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## ORGANIZATIONAL DETERMINANTS OF IS PERFORMANCE - A STRATEGIC PROFILE PERSPECTIVE

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### ABSTRACT

As a strategic resource, an organization's information system (IS) often determines its competitive advantage. Literature have indicated that many organizational factors influence IS performance. However, the effects of these factors may be different for organizations with different distinctive information management (IM) strategies. This paper applies the methodology developed by Sabherwal and Chan (2001) to convert organizational strategic profiles to Miles and Snow (1978) typology, validates the methodology and examines the impact of a set of organizational variables on IS performance in each IM strategic profile type. Managerial implications of the findings are also discussed.

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### INTRODUCTION

Organizations have long believed that the innovative use of information systems (IS) would create a sustained competitive advantage. Managers expected the use of IS would create a niche or efficiencies within their industry that would increase barriers to entry, change the bargaining power of buyers and suppliers, and also, in some instances, create new business opportunities. Some of the short-term benefits at the operational level included reduced operation costs (Rajagopal 2002), enhanced speed, communication, and integration (Doll and Torkzadeh 1998; Grover, Teng, Segars and Fiedler 1998).

Although many firms did initially achieve a competitive advantage due to IS and the acquisition of complex hardware and software that increased efficiency, the advantage was short-lived. The high entry barrier that expensive information technology equipment and software helped to build was quickly eliminated by the rapidly decreasing cost of software and popularity of inexpensive personal computers. When it is possible for a firm to attain higher levels of technology competence, or duplicate existing information technology (IT) competence, within a very short time frame, the entry barriers are brought down and there is no real competitive advantage to be achieved through IT (Clemons and Row 1991; Porter 2001). As Kettinger, Grover, Guha, and Segars (1994) were quick to point out, "technological wizardry and innovating first may not be necessarily the complete path to competitive success". The use of IT in a competitive environment has therefore become a challenge to managers. In this environment it is important for IS managers to devise and follow a consistent strategy for their information systems, a strategy that will fit with the organization's IT and organizational environments and help build and maintain a competitive advantage through information technology.

IS managers must adapt their strategy in a way that enables them to exploit opportunities and achieve internal and external efficiencies. In order to accomplish this goal, the IS function should assess its current position and its unique and dynamic characteristics, and decide on a strategy that will complement its internal structure and strategy. Several studies published in the eighties and early nineties (Hambrick 1983; Doty, Glick and Huber 1993) have researched the linkages between organizational strategy and organizational variables. Other studies have highlighted the importance of linking organizational strategy and information systems strategy (Tavalokian 1989; Das, Zahra and Warkentin 1991; Croteau and Bergeron 2001; Sabherwal and Chan 2001). Although information systems has been considered the most vital strategy of a business (Earl and Feeny 2000; Applegate, Austin and McFarlan 2002), and information systems strategy has been comprehensively conceptualized (Earl 1989), only recently have researchers operationalized the dimensions of information systems functional strategy (Chan, Huff, Barclay and Copeland 1997; Ragu-Nathan, Ragu-Nathan, Tu and Shi 2001; Sabherwal and Chan 2001).

With managers struggling to use IS to gain a competitive advantage, knowledge of those specific determinants of IS that will fit their information systems strategy can help them exploit opportunities within their organization and improve IS performance. However, studies in the information systems area that links information systems functional strategy and information systems functional characteristics to IS performance is lacking. In an attempt to fill this gap in

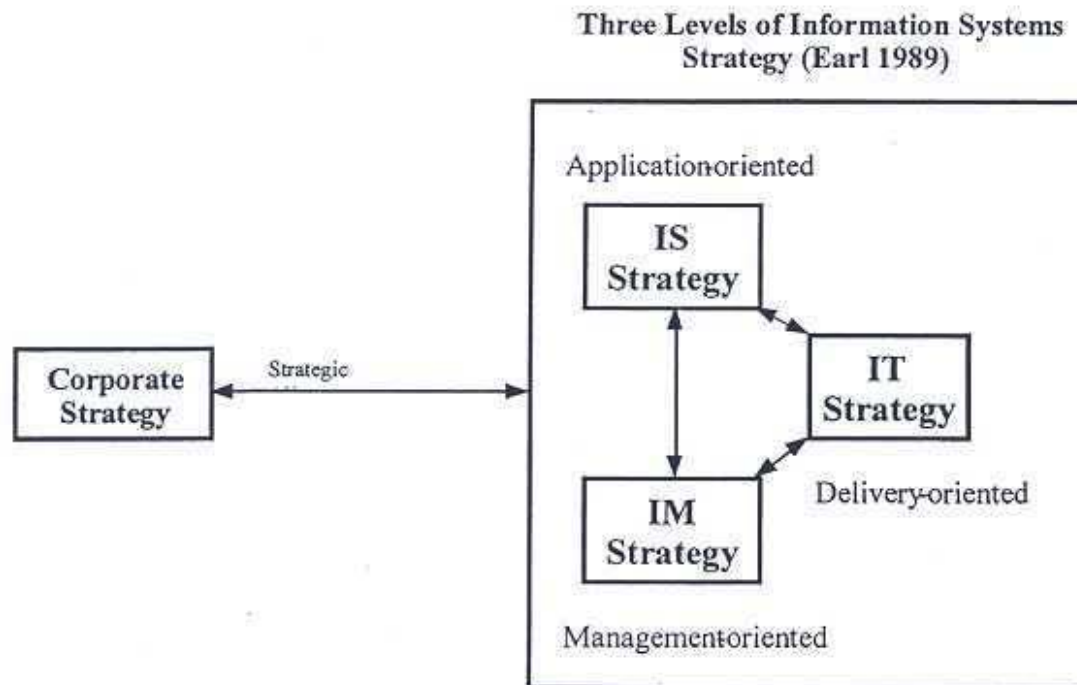


the literature this paper explores the interactions among information management strategy profiles, information systems determinants and IS performance. The information systems variables addressed in this study are: Strategic significance of IS, IS support to users, Top management support to IS, Degree of IS control, Degree of IS stability, Degree of IS integration, and Degree of IS centralization.

