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MOBILE ENTERPRISE COMPUTING AND THE DIFFUSION OF MOBILE ENTERPRISE BUSINESS APPLICATIONS IN ORGANIZATIONS

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Abstract

This paper presents research in progress concerning the diffusion of a technology, a mobile enterprise business application (EBA), throughout organizations of varying industries and sectors. External factors such as the environment in which the organization exists and myths about the technology, internal factors such as organizational culture, and personal factors attributed to individual expectations of the technology are thought to impact the type of mobile computing strategy chosen, the perceived usefulness and the diffusion process of the mobile EBA. A phased research approach will be applied and incorporate qualitative and quantitative methods to discern (1) the differing inhibiting and facilitating factors that affect an organization's mobile computing strategy choice and (2) the impact of perceptions and perceived usefulness of a mobile EBA on the diffusion process of the technology within an organization.

Keywords: Wireless business solutions, organizational culture, synchronization, innovation diffusion, perceived usefulness

Introduction

Enterprise mobile computing is becoming the dominant computing strategy for organizations with highly mobile or geographically dispersed workforces and remotely located assets. There are two main forms of enterprise mobile computing: (1) synchronization and (2) direct access to legacy applications via a wireless network. Synchronization is the process of integrating multiple technologies (i.e., varying input – output devices and enterprise software and hardware) in mobile computing to allow continuous access to vital corporate information that promotes the organization's mobile strategy. Primarily, data is locally entered and stored via mobile devices such as personal digital assistants (PDAs), smart phones (i.e., cell phones with advanced storage and processing capabilities), laptops, and handheld micro-processing devices. This data is then uploaded to an enterprise business application (EBA) over a wired or wireless network. An EBA is software that performs financial, accounting, inventory, personnel management, and/or other enterprise functions that are applicable to the major factions of the organization. Direct access entails the use of the mobile devices that are within specified radial proximity of the wireless network to record, process, and manipulate data stored in organizational memory via a device that is equipped with or designed to access an enterprise application. Both strategies facilitate the accessibility of organizational memory to both the members of the organization and clients of the organization. Champions for enterprise mobile computing assert that the process of making corporate information accessible through parallel systems and enterprise mobile mediums empowers mobile workers and affords the organization a competitive advantage. Mobile computing, facilitated by advances in Wireless Application Protocol (WAP) technology, is becoming commonplace amongst individual consumers and, as some providers suggest, a necessity for maintaining open communication lines and continuity within organizations that contain factions that operate remotely. Both strategies provide the organization with the ability to retain control of their dispersed assets and afford flexibility that may prove to be cost effective through a "wide array of devices, operating systems, and form factors (Future of Enterprise Mobile Computing, pg. 1)." However, some organizations are still very reluctant to adopt mobile computing strategies because of the technological challenges, security concerns, and uncertainty of value added.

