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INFORMATION MANAGEMENT STRATEGIC PROFILE AND IS PERFORMANCE – AN EMPIRICAL INVESTIGATION

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ABSTRACT

Literature indicate many organizational factors influence IS performance. However, the effects of these factors may be different for organizations with distinctive information management (IM) strategies. This paper applies the methodology developed by Sabherwal and Chan (2001) to identify IM strategic profiles based on Miles and Snow (1978) typology 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.

INTRODUCTION

Organizations have long believed that the innovative use of information systems (IS) would create a sustained competitive advantage. Managers expected the use of information systems technology (IST) 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 et al. 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.

Information systems 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 must 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 et al. 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 et al. 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 et al. 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 et al. 1997; Ragu-Nathan, Ragu-Nathan et al. 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 lot of research concerning IS strategy (Chan, Huff et al. 1997; Gupta, Karimi et al. 1997; Sabherwal and Chan 2001) and its alignment with business 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 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 non-existent.

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.

Three Levels of Information Systems Strategy (Earl 1989)
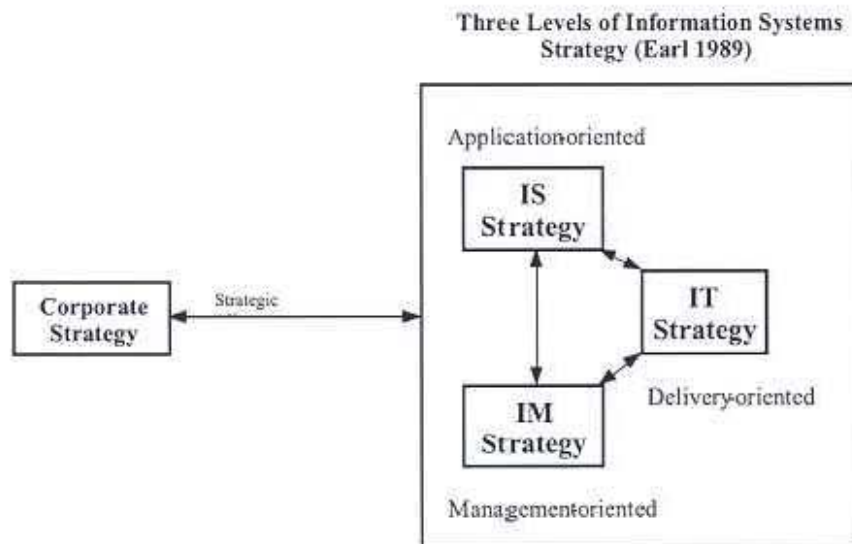

Figure 1: Information Systems Strategy and Organizational Strategy

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 Venkartaman'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 et al. 1978), and may be more common in large organizations (Doty, Glick 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). This research uses the Miles and Snow typology without Reactors.

IS CHARACTERISTICS AND HYPOTHESIS DEVELOPMENT

The characteristics chosen for this study were based on prior IS literature that identified these seven 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 et al. 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).

> *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 et al. 2002).

> *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 a supplying adequate resources for attaining IS performance (Weill and Vitale 2002).

> *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, Bhattacherjee et al. 2000).

> *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.

> H5a: *Degree of IS Stability will <u>not</u> 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.

> H6a: *Degree of IS Integration will <u>not</u> 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 <u>not</u> 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. King and Sethi (2001) referred to centralization as the central control of organization resources by the corporate office.

> H7a: *Degree of IS Centralization will <u>not</u> 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 <u>not</u> have a significant positive effect on IS performance for firms with a Defenders IM strategy.*

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. 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.

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 et al. 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 et al. 1999).

Sabherwal and Chan (2001) had developed a methodology to classify the organizations based on their score on Venkatraman's strategic attributes into to 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).

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 OF RESULTS

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. 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 ($p<0.05$).

MANAGERIAL IMPLICATIONS AND CONCLUSION

Two main goals of this exploratory research were: (1) to check whether the methodology developed by Sabherwal, R. and Y.E. 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.

From a managerial standpoint, this research identifies different strategic profiles 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.

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.

References are available from Dr. Charles Apigian (capigian@mtsu.edu) upon request