The Impact of Organizational Characteristics and Vendor Activities on the Decision to Integrate Smartphones into Clinical Workflow

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ABSTRACT

In spite of increasing number of smartphone use among health professionals, the integration of health professional's smarphone into clinical workflow is slow and hindered by many obstacles. The purpose of this research is to identify the factors influencing the integration of health professional's smartphone into clinical workflow.

Keywords: Smartphone, Clinical workflow, hospital information systems

INTRODUCTION

More and more health professionals including doctors and nurses are using smartphones in their personal lives. According to a recent report (Versel, 2009), more than 80 percent of U.S. physicians will have smartphones by 2012 and half of that group will use their phones for patient care, administrative functions, and continuing medical education. Smartphones are expected to be used more widely and frequently among health professionals as more health oriented smartphones applications are developed and available.

In spite of increasing number of smartphones use among health professionals, the integration of health professional's smarphones into clinical workflow is slow and hindered by many obstacles including cost and privacy issues (Bhanoo, 2009). Therefore, physicians using smartphones either have to double-document, or they fail to reap the advantages of up-to-date information by patients' bedsides.

The purpose of this research is to identify the factors influencing the integration of health professional's smartphones into health information systems, including hospital information system, electronic medical record, and practice management system. Specifically, this study investigates the impact of organizational characteristics and vendor activities on the integration process. In this study, a hospital smartphones integration model will be proposed and empirically tested by a survey using senior executives in US hospitals.

BACKGROUND

Characteristics of Organization

Many studies found that the characteristics of organizations are significant determinants of organizational IT adoption (Iacovou *et al.*, 1995). Some organizational characteristics frequently

identified in prior studies include organization size, organization readiness, and organization structure.

Organizational Size

Organization size has been proposed as a significant antecedent of adoption in many innovation and IT studies (Bajwa and Lewis, 2003). In the meta-research of the effects of organization size on innovation adoption, Damanpour (1992) found a positive relationship between organization size and innovation adoption. In addition, he found that 1) size is more positively related to innovation in manufacturing and profit-making organizations than in service and non-profit-making organizations, 2) the association between size and innovation is stronger when a non-personnel or a log transformation measure of size is used than when a personnel or a raw measure of size is used, 3) types of innovation do not have a considerable moderating effect on the relationship between size and innovation, and 4) size is more strongly related to the implementation than to the initiation of innovations in organizations.

For the most part, it has been convincingly argued that larger, resource-rich organizations are more able to afford the cost of IT innovations and have higher ability to handle risk (Dewar and Dutton, 1986). However, the results of research investigations have been somewhat inconclusive. While some innovation studies suggest a positive relationship between organization size and adoption behavior (Moch and Morse, 1977), a negative relationship between size and adoption behavior has also been reported (Mohr, 1969). For example, Ein-Dor and Segev (1978) asserted that small businesses face substantially more barriers to adoption of IS and are less likely to adopt IS than large businesses. Iacovou *et al.* (1995) also argued that small firms resisted becoming EDI-capable because of the (1) limited impact that IT had on small firms due to under-utilization and lack of integration, (2) low levels of IT sophistication, and (3) weak market positions of small firms and the network nature of the technology.

Organizational Readiness

Organizational readiness refers to the level of financial and technical resources of the firm (Kuan and Chau, 2001). Financial resources refer to the financial resources available to pay for new technological innovation costs, for implementation of any subsequent enhancements, and for ongoing expenses during usage. Technical resources refer to the level of sophistication of IT usage and IT management in an organization. For example, Iacovou *et al.* (1995) identified organizational readiness, which is represented by financial resources and technological resources, as an important determinant of EDI adoption. Chwelos *et al.* (2001) used organizational readiness to represent an intraorganizational construct, which in turn is represented by several dimensions: organization financial resources, IT sophistication, and trading partner readiness.

Mehrtens *et al.* (2001) also found that organizational readiness significantly influences Internet adoption. However, they found that the definition of organizational readiness is different. In their study, the level of IT knowledge among IT professionals, the level of IT knowledge among non-

IT professionals, and level of IT use in the organization explain organizational readiness better than Iacovou's (1995) financial resources.

Organizational Structure

Organizational structures are often defined in terms of their centralization (Kwon and Zmud, 1987). More concentrated decision-making is associated with a centralized organizational structure. Although many studies have found centralization to be negatively associated with information technology innovation adoption and use (Damanpour, 1991), some positive associations have also been reported (Kimberly and Evanisko, 1981).

According to Ellis *et al.* (1994), organizational complexity plays a significant role in the adoption of LAN technology. Complexity refers to the number of levels in the organizational hierarchy, the number of geographic locations of an organization, and the number of departments or jobs in an organization. However, according to Lai and Guynes (1997), the organizational structure factors proved to be least effective in discriminating adoption. In their research, there was no significant relationship found between the ISDN adoption decision and the degree of centralization, formalization, or complexity. Lai and Guynes argued that other factors may overpower the structural factors during the time period chosen by this research. Eder and Igbaris (2001) also found that organization structure was not related to the diffusion or infusion of intranets.

