EXECUTIVE INFORMATION SYSTEMS USE IN ORGANIZATIONAL CONTEXTS: UNDERSTANDING THE USER BEHAVIOR

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ABSTRACT

Executive Information Systems (EIS) are designed to enhance the managerial roles of top-level managers in organizations. Despite reports of the growing popularity of EIS, there are reports of low usage of these systems that, in part, contributes to their failures in organizations. Majority of prior EIS research has focused on documenting the features, benefits, development methodologies, and implementation of the systems. Regrettably, there are very few studies addressing the problem of low EIS usage. This paper reports on a research in progress on the use of EIS in organizational settings. The primary focus of the research is to investigate factors that explain users' behavior towards using EIS. It is also aimed at identifying the relative importance of these factors that determine the use of EIS. Preliminary results are reported below. In the context of this paper, an EIS is defined as: "A computer-based information system designed to aid top-level managers in organizations in performing their managerial roles".

Keywords: EIS; System use; Behavior; Social; Cultural; Organizational; Behavioral model.

INTRODUCTION

In the past two decades, executive information systems have been designed and built primarily to support the managerial activities of top-level managers of organizations. Along with the success stories, however, there are many examples of EIS failures some of which are due to the non-use of the systems (e.g., [12]). Whereas these systems have attracted a growing number of research studies in recent times, a review of the EIS literature reveals that few studies have been done on the real use (that is, the active engagement) of the systems. The majority of the prior EIS research studies has focused on documenting the features, benefits, development, methodologies, and implementation of EIS by using case studies and interviews (e.g., [2] [12] [27] [28]). The research studies on this side are quite thorough and extensive than the use side. Of the limited research studies on the use side, very few used appropriate reference theories that address system use as a behavior [24]. These studies are also mixed, with only a very small number addressing the problem of low EIS usage.

Although recent studies ([2] [27]) indicate there is a growing popularity of EIS, and new concepts like enterprise resource planning (ERP), data warehousing, data mining, OLAP, ROLAP, Internet, Intranet, Extranet and the Web are giving rise to a renewed need to provide executives with a meaningful view of corporate information, the of problem low EIS usage still remains.

The primary aim of the study is to identify, examine and provide some understanding of the social, cultural and organizational factors that explain the behavior of managers towards using EIS. The results of this study will be used to suggest those social, cultural and organizational

factors that need to be considered in the development and implementation of EIS to improve their usage in organizations. This paper reports some preliminary results for this research study.

RESEARCH PROBLEM AND QUESTIONS

Information systems are social systems. Studies (e.g., [16]) have suggested that the success or failure of an IS cannot be explained purely in technical terms, and that the roots of successful IS lie in the social and organizational context. Studies of the Stock Exchange Taurus system [7], the London Ambulance system [3], the Confirm system [15] and some others (e.g., [12]) have also indicated that the complex interaction of the social, cultural, political and organizational elements with the technical elements result in the failure of information systems.

The success or failure of IS is therefore inextricably linked with the dynamics of the organization within which they exist. McBride [12], who studied the rise and fall of an EIS in a UK manufacturing company over nine years, concludes that: "no study that concerns itself with how to develop a successful IS and how to avoid failures can reach many reasonable conclusions unless it addresses issues of context and culture" (p. 277). Social, cultural and organizational factors are equally linked with system use [2][25].

The main purpose of this research study, therefore, is to identify, examine and provide some understanding of the social, cultural and organizational factors that explain the behavior of managers to use EIS, using a model from organizational behavior as a theoretical foundation. The main research questions for the study are:

1. What are the major social, cultural, and organizational factors that explain the behavior of managers towards using EIS in an organizational setting?
2. What is the relative importance of these factors in determining EIS use by managers?

THEORETICAL PERSPECTIVE FOR THIS STUDY

A number of researchers have studied different aspects of the phenomenon of individual reactions to computing technology from a variety of theoretical perspectives, including Diffusion of Innovations (e.g., [13]); the Technology Acceptance Model (TAM) which is an adaptation of the Theory of Reason Action (TRA) (e.g., [8] [10] [25]); the Theory of Planned Behavior (TPB) (e.g., [20]); Social Cognitive Theory (SCT) (e.g., [6]); and Activity Theory (e.g., [11]). This body of research has produced some useful insights into the cognitive, affective and behavioral reactions of individuals to technology and into the factors that influence these reactions.

