



Exploring user acceptance of an e-hospital service: An empirical study in Taiwan



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ABSTRACT

The web-based appointment system (WAS) is considered one of the major Internet services provided by e-hospitals. Because of the very high adoption rate of WAS in the public medical centers in Taiwan, this research investigates the current status of its implementation and examines the factors affecting the user acceptance of WAS by integrating the Technology Acceptance Model (TAM) with the constructs of service quality. Further, this study proposes a research framework that delineates the user acceptance of WAS, which is verified via an empirical survey. This article is concluded with the managerial implications and suggestions.

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1. Introduction

The success and prevalence of the Internet has made web-based systems become an important medium in connecting service/product providers with their customers. It also created a new arena for firms in various industries. The healthcare industry is not exempt from this new arena; hospitals are eager to develop and implement web-based information systems. Therefore, every health-care institution's current, top priority is to reduce the workload of staff and improve efficiency and service quality through the utilization of information technology and the Internet [7]. In order to gain a competitive edge, hospitals are developing and implementing web-based e-hospital systems that will enhance clinical service quality, promote patient loyalty, reduce operation cost, and increase the efficiency of hospital management [18]. E-hospital systems provide various e-hospital services, such as remote monitoring of patients, clinical information collection and processing and web-based appointment systems. The web-based

appointment system (WAS) is considered the as paramount of all of these new Internet services provided by e-hospitals.

WAS not only provides a convenient channel for patients to remotely make clinical appointments on the Internet, but also offers rich data warehousing for doctors to retrieve a patient's medical records, which are useful and beneficial for tracing a patient's recovery or making cross-department consultations. In comparison to other e-hospital implementations, WAS is widely employed by medical centers. The e-hospital systems such as WAS are evolving toward user-centricity, where the patients are able to control the granularity of healthcare information disclosed to the third party, by specifying the content of the health information and to which healthcare provider can the information be disclosed, and the purpose of processing the information, etc. [15]. Therefore, it is a crucial issue for hospitals to explore the acceptance of WAS from the patient's viewpoints. However, prior studies which discuss the user acceptance of WAS are very limited.

Since WAS is the pioneer of the e-hospital business, the health-care industry and the academic world pay high attention to the acceptance of WAS. Therefore, one of the research objectives of this study is to reveal the current status of WAS implementation in Taiwan. To facilitate the exploration of the acceptance of new information technologies or systems, the Technology Acceptance Model (TAM), which helps to explain the intentions and behavior of users, will be implemented in the research of this study. The exclusive use of the TAM in this study is

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not enough to fully disclose users' acceptance, since WAS is not only an information system, but also an information-intensive service; the service quality may also influence the acceptance of WAS. Therefore, this study will also aim to probe into the factors affecting the user acceptance of WAS by integrating the TAM with the constructs of service quality. Moreover, this study intends to propose a research framework that will delineate the user acceptance of WAS.

Thereafter, an empirical survey will be conducted in a medical center in Taiwan to verify the proposed framework. More specifically, this research will test the following hypotheses in order to derive useful and meaningful findings and conclusions:

1. The impact of user experience, web site quality and service quality on perceived ease of use;
2. The impact of user experience, web site quality, service quality and perceived ease of use on perceived usefulness;
3. The impact of perceived ease of use and perceived usefulness on willingness of use of online registration.

2. Literature review

2.1. Web services in hospitals

To understand WAS in Taiwan, a survey conducted by Yang [67] randomly sampled information service contents from 14 of 17 medical centers and 44 of 62 regional hospitals. The result of the survey showed that medical centers were more eager to implement online registration services, such as online registration, clinical department suggestion, and outpatient service time schedules, than regional hospitals. For example, 92.9% of medical centers provided online registration in comparison to only 29.5% of the regional hospitals. Another research study [35] that focused on the contents of online registration found that 88.1% of hospital websites provided hospital addresses and contact phone numbers, 68.8% provided hospital e-mail accounts, 96% provided hospital introduction information, 91.7% provided outpatient service time tables, and 82.6% provided the other medical treatment related information. On the other hand, only 46.8% of the hospital websites in this study provided online registration. Furthermore, the percentage of those hospitals providing interactive services was low; a mere 30.3% of them possessed a web page for opinions and comments, and only 16.5% provide online treatment consultation [35,67]. Therefore, Deng et al. [15] pointed out that interoperability in e-health became more problematic when more actors collaborate.