Burns and Stalker (1961) suggested two different types of organizational structure: mechanistic and organic. A mechanistic structure is somewhat rigid in that it consists of very clearly delineated jobs, has a well-defined hierarchical structure, and relies heavily on the formal chain of command for control while an organic structure is more dynamic, decentralized, flexible, and informal. Daft (1986) states more organic organizations tend to adopt new technology more readily.

RESEARCH MODEL AND HYPOHTESES

Information technology (IT) adoption is defined as the process through which individuals or other decision-maker units pass from first knowledge of an IT, to forming an attitude toward the IT, to a decision to adopt or reject, to implementation of the IT, and to confirmation of this decision (Rogers, 1983). Zaltman *et al.* (1973) examined IT adoption within organizations and proposed that the adoption process often occurs in two stages - a firm level decision to adopt the innovation (primary level adoption), and subsequent implementation, which includes individual adoption by users (secondary level adoption). Figure 1 summarizes the IT adoption process. That is, managers identify objectives to change some aspect of their business and seek available innovations which may fit their objectives. Then, the primary level adoption decision is made. Once the primary level adoption decision has occurred, secondary (or individual) level IT adoption is followed.

However, decision to integrate smartphones into clinical workflow occurs in the reverse order which individuals or groups pass from their current practice, to forming a managerial attitude toward the integration of their devices, to a decision to the integration, and to confirmation of the integration decision. Therefore, in the smartphones integration process, unlike the Zalman's adoption process model, management objectives and other organizational factors influence the second phase of the adoption or integration decision. Figure 2 summaries the smartphones integration decision.

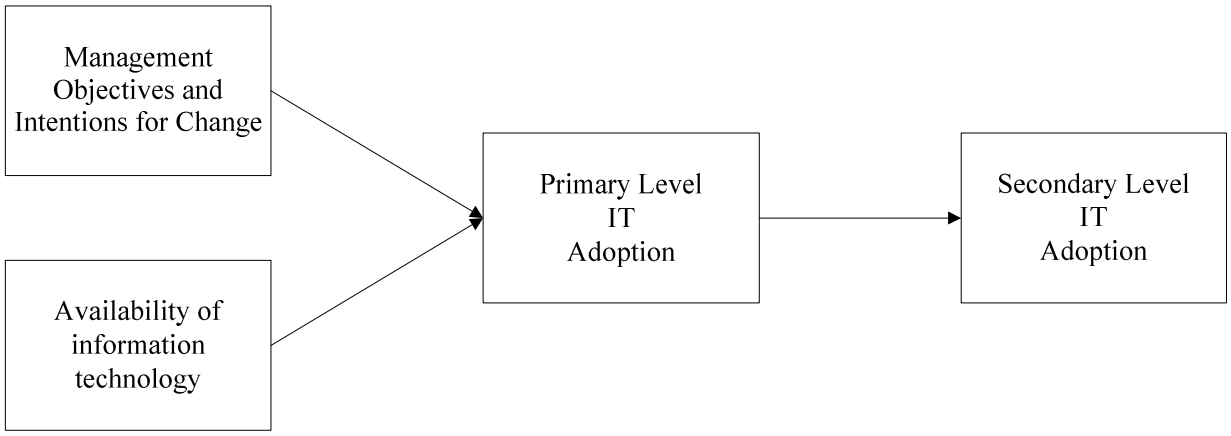
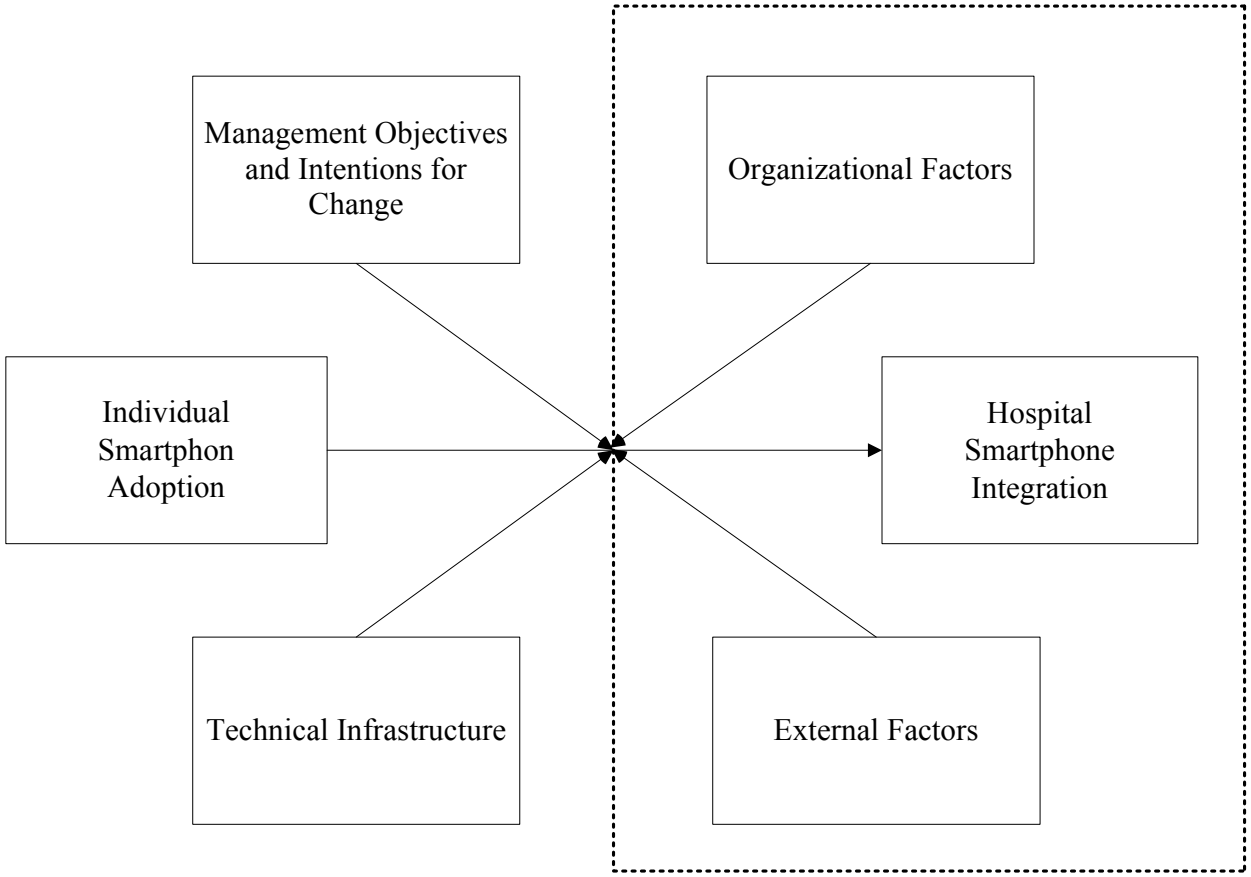