According to Compeau et al. [5], in each of the theories noted above, behavior (e.g., the use of computers) is viewed as the result of a set of beliefs about technology and a set of affective responses to the behavior. The beliefs are represented by the perceived characteristics of innovating in Innovation Diffusion research, by perceived usefulness and perceived ease of use in TAM, by behavioral beliefs and outcome evaluations in TPB, and by outcome expectations in SCT. Seddon [18] refers to these as the net benefits (realized or expected) accruing from the use of a system. Affective responses are typically measured by attitudes towards use, an individual's evaluation of the behavior as either positive or negative. These commonalities in the models reflect a belief in the cognitive basis of behavior.

Compeau, et al. [5] however suggest that, while TAM and the Diffusion of Innovations perspectives focus almost exclusively on beliefs about the technology and the outcomes of using it, SCT and the TPB include other beliefs that might influence behavior, independent of perceived outcomes. The TPB model incorporates the notion of Perceived Behavioral Control (PBC) as an independent influence on behavior, recognizing that there are circumstances in which a behavior might be expected to result in positive consequences (or net benefits), yet not be undertaken due to a perceived lack of ability to control the execution of the behavior. PBC encompasses perceptions of resource and technology facilitating conditions, similar to those measured by [21], as well as perceptions of ability, or self-efficacy [20].

Regrettably, none of the above theoretical frameworks addresses explicitly some of the social and organizational factors that may influence/explain the user's behavior to use IS.

A model developed by Triandis [22] [23] from organizational behavior addresses explicitly the net beliefs as well as the social, cultural and organizational factors that influence/explain behavior. TAM which is derived from TRA is mostly used as a theoretical framework for IS use studies. Triandis' model has some similarities with TRA and forms the theoretical foundation for this study.

AN OVERVIEW OF EIS

EIS is most concerned with data and ways of interacting with the data. It is designed as structured reporting system which filters, extracts, and compresses a broad range of relevant current and historical information which are either internal or external to the organization. It is used, in part, to monitor and highlight the critical success factors of the organization as defined by the user.

New technologies such as data warehousing and data mining, enterprise resource planning (ERP) and the Web have recently increased the popularity of EIS rather than replace them (e.g., [1]). These technologies gave the impetus for the widening use of EIS by managers whose decisions must be timely in an increasingly competitive and uncertain environment [2]. Data warehousing, for example, is generally regarded as the prerequisite for effective decision support or data mining systems and ROLAP and MOLAP (relational and multidimensional operations for online analytical processing) have given rise to such concepts as "slicing" and "dicing" of data which have added more flexibility and ease-to-use EIS [1].

Recent studies (e.g., [1] [2]) show EIS are spreading to other levels in some organizations. Subsequently they are referred to in some organizations as "enterprise-wide information systems" or "everyone's information systems" which still befit the acronym EIS, whereas in other organizations they are known by vendor product names such Enterprise Business Intelligence Systems, Balanced Scorecard or simply Scorecard.

PREVIOUS RESEARCH STUDIES ON EIS USAGE

The focus of prior EIS research studies can be classified broadly into two groups. One group of studies focuses on EIS development and implementation while the other group focuses on EIS usage (see Table 1). The studies on the development and implementation side are more thorough and extensive and form the bulk of the EIS literature than the studies on the usage side. The research studies on EIS usage are relatively few and mixed with only a very small number

addressing the actual use of the systems.   Of this small number too, only very few use appropriate reference theories to address system usage.   The focus of these research studies seems to be in line with the four suggested frameworks by Carisson and Widmeyer [4] for researching EIS usage based on executives' management activities. This seems to be adhered to with almost a complete neglect of studies into the real use of the systems. These managerial activities should rather filter into determining the real use of the systems by the target users.

The focus of the few studies on the usage can be broken into six areas (see Table 1). And of the six areas, only the focus on factors that influence/explain EIS use deals with the actual engagement of the systems: without which the other five cannot be realized. The studies on the actual engagement are quite few, and of the few, only a small number used appropriate reference theories to address system use as a behavior (e.g., [2] [10]). Since system use is a behavior [24], appropriate reference theories are necessary to study it.