Theoretical Underpinnings

The application of relevant theory lends credence in explaining phenomena such as an organization’s mobile computing strategy choice and adoption of wireless applications for the purpose of enhancing enterprise to employee (E2E) operations. Diffusion is “the process of by which an innovation is communicated through certain channels over time among the members of a social system (Rogers 1983).” The theory of diffusion as articulated by Rogers is applicable in explaining the steps by which an innovation such as a wireless application is integrated into the IT infrastructure of an organization. This integration is facilitated by the (1) a business need, (2) formal and informal communication channels, (3) the social system of the organization that is defined by culture, over a period of (4) time. The rate of adoption/diffusion is “the relative speed with which an innovation is adopted and used by members of a social system to perform organizational tasks (Rogers 1983). The Theory of Reasoned Action (TRA) (Fishbein 1979) is a very parsimonious description of usage that provides a basis for understanding usage but does not include various factors such as the impact attributed directly to the task or the impact of a myth in the external environment concerning the technology. Due to some concerns of this nature, many models (Davis 1987, Triandis 1979, Compeau et al. 1999, and Karahanna 1995) were developed to note other facilitating or inhibiting factors attributing to technology usage and adoption. The Technology Acceptance Model (TAM) (Davis 1987) asserts that usage is the actual behavior of an individual to interact with a particular information system. However, none of the models accounts for adoption directly, except for Karahanna et al. (1995), who assert that adoption precedes usage. Additionally, these models do not incorporate the relevance of the task and its impact on a user’s decision to use and adopt a particular device. Goodhue et al. (1995) assert that the task at hand such as acquiring timely technical data about a product or customer data from organizational memory while in remote locations greatly impacts the ultimate decision to adopt a technology such as a mobile EBA. Additionally, none of the models *explicitly* account for the impact of organizational culture an individual’s expectations of performance outcomes or a myth about the utility of the technology in the industry or competitive environment in which the organization operates. Figure 1. is a theoretical model, which incorporates portions of the aforementioned models, that depicts the diffusion of a mobile EBA within an organization taking into account the process of diffusion, external and internal factors attributing to adoption of the technology over time. Since the theoretical model is extremely broad and validated research exists for the attitude/adoption relationship, this research will be narrowed to examine (1) the factors attributing to a mobile computing strategy choice and (2) how external, internal organizational and personal factors affect perceptions and perceived usefulness of a mobile EBA, which is the research model depicted by the constructs within the dashed lines of Figure 1.

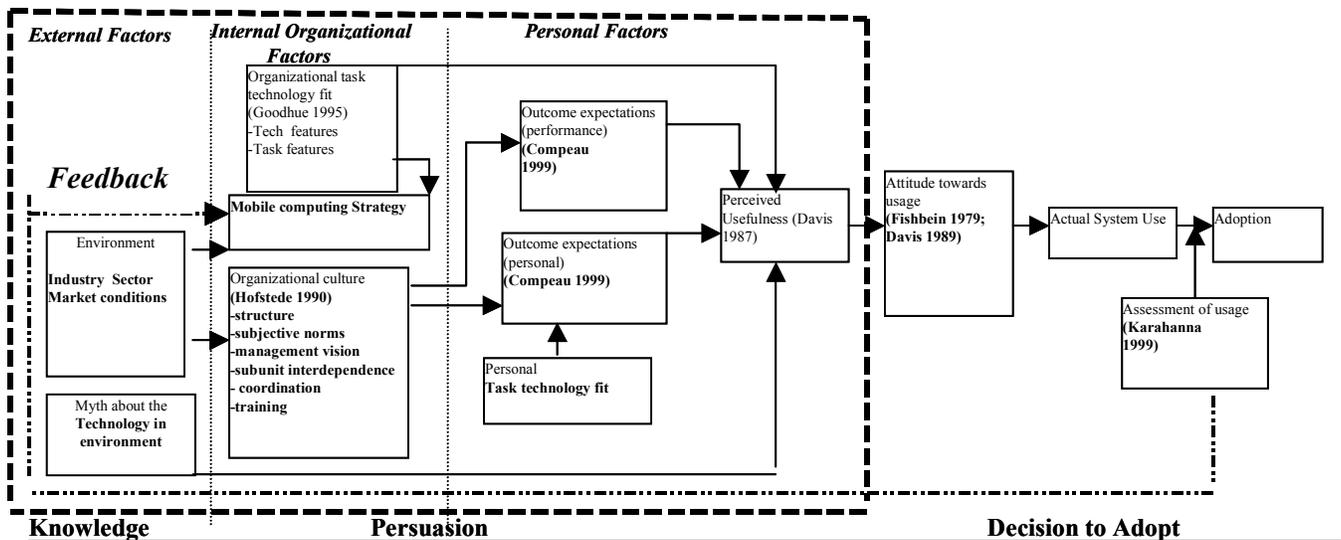


Figure 1. Theoretical Model and Research Model (imbedded within the thick dashed lines)