The remainder of this paper has been organized in four sections. The next section discusses the development of information strategy into three types, namely Defenders, Prospectors, and Analyzers. In the section that follows, the information systems functional characteristics are discussed and hypotheses linking these characteristics to the strategic types and IS performance are developed. The next section discusses the research methodology and data analysis. The last section discusses the implication of the results of this research.

### INFORMATION SYSTEMS STRATEGY

Earl's (1989) work on the IS management function has distinguished three components of strategy in relation to information systems: information systems (IS) strategy, information management (IM) strategy, and information technology (IT) strategy (See Figure 1). *IS strategy* pertains to what a company should do with technology. It focuses on the business applications or systems of IT and aligning this development with business needs. There has been a considerable amount of research concerning IS strategy (Chan et al. 1997; Gupta, Karimi and Somers 1997; Sabherwal and Chan 2001) and its alignment with business strategy.



**Figure 1: Information Systems Strategy and Organizational Strategy**

*IT strategy* is concerned primarily with technological policies. It pertains to the architecture of a system including risk attitudes, vendor policies, and technical standards. IT professionals are generally responsible for developing this strategy, but in many cases top management is involved to ensure the alignment of business strategy with the 'delivery' of information technology. Even though the importance of top management's involvement with IT strategy is critical, the literature pertaining to the IT strategy defined by Earl (1989) is lacking.

*IM strategy*, according to Earl (1989), is concerned primarily with the roles and structures for the management



of IT and IS. It focuses on the relationships between specialists and users and between the corporate entity and business units. It is also concerned with management controls for IT, management responsibilities, performance measurement and management processes. Thus, while IS strategy is about the 'what', and IT strategy is the 'how' of information technology, IM strategy is about the 'wherefore'. This research focuses on the importance of the 'wherefore' that is IM strategy and its relationship to the information systems characteristics set out earlier.

Based on the six dimensional organizational strategy constructs conceptualized by Venkatraman (1989), Ragu-Nathan et al. (2001) had developed an instrument to measure information management strategy, which is the focus of this present research. The dimensions of the IM Strategy construct operationalized in their study are Aggressive Promotion of IS - (APIS), Analysis-based Development of IS - (ADIS), Defensive Management of IS - (DMIS), Future-oriented Development of IS - (FDIS), Proactive Management of IS - (PMIS), and Conservative Management of IS - (CMIS). Since these dimensions represent the orientation of IS management in strategically managing the IS function, this construct was referred to as the Strategic Orientation of Information Management, STROIM.

Sabherwal and Chan (2001) have mapped Venkatraman's six dimensions of organizational strategy onto the three fold Miles and Snow (1978) typology of Defenders, Prospectors, and Analyzers, which will be discussed later in this paper. They used these broad-based strategy types to analyze the fit between organizational strategies and IS strategies. Following the same methodology, this research classifies organizations into three groups based on IM strategy type.

### MILES AND SNOW TYPOLOGY

Miles and Snow (1978) developed a dynamic and comprehensive framework that addresses the alternative ways in which organizations define and approach their product and market domains, construct structures, and processes to achieve success. The premise of their research was based on three pivotal ideas (Miles and Snow 1978).

1. Organizations act to create their environments.
2. Management's strategic choices shape the organization's structure and process.
3. Structure and process constrain strategy.

Based on patterns of behavior that they witnessed in four different industries, Miles and Snow (1978) identified four types of organizations: Prospectors, Analyzers, Defenders, and Reactors.

*Prospectors* continually seek to locate and exploit new product and market opportunities. They tend to take more risks in emerging markets and they are normally the creators of change in its market (Sabherwal and Chan 2001). This type of organization values being "first in" in new product market areas even if not highly profitable. This type also seeks flexibility and a more open organizational structure, which may lead to a less than optimal operational efficiency.

*Defenders* tend to be the polar opposite of Prospectors. They attempt to seal off a portion of a market to create a stable set of products and customers. With a narrow focus, they tend to not have to change structure, technology, or methods, but instead put all of their attention on improving existing processes. This type of organization does this by offering higher quality, superior service, lower prices, etc.

*Analyzers* tend to occupy an intermediate position between Prospectors and Defenders, by normally being "second in" in a new product market, while protecting a stable set of products. They will minimize risk while maximizing the opportunity for profit. This balanced approach can be highly profitable, but is not easy to achieve (Miles, Snow, Meyer and Coleman 1978), and may be more common in large organizations (Doty et al. 1993).

