

# Relationships Between Web Service Quality and User Satisfaction with Hospital Online Register Systems

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## Abstract

Internet services are becoming increasingly popular today. Both commercial and non profit organizations adopt web services to enhance their relationships with customers. Online register systems are among the important web services provided by hospitals. Additionally, previous studies have indicated that service quality is an essential determinant to success. Therefore this study focuses on web-based online registration systems and their contribution to end user satisfaction. Based on an empirical data analysis, this study found that the service quality of hospital online register systems can be measured by four constructs named tailored information and communication, trust, response time and ease of use. Additionally, except for trust, other three constructs have positive relationships with user satisfaction. Discussions are illustrated in this paper.

Keywords: hospital online register systems, web service quality, user satisfaction

## 1. Introduction

Internet services are becoming increasingly popular today. Both commercial and non profit organizations adopt web services to enhance their relationships with customers. Online register systems are among the important web services provided by hospitals.

Through well-designed web self-administrated services, an organization can reduce its costs and increase service quality. Therefore, to deliver good service from

web, managers need to understand how customers perceive and evaluate online service quality [17]. It's the same for hospitals. Ball and Lillis [1] proposed that online applications can empower communications between physicians and patients in order to improve their relationships. Besides, Internet applications can enable hospitals to communicate with their patients and other important stakeholders [4]. Gruca and Wakefield [4] indicated eight features of the US hospital sites, including multiparty targeting, electronic documents, self-service information, discussion forums, facilitating transactions, providing decision aids, linkages to partners, and building trust via external verification.

This work focuses on hospital online register systems to study the relationships between web service quality and user satisfaction. This study has two main purposes, to measure the user-perceived service quality of online register systems and to examine the relationships between service quality and user satisfaction in the context of online web register systems.

## 2. Literature Review

### 2.1 Web Service Quality

Zeithaml et al. [17] proposed that maximizing web service quality is a fundamental success strategy and studies on this issue are available. The WebQual measurements developed by Loiacono et al. [7], consists of 12 constructs and 36 items. Additionally, the twelve constructs can be classified into four categories:

usefulness, ease of use, entertainment, and complimentary relationships. Usefulness comprises four constructs information fit-to-task, tailored communications, trust and response time. Ease of use consists of two constructs ease of understanding and intuitive operations. Entertainment comprises three constructs visual appeal, innovativeness and emotional appeal. Finally, the complimentary relationships category consists of three constructs image, online completeness and relative advantage.

Yang et al. [15] proposed an instrument for assessing web portals service quality. They developed and validated five constructs which were usability, usefulness of content, adequacy of information, accessibility, and interaction. Yang et al. [14] employed online banking services to identify online service quality measurements and proposed six quality dimensions, reliability, responsiveness, competence, ease of use, security, and product portfolio.

In the online retail environment, Wolfinbarger and Gilly [12] proposed four factors to predict customer perceived quality and satisfaction. These four factors are website design, fulfillment/reliability, privacy/security and customer service. Additionally, Ranganathan and Ganapathy [10] presented four key dimensions of B2C web sites effectiveness, which are information content, design, security, and privacy.

Each web service has its own characteristics and goals, and requires different service quality measures. However, previous studies have mostly focused on online commerce activities. More efforts is needed to understand other web services. Therefore, this study focuses on hospital register systems, to determine whether the same quality measures are appropriate when the web service environment change.

## **2.2 Relationship between service quality and satisfaction**

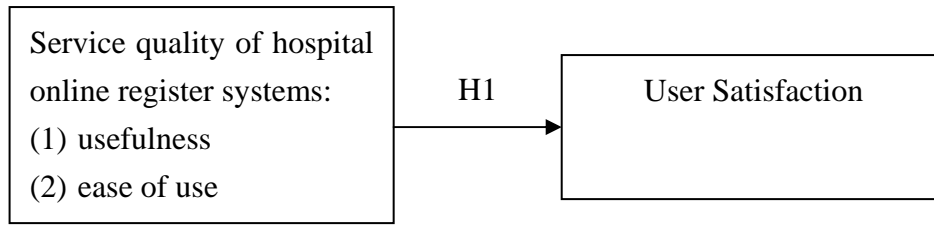
Previous researches indicated that service quality will

improve customer satisfaction. Kettinger and Lee [6] found that in the context of IS service function, user perceived service quality is the determinant of their satisfaction. Additionally, in online environment, Yang et al. [15] found that service quality of web portals will affect user satisfaction positively. Wolfinbarger and Gilly [12] has similar opinions, they proposed that quality is related to customer satisfaction in the context online retail. Finally, Yang and Fang's [13] indicated that in the setting of online securities brokerage services service quality will lead online customer satisfaction.

