Theory of User Acceptance of Information Technologies: An Examination of Health Care Professionals

Melissa J. Succi
Department of Health Systems Management
School of Business Administration
University of Connecticut
msucci@sba.uconn.edu

Zhiping D. Walter
Department of Operations and Information Management
School of Business Administration
University of Connecticut
zwalter@sba.uconn.edu

Abstract

TAM has been developed to explain user acceptance of new information technologies. Empirical studies of this and other models, however, have based their conclusions on surveys of middle managers or MBA students. Given strong differences between middle managers or MBAs and physicians, we argue that these models may not predict well the attitudes of physicians towards a new IT. Therefore, we propose to extend TAM by adding a new dimension of perceived usefulness: perceived usefulness towards professional status. Our paper suggests strategies that health-care decision-makers may take to influence physicians’ attitudes in a positive way.

1. Introduction

Employee attitudes towards and acceptance of a new information technology (IT) have long been recognized by researchers as a major factor in its successful adoption ([2], [3], [4], [5], [7], [11], [12], [13], [14], [15], [17], [18], [23], [24], [25], [26]). The more accepting of a new IT the employees are, the more willing they are to make changes in their long-standing practice patterns and to both adopt and integrate a new IT into their day-to-day work activities.

To predict and explain user acceptance of a new IT and to ultimately influence users’ attitudes in a positive way, researchers have developed various models based on existing behavioral intention models in social sciences. Among them, Davis's ([4], [6]) Technology Acceptance Model (TAM), which is based on Fishbein and Ajzen's Theory of Reasoned Action ([8], [1]), is the most noticeable. TAM highlights two key factors that explain and determine user acceptance of a new IT: ease of use and perceived usefulness.

Empirical studies have provided support for those theoretical models (see for example, [13], [2], [5], [20]). However, the majority of these studies have based their conclusions on surveys of middle managers or MBA students. Unlike middle managers or MBA students, however, physicians, like many other professionals, receive privileges such as autonomy, prestige, and institutional power ([22]). Given the value associated with such privileges, physicians are likely to consider whether and how their privileges would be affected by information technologies when making decisions about their use. Because such factors have not been taken into consideration by TAM, it remains a question whether TAM can predict well the attitudes of physicians towards new IT.

An examination of physicians’ attitudes towards information technologies is important for three reasons. First, recent literature suggests that relative to non-professionals and other professionals, physicians demonstrate slow acceptance of particular information technologies, especially decision support systems, even when they have demonstrated benefits for physicians. Second, our understanding of physicians’ attitudes towards information technologies is limited given that few studies have examined factors affecting physicians' attitudes toward information technologies. Third, organizations have adopted or are in the process of adopting information systems in the hope of cutting health care costs. The attitudes of physicians towards information technologies play a crucial role in this process.

In this paper, we propose a new model of user acceptance of IT that is applicable to physicians. The proposed model is an extension of TAM, taking into account additional factors that might affect physicians'
attitudes towards new information technologies. The rest of the paper is organized as follows: In section 2, we review current models designed to assess user acceptance of new technologies and lay the foundation for the argument that existing acceptance models may not be applicable to professionals in general and physician in particular. In section 3, we discuss characteristics of physicians as a special type of professionals. We then present and justify our argument that the existing models are not applicable to physicians. In section 4, we propose a new model of user acceptance of IT that is applicable to physicians. In section 5, we propose a set of hypotheses to test the determinants of acceptance of new information technology among professional, especially physicians. In the last section, we discuss the implications of our theoretical arguments for health care organizations, discuss ways in which health care organizations should manage the adoption of new information technologies, and propose future empirical examinations.

2. User acceptance models in the MIS literature

Literature on user acceptance of information technologies has received increased attention over the past decade. Early discussions of user acceptance have borrowed from behavioral intention models in social psychology to develop a theoretical foundation for research on the determinants of user acceptance of IT ([3], [4], [6], [7], [13], [15], [17], [24], [25]).