Proposed Research

The purpose of this research is to discern (1) the factors that attribute to an organization's mobile enterprise computing strategy and (2) how external and internal organizational factors and personal expectations inhibit or facilitate the diffusion of a mobile

enterprise business application. The unit of analysis for this field research is the organization. In order to accurately discern the diffusion process over time, the study is longitudinal. The initial phase of the proposed research is interpretive to gain insight concerning the background of wireless technologies and factors attributing to the chosen strategy and factors impacting the diffusion of mobile EBAs in organizations with varying organizational cultures, industries, and sectors. Interpretive methods include conducting case studies of organizations to obtain contextual information concerning (1) the internal organizational factors (i.e., organizational culture to include structure, social system, communication channels, norms, values of the organization, and the socio-technical impact of a mobile EBA), (2) personal factors (i.e., individual expectations), and (3) external factors (i.e., environmental conditions and myths about the technology). Thus far, four organizations are proposed organizations for the case studies, which are as follows:

- 93rd Air Control Wing and the 19th Air Refueling Wing at Robins Air Force Base - employs a mobile EBA for aircraft field level maintenance on the flight line
- Delta Baggage Department at Hartsfield Airport - planning to implement a mobile EBA for quickly re-routing baggage
- Fleet and Industrial Support Center (FISC) at Norfolk Naval Base - uses a mobile EBA to manage warehousing operations
- Sears Inc. – planning to use a mobile EBA to manage inventory, price changes, merchandise pickup, a receiving and replenishment of goods.

Specifically, interviewees will be the project manager and lead analysts for each initiative, champions for the projects, and select member of the user groups. Additionally, mobile EBA developers and integrators such as Hotplam.com, Synchronologic Inc, and Telos Inc. will be interviewed to discern the strategies employed for devising a mobile computing strategy for client organizations based on the external, internal, and personal factors associated with a mobile EBA.

Propositions will be formulated from the information qualitatively analyzed from the case studies and the aforementioned research model will be revised based on findings in the case studies.

Phase two will entail quantitative methods such as a survey to discern the discriminant validity and explanatory relationships of proposed constructs impacting the mobile computing strategy choice and the diffusion of wireless solutions for enterprise usage based on the revised research model developed in phased 1. Hypotheses will also be generated based on the revised research model. Survey questions will be developed for the managerial personnel of the organization and its units, the internal users of the application, and clients of the organization or serviced personnel. At least forty organizations (not including the organizations involved in phase 1) are required to assess the causal relationships to be determined in the revised research model (at least twenty public – military, state, and federal government and at least twenty private – traditional civilian organizations with medium to large mobile workforces (i.e., 150+ personnel). Under the best circumstances, a survey will be administered at the start and end of each stage of the diffusion process (for the organization) to discern the change in the percent of adopters and differences in rates of diffusion at particular times during the study. This may not always be feasible because some organization may be further along in the diffusion process than others but measures to control for the differences in stages will be employed. For example, a post hoc survey will be administered to discern how the organization fared during the unobserved stages. Data analysis will employ structural equation modeling (SEM) in the confirmatory mode to test the proposed interrelationships between constructs of the revised research model developed in phase 1. In phase three, qualitative methods will be used to help explain any spurious findings.

Despite the penetration of mobile computing devices into the technological environment and consumer market, IT firms at this point are most reluctant to adopt mobile companion devices into the IT infrastructure of the organization. Most likely, this is due to the fact that companion devices are targeted toward the individual consumer and firms feel that little organizational value can be gained from integrating these devices with corporate systems in addition to the complex task of synchronizing information or implementing a wireless LAN to be accessible with devices operating on separate platforms with differing security mechanisms. Undoubtedly organizations have questioned how secure their organizational information systems will be if access is granted via a cell phone or handheld device! This research intends to employ a socio-technical perspective (Martin et al. 1999) to provide practical implications for service providers, systems developers, and organizational members for choosing a mobile computing strategy and understanding the impetuses and impediments for acceptance of a complex technology such as a mobile EBA.

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