## **3. Research Model**

This study draws on theories in Davis's Technology Acceptance Model (TAM) [2] and Loiacono's WebQual [7]. TAM indicated that perceived usefulness and perceived easy of use are two key determinants of user acceptance of information technology [2]. Additionally, the constructs in Loiacono's WebQual are classified into five categories, usefulness, ease of use, entertainment, and complimentary relationship [7]. Integrated above two systems, this work employed usefulness and ease of use as the main constructs. Furthermore, unlike an online commerce web sites, a hospital online registration system is only an interface for registering patients who have already decided to take medical treatment in that hospital before accessing the web site. Therefore, entertainment and complimentary relationship constructs are not critical determinants for measuring the service quality of an online registration web site. Based on WebQual, usefulness has four components: informational fit-to-task, tailored communications, trust, and response time. Additionally, ease of use has two parts: easy of understanding and intuitive operations.

Finally, based on previous studies, the service quality positively affect user satisfaction [6, 12, 13, 15]. Therefore, the following research framework and hypothesis is proposed, as illustrated in Fig 1.



**Figure 1 Research Framework**

**Table 1. Instruments**

	Source	Items
Web service quality	WebQualTM	18
Satisfaction	McKinney et al. [8]	6

**H1: Service quality of hospital online register systems positively affect user satisfaction.**

This study consists of two stages. First, measures of systems service quality of hospital online registration systems were developed and validated. Then, the relationship between web service quality and user satisfaction was tested.

## 4. Research Method

### 4.1 Sample

The informants of this study were people who had experienced hospital online registration systems. The targets were two regional hospitals in Taiwan. Both of which provide online register systems for patients. Questionnaires were delivered in the waiting lounge. People who had experience of online registration systems were asked to fill in the questionnaire. A total of 221 usable questionnaires were obtained.

### 4.2 Measurement Development

The sources of the instruments employed in this study (Table 1.) were modified from WebQual and McKinney et al. [8]. Concerning web service quality, six constructs (four belonging to usefulness and two belonging to ease of use) and 18 items in total from WebQual were used.

The patients' overall satisfactions was measured by six items developed by McKinney et al. [8]. First, the items were translated to Chinese and modified to fit the research context. Next, experts reviewed and revised the questionnaire.

## 5. Data Analysis

### 5.1 Sample Profile

A total of 221 usable questionnaires were collected. Among them, 65.4% were female and 34.6% were male; 64.5% were between the ages of 21 and 35. Additionally, 88.6% had at least college education. This profile is similar to Internet users profile.

### 5.2 Validity and Reliability

An exploratory factor analysis with VARIMAX rotation was used to assess the discriminant and convergent validity. The threshold of factor loading is 0.5 and threshold of eigenvalue is 1. Besides, Cronbach's  $\alpha$  is employed to test instrument reliability.

Table 2 lists the results, which indicate that five factors are extracted (eigenvalue large than 1) and all the loading values are reasonably acceptable (only one of the items is 0.493 which is close to 0.5, therefore it is not eliminate from this study) . Five extracted factors are

named: tailored information and communication, trust, 3)  
 response time, ease of use, and overall satisfaction. (Table

**Table 2. Results for the Extraction of Common Factors**

Factor	Eigenvalue	Percent of Variance	Cumulative Percent of Variance
1	10.580	19.832	19.832
2	2.150	17.765	37.597
3	1.978	16.904	54.501
4	1.598	12.074	66.575
5	1.054	5.754	72.329