Derived from social psychology literature, Theory of Reasoned Action (TRA) ([8], [1]) is a well-known model that has proven successful in predicting and explaining behavior across a wide variety of domains (see Figure 1). However, many have criticized this model because it does not specify the beliefs that are operative for a particular behavior such as IT usage ([19]). To explain behavior of IT usage, MIS researchers using TRA must first identify the beliefs that are salient for IT users concerning IT usage. This can be complex if different user groups focus on different outcomes using the same system since theoretical constructs measured in one situation may differ from another ([19]).

In addition to TRA, MIS researchers have drawn from the diffusion of innovation literature in conceptualizing the determinants of user acceptance of IT ([20]). According to the work of Rogers ([21]) in this area, five general characteristics of an innovation influence its adoption: relative advantage, compatibility, complexity, observability, and trialability. It is argued that a user’s perceptions about each of these characteristics of an innovation will affect the extent to which they intend to adopt it. However, the complexity associated with this model, coupled with the fact that it focuses on the adoption of innovations, makes it difficult to apply when examining determinants of user acceptance of information technology.

In response to the limitations associated with TRA and diffusion of innovation literature, Davis ([4,6]) proposed a new model of user acceptance, Technology Acceptance Model (TAM, represented in Figure 2), which is designed specifically to understand acceptance of information technologies. This parsimonious model highlights two key factors that explain and determine user acceptance of a new IT: ease of use and perceived usefulness. He defines these two constructs as follows:

Perceived ease of use is the degree to which a person believes that using a particular system would be free of effort.

Perceived usefulness is the degree to which a person believes that using a particular system would enhance his or her job performance.

TAM assumes that beliefs about usefulness and ease of use are always the primary determinants of usage decisions. The selection of these two constructs was based on the assumption that a potential user decides whether or not to use a particular information technology by assessing the extent to which it will help her perform her job better ([6]). This assumption is appropriate for middle managers since job performance is the primary measurement in determining rewards or compensations for middle managers. Thus, the effects of a particular information technology on job performance are critical for
middle managers and will likely affect their decision about whether or not to use the technology.

In contrast, the effects of a particular information technology on job performance may be less critical for physicians. As we shall discuss in more detail in Section 3, due to professional knowledge involved in their work and the fact that they have complete autonomy in their individual work domains, their job performances are hard to evaluate, and in many cases, are not evaluated at all. Hence, the impact of information technology on job performance is less critical to physicians than to middle managers. In addition to being scarcely evaluated or not evaluated at all, physicians collect non-monetary rewards for their professional status, which include autonomy, professional dominance, institutional power, and access to and control of critical resources. As we shall argue in Section 3, an information technology that has a positive impact on physicians' job performance may have a negative impact on their professional status. Hence, physicians are likely to consider the impact of information technologies on their professional status when making decisions about IT usage. Currently, TAM does not take into account physicians' commitment to defending their professional status. Thus, the current TAM may not be appropriate for evaluating professionals' acceptance of new information technologies.

In the next section, we borrow from the literature on professionals in general and physicians in particular to justify our arguments presented in this section.

3. User acceptance of IT among physicians

Our earlier theme is that physicians differ from middle managers and MBA students in their attitudes towards information technologies. This difference is a manifestation of the difference between professionals and non-professionals and of the fact that the medical profession enjoys more professional status than almost any other profession. We illustrate these points next through an investigation of characteristics of professionals in general and of physicians in particular.

3.1. Characteristics of professionals

While there is no single, agreed upon definition of professionals, there is an emerging consensus that professionals are individuals in occupations that have achieved professional status of special power and prestige because of their special competence in esoteric bodies of knowledge ([16], [22]). In other words, the key distinguishing characteristic of professionals is that they exclusively have the license to apply, in a trade, an abstract body of knowledge in a specific field. This license can only be obtained through extensive training ([9], [10]). Individuals outside the profession are excluded from obtaining this license to practice.