Table 1: Classification of EIS Research Studies by Research Focus

Focus of Research Study	Researchers (for example)
Development and implementation	[12] [28] [27] [2]
Usage:	
i. Impact of use on - managerial activities	[17]
- decision-making	[9]
ii. Overall benefits from use	[14]
iii. Use to respond to competitive advantage and other business problems	[26]
iv. Mode of use (e.g. searching and scanning)	[2]
v. Pattern of use (including frequency of use)	[19]
vi. Factors that influence/explain use	[2] [10]

THEORETICAL FRAMEWORK

Trice and Treacy [24] asserted that, system use is a behavior whose determinants are not well understood in IS research, and that system use can best be explained by referring to an appropriate reference theory. This assertion has guided some system use studies (e.g., [8] [24] [25]) with TRA as the conceptual framework of choice employed to link user beliefs and attitudes to behavior. Some researchers (e.g., [2] [21]) have sought to explain personal computer usage and IS use by grounding their research models on a similar but richer theoretical framework developed by Triandis [22] [23]. This study also employs Triandis' framework as theoretical foundation. The research model derived from the framework takes into consideration the social, cultural and organizational factors that explain the behavior of top-managers to use EIS. The model is used to test empirically the hypothesized relationships among the factors.

THE RESEARCH MODEL

Bergeron et al. [2] who based their research model on Triandis' framework suggested that "future investigations should aim for a cumulative tradition by continuing to employ Triandis' framework as a theoretical foundation to further understand the phenomenon of EIS use" (p. 142). In line with this suggestion, this research model is based on Triandis' framework (as shown in Figure 1) and is similar to that used by Bergeron et al [2].

The affect construct consists of satisfaction with information similar to that of Bergeron et al. The facilitating conditions construct consists of EIS development processes, EIS management processes, and organizational environment. In line with Triandis framework, the consequences

construct consists of perceived usefulness (consequences) of EIS use. The behavior construct consists of the frequency of EIS use and the internalization of EIS use, similar to that of Bergeron et al. Similar to [2] and [21]'s studies, genetic/biological factors are not included in this research model.   Similarly, behavioral intentions are not included in line with the suggestions by [2] [13] [21]. This study seeks to explain behavior towards the use of EIS but not to predict it, as did by Bergeron et al, and therefore a longitudinal study is not also necessary. Due to limit of publication space, detail operationalizations of constructs are not included in this paper but available on request.
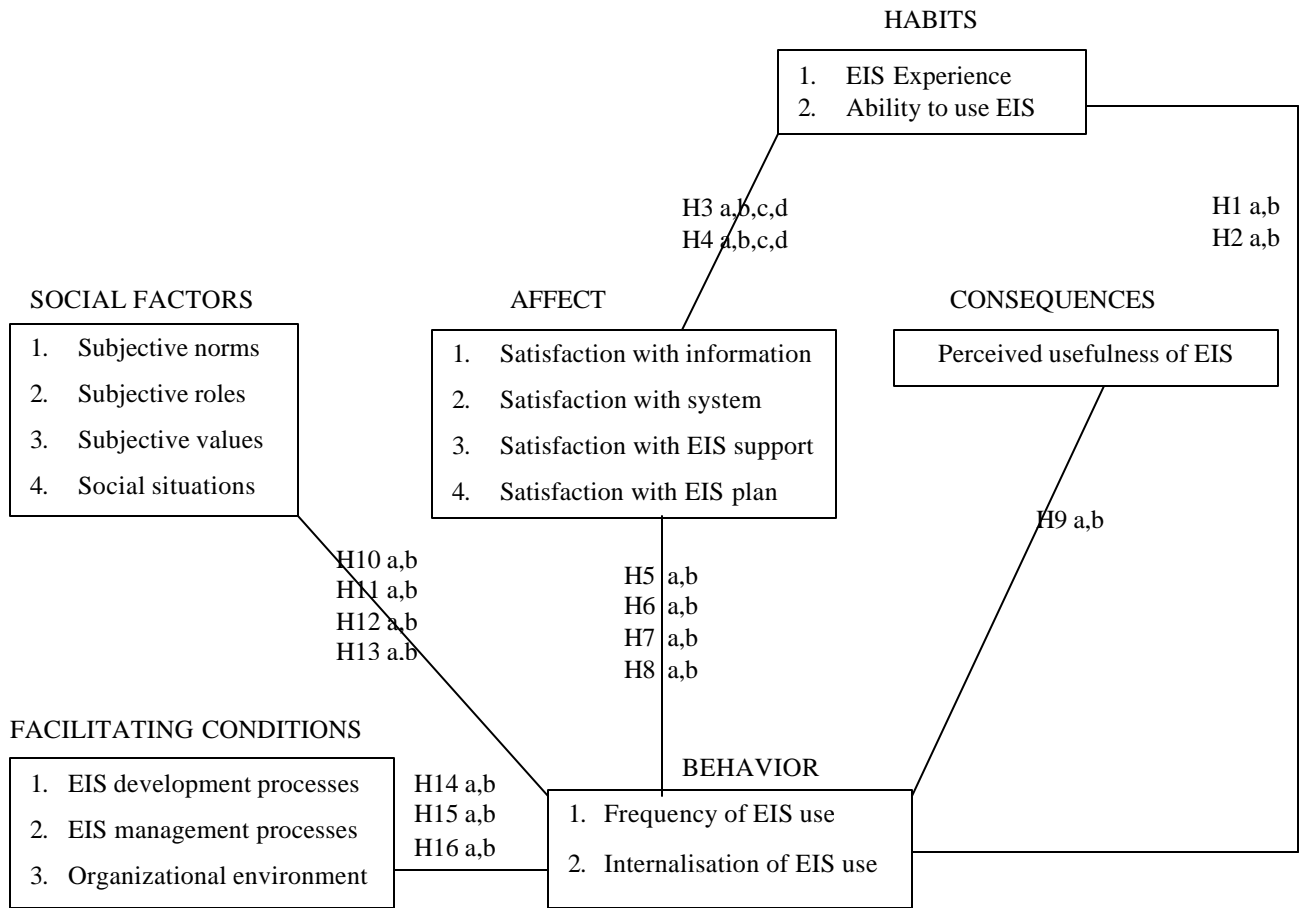