The *Reactors* business strategy is defined as an unstable organizational profile that lacks a set of consistent response mechanisms (Miles and Snow 1978). This type of organization lacks a viable strategy or is in transition from one viable strategy to another (Sabherwal and Chan 2001). Other research has excluded this fourth strategic type, (Hambrick 1983; Shortell and Zajac 1990; Doty et al. 1993; Delery and Doty 1996), with Doty et al. (1993) empirically testing the effectiveness of the Miles and Snow (1978) typology with and without Reactors, and concluding that the typology is more effective without Reactors. Also, since this research used the mapping of the Miles and Snow (1978) typology similar to that used by Sabherwal and Chan (2001), and they did not include the Reactors strategy, this research uses the Miles and Snow typology without Reactors. Therefore, three viable strategies are identified: Prospectors, Analyzers, and Defenders.



## IS CHARACTERISTICS AND HYPOTHESIS DEVELOPMENT

The characteristics chosen for this study was based on prior IS literature that are identified as critical to the performance of IS. Tu, Raghunathan, and Raghunathan (1999) identified similar characteristics as an antecedent to IS performance. These seven characteristics also are relevant to management of information or IM strategy of organization. The following sections describe each of the characteristics and identify hypotheses for each based on the characteristic, the strategic profile, and IS performance.

### STRATEGIC SIGNIFICANCE OF IS

The strategic significance of IS in an organization is defined as the consequences of the portfolio of systems applications in operation (Cash, McFarlan, McKenney and Applegate 1992). Empirical studies by Raghunathan and Raghunathan (1990) and Neumann, Ahituv, and Zviran (1992) have further developed and operationalized this notion of IS strategic significance as initially conceptualized by Cash et al. (1992). A firm's information technology portfolio is the total investment in computing and communications technology, which includes hardware, software, telecommunications, and the people who provide IT services (Weill and Vitale 2002). Campion and Medsker (1993) found that task significance could greatly improve work group effectiveness. This would lead one to expect that IS performance would be influenced by the significance of IS function within the organization.

Karimi et al. (2000) identified that "IT management sophistication implies that IT managers are aware of the firm's long-term strategic plans". This also implies that an organization with a high level of IT sophistication tend to evaluate IS performance on IT's contribution to a firm's overall objective instead of just cost savings (Karimi, Bhattacharjee, Gupta and Somers 2000).

While the focus of Prospectors will be more externally directed for the purpose of bringing in and trying out new technologies and also to seek a high level of IT sophistication, which may lead to a higher level of performance. Defenders will tend to use IS to improve efficiencies of their existing systems and their focus, will be more internally directed and based on improving operations. It is expected that Analyzers will be in the middle, but tend to lean toward a need for IT sophistication and a high level of strategic significance. Therefore, it is hypothesized that:

*H1a: Strategic significance of IS will have a significant positive effect on IS performance for firms with a Prospectors IM strategy.*

*H1b: Strategic significance of IS will have a significant positive effect on IS performance for firms with an Analyzers IM strategy.*

*H1c: Strategic significance of IS will not have a significant positive effect on IS performance for firms with a Defenders IM strategy.*

### IS SUPPORT TO USERS

IS support to users is defined as the extent to which the IS department provides training and develops cordial working relationships with end-users, as well as sufficient resources (Basu, Hartono, Lederer and Sethi 2002). With the proliferation of hardware and software technology towards easy-to-use end-user oriented applications, the difference between traditional users of IS and end-users is beginning to blur. While IS-user coordination has always been encouraged in the IS literature and in practice (Applegate, McFarlan and McKenney 1999), the emergence of end-users has added a new dimension to the nature of cooperation between IS and users. McKeen (1994) found that communication between IS and users played a key role in promoting end-user satisfaction. Henderson (1990) argues that effective delivery of IS products and services requires an effective partnership between the two major actors concerned with systems, namely, user managers and IS managers. Nelson and Coopridge (1996) empirically verified that a good working relationship of mutual trust, influence and shared knowledge between the IS department and other organizational groups can make a major contribution to increasing IS performance.

With a Prospectors strategy that thrives on constant change, IS support to its users becomes critical. This reliance on communication with its users is also vital in a less structured organization, which is similar to Prospectors, and support will lead to a more effective IS organization and optimal IS performance. For an Analyzers strategic profile, IS support to its users is also critical. Not only is an Analyzer seeking opportunities to improve technology within their organization, but they are also at the same time trying to minimize any type of risk. Therefore, a high level of two way communication and support to its users is critical to the IS performance of an organization. Defenders, on the other hand,



because of their fairly unchanging environment need less constant interaction with their users. Although minimal support is needed, IS support may not be a critical characteristic of IS performance. It is therefore hypothesized that:

- H2a: IS Support to Users will have a significant positive effect on IS performance for firms with a Prospectors IM strategy.*
- H2b: IS Support to Users will have a significant positive effect on IS performance for firms with an Analyzers IM strategy.*
- H2c: IS Support to Users will not have a significant positive effect on IS performance for firms with a Defenders IM strategy.*