**Table 3. Exploratory Factor Analysis with VARIMAX Rotated**

		Factors				
		1	2	3	4	5
Tailored information and communication	Information fit to carry out tasks	0.617				
	Information is adequate	0.789				
	Information is effective	0.661				
	Receive tailored information	0.749				
	Interactive features	0.748				
	Tailored information need	0.729				
Trust	Feel safe		0.863			
	Keep personal information safe		0.875			
	Not misuse personal information		0.862			
Response time	Little waiting time			0.493		
	Loads quickly			0.580		
	Takes ling time to load (reverse)			0.789		
Ease of use	Pages are easy to read				0.734	
	Text is easy to read				0.780	
	Labels are easy to understand				0.827	
	Learning to operate is easy				0.826	
	Easy to become skillful				0.809	
	Easy to use				0.718	
Overall satisfaction	Satisfied					0.784
	Pleased					0.782
	Contented					0.824
	Delighted					0.716
	Recommend to my friends					0.742
	Will use it again					0.739

Concerning the reliability testing, from Table 4 we can find that most of the values are reasonably acceptable ( $>0.6$ ) [5], only one construct (response time) is less than 0.6 (0.591) but it is close to 0.6, therefore it is still acceptable.

### 5.3 Hypotheses Testing

This study used multiple regression analysis, with patient overall satisfaction as dependent variables and variables about perceived service quality as independent variables (four variables). Table 5 displays all the

correlations among the four independent variables and their correlations with the dependent variable. We can find that ease of use (X4) is most closely correlated with the dependent variable (0.561). Additionally, from Table 6 R square is 0.417 and adjusted R square is 0.406. Finally, Table 7 shows the results of model variance analysis.

Concerning the hypothesis testing, from Table 8 shows that except for X2 (trust) all other three variables were significant ( $p < 0.05$ ).

**Table 4. Cronbach's  $\alpha$**

Constructs	Cronbach's $\alpha$
Tailored information and communication	0.882
Trust	0.907
Response time	0.591
Ease of use	0.928
Overall satisfaction	0.912

**Table 5. Correlation Matrix**

	X1	X2	X3	X4	Y1
X1: Tailored information and communication	1.00	0.428	0.367	0.610	0.527
X2: Trust	0.428	1.00	0.347	0.377	0.373
X3: Response time	0.367	0.347	1.00	0.509	0.477
X4: Ease of use	0.610	0.377	0.509	1.00	0.561
Y1: Overall satisfaction	0.527	0.373	0.477	0.561	1.00

**Table 6. Model Summary**

R	R Square	Adjusted R Square	Durbin-Watson	Standard error of estimate
0.646	0.417	0.406	2.053	0.523

**Table 7. Analysis of Variance**

	Sum of Squares	df	Mean Square	F Ratio	Sig.
Regression	40.300	4	10.075	36.847	0.000
Residual	56.327	206	0.273		

**Table 8. Variables in Equation**

Variables	Standardized Coefficients (Beta)	T value	Sig
Constant		2.839	0.005**
X1: Tailored information and communication	0.245	3.506	0.001**
X2: Trust	0.092	1.516	0.131
X3: Response time	0.220	3.490	0.001**
X4: Ease of use	0.266	3.636	0.000**

\*\* : P<0.05

## 6. Discussions and Conclusions

The empirical data collected and analyzed in this study showed that in the context of hospital online register system, web service quality can be measured by four constructs, tailored information and communication, trust, response time, and ease of use, making 18 items in total. Additionally, three of these four constructs were found to have significant positive effects on end user satisfaction. Only one factor (trust) was not significant. However, most other studies showed that trust is one of the key factors affecting online service acceptance [11,16,9,3]. This study discusses two reasons why trust might not be significant. First, in the context of hospital online register systems, people who access selected online register systems already trust the hospital and have already decided to use its services. Additionally, the questionnaire was answered by hospital patients. Only a patient who trusts a hospital is likely to seek medical advices, this making trust essential rather than determinable.

Finally, two contributions can be drawn from this study. First, the measures used in this study can be applied by hospital IS department to understand user-perceived service quality as the basis for future improvement. Additionally, unlike in previous studies, trust was not found to affect user satisfaction significantly. Related discussions are included in this study and can be used for future related studies.

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