Steinhardt, O'Callaghan and Murray [59] conducted a survey on the hospital web sites of New York City and found that 46 of them provided 11.8 functions of medical treatment information, on average; general information accounted for 92.3% of those functions, department service information for 84.8%, health promotion for 67.4%, email accounts and/or reply forms for 65.2%, location and direction for 63%, and latest news for 50%, while an online community health demand survey and online application service only accounted for 2.2%. Lu et al. [46] determined that the expectancy value of Internet characteristics, attitude toward online information seeking, and perceived credibility of online information significantly and positively predicted online information seeking behavior in nurses. Health Data Management [22] quoted FCG survey findings that recognized that chief information officers (CIOs) of various medical service websites (excluding highly specialized hospitals like Mayo Clinic and John's Hopkins Hospital) did not construct their sites to possess the function of attracting new patients. Instead, the websites were aimed at establishing the relationship between patients and physicians.

The El Camino Hospital in California redeveloped its web services to provide excellent web services to enhance relationships with their existing patients as well as help attract new ones [24]. Health care services are trying to push in new ways to communicate with patients through the use of secured electronic messaging and electronic access to medical records and test results [53].

The development of web registry involves many aspects of information management technology. These aspects are depicted as follows. At first, the development of web registry relates to the application of the programming language. For example, Shih et al. [57] examined the feasibility of a web-based registry system on in-hospital resuscitation using the Utstein style coded with the active server page (ASP) programming method in Asia. The system provides a comprehensive and standardized method for on-line registry of data collection, allowing individual hospitals to track each case for quality improvement. Second, the development of web registry involves the Sensor Network technology, which is important for web designers to provide a centralized or distributed registry for the fixed and nomadic sensor networks to implement an efficient Sensor Web Registry. Padey and Patel [50] proposed a distributed registry database in which the registry will be hosted on special servers (Sensor Name Servers). The user or client is given an interface to search a sensor network based on the single or combination of the parameters given in the registry. Details submitted by users will get the complete description of all the sensor networks available on a web interface. Third, with the increasing databases and data volume, management and interoperability of metadata had become the key point after the metadata standard system of the Science and Technology Resources Database has been established. Liu et al. [45] pointed out that the metadata registry system extracts the metadata standard and related information from metadata standards as registry information and then submits them to the registry server for metadata standard registry. Finally, registry information would be restored in the database and then the user can prepare sufficient data for querying only after the registration is completed.

2.2. Web-based appointment systems for hospitals

Hospital online registration services provide patients a convenient channel with which they can obtain a great deal of information without having to physically go to a hospital or medical center. They can easily connect remotely to a hospital database by keying in an account number and password in order to retrieve personal information and clinical records. The web-based appointment system can also assist patients in making appointment reservations in advance with physicians according to the doctors' available time [40,41]. The web-based appointment system has the following advantages.

- Patients do not have to go to the hospital for an initial appointment before they receive clinical treatment, thus decreasing clinical cost.
- Hospitals can reduce medical management cost by automatically finding out the patient's personal clinical information records through the registration system that is connected to the medical database.
- The web-based reservation system reduces the cost associated with patients waiting for medical services at the hospital.
- The patients can use the reservation system to automatically acquire information regarding the current physicians on duty.
- Using electronic health records, which can help physicians quickly understand the current status of their patients, can reduce the medical cost.

Although online registration can provide patients with various beneficial registration services, elderly patients' ability to take advantage of these added benefits may be strained due to their lack of computer-use experience. Essentially, elderly patients' lack of IT knowledge will cause them to have little intention of taking advantage of new, web-based appointment systems. According to the analysis of Liao [40,41] on the web-based registration systems of six medical centers, including National Taiwan University Hospital, Veterans' General Hospital Taipei, Chang Gung Hospital, Tri-service General Hospital, MacKay Hospital and Cathay Hospital, there was no difference in each hospital's Internet registration system's time period. The research findings also showed that the web sites of Veterans' General Hospital Taipei and Chang Gung Hospital provided more information. Thereof, user online inquiry of health or illness therapy related information ranked at the top and accounted for 56.7%, while online registration service accounted

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