Figure 1. The Process of Innovation Adoption

Adapted from Gallivan, M. J. (2001). Organizational Adoption and Assimilation of Complex Technological Innovations: Development and Application of a New Framework. *The DATA BASE for Advances in Information Systems, 32*(3), 51-85.



Note: Dotted line denotes the focus of this study

Figure 2. Research Model - Hospital Smartpones Integration Model

Hypotheses Development

Organizational Size

One of the reasons prior studies on the effects of organization size on IT adoption have generated little consensus on the size-adoption relationship is that size correlates with many structural characteristics, such as formalization or decentralization, that tend to have contradictory effects on innovation adoption (Boeker and Huo, 1998). Many have argued that larger size implies a larger pool of resources and a better ability to compete, and large organizations are more capable of sustaining failures or absorbing the risk in trying new things (Bajwa and Lewis, 2003). Thus,

H1: Organizational size is significantly associated with the decision to integrate smartphones into clinical workflow.

Organizational Resource

Organizational readiness reflects a firm's financial and technological capabilities, or the level of use of knowledge and skills (Dosi, 1991). While it is important that organizations have motivation to adopt a technology by perceiving the benefits of the technology or the pressure from internal or external forces, it is meaningless if the organization does not have appropriate resources to carry out the action. Kwon and Zmud (1987) expressed that successful IS implementation occurs when sufficient organizational resources are directed first toward motivation, then toward sustaining the implementation effort. Therefore, organizations without such resources may be less able to adopt innovation and thus demonstrate lower readiness. Thus,

H2: Organizational resource is significantly associated with the decision to integrate smartphones into clinical workflow.

Vendor Marketing Activity

Prior studies on information systems adoption have extensively focused on explaining the innovation and adoption of information technology by the potential adopter population in the IT market. However, studies have shown that supplier marketing activities have a significant effect on the adoption decision (Frambach *et al.*, 1998). According to Rogers (1983) marketing activities and competitive strategies play an important part in the adoption of innovations. Especially, in mobile computing adoption, it has been found that vendors play a significant role determining adoption decision (Dash, 2001). This suggests the following hypotheses:

H3: Vendor marketing activity is significantly associated with the decision to integrate smartphones into clinical workflow.

Methodology

Operationalization of Measurement Variables

All latent constructs in this study will be employed multiple item scales. The majority of the items will be written in the form of statements with which the respondent is to agree or disagree on a 7-point Likert scale. Most items will be adopted from existing instruments and modified to fit the context of mobile technologies when necessary. New items will be developed through literature review on the topics. In order to ensure the appropriateness of the research instrument in this research, the instrument will be tested for reliability, content validity, and construct validity.

Human Subjects

Subjects for this study are required to be decision makers within the organization. The sample in this research will consist of decision makers including Chief Executive Officers (CEOs), Presidents, Chairman, Chief Medical Officers (CMOs), and IT executives in the healthcare industry.

IMPLICATIONS AND CONCLUSIONS

Discussion of Results

The author believes that the findings of this research will help to understand the decision process of integrating smartphones into clinical workflow. The results will be presented at the conference in December 2011, and the preliminary findings (along with a discussion of their implications) will be included in the Conference Proceedings.

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