DIGITALIZED HOSPITAL – MYTH OR REALITY: AN EXPLORATORY STUDY

Ravi S. Narayanaswamy Ph.D.
Department of Management
School of Business Administration
University of South Carolina Aiken
471, University Pkwy
Aiken, SC 29801
Phone: 803-641-3655
Email: ravin@usca.edu

Mohammed Raja Ph.D.
School of Business and Behavioral Sciences
Clemson University
101, Sirrine Hall
Clemson, SC 29634
Phone: 864-508-0161
Email: mraja@clemson.edu

ABSTRACT
To meet the increasing demand of quality health care, health care service providers need to provide higher quality service at a relatively lower cost if they are to be the preferred choice of patients/consumers. This study explores the factors that influence the adoption of administrative information technological innovation. Rogers’ diffusion of innovation theory and the Tornatzky and Fleischer framework are used as the guiding theoretical lenses to identify the technological, environmental, and organizational factors that facilitates healthcare organizations’ adoption of the administrative information technology.
INTRODUCTION

Over the past decades, there has been a consumerism in health care. Recent reports predict that in the next 25 years, the demand for acute care beds will increase by 46% and patients over age 65 will account for 51% of the admission and require 59% of the beds [1]. These changes will put not only a financial strain on the Medicare and Medicaid programs, but also emphasis the need to provide quality care to the aging population. One possible way to address these issues is to adopt innovative administrative information technology (AIT) [2]. AITs will reduce operational and administrative costs, while maintaining high quality by creating and modifying the rules, roles, procedures, and structures that are related to the communication and exchange of information among healthcare staff [3]. For example, Electronic Medical Records (EMR) reduce manual data entry, the Computerized Provider Order Entry (CPOE) system improves data accuracy, and the Radio Frequency Interactive Device (RFID) tracks assets - wheel chairs, defribulators, and incubators, all of which allows the healthcare staff to spend more quality time with their patients. These changes brought about by the administrative IT innovations provide new ways to either allocate resources or structure tasks in the organization resulting in improved operational performance.

As the importance of AIT does continue to grow it is essential to understand how to successfully implement these systems. In other words, what factors inhibit or facilitate successful implementation of AIT in healthcare organizations. This study investigates the relationship between environmental uncertainty, organizational factors, technological perceptions and adoption of AIT. In addition, this study examines the impact of level of adoption of AIT and organizational performance.
LITERATURE REVIEW, RESEARCH MODEL AND HYPOTHESES

The primary focus of this study is to explore what factors affect the adoption of AIT and how the level of AIT adoption influences the organizational performance. The proposed research model, shown in Figure 1, is adapted from [4]. According to this model, three factors - environmental, technological, and organizational influence the level of AIT adoption in health care organizations.

![Research Model Diagram](image)

**Figure 1 A model of administrative IT adoption**

**Environmental uncertainty**

Environmental uncertainty is defined as the inability of the organization to accurately predict the consequences of an action or the future state of the organization and its environment [5]. It is generally captured along two dimensions - complexity and dynamism [6, 7]. Complexity
refers to the number of elements and the nature of dissimilarity and the interconnectedness of those elements [7]. The *number of elements* is a combination of external and internal entities or associations that health care organizations interact with. External elements are comprised of suppliers, competitors, customers, financial capital markets, government regulatory agencies, and educational institutions. Internal elements include professional associations, labor unions, health care professionals, and insurance payers.

Dynamism is defined as the frequency and the predictability of changes in the environment [8]. The frequency of changes in the healthcare environment refers to changes in the aspects of complexity. The predictability of change in the healthcare environment is based on examination of healthcare indicators (i.e. national health expenditures, hospital admissions, outpatient visits, supply of nurses and physicians, number of hospitals, and hospital revenues) and their trends over time [6].

Prior research offers evidence that intense market competition, complex and rapidly changing environment enforce organizations to adopt innovative IT [9, 10]. Previous studies reveal a significant relationship between environmental uncertainty and usage of technology [11]. Environmental uncertainty cannot be controlled by organizations, yet it affects the way in which they conduct their business. Thus we posit:

H1a: Higher level of dynamism will positively affect the level of adoption of AIT.

H1b: Higher level of complexity will positively affect the level of adoption of AIT.

**Organizational Structure**

Organizational structure refers to an organization’s internal pattern of relationships, authority, and communication. Prior research suggests that the adoption of innovations in IT can be facilitated or hindered by organizations’ structural design [12-14]. Some organizational
structures produce radical innovations, while others generate more routine or incremental innovations [13]. In particular, different degrees of centralization and formalization are required during different phases of innovation - initiation and implementation. Organizational structure is commonly represented by two dimensions - centralization and formalization. Centralization refers to the degree to which the authority to make decisions and evaluate activities is concentrated at the higher levels in the organization [14]. Formalization measures the extent to which an organization uses rules and procedures to prescribe behavior [15].

