the same strategic impact in every organization (McFarlan, 1984). Thus many prior studies on ISSP have predominantly focused on and suggested that organizational factors such as the role of IS in the organization were primary determinants of ISSP behaviour (see Raghunathan and Raghunathan, 1990; Premkumar and King, 1992; Premkumar and King, 1994; Tukana and Weber, 1996). Despite the existence of alternative classifications (see for example Earl, 1989), McFarlan, McKenney and Pyburn's (1983) strategic grid remains the most popular framework employed for studying the role of information systems within organizations. The strategic grid has received much attention in measurement research (e.g. Raghunathan, Raghunathan and Tu, 1999) and has also been operationalized in prior ISSP research (see Raghunathan and Raghunathan, 1990; Premkumar and King, 1992; Kearns, 1997).

This study continues the efforts of these prior studies into empirically confirming the contingent nature of ISSP with respect to the role IS plays within an organization, and in particular confirms such theories in the context of a developing country such as South Africa. Prior studies have, however, focused mainly on differences between IS groups and not on perceptions of the role of IS as empirical determinants of the ISSP process. In that regard this paper is unique. This paper presents results of a partial least squares (PLS) structural model, testing the relationship existing between the role of IS, as measured by the McFarlan grid, and three important ISSP constructs that reflect the formulation of a comprehensive IS strategic plan aimed at aligning IS with business strategy. In addition, the paper examines differences in the ISSP process between organizations with different roles for IS and the associated performance implications. Results are important as they point to the need to match the ISSP process with the role IS plays within the organization and will assist IS planners in determining the appropriateness of their planning systems.

ROLE OF INFORMATION SYSTEMS

McFarlan et. al. (1983) introduced their strategic grid in order to identify the different roles played by IS within organizations and thus to explain how and why different approaches to the management of IT within organizations was needed. The strategic grid identifies four different IS environments (strategic, turnaround, factory and support) depending on how critical current IT applications are to current business operations (current role) and depending on how important applications under development and future IT opportunities are to driving business strategy (future role). McFarlan et. al. (1983) indicated that organizations in the support group should not expect senior management to devote the same amount of strategic thinking to IS as those organizations for which IS activities represent an area of greater strategic importance. Thus the location of an organization within the strategic grid is likely to have implications for the design of its IS planning systems. The next section investigates this and the study's hypotheses are stated.

INFORMATION SYSTEMS STRATEGIC PLANNING

For firms in the strategic quadrant of McFarlan's grid, IT is viewed as essential for executing current strategies and, moreover, IT applications under development are crucial to future competitive success (Applegate, McFarlan and McKenney, 1999). For these firms, therefore, ad-hoc, incremental and disconnected (Ward and Griffiths, 1996), approaches to IS strategy formulation are simply not good enough given the opportunities that IT affords such organizations. Formal planning, carefully considered implementation and meticulous monitoring are required to ensure that strategic advantages from information systems are achieved (Lederer and Mendelow, 1986). The strategic management literature suggests that the benefits of planning are a product of the emphasis placed on various planning activities (Hopkins and Hopkins, 1997). Thus, for firms where IS plays a strategic role, emphasizing ISSP activities will be high on the IS management agenda. However, for firms not currently dependent on IT, that can continue to operate in the event of major IT failure, and where the strategic impact of IT applications under development is quite limited (Applegate et. al., 1999), emphasizing ISSP activities is not likely to be a priority. It follows that the emphasis placed on planning activities is likely to be determined by the role and perceived importance of IS within an organization. Hence:

Hypothesis 1: The greater the future role of IS within the organization, the higher the emphasis placed on ISSP activities.

Hypothesis 2: The greater the current role of IS within the organization, the higher the emphasis placed on ISSP activities.

In addition to the planning activities themselves, the provision of both tangible and intangible resources to the planning process are seen as necessary costs of doing effective planning and are representative of management's commitment to the planning concept (Ramanujam and Venkatraman, 1987). Commitment includes the allocation of tangible resources (time, money, people) to the ISSP process and intangible resources such as the use of planning methodologies and the allocation of skilled and experienced planners. Yet, it has been argued that planning is often a drain on resources with little evident return and that the demands of daily operational issues afford managers little time or energy to devote to planning activities (see Cohen, 2001b). These facts taken together with empirical evidence provided by Raghunathan and Raghunathan (1990) and Premkumar and King (1992) suggest that commitment to ISSP is likely to be higher for those firms with a more strategic role for IS. Hence:

Hypothesis 3: The greater the future role of IS within the organization, the greater the commitment to ISSP.