### TOP MANAGEMENT SUPPORT TO IS

Top management support to IS is the degree to which top management understands the importance of the IS function and is involved in IS activities. It includes many of the professional and strategic activities including negotiation, IS planning, project management, as well as supplying adequate resources for attaining IS performance (Weill and Vitale 2002). IS management comprises the senior leadership of an organization, which includes CEO, CIO, COO, and other senior-level business executives (Armstrong and Samburamurthy 1999). The IS literature has consistently identified top management support as a key positive factor in influencing the success of many IS-related activities (King, Grover and Hufnagel 1989). Raghunathan and Raghunathan (1988) verified the important impact of top management support on successful IS planning. Several other studies also found top management support to be a critical success factor for IS (Doll 1985; Slevin, Stieman and Boone 1991; Choe 1996). Although different strategic types may have varying characteristics of top management support, the criticality of support is apparent for all types of organizations (Bajwa, Rai and Brennan 1998; Earl and Feeny 2000). For example, Prospectors are likely to attract more top management attention and support because they are constantly seeking new opportunities and innovating while Analyzers, who are organizations that seek opportunities to implement low risk technologies as well as improve internal efficiencies, will also have higher levels of top management support leading to higher levels of IS performance. Defenders will also have a high level of top management support to continually improve internal operations and costs to improve productivity and efficiency. Based on the above, Prospectors, Analyzers, and Defenders will benefit from a high level of top management support, therefore, it can be hypothesized that:

- H3a: Top Management Support to IS will have a significant positive effect on IS performance for firms with a Prospectors IM strategy.*
- H3b: Top Management Support to IS will have a significant positive effect on IS performance for firms with an Analyzers IM strategy.*
- H3c: Top Management Support to IS will have a significant positive effect on IS performance for firms with a Defenders IM strategy.*

### DEGREE OF IS CONTROL

IS control is defined as the degree to which the IS function has authority over IS related decisions. The control of IS activities has changed over the past two decades from a loose, informal, and project oriented activity to a more tight and refined system based on managerial control (Karimi et al. 2000). Donovan (1988) provides an interesting description of the control tactics used by IS executives to maintain control over the IS domain, and notes that, through these tactics, end-users are sought to be controlled. However, rapid changes in IS technology can lead to greater dispersion of systems development and operating responsibilities away from IS functional control. Cash et al. (1992) note that, as companies become more decentralized in structure and geographically diverse, a distributed IS function becomes a better fit to the organizational structure. This may lead to a greater degree of user control. Defenders, by definition, have built their own narrow niche and are comfortable because of the control they maintain over their domain, whereas Prospectors need to operate in a dynamic domain within a flexible and organic organization. This need for a Prospectors strategy to be flexible can lead to a lack of control, which would hinder the operational efficiency of a firm or performance (Sabherwal and Chan 2001). Therefore, the need for control is of high importance to a Prospectors strategic type for a higher level of IS performance, with Analyzers similar to the need for control. A Defenders strategy is inherently controlled (Miles and Snow 1978) and due to few adjustments needed in a stable environment, a higher level of control is not needed for a high level of IS performance. Therefore, it is hypothesized that:



- H4a: Degree of IS Control will have a significant positive effect on IS performance for firms with a Prospectors IM strategy.*
- H4b: Degree of IS Control will have a significant positive effect on IS performance for firms with an Analyzers IM strategy.*
- H4c: Degree of IS Control will not have a significant positive effect on IS performance for firms with a Defenders IM strategy.*

#### DEGREE OF IS STABILITY

IS stability, as defined, is a broad measure of stability in the operational environment of IS. It includes the stability of IS group membership and working environment. For example, lower turnover rate, longer member tenure, and fewer systems fiascos will indicate higher IS stability. An unstable IS environment may have negative psychological impact on IS personnel such as unnecessary tension and stress that decrease performance level. Igarria, Greenhaus and Parasuraman (1991) found job security to be an important career orientation of IS employees. McLean, Smits and Tanner (1991) surveyed 261 MIS majors, and found "Provide security and stability" to be one of the most expected MIS job characteristics. Using a simulation-based study, Abdel-Hamid (1992) verified that frequent IS managerial turnover and succession have significant negative influence on system performance.

It is important to note that IS stability is not the opposite of IS flexibility. IS flexibility is defined as the variety of actual and potential procedures, as well as the ability to implement changes rapidly within an organization (Byrd and Turner 2001). An organization may have the ability to be flexible in IS operations, but this can be achieved and actually enhanced with a stable workforce. The ability to change rapidly to accommodate new or changing technology would be harder to attain with a high level of turnover, which means that stability may lead to a higher level of IS performance.

Within strategy types, Prospectors, by their inherent nature, is less stable than Defenders or Analyzers. They are more concerned with pursuing opportunities and staying agile (Sabherwal and Chan 2001). Defenders and Analyzers look to keep what they currently have and gain efficiencies within their organizations. A more stable workforce and security within an organization would be of high importance to Defenders and Analyzers, and a Prospectors ever changing system will inherently produce a less stable environment. Therefore:

- H5a: Degree of IS Stability will not have a significant positive effect on IS performance for firms with a Prospectors IM strategy.*
- H5b: Degree of IS Stability will have a significant positive effect on IS performance for firms with an Analyzers IM strategy.*
- H5c: Degree of IS Stability will have a significant positive effect on IS performance for firms with Defender IM strategy.*

#### DEGREE OF IS INTEGRATION

IS integration refers to how well IS activities are integrated with organizational and other functional activities. These activities may include cross-functional problem solving, personnel transfer and joint strategic planning. Henderson and Venkatraman (1991) proposed a model of strategic IS alignment in terms of two dimensions: functional integration and strategic fit. Functional integration reflects the strategic integration between IS function and the business unit, while strategic fit reflects the integration between external strategies and internal IS structures/processes. They claim that these two types of integration are essential to IS performance. Teo and King (1997) argued that the integration between IS planning and business planning is key to successful strategic IS planning. Karimi et al. (2000) identify the need for a top down (business-based) approach to the IS function for a higher level of IS performance. Several other studies also confirm the importance of linking IS objectives and business objectives (Zviran 1990; Reich and Benbasat 1996). Although integration is essential to improve efficiencies within a Defenders organization, they do not rely on the strategic importance of external integration. Prospectors normally are the polar opposite and they do not rely on the internal integration of strategic imperatives, which implies that an overall business-based integration of strategy and functional practices is unlikely. Analyzers, on the other hand, rely on cross-functional teams, and the integration of IS activities to assist in the process of new opportunities and strategic planning, and thrives in an environment where integration between internal and external strategies is at a high level. Based on the above arguments, it is hypothesized that:

- H6a: Degree of IS Integration will not have a significant positive effect on IS performance for firms with a Prospectors IM strategy.*



*H6b: Degree of IS Integration will have a significant positive effect on IS performance for firms with an Analyzer IM strategy.*

*H6c: Degree of IS Integration will not have a significant positive effect on IS performance for firms with a Defenders IM strategy.*

### DEGREE OF IS CENTRALIZATION

IS centralization is defined as the degree to which an organization's computing facilities and activities are centrally organized and controlled. In this research, degree of IS Centralization and IS Control are two different constructs. IS control is functional management control oriented while IS centralization is data, information, architecture oriented. King and Sethi (2001) referred to centralization as the central control of organization resources by the corporate office. As information technology became less expensive and more powerful, end users gained more control of their computer applications. Thus many firms migrated from centralized mainframe computing to decentralized computing (Fiedler, Grover and Teng 1996). However, IS decentralization caused many organization-wide problems, such as lack of standardization and control over data hygiene, duplication of technical staff, increased computing cost, and data security problems (Cash et al. 1992). Thus, after a period of decentralizing their IS organizations, companies started "consolidating data centers, beefing up the authority of their central IS staff, and establishing company-wide technical standards and work procedures" (Von Simson 1990). Organizations realized that re-centralization of IS helped improve system reliability, facilitated system integration and cut computing costs - key factors for Analyzers. Defenders, although seek to cut costs, mainly rely on operational effectiveness at the department level, which would infer a decentralized structure of IS. Prospectors, on the other hand are more likely to seek flexibility, which is more likely to be a characteristic of a de-centralized IS organization. It is therefore hypothesized that:

*H7a: Degree of IS Centralization will not have a significant positive effect on IS performance for firms with a Prospectors IM strategy.*

*H7b: Degree of IS Centralization will have a significant positive effect on IS performance for firms with an Analyzers IM strategy.*

*H7c: Degree of IS Centralization will not have a significant positive effect on IS performance for firms with a Defenders IM strategy.*

Table 1: Type of companies in the sample

| Industry Type          | Number | Percentage |
|------------------------|--------|------------|
| Business Services      | 7      | 3.0%       |
| Finance/Insurance      | 52     | 22.5%      |
| Government             | 3      | 1.3%       |
| Manufacturing          | 86     | 37.2%      |
| Medicine/Law/Education | 10     | 4.3%       |
| Petroleum              | 5      | 2.2%       |
| Public Utility         | 12     | 5.2%       |
| Transportation         | 10     | 4.3%       |
| Wholesale/Retail       | 22     | 9.5%       |
| Others                 | 24     | 10.4%      |
| Total                  | 231    | 100.0%     |

### RESEARCH METHOD

A self-administered questionnaire was mailed to 800 information systems executives senior IS executives. There were 231 usable responses in this study. The response rate of 29.6% is similar to that in comparable studies; due to lack of information on non-respondents it was not possible to test if the responding group differed from the non-respondents. Table 2 provides an industry classification of the sample companies. Manufacturing and finance sectors are represented by 57% of the sample.



To ensure the content validity of the instrument items, the questionnaires were first sent to two IS researchers who checked the items for appropriateness and relevance. Two IS executives of major organizations were also requested to complete the questionnaire, and then to comment on the clarity and appropriateness of the items. Modifications were made to the final questionnaire based on their comments. An exploratory analysis was then conducted to determine the validity of the constructs that were developed for each IS variable. Thirty-five items were used to measure seven items, with seven clear factors emerging. Table 2 shows the factor loadings of all thirty-nine items and eight constructs.



