

# A Proposal of a Quality Model for Cultural Heritage Archive Portals\*

문화유산기관의 아카이브 포털 평가모델 구축을 위한 이론적 고찰

Misook Heo\*\*

## 목 차

- |  |                                       |
|--|---------------------------------------|
| 1. Introduction                                | 2.4 Cultural Heritage Archive Portals |
| 1.1 Problem Statement and Goal of the Research | 3. Conceptual Framework               |
| 2. Theoretical Background                      | 3.1 Reasoning                         |
| 2.1 Concept of Web Portal                      | 3.2 Web Portal Quality Models         |
| 2.2 Web Portal History                         | 4. Proposed Model and Instrument      |
| 2.3 Types of Web Portals                       | 5. Conclusion and Future Direction    |

## <ABSTRACT>

User needs and their usage motivations are critical components of web portal success, yet limited studies have been conducted with the constituents of good cultural heritage archive portals from the user perspective. This study proposes a quality assessment model from the user perspective. To overcome the intrinsic biases, the triangulation approach was chosen for building a research model. The proposed research model adapts three existing web portal quality models: service quality model, data quality model, and technology acceptance model. A 99-item instrument is suggested to investigate the proposed model. In the next phase of research, the instrument will be tested for its construct validity, and the research model will be empirically tested.

Keywords: web portal quality model, cultural heritage archive portals, service quality, data quality, technology acceptance model(TAM)

## <초 록>

이 논문은 문화유산기관 아카이브 포털의 대중화와 지속적인 이용을 위해 퀄리티 포털에 필요한 요소들을 살펴보고 있다. 이용자에 대한 이해가 문화유산기관 아카이브 포털의 성공에 결정적임에도 불구하고 많은 연구가 되어오지 않은 점을 감안하여, 타 포털들의 퀄리티 분석에 적용된 이용자 중심 평가모델들을 정리하였다. Intrinsic bias를 피하기 위해 triangulation 방법론을 선택하였으며, 이에 서비스 품질(Service Quality), 데이터 품질(Data Quality), 그리고 기술수용모델(Technology Acceptance Model: TAM)을 분석 정리하여 문화유산기관의 아카이브 포털에 적합한 평가모델을 제시하였다. 제시된 평가모델을 검증하기 위한 99 항목 설문도 제안하였다. 후속 연구에서는 설문의 타당성과 평가모델의 적합성이 실증적으로 검증될 계획이다.

주제어: 웹포털 퀄리티 모델, 문화유산기관 아카이브 포털, 서비스 품질 모델, 데이터 품질 모델, 기술수용모델

\* This work was supported by the National Research Foundation of Korea and is grant funded by the Korean Government(NRF-2010-330-H00006).

\*\* Duquesne University, Pittsburgh, PA, USA(heom@duq.edu)

■ 접수일: 2011년 5월 24일 ■ 최초심사일: 2011년 6월 1일 ■ 게재확정일: 2011년 6월 22일

## 1. Introduction

### 1.1 Problem Statement and Goal of the Research

For the past decade, the Internet has grown to be an integral part of our daily lives, and numerous innovative Web services have been introduced. With the increased time spent data mining on the Internet, web portals quickly became one of the most promising Web services. Web portals enabled new ways of gathering, synthesizing, altering, evaluating and sharing information across diverse platforms (Kalyanaraman & Sundar 2006). Web portals not only provided users with integrated access to dynamic content from various information sources, but also made it possible for users to personally tailor their information retrieval (Tojib, Sugianto, & Sendjaya 2008).

As more web portal services became competitively available, studies on portal quality, especially the factors that influenced user loyalty, started to receive more attention from service providers and researchers (Lee & Cho 2007; Liao, To, Liu, Kuo, & Chuang 2011; Lin, Wu, Tsai 2005; Liu, Du, & Tsai 2009; Presley & Presley 2009; Telang & Mukhopadhyay 2005; Tojib et al. 2008; Yang, Cai, Zhou, & Zhou 2005). With the high cost of portal implementation and management (Bannan 2002), studies on user retention have become more critical regarding the implementation of web portal services.

In the past, most studies on web portal user retention have been in the field of business. This may be because business web portals were the forerunners of web portal services, and because the more users visit a web portal, the more revenue the business makes from the advertisements shown on the web portals (Ha 2003). As increasingly more institutions adopt web portals, these studies are expanding into diverse domains such as education, government, and libraries. Yet, studies on user retention factors for domain-specific, non-commerce web portals, such as cultural heritage archive portals, are still very limited.