Hypothesis 4: The greater the current role of IS within the organization, the greater the commitment to ISSP.

In order to ensure that IT investments are directed toward the achievement of both current and future business objectives, firms with a more strategic role for IT will need to ensure that IS planning is conducted within the context of business planning (Ward and Griffiths, 1996). Earl (1989), Remenyi (1993) and others have described this concept as planning integration, where fully integrated business strategic planning (BSP) and ISSP processes are necessary for those firms in which IS plays a major strategic role. Such integration is usually facilitated through the use of various integration mechanisms such as top management involvement in ISSP, IS management involvement in BSP, the use of steering committees where IS, users and management are represented (Premkumar and King, 1992), and by ensuring that the activities of ISSP dovetail in with BSP approaches and time tables (Teo and King, 1996). However, it has been suggested that in those firms where IS plays a non-critical role, planning systems tend to be reactive and the integration of IS and business planning processes is weak (Remenyi, 1993; Teo and King, 1996). Thus it is hypothesized that:

Hypothesis 5: The greater the future role of IS within the organization, the greater the importance attributed to ISSP-BSP integration mechanisms.

Hypothesis 6: The greater the current role of IS within the organization, the greater the importance attributed to ISSP-BSP integration mechanisms.

In addition, Raghunathan and Raghunathan (1990) suggest that IS planning is more strongly associated with the future, than the current, role for IT within an organization. Thus it is also hypothesized that:

Hypothesis 7: The future role of IS will have a significantly larger impact on the ISSP process than the current role.

Ward and Griffiths (1996) mapped Earl's (1993) five planning approaches onto McFarlan's grid to illustrate the differing characteristics of planning processes between different IS environments. In addition, prior findings of Raghunathan and Raghunathan (1990) and Premkumar and King (1992) suggest that firms in different positions within the grid will approach planning differently. Thus, it is further hypothesized that:

Hypothesis 8: Emphasis placed on ISSP activities, commitment to ISSP, and importance attributed to ISSP-BSP integration mechanisms will differ depending on an organization's location within the McFarlan strategic grid, and will be greatest for organizations in the strategic group.

A fit between the role of IS and the emphasis placed on planning activities, the firm's commitment to planning and the importance attributed to integration mechanisms should lead to improved IS per-

formance. Premkumar and King (1992), however, did not find such fit, between their planning variables and the role of IS, as having a significant effect on IS performance at the functional and organizational levels. Disappointed by that finding, this study revisits that concept of "fit" and hypothesizes that:

Hypothesis 9: Emphasis placed on ISSP activities, commitment to ISSP and importance attributed to integration mechanisms affect IS function performance more strongly in strategic firms than in support firms.

In addition, for firms in the strategic quadrant of the grid, a major objective of the ISSP process and an important IS performance criteria will be to improve the contribution of the IS function to the organization's strategic and competitive position. Thus it is hypothesized that:

Hypothesis 10: The contribution of the IS function to the organization's strategic position will be higher in strategic firms than in support firms.

RESEARCH METHODOLOGY

Sample

A pilot-tested questionnaire was mailed to the directors of IT in over 450 companies listed on the Johannesburg Securities Exchange in South Africa. Data collection took place over a 3 month period and formed part of the refinement of measures and constructs for a larger doctoral study. One hundred completed questionnaires were returned, for a 22% response rate. Questionnaires with missing values were eliminated, yielding 90 useable responses. All respondents indicated that they were directly involved in their organization's ISSP process.

Measurement of the Study's Constructs

The role of IS was measured by asking respondents to indicate on a 5 point scale the extent to which they agreed with 5 statements relating to the future and 5 statements relating to the current roles for IS within their organization (adapted from Premkumar and King 1992). These perceptual measures of the role of IS were considered appropriate since managers' perceptions are an important component of the strategy making process and enter into their strategy making behaviour (Bourgeois, 1980). Also on five-point scales respondents were asked to indicate the relative emphasis placed on 11 distinct ISSP activities over the last 2 years (very low emphasis to very high emphasis), and the extent of importance that had been attributed to 4 ISSP commitment measures and 5 ISSP-BSP integration mechanisms. These measures were all adapted from items found in the literature. Performance was measured by asking respondents to indicate the extent to which IS function performance had improved over the last 2 years with respect to 4 measures of the internal functioning of IS adapted from Nelson and Coopridge (1996). These items included the ability of the IS function to meet its organizational commitments, meet its goals, react quickly to organizational needs, and the quality of its work product. The contribution of the IS function to the organization's strategic position was measured by asking respondents to indicate the extent to which the IS function had improved over the last 2 years in its contribution to business strategy formulation, implementation, the organization's ability to achieve its business objectives and a competitive advantage.