Table 2: Factor Analysis for IS Variables

| Item                                      | Description   | Factor Loading |
|---|---|----------------|
| <b>I. Strategic Significance of IS:</b>   |   |                |
| 1   | IS is used to offer significant new features to the existing product line                                   | 0.61           |
| 2   | IS is not vital to our organization (reverse coded)   | 0.66           |
| 3   | IS is looked at as a competitive resource   | 0.44           |
| 4   | IS breakdown for extended periods will affect organizational activities severely                            | 0.81           |
| 5   | Our company relies heavily on IS for efficient operation  | 0.72           |
| 6   | IS breakdown will critically affect one or more of our functional departments                               | 0.81           |
| 7   | IS breakdown will affect our database access  | 0.81           |
| 8   | IS breakdown will affect overall coordination within our organization                                       | 0.66           |
| <b>II. IS Support to Users:</b>           |   |                |
| 1   | We educate and train users to develop their own systems   | 0.87           |
| 2   | We have cordial relations with user groups  | 0.76           |
| 3   | We support end user computing   | 0.83           |
| <b>III. Top Management Support to IS:</b> |   |                |
| 1   | Top management involvement with IS function is strong   | 0.79           |
| 2   | Top management is not interested in the IS function(reverse coded)  | 0.79           |
| 3   | Top management understands the importance of IS function  | 0.73           |
| 4   | Top management does not support the IS function(reverse coded)  | 0.80           |
| 5   | Top management considers IS as a strategic resource   | 0.77           |
| 6   | Top management understands IS opportunities   | 0.70           |
| 7   | Top management keeps pressure on operating units to work with IS  | 0.75           |
| <b>IV. Degree of IS Control:</b>          |   |                |
| 1   | IS feels it is losing control over IS activities to users   | 0.58           |
| 2   | There is unplanned growth in the number of new systems and supporting staff to meet user demand             | 0.69           |
| 3   | IS support services are delivered to users by multiple suppliers without coordination                       | 0.76           |
| 4   | There is lack of standardization and control over data hygiene  | 0.78           |
| 5   | There is lack of standardization and control systems  | 0.76           |
| <b>V. Degree of IS Stability:</b>         |   |                |
| 1   | Stability of IS development group   | 0.72           |
| 2   | Quality of IS development group as perceived by others in the organization                                  | 0.60           |
| 3   | Experience of IS systems development group  | 0.75           |
| 4   | Frequency of major IS fiascos in the last two years (reverse coded)   | 0.58           |
| 5   | Length of service of IS management team   | 0.72           |
| <b>VI. Degree of IS Integration:</b>      |   |                |
| 1   | Senior people are transferred between IS and organizational line functions                                  | 0.77           |
| 2   | Joint task forces evaluate the strategic potential of IS  | 0.75           |
| 3   | IS planning is integrated with overall organizational business planning                                     | 0.62           |
| 4   | Specific executives are charged with expanding IS capability to support the organizational strategic effort | 0.56           |
| <b>VII. Degree of IS centralization:</b>  |   |                |
| 1   | Management of the IS function is centralized  | 0.79           |
| 2   | Data processing in our organization is centralized  | 0.87           |
| <b>VIII. IS Performance:</b>              |   |                |
| 1   | IS is perceived as facilitating organizational decision making  | 0.69           |
| 2   | The user community is generally satisfied with IS   | 0.70           |
| 3   | The IS function has not achieved its performance goals (Reverse Coded)                                      | 0.67           |
| 4   | Use of IS has let to better management of organizational activities   | 0.74           |
| 5   | Benefits of IS have outweighed its cost   | 0.72           |



**Table 3: Means, Standard Deviations, and Inter-correlations of the Organizational Variables**

| Variables                        | Mean | SD   | 1    | 2    | 3    | 4    | 5    | 6    | 7    | Reliability |
|----------------------------------|------|------|------|------|------|------|------|------|------|-------------|
| (1) Strategic significance of IS | 4.33 | 0.55 | -    |      |      |      |      |      |      | 0.83        |
| (2) IS support to users          | 3.55 | 0.69 | 0.20 | -    |      |      |      |      |      | 0.83        |
| (3) Top management support to IS | 3.51 | 0.87 | 0.37 | 0.23 | -    |      |      |      |      | 0.91        |
| (4) Degree of IS control         | 3.64 | 0.79 | 0.23 | 0.19 | 0.34 | -    |      |      |      | 0.83        |
| (5) Degree of IS stability       | 3.87 | 0.61 | 0.34 | 0.22 | 0.33 | 0.45 | -    |      |      | 0.80        |
| (6) Degree of IS integration     | 3.02 | 0.87 | 0.18 | 0.28 | 0.58 | 0.18 | 0.17 | -    |      | 0.81        |
| (7) Degree of IS centralization  | 3.87 | 1.05 | 0.37 | 0.03 | 0.27 | 0.23 | 0.19 | 0.14 | -    | 0.86        |
| IS Performance                   | 3.67 | 0.65 | 0.39 | 0.29 | 0.42 | 0.51 | 0.55 | 0.28 | 0.27 | 0.86        |

For IS Performance, one single factor emerged with none of the loadings lower than 0.67. The IS Performance measure is based on an organizational view of success and is based on the development of prior IS performance measures (Grover, Jeong and Segars 1996; Saarinen 1996). To ensure predictive validity of the IS Performance instrument and minimize respondent bias, the questionnaire used for this study was sent to both IS managers and CEO's, and 63 matched pairs were found. A matched-pair T-test showed no significant difference between the views of IS managers and CEO's on IS performance (Tu, Raghunathan and Raghunathan 1999).

Table 3 reports means, standard deviations, correlations and reliability values for each of the variables. The reliability values based on Cronbach's alpha are all greater than 0.80, well above the recommended minimum value of 0.7 (Nunnally 1978).

**Table 4: Business Strategy Profiles of Defenders, Prospectors, and Analyzers (Sabherwal and Chan 2001)**

| Business Strategy Attributes | Prospectors | Analyzers  | Defenders  |
|------------------------------|-------------|------------|------------|
| Defensiveness                | Low (-1)    | Medium (0) | High (+1)  |
| Risk Aversion                | Low (-1)    | High (+1)  | High (+1)  |
| Aggressiveness               | High (+1)   | Medium (0) | Medium (0) |
| Proactiveness                | High (+1)   | Medium (0) | Low (-1)   |
| Analysis                     | Medium (0)  | High (+1)  | Medium (0) |
| Futurity                     | Medium (0)  | Medium (0) | High (+1)  |

Sabherwal and Chan (2001) had developed a methodology to classify the organizations based on their score on Venkatraman's strategic attributes into the Miles and Snow (1978) typology. Since IM strategy, defined by Ragu-Nathan et al. (2001) is the IS management strategy at functional management level and similar to Venkatraman's definition of management strategy at business unit level, follows the Sabherwal and Chan methodology, this study classifies organizations into three strategic types - Prospectors, Analyzers, and Defenders - based on their score on the six attributes of IM strategy - Aggressive Promotion of IS (APIS), Analysis-Based Development of IS (ADIS), Defensive Management of IS (DMIS), Future-Oriented Development of IS (FDIS), Proactive Management of IS (PMIS) and



Conservative Management of IS (CMIS).

