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An investigation on physicians' acceptance of hospital information systems: A case study

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ABSTRACT

Purpose: Information technology is used to support a wide range of highly specified healthcare tasks and services. There is, therefore, a need to understand the factors affecting the acceptance of this technology by healthcare professionals. Physicians are key providers of healthcare services and are among the principal users of hospital information systems. Their acceptance of hospital information systems is hence of great significance when evaluating the success of those systems.

Method: The survey methodology was employed to targeted physicians in the selected case hospital for investigating factors affecting physicians' acceptance of hospital information systems. A total of 202 questionnaires were sent out, with 124 completed copies returned, indicating a valid response rate of 61.4%. We used structural equation modeling to analyze the data.

Results: The results indicated that top management support ($\gamma = 0.431$, $p < 0.001$) had a significant impact on perceived usefulness. Project team competency ($\gamma = 0.381$, $p < 0.001$) and system quality ($\gamma = 0.369$, $p < 0.001$) had a significant impact on physicians' perceived ease of use of hospital information systems. Physicians' perceptions of the usefulness ($\beta = 0.132$, $p < 0.05$, $R^2 = 0.296$) and ease of use ($\beta = 0.952$, $p < 0.001$, $R^2 = 0.784$) of hospital information systems had a significant impact on the acceptance of the systems, accounting for 81.4% of total explained variance.

Conclusions: Through the understanding of the identified critical factors affecting physicians' HIS acceptance, the planners and managers should ensure that hospital information systems to be introduced into a hospital are useful and ease to use. Effort should be focuses on providing sufficient top management support, selecting qualified project team members, and delivering higher system quality in addressing physicians' clinical needs. Thus, our research results can help planners and managers understand key considerations affecting HIS development and use, and may be used as a reference for system design, development and implementation.

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1. Introduction

1.1. Background

1.1.1. The current status of hospital information systems (HIS) in Taiwan

The healthcare industry is an information-intensive industry with considerable information requirements. Hospitals have considered various information technologies (IT) as possible solutions to provide timely and accurate information in fulfilling managerial needs and improving operational effectiveness and efficiency at a reasonable cost. Rapid developments in IT applications have led to IT being widely used in support of highly specific healthcare tasks and services. For example, approximately 95% of Taiwanese hospitals have already developed computerized physician order entry (CPOE) systems to assist physicians in their clinical activities [1]. Prior studies have suggested that user acceptance of information technology is essential for evaluating the success of IT applications [2,3]. Positive correlations between information system (IS)/IT utilization and organizational performance, combined with the wide-ranging use of hospital information systems (HIS) in the healthcare industry, means that understanding the usage behavior of healthcare professionals is now an important research topic for HIS development.

1.1.2. A need to understand physicians' acceptance of health IT (HIT)

Hospital information systems (HIS) have been defined as the socio-technical subsystems of a hospital, comprising all information processing systems as well as the associated human or technical actors in their respective information-processing roles [4]. The HIS is designed to enable the execution of patient-care-related hospital functions, such as patient administration, hospital financial affairs, and legal affairs. Therefore, an HIS is an integrated information system that plays a key role in supporting hospital affairs through the use of appropriate hospital information technology.

Past research has indicated that healthcare professionals play an important role in adopting and evaluating HIS [5]. Physicians influence the development of healthcare systems because these systems share patient health information, integrate related data to provide healthcare professionals with necessary information, and promote cooperation and integrity in the treatment process [6]. Alquraini et al. [7] and Timmons [8] found that poor HIS design may cause user resistance and reduced satisfaction, especially when healthcare professionals perceive an HIS as having an interface that is difficult to use, or consider the HIS to be inconvenient. Therefore, designers and developers of HIS should pay greater attention to factors affecting key healthcare personnel acceptance of HIS, particularly from a physicians' perspective.

Prior studies have suggested that the acceptance of technology can be viewed as a surrogate for measuring the success of information systems, indicating that acceptance by healthcare professionals is essential for the successful adoption and implementation of HIS [9]. Physicians are key providers of healthcare services and are among the principal users of HIS; thus, their acceptance of HIS is critical to the success of those systems. Two critical research questions can be raised: firstly, what are the critical factors affecting HIS acceptance among physicians? Secondly, how do those factors affect the physicians' HIS acceptance?

1.2. Theoretical foundations

1.2.1. Technology acceptance model

The technology acceptance model (TAM), originally proposed by Davis [10], is one of the most widely used theoretical models for predicting and explaining whether users will accept development and application of new IT or other systems. Previous meta-research has indicated that TAM is a flexible tool for measuring user acceptance and for examining and evaluating strategies that promote user acceptance [11]. TAM postulates that people's attitudes toward various behaviors and subjective criteria determine their behavioral intentions toward technology applications, which consequently affect their own behavior [10]. Perceived usefulness and perceived ease of use represent two major factors affecting IT acceptance, and these are prone to be influenced by many exogenous variables [12]. Wu et al. argued that TAM focuses more on technological aspect and its strengths are its parsimony and high explanatory power [13]. They also indicated that TAM lacks consideration of the effects of human and organizational factors in the adoption process.

Although TAM has been applied to investigate factors affecting healthcare professionals' acceptance of HIT applications [14–20], inconsistent results have been found due to the inherent differences between various user groups and application systems [16,21]. For instance, the influences of perceived usefulness on a clinical decision support system among physicians are significantly supported, but the influence of perceived ease of use is not as apparent [15]. In addition, Yarbrough and Smith [22] conducted a systematic review of the literature on physician acceptance of information technology (including CPOE, telemedicine, EMR, internet-based applications, handheld computers, electronic mental health resources, and medical error reporting system) from 1996 to 2006. In all, they reviewed eighteen studies on physician technology acceptance. They found that the TAM constructs generally hold in a physician-specific context, but the perceived ease of usage component of the model does not prove to be consistently related to either attitudes or perceived usefulness.

Yarbrough and Smith [22] argued that one limitation of the TAM is its inability to consider the influence of external variables and barriers to technology acceptance. They suggested customizing the inclusion of variables to enhance the model's accuracy. They concluded that the major barriers to physicians' acceptance of HIS can be classified into three groups: personal (human) characteristics, organizational characteristics, and information system (technology) characteristics. Yusof et al. [23] proposed a human, organization, and technology-fit (HOT-fit) framework for evaluating the success of health information systems after a critical investigation of the existing findings of HIS and IS evaluation studies. They argued that most existing evaluation studies of HIS only focus on technical issues or clinical processes, and therefore, do not explain why HIS works well or poorly with a specific

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