User Acceptance of Computerized Physician Order Entry: An Empirical Investigation

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ABSTRACT

Computerized physician order entry (CPOE) holds potential of reducing medical errors, improving care quality, and cutting healthcare costs. Yet, its success largely depends on physicians’ acceptance and subsequent usage. This study examines whether Technology Acceptance Model (TAM) can be applied to explain physician acceptance of CPOE. A survey was conducted in a large general hospital in China, and 103 data were collected from 200 physicians. The data analysis provided support for all relationships predicted by TAM but failed to support the relationship between ease of use and attitude. A follow-up analysis showed that this relationship is moderated by CPOE experience. Under the condition of high CPOE experience, perceived ease of use has no effect on attitude, whereas under the condition of low CPOE experience, perceived ease of use positively affects attitude. Implications for healthcare informatics are discussed.

Keywords: acceptance; attitude; behavioral intention; CPOE; ease of use; TAM; usefulness

INTRODUCTION

It has been touted widely that CPOE systems can substantially reduce medical errors, contain costs, and improve the quality and efficiency of medication utilization (Bates et al., 2001; Bates et al., 1998; Bates et al., 1999; Kaushal, Shojania, & Bates, 2003; Kuperman & Gibson, 2003). Yet the promised benefits cannot be realized, unless physicians accept and use the CPOE systems. User resistance of information technologies (IT) long has been recognized as a problem that troubles organizations. This problem is more prominent in healthcare settings, given that physicians are less willing to change their habitual behavior developed during a long time of medical practices to adapt to requirements of information technologies. Hence, even after CPOE is implemented at the organizational level, physicians may avoid using it, and discontinuation of the system implementation may occur (Anderson, 1997). For example, Ahmad et al. (2002) noted that during the implementation of CPOE at a large healthcare system, some clinicians wanted...
to go back to manual order entry, because they found that the computer system was difficult to use. Therefore, ensuring physician acceptance should be emphasized in order to achieve overall CPOE success.

User acceptance belongs to the people and to the organizational aspect of the discipline of health informatics and has received increasing attention in the health informatics community (Kaplan, Brennan, Dowling, Friedman, & Peel, 2001; Lorenzi, Riley, Blyth, Southon, & Dixon, 1997). Efforts to introduce IT into medical practice settings likely will lead to failures and unanticipated consequences, if their technical aspects are overemphasized and their social and organizational factors are overlooked (Anderson, 1997). The information systems (IS) discipline has a rich literature concerning user acceptance of IT. This body of knowledge can shed some light on user acceptance issues in the health informatics field. In the IS literature, one of the most widely used models explaining user acceptance is the technology acceptance model (TAM) (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989). TAM asserts that users’ usage behavior is determined largely by their intentions to use the technology. Hence, a stronger intention to use indicates a higher level of acceptance. Based on this relationship, TAM explains user acceptance by positing that users’ intentions to use a certain technology are determined by their attitudes, which are shaped by two perceptions: perceived usefulness and perceived ease of use. When a user perceives a technology to be more useful and easier to use, he or she will have a more positive attitude toward the technology and will be more likely to use the technology. TAM provides an excellent tool to facilitate examining the viability of IT acceptance testing by focusing on critical subjective predictors such as usefulness and ease of use (Davis & Venkatesh, 2004). We contend that TAM also is useful in studying physician acceptance of CPOE.

The motivation for this research stems from the need to investigate physician acceptance of CPOE from a behavioral perspective (Kuperman & Gibson, 2003; Lorenzi et al., 1997) and the recognition that physicians are different from general business IT users due to their possession of esoteric bodies of medical knowledge (Sharma, 1997). It is necessary to validate TAM, despite its established legitimacy in the IS discipline, because the generalizability of TAM may not be expanded into medical settings. It is possible that there is a discrepancy between what TAM predicts and what actually exists between physician perceptions and acceptance of CPOE. For example, TAM has been used to explain physician acceptance of telemedicine, and it was found that perceived ease of use was not related to user acceptance behavior (Chau, 1996; Chau & Hu, 2001). However, another study that examined healthcare professionals’ acceptances of personal digital assistants found that perceived ease of use was a significant determinant of usage (Liang, Zue, & Byrd, 2003). This inconsistency in the literature suggests that different user groups and technologies of interest may influence the inner structure of TAM. Therefore, based on the empirical evidence we found, some modifications of TAM may be warranted so it can be applied appropriately in explaining physician acceptance of CPOE.

The objective of this study is to test the relationships among the major constructs suggested by TAM in the context of CPOE in a large hospital in China. We also intended to explore reasons if any inconsistencies were found. With appropriate modifications to TAM, we can make a significant contribution to the emerging discipline of health informatics.

**THEORETICAL BACKGROUND**

User acceptance of IT is determined not only by objective technological characteristics but also by individual beliefs and attitudes toward the technology. In social psychology, theory of reasoned action (TRA) (Fishbein & Ajzen, 1975) has been developed to explain how user beliefs and attitudes relate to behavioral intention. According to TRA, attitude toward a behavior is determined by beliefs about the consequences of the behavior. Beliefs reflect an individual’s subjective estimate of the prob-
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