Many privileges come with achieving professional status through the exclusive license to practice, among them, professional autonomy is the most important. With such autonomy, professionals are trusted to work conscientiously without supervision as well as to undertake the proper regulatory action on those rare occasions when an individual does not perform his work competently or ethically. As a result of professional autonomy, job performances of professionals are established through peer review processes. However, performance measures may or may not have been established in some professions and may or may or reflect the true job performance of a professional due to the nature of professional work. The privilege of professional autonomy is justified by the belief that individuals outside the profession do not possess the professional knowledge needed to evaluate the practices of the professionals and protect themselves against incompetence, carelessness, and exploitation in the profession. This belief is further intensified by the fact that performance measures are not and cannot be established in some professions. Thus, professionals proclaim that they are in the best position to operate, control, and regulate their own practices. The process of professionalization in which they establish rules and procedures to regulate their own practices (e.g., codes of conduct) help them gain the trust of individuals outside their profession and obtain professional autonomy. Professional autonomy in turn enforces other privileges such as its prestigious social status, control of resources, and where professional hierarchies exist, professional dominance over subordinate paraprofessions.

Professional status and the resulting privileges, especially autonomy, is less absolute in those professions where job-performance measures are more established and job performances of the members are relatively easier to measure. For example, university professors are subject to students' evaluations in teaching. Research performances of university professors are evaluated based on the number of publications and the quality of journals in which the publications appear. As another example, attorneys are evaluated based on cases represented, cases won, and damages awarded. These performance measures are somewhat subjective, nonetheless the job performances of these professionals are measurable to some extent. On the other hand, physicians' job performances are not based on the number of patients seen or the number of patients cured, since not all illnesses are curable and physicians are expected to attend to all patients.

The non-measurability of physician performances has two important implications: first, performance evaluations are less critical to the survival and success of physicians than to nonprofessionals and other professionals. Second,
professional autonomy is more central, complete, and prominent in the medical profession than in almost any other profession. With complete autonomy, physicians enjoy more fully other privileges such as professional dominance over nurses and other paraprofessionals, prestigious social status, and great control of resources.

To maintain these privileges, physicians have great interest in maintaining the monopoly over medical knowledge to justify their exclusive license to practice medicine, as well as maintaining non-measurability of their performances to fortify their complete professional autonomy. Our next discussion suggests that certain types of information technologies, such as decision support systems and expert systems, may be perceived by physicians as big obstacles to their efforts towards maintaining exclusive license to practice and non-measurability.

3.2. Resistance of physicians to information technology

The term "information technology" is often used interchangeably with the term "information system," which refers to a system that collects, processes, stores, analyzes, and disseminates information for a specific purpose. Information technology also refers to the technological side of an information system, including hardware, networks and other devises. Users' attitudes towards hardware or devices are usually neutral; it is the system supported by these devices or the purpose of these devices that a user tends to have a positive or negative attitude towards. We hence use information technology interchangeably with information system.

There are two major types of information systems: systems designed to improve communications or information retrieval, such as e-mail, word processors, and image storage, and systems designed to support decision-making, business management functions, and knowledge management, such as decision support systems for various functions and engineering workstations.

The first type of information systems improve efficiency and reduce overhead for professional workers. However, the second type of information systems may, to different degrees, codify expert knowledge possessed by professionals and the problem-solving process previously known only to the professionals, although they may improve job performances of processional at the same. This codification process may be feared by certain professionals as a threat to the monopoly of their expert knowledge and hence to their autonomy and other privileges.

Fears about the impact of information technology on professional status are more prominent in physicians than in other professionals for two reasons. First, there are various hierarchies existing in health care organizations. The medical knowledge is divided among them, with physicians being at the top of the hierarchy and supervising all other. Codification inevitably results in more knowledge distributed among subordinate paraprofessions, compromising physicians' professional dominance. Second, codification of knowledge is very likely to make the performances of physicians more measurable because it may permit laypersons as a whole and subordinate paraprofessionals greater access to the abstract knowledge possessed by them as well as greater understanding of physicians' medical practices, eroding physicians' professional autonomy.

In summary, although information technologies in general may improve physicians' performances, certain types of information technologies, such as decision support systems and expert systems may, at the same time, undermine the monopoly of medical knowledge and reduce non-measurability of physicians' job performances. As a result, physicians' professional autonomy may be eroded and professional dominance compromised. Since job performance is not as critical to physicians given the non-measurability as it is to nonprofessionals and other professionals and since professional autonomy and dominance are better enjoyed by and hence more essential to physicians than to nonprofessionals and other professionals, physicians may perceive certain IT as disadvantageous to their professional status and react with resistance. Such resistance may occur even though they believe that using a particular system would enhance their performance and that using a particular system would be free of effort, which contradicts the proposition of TAM. However, to nonprofessionals and professionals other than physicians, professional status is equivalent to job performance. Hence they would be likely to adopt the IT if it improves their job performance and if using the systems would be free of effort, which justifies the proposition of TAM.