As detailed in Table 4, organizations that are high in defensiveness (DMIS), risk aversion (CMIS), and futurity (FDIS) will resemble a Defenders strategic profile. Organizations that are high in aggressiveness (APIS) and proactiveness (PMIS) are similar to a Prospectors strategic profile. An Analyzers strategic profile is not low in any one type of attribute, but is high in risk aversion (CMIS) and analysis (ADIS).

To classify organizations into the three strategic profiles, the following steps were conducted as prescribed by Sabherwal and Chan (2001). First, the ideal business strategy profiles were identified by indicating a value for high, medium or low for each attribute (See values indicated in parenthesis in Table 4). For an attribute that is expected to be high, a value of +1 was assigned. For a medium level, a zero was assigned and for a low level for any attribute a -1 was assigned. Second, the ideal types were compared to normalize actual values for each organization and a Euclidian distance was attained. For each organization, three values were determined: (1) one that determined the distance from an ideal Prospectors strategic profile, (2) one that determined the distance from an ideal Analyzers strategic profile, and (3) the last score was a distance comparison to an ideal Defenders strategic profile. Finally, each organization was categorized based on their lowest Euclidian distance of the three calculated. Therefore, if the smallest distance for an organization from an ideal strategic profile was from a Prospectors strategic profile, the organization was categorized as a Prospectors strategy.

The categorization of each organization into one of the three strategic profiles allowed for the testing of each hypothesis and also determined its relation to IS performance based on whether they were more similar to a Prospectors, Analyzers, or Defenders strategic profile. To accomplish this analysis, a subgroup regression was conducted to indicate significant relationships between characteristics of an organization and IS performance. This indicates the keys (such as IS control) to a high level of IS performance based on their strategic profile.

## ANALYSIS

In order to determine the differing impact of the IS variables on IS performance in each strategic profile type, a subgroup regression analysis was run (Table 5).

Table 5: Subgroup Regression Analysis Results

| IM Strategy Type | IS Variables                 | Standardized Coefficients | t    | Significance |
|------------------|------------------------------|---------------------------|------|--------------|
| Prospectors      | Strategic Significance of IS | 0.299                     | 3.27 | 0.002***     |
|                  | Degree of IS Control         | 0.254                     | 2.64 | 0.010***     |
|                  | Stability of IS              | 0.245                     | 2.54 | 0.013**      |
|                  | Top Management Support       | 0.174                     | 1.95 | 0.055*       |
| Analyzers        | Stability of IS              | 0.369                     | 4.48 | 0.000***     |
|                  | Degree of IS Control         | 0.240                     | 2.94 | 0.004***     |
|                  | Centralized IS Structure     | 0.196                     | 2.61 | 0.011**      |
|                  | Integration of IS            | 0.166                     | 2.13 | 0.036**      |
|                  | IS Support to Users          | 0.150                     | 1.98 | 0.050**      |
| Defenders        | Stability of IS              | 0.433                     | 3.37 | 0.002***     |
|                  | Top Management Support       | 0.298                     | 2.32 | 0.025**      |

\* Significant  $p < .10$

\*\* Significant  $p < .05$

\*\*\* Significant  $p < .01$

According to the results, for firms with a *Prospector* IM strategy, the IS variables that have significant positive effect on IS performance are Strategic Significance of IS ( $p < 0.01$ ), Degree of IS control ( $p < 0.01$ ), Stability of IS



( $p < 0.05$ ) and Top Management Support ( $p < 0.1$ ); for firms with an *Analyzer* IM strategy, the IS variables that have significant positive effect on IS performance are Stability of IS ( $p < 0.01$ ), Degree of IS control ( $p < 0.01$ ), Centralized IS Structure ( $p < 0.05$ ), Integration of IS ( $p < 0.05$ ) and IS Support to Users ( $p < 0.05$ ); for firms with a *Defender* IM strategy, the IS variables that have significant positive effect on IS performance are Stability of IS ( $p < 0.01$ ) and Top Management Support ( $p < 0.05$ ).

The Prospectors strategic profile was hypothesized to have a significant positive effect on IS performance with four separate characteristics of IS: Strategic significance of IS (H1a), IS support to users (H2a), Top management support to IS (H3a), and Degree of IS control (H4a). Of these four hypotheses, three (H1a, H3a, and H4a) were found to be significant, with IS support to users (H2a), the lone exception. The reason for a non-significant relationship between IS support to users and IS performance may be due the high level of change in a Prospectors environment, which may leave it infeasible to support users at the functional level. However, since top management support was found significant (H3a), the support to users may be from a higher level of an organization. This lack of support to users may be based on an empowerment by top management to allow users to produce and operate at an individual or sub-business unit level. This would also explain the lack of relationship between Degree of IS centralization (H7a) and IS performance.