Radical innovations occur frequently in organizations that have a relatively powerful centralized coalition of authority which has the potential to overcome opposition and initiate the process of innovation adoption [12, 16]. Accordingly, we argue that initiation of AIT adoption will require a centralized coalition of authority in order to re-allocate resources, to cut off opposition, and to dismiss personnel who stand as barriers to change. Furthermore, initiation of radical innovations requires high information gathering and processing needs [17]. On the other hand, a high level of formalization not only eliminates role ambiguity, but also limits members’ decision making discretion. A less formalized decision making profile is more effective for gathering and processing the increased information [14]. In other words, less formalization is necessary to allow experimentation and significant departure from the existing state which is critical for adopting radical innovations [12]. Therefore we hypothesize that -

- **H2a**: Centralized structure will have a positive effect on the level of innovative administrative IT adoption
- **H2b**: Formalized structures will have a negative effect on the level of innovative administrative IT adoption

**Technological factors**

Technological factors include characteristics of the technology and perceived consequences of its usage in an organization. Prior research has noted that characteristics of IT
play a considerable part in its adoption [18]. Studies on diffusion of innovation acknowledge that relative advantage, along with compatibility and complexity, have a significant impact on relationship between the level of technology adoption and the attributes of that technology [17-19]. Relative advantage is defined as the degree to which a particular innovation is perceived as providing greater organizational benefit than either the status quo or any other innovation [20]. Compatibility is defined as the extent to which an innovation is consistent with the values, experiences, and needs of potential adopters [21]. Complexity refers to the degree of difficulty users experience in understanding or using an innovation [20, 21].

Prior studies note that adoption of innovative IT in healthcare organizations promises to provide potential advantages such as improved labor productivity, higher inventory reductions, increased asset visibility, better patient safety, and pharmaceutical material tracking [3, 5]. Similarly, positive correlations have been found between compatibility and adoption behaviors [12]. Since significant physical and environmental programming issues are involved in the adoption of innovative AIT, the perceptions of health care administrators’ in terms of the compatibility of new IT system will influence the decisions to adopt the innovative administrative IT [22]. Finally, technological innovations are generally considered to be complex products that expose adopting organizations to unfamiliar features. The degree to which technical skills are required to use an innovation may tend to inhibit/or facilitate its adoption [23]. Innovative AIT adoption in health care organizations presents certain challenges as it requires training to understand and use the technology [22]. Based on the above arguments, we posit that -

H3a: Higher relative advantage will have a positive effect on the level of innovative administrative IT adoption.

H3b: Higher levels of perceived compatibility will have a positive effect on the level of innovative administrative IT adoption.
H3c: Higher levels of perceived complexity will have a negative effect on the level of innovative administrative IT adoption

**Performance**

The relationship between the level of IT adoption and organizational performance has been researched to a great extent by both academicians and practitioners. However, the results do not always add up to a compelling business case in favor of a strong relationship between the level of IT adoption and organizational performance improvements [24]. IT adoption facilitates accurate information availability, which in turn helps in reducing waste during the service delivery process [25]. This reduction in waste leads to superior operational performance, which results in improving financial performance. Moreover, IT adoption improves employee satisfaction[18]. Hence it is posited:

H4: Higher levels of innovative administrative IT adoption will have a positive effect on the organizational performance

**Control Variable**

The decision to adopt a comprehensive IT capability requires extensive organizational resources in order to purchase, implement, and maintain the technology. For this reason, size of the organization plays a significant role in the adoption of new technology [26]. Previous studies has observed that innovation adoption is positively related to organizational size, and a positive relationship is consistently found at the empirical level [16, 21]. Based on these arguments size is treated as a control variable.

**MOVING FORWARD**

Data collection will be done using a survey based design. The unit of analysis is acute care hospitals that are not controlled by the federal government. A survey instrument will be
developed and deployed to desired sample which include - chief information officer, vice president of operations/support services from hospitals that meet the American Hospital Association’s (AHA) criteria for registration as a hospital facility. We believe that the variety of sample hospitals will facilitate a comprehensive evaluation of the technological, organizational and environmental antecedents to AIT adoption in health care organizations. Six hundred questionnaires will be mailed to hospitals using a stratified random sampling approach from a list of AHA-registered hospitals. Most of the variables are adapted from earlier empirical work on innovation (see table 1), the items are measured with a five point Likert scale (1- strongly disagree, 5 - strongly agree).

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