Reliability and Validity

Cronbach alpha was used to confirm the reliability of the scales. All alpha values exceeded the 0.60 cut off level and were considered acceptable. Factor analysis extracted single factors for all constructs except the future role construct. The analysis revealed that future role consisted of two dimensions that can be regarded as future strategic and future tactical roles respectively. The future strategic dimension consisted of items relating to impact on competitive strategy while future tactical role items related to product improvements. This finding is consistent with Raghunathan et. al.'s (1999) finding that future role was multidimensional in nature.

EMPIRICAL RESULTS

Analysis of Respondents

Consistent with Raghunathan and Raghunathan (1990) respondents were classified into four different groups corresponding to McFarlan's strategic, turnaround, factory and support IS environments. Twenty-nine firms were classified in the strategic grid, 9 firms in the turnaround group, and 23 and 29 in the factory and support groups respectively. This classification was based on respondent scores for the future strategic, tactical and current role dimensions, which were compared to the overall sample mean for each dimension respectively.

Partial Least Squares Analysis of Path Model

Results of a PLS analysis (see Figure 1), using PLS-Graph version 3.0, revealed that the future strategic role of IS strongly predicts the three planning constructs. The greater the importance of applications under development to future competitive success, the higher is the emphasis placed on ISSP activities, the importance attributed to integration mechanisms, and organizational commitment to planning thus confirming the strong future orientation of ISSP. However, future tactical role did not influence planning activities, integration or commitment significantly, thus **hypotheses 1, 3 and 5 were only partially supported**. **Hypotheses 2, 4 and 6 are rejected** as the path coefficients from current role of IS to the planning constructs were not found to be significant. The future strategic rather than future tactical or current roles of IS has the largest affect on the ISSP process,

thus providing **support for hypothesis 7**. This finding is similar to the significance of the future role of IS reported in Premkumar and King (1994: 97). PLS analysis also reveals that the model explains 39% of the variance in the emphasis placed on ISSP activities, 29% of the variance in managerial commitment to planning, and 20% of the variance in the importance attributed to ISSP-BSP integration. These results provide support for the model's predictive and explanatory power, and confirm the important role that organizational factors play in determining ISSP process characteristics.

Differences Between the Four Groups

The mean of the 11 planning items, 5 integration mechanisms and 4 commitment measures were calculated in order to provide overall index values for the 3 constructs. These index values were then used for ANOVA testing.

Results revealed that the difference between the IS environments of the McFarlan grid is significant for emphasis placed on ISSP activities ($F=10.506$, $p<0.001$), integration mechanisms ($F=4.995$, $p<0.01$) and planning commitment ($F=8.439$, $p<0.001$). An analysis of means revealed that the emphasis placed on planning activities is as expected highest in the strategic group (4.2) and lowest in the support group (3.3). Similarly, integration mechanisms and commitment were highest in the strategic group (4.3 and 3.6 respectively) and lowest in the support group (3.5 and 2.5 respectively). Thus **hypothesis 8 was supported**.

Fit Between the Role of IS and ISSP

The concept of "fit" is integral yet often misunderstood in contingency theory (see Schoonhoven, 1981, Venkatraman, 1989), and it is important that the appropriate analytic scheme be employed to study "fit" (Venkatraman, 1989). The type of "fit" proposed in hypothesis 9 suggests that the role of IS moderates the strength and not the form of the relationship between planning and performance and thus calls for subgroup analysis. This was accomplished through regression analysis and the comparison of beta coefficients. Index values were relied upon as per above and were also calculated for the IS function performance construct.