Table 6: Summary of the Results for Each Hypothesis

|                 | Hypothesis 1 | Hypothesis 2 | Hypothesis 3 | Hypothesis 4 | Hypothesis 5 | Hypothesis 6 | Hypothesis 7 |
|-----------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| (A) Prospectors | S*           | S            | S*           | S*           | N            | N*           | N*           |
| (B) Analyzers   | S            | S*           | S            | S*           | S*           | S*           | S*           |
| (C) Defenders   | N*           | N*           | S*           | N*           | S*           | N*           | N*           |

Note:

S = Hypothesized significant relationship

N = Hypothesized non-significant relationship

\* = Significantly supported hypothesis

Analyzers were hypothesized to have a significant positive effect between all seven determinants of IS and IS performance: Strategic significance of IS (H1b), IS support to users (H2b), Top management support of IS (H3b), Degree of IS control (H4b), Degree of IS stability (H5b), Degree of IS integration (H6b), and Degree of IS centralization (H7b). Of these seven hypotheses, five (H2b, H4b, H5b, H6b, and H7b) were found to be significant. The two that were found to be non-significant (H1b and H3b) were initially theoretically perplexing. However, in one of the cases presented by Miles and Snow (1978), it became apparent that an Analyzers ability to balance the strengths of a Prospectors and Defenders strategy make it highly unlikely that any long range planning is necessary or relevant. Silicon Systems, a company presented by Miles and Snow (1978) acknowledged that:

*"Outsiders are usually surprised at how little long-range planning we do. But why should we? We need to be able to act quickly when a new product design appears on the market and develop elaborate plans that might have to be junked later on. We do some careful planning but only for our industrial business."* (Miles and Snow 1978)

They also implied that they invest heavily in the functions of their organization and allow them to operate in a fashion that is quick to respond and also operate as efficiently as possible. Therefore, support for IS comes at the functional level, which was indicated by a significant relationship between IS Performance and IS support to users (H2b).

A Defenders strategic profile was hypothesized to have a significant positive effect between two of the IS characteristics and IS performance: Top management support of IS (H3c) and Degree of IS stability (H5c). Each of these hypotheses was supported and the other five hypotheses (Strategic significance of IS (H1c), IS support to users (H2c), Degree of IS control (H4b), Degree of IS integration (H6b), and Degree of IS centralization (H7b)) were supported by a non-significant relationship to IS performance. Therefore, the Defenders strategic profile was empirically supported with two (H3c and H5c) hypotheses significant.

Another interesting aspect of our analysis is the relationship that Degree of IS stability has with each type of strategic profile. Stability of IS was found significant to IS performance for all three strategic profiles, even though it was hypothesized that a stability would lead to a high level of IS performance for Analyzers and Defenders, but not Prospectors. Therefore, regardless of the type of environment an organization may be involved in, stability is a key factor to achieving a high level of IS performance.



## MANAGERIAL IMPLICATIONS

From a managerial standpoint, this research identifies different strategic types of the management of information. An information management (IM) strategy should match the appropriate classification of an organization for proper implementation. Therefore, by first identifying the type of organization you are, and then identifying key determinants of an organization that are highly related to IS performance, an organization can enable its IS function to be managed in an effective manner.

For an organization that is similar to a Prospectors strategic profile, it is important to develop high levels of strategic significance, top management support, stability and control over there is function. This implies that by strategically identifying the role of IS and managing and supporting IS from a senior level within an organization, the IM strategy will lead to a high level of IS performance. Also, this research shows that an organization must have stability within their organization, even one that is similar to a Prospectors strategic profile, as well as control of operations. This does not mean that the other characteristics must be ignored, but concentrating on characteristics that are not highly correlated with IS performance, will not lead to the same possible results of IS Performance.

For an Analyzers strategic profile, an organization must concentrate at the functional level to develop a balance between the Prospectors and Defenders strategic profiles. Therefore, micro managing at a high level may lead to obsolete plans due to future changes. An Analyzer must develop a centralized IS structure, with a high level of stability and control. This type of organization must also work well within their organization with other functions, which implies a high level of integration and support at the functional level of an organization. Therefore, top management support is still important, but it should be filtered through other functions of an organization to allow each function to respond to any pertinent changes in their environment as well operate in an highly efficient manner.

A Defenders strategic profile had only two characteristics that were found significant to IS performance. It is important to note that this does not imply that the management of information is not important within an organization that is similar to a Defenders strategic profile. However, additional resources or structure within an IS function of an organization will not lead to the ultimate goal of a Defenders strategy, which is to operate at the most cost effective and efficient way. Therefore, developing an IM strategy that includes high levels of characteristics included in this research is not consistent with their business strategy, since only two characteristics were hypothesized as significant. With the support from top management, it is most important to this type of organization to keep a stable environment to maintain current operations.

## CONCLUSION

Two main goals of this exploratory research were: (1) To check whether the methodology developed by Sabherwal and Chan (2001) to map organizational strategic profile on to the Miles and Snow (1978) typology is also applicable in the context of an information management strategic profile; this research found the methodology is appropriate to the context. (2) To test the hypotheses linking IS variables with IS performance within the strategy types of Prospectors, Analyzers and Defenders. The results indicate general support for the directionality stated in the hypotheses.

In the organizational strategy area, there has been extensive research conducted at the organizational level on the relationship between organizational characteristics and organizational strategy, and the effect of this relationship on organizational performance. Future research in information systems can similarly try to identify the fit between information management strategy, information systems characteristics (variables) and information systems performance.

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