4. Proposed model

In this section, we propose a revised TAM model, represented in Figure 3, that incorporates information about a user’s attitudes about the effects of information technology on their professional status.
5. Propositions: user acceptance of IT among health care professionals

5.1. Perceived ease of use

Like other IT users, physicians are likely to base their decisions about the adoption of an IT on its perceived ease of use. That is, they are likely to evaluate the extent to which the IT can be used free of effort and are more likely to use the IT if using it is perceived to be free of effort. Therefore we propose that perceived ease of use of an IT affects physicians’ attitudes about the adoption of the IT.

Proposition 1: Perceived ease of use of an IT is positively related to the adoption of that IT by physicians.

5.2. Perceived usefulness towards one’s job performance

Like other users, physicians are likely to base their decisions about the adoption of an IT on its perceived usefulness towards their job performance. That is, they are likely to evaluate whether and how the IT might affect time to complete work, productivity, and overall efficiency and accuracy. Hence, we propose that perceived usefulness towards job performance affects physicians’ attitudes about the adoption of certain IT.

Proposition 2: Perceived usefulness of an IT towards job performance is positively related to the adoption of that IT by physicians.

5.3. Perceived usefulness towards one’s professional status

Unlike other users, physicians are particularly sensitive to changes in their work environment that may threaten their overall professional status. Hence, they are likely to base their decisions about the adoption of an IT on its perceived usefulness towards their professional status. Therefore we propose that perceived usefulness towards their professional status would affect physicians’ attitudes about the adoption of an IT.

Proposition 3: Perceived usefulness of an IT towards professional status is positively related to the adoption of that IT by physicians.

5.4. Perceived usefulness towards job performance and professional status.

As we argued earlier, physicians are very sensitive to the factors that affect their work autonomy and professional peer-evaluation. Thus, we argue that if physicians perceive certain IT as disadvantageous to their professional status, they will react with resistance even though that IT may improve their job performance.

Proposition 4: Perceived usefulness of an IT towards users’ professional status is a more important determinant
of its being adopted by physicians than perceived usefulness towards users' job performance.

Proposition 5: The combined effect of perceived ease of use and perceived usefulness towards job performance predicts user acceptance towards information technology better for non-professionals than for physicians.

6. Discussion and conclusions

The purpose of this paper is to improve our understanding of the acceptance of information technologies among physicians. We extend TAM by constructing a new dimension of perceived usefulness: perceived usefulness towards professional status. We establish a set of hypotheses indicating how physicians' attitudes towards information technologies may be affected by the constructs proposed in our model.

Our model has important implications for decision makers considering the implementation of new information technologies in health care organizations. Decision makers should address professionals' concerns that information technologies will threaten their overall professional status and associated benefits. Some of the approaches include providing physicians with greater opportunity to influence decisions about the choice of information technologies. Such initiatives may give professionals more "voice" in hospital decision making, thus creating opportunities for professionals to play a more active role in decisions about the use of new information technology.

A second direct implication is that health care decision makers should work to foster greater communications and cooperation between physicians and non-physicians when considering the adoption of new information technologies so that the fears that their professional activities will be assumed by non-professional providers will be minimized. At the same time, greater communication and cooperation between these two groups may result in greater coordination and, thus, smooth the implementation.

Our model has been developed treating physicians as a special example of professionals. When trying to generalize model to other professional groups, great caution should be exercised. Physicians, for example, tend to hold greater professional dominance than other professional groups and have experienced dramatic changes in their professional position over the past decade due to the growth of managed care and changes in health care policy. Thus, they may be more sensitive to potential threats to their professional status than other professional groups. Future research is needed to test the model across different professional groups and determine the extent to which each model construct affects different professional groups.

In sum, our proposed model represents a new perspective for understanding professionals' attitudes towards information technologies. Lack of agreement in the research on the implementation of different information technologies such as electronic medical record systems and computer-assisted decision support systems suggests the need for further research on the determinants of acceptance with respect to diverse information technologies.

7. Reference