Figure 1. Research Model for EIS use

RESEARCH METHODOLOGY

The research methodology is a combination of both quantitative and interpretive methods.

Data Collection Methods

Data for analysis will be collected using two data collection methods:

1. By survey questionnaires mailed out to CEOs, CFOs, or equivalent and one other senior manager in organizations in Australian who are using EIS; and
2. By interviews and observations (case study) of CEOs, CFOs, or equivalent and one other senior manager in three organizations in Australia who are using EIS and participated in 1.

The questionnaire was pre-tested on six colleagues, refined with feedback received and pre-tested again. Each time a consultation was made with the Statistical Consulting Service at the university to verify the statistical validity of the questionnaire as well. The cover letter to the questionnaire mailed out had a statement guaranteeing the confidentiality of the respondent and a statement of how the research has been reviewed by the Human Research Ethics Committee as required in Australia and their contact for any concerns or complaints regarding the conduct of the research.

Data for the pilot study was collected from two large organizations in Australia using EIS by mailed-out questionnaires. Ten questionnaires were mailed out and eight were returned, all of which were good. The feedback from the pilot was used to refine the main survey questionnaire.

Data Analysis

Similar to Bergeron et al, the research model and associated hypotheses for this study is being tested by calculating product-moment correlation coefficients (Pearson's r) at time of submitting this paper. Further analysis is also being conducted by using standard or stepwise multiple regression to determine the relative importance of the independent variables in explaining EIS use. Data collected by interviews and observations will be interpreted and further used to reconcile the statistical analysis. The analysis of the data from the pilot study at this stage was qualitative.

PRELIMINARY RESULTS

Preliminary results suggest there is very high perceived usefulness of EIS in organizations. The results suggest social factors are much considered by users in using EIS. The results also suggest users consider satisfaction with information from EIS, support for the EIS system and the EIS system itself a little more over EIS development plans in using EIS. The preliminary results also suggest users consider management processes associated with the EIS system more than the EIS development processes and the organizational environment in using EIS.

WORK-IN-PROGRESS

At the time of submitting this paper, 700 questionnaires were mailed out for main survey to mainly CEOs, CFOs, and one executive in 200 organizations using EIS in Australia. The organizations were identified through a database purchased from the Fairfax Business Media purposely for this study. One hundred and forty five (145) responses were received. Follow-up questionnaires were sent to non-respondents and 115 responses were received: giving the overall response rate of 37.14% with 25% good for analysis. Some results from the statistical analysis are available and will be presented at the conference because of limit of publication space.

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