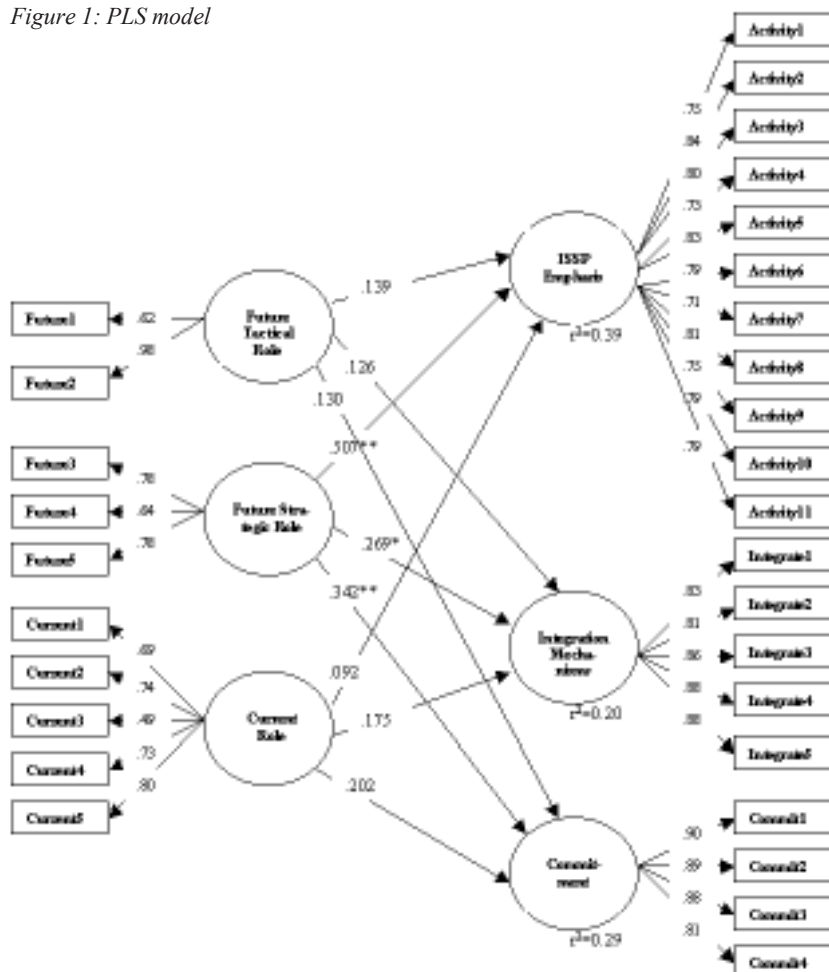
The index values of the three ISSP constructs were regressed individually on performance for both the strategic and support groups. The statistical difference between the regression coefficients was calculated using a t-test. Results revealed that the differences between the regression coefficients were significant (see Table 1). This provides **support for hypothesis 9**, suggesting that planning has a stronger effect on performance in strategic firms than it does in support firms.

An index value for the contribution of the IS function to the organization's strategic position was calculated. ANOVA testing revealed that this value was significantly higher in strategic firms than in support firms ($F=9.693$ $p<0.01$), thus **supporting hypothesis 10**.

CONCLUSION

A study of ISSP and the role of IS within 90 companies in South Africa was conducted and served to provide empirical support for contingency theories suggesting that organizational factors are important determinants of the ISSP process. Results of a PLS analysis demonstrated the significant effect that perceptions of the future strategic role of IS within an organization have on the ISSP process. Moreover, it was found that those organizations in the strategic

Figure 1: PLS model



** significant at the $p<0.001$ level * significant at the $p<0.001$ level

Table 1: Role of IS as a moderator of strength of relationship between ISSP and performance

	ISSP Emphasis	Integration	Commitment
	Beta Coefficients	Beta Coefficients	Beta Coefficients
Strategic group	.529	.227	.519
Support group	.280	-.163	.022
t-value*	2.87	4.93	7.42
Diff. Significant	0.01 level	0.001 level	0.001 level

* $t = (b_1 - b_2) / \text{pooled standard error}$; degrees of freedom = $(n_1 - 2) + (n_2 - 2) = 54$

quadrant of the McFarlan grid emphasized ISSP activities, committed more resources to the ISSP process and attributed greater importance to ISSP-BSP integration mechanisms than those organizations in the other quadrants of the grid. The relationship between planning and performance was also stronger for firms with a more strategic role for IS, suggesting that the role of IS within the organization moderates the strength of the relationship between planning and performance. Despite the promising results reported here, between 60-80% of the variance in ISSP is left unexplained. Future research would do well to continue identifying environmental, organizational and managerial factors, which explain greater amounts of variance in the ISSP processes of firms.

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