Web portal users are a heterogeneous population; they access different web portals with differentiated goals in mind. It is, thus, possible that dissimilar factors would contribute to the user retention for different web portals. The goal for this paper is to propose a research model and instrument to test factors that increase user retention for domain-specific, non-commerce web portals, especially cultural heritage, archive portals. When a cultural heritage, archive portal can not only obtain potential users' initial attention but also retain users' attention over time, the use of a cultural heritage, archive portal will be maximized and broad educational impact can be expected. This line of study will provide researchers and practitioners of web portals, especially domain-specific non-commercial web

portals, with a research-based user study framework, which will help them better understand their users and eventually build and maintain successful web portals.

## 2. Theoretical Background

### 2.1 Concept of Web Portal

While there are numerous definitions for web portals, a general consensus seems to be that web portals are a personalized, Internet-based, single access point to varying, divergent sources (Al-Mudimigh, Ullah, & Alsubaie 2011; Liu et al. 2009; Presley & Presley 2009; Telang & Mukhopadhyay 2005; Yang et al. 2005; Watson & Fenner 2000). Web portals join channels (portlets), applications, and data from diverse resources in order to provide users with access to the most up-to-date information that is relevant to their needs. Web portals also functions as an authenticated access point to a single user interface. With this personalization feature, each user becomes a unique audience of his/her own distinct content (Gilmore & Pine 2000; Kobsa, Koenemann, & Pohl 2011) and is responsible for the content he/she consumes. Individuals, playing “self as source”, perform the gatekeeping function by customizing their information preferences (Sundar & Nass 2001). This personalization feature may promote a greater sense of ownership of portal content (Kalyanaraman & Sundar 2006).

### 2.2 Web Portal History

Web portals began to emerge in the mid 1990s as a service to address the problem of attention scarcity caused by information abundance on the World Wide Web (Hargittai 2000). The success of MyYahoo!, a personalized web service launched in 1996, captured the initial market attention on web portals (Detlor 2000).

Over the years, web portals evolved with improved and/or added functionality. Maltz (2005) summarizes the five generations of portal advancement: with an emphasis on content, first generation portals allowed users to access commonly used information and applications; second generation portals stressed services and facilitated collaboration; third generation portals focused on integration and enterprise solutions, and is represented by the merger of multiple portals and the beginning of enterprise portals; fourth generation portals' focus was on the merger of enterprise and external sources. At this time,

collaboration and communication are further facilitated leading to the fifth generation portals' foci, which include application delivery, simplification of the application integration effort, and incorporation of standards. As the web began to emerge as a platform, harnessing collective intelligence and distributing it with lightweight programming models (Anderson 2007), web portals became constant-update services that allowed users to consume, remix and multiply data and services, emphasizing collaborative information sharing.

In the current browser-based portal framework, consisting of portlets of static content and dynamic applications, the features that users find in their web portals are still limited to the nature of their subscription (Telang & Mukhopadhyay 2005). The transformation of portal services from static flows of information to a more dynamic, collaborative flow of information is yet to come.

### 2.3 Types of Web Portals

Classifying the portal is quite a complex process since many types of portals have been developed with different purposes and are still evolving. Since a portal oftentimes shares characteristics with many types of portals, delineating one type of portal from another is rather difficult, if not impossible. The classification offered in this section is, thus, only an effort to understand the world of web portals and by no means exhaustive. Rather than naming portal types, general concepts of portal types are introduced categorically, since a naming convention has been difficult to articulate in certain fields (e.g., business portal, corporate portal, corporate information portal, and enterprise information portal have often been used interchangeably) (Yang, Yang, & Wu 2005).

Every web portal is created with distinguishing properties such as its mission, content structure, and target users (Liu et al. 2009; Maltz 2005). Depending on the mission of a web portal, it can be classified into transaction-based portals that are designed to make profit; and information-based portals that are designed to disseminate information where users often simply consume the information prepared and published by others. Depending upon the depth of content, web portals can also be categorized as horizontal and vertical. Horizontal portals focus on a wide area of topics and general audiences, and are often referred to as mega-portals. Conversely, vertical portals, also known as vortals, focus only on a specific domain and narrowly defined group of audiences. Web portals can also be classified as either public or private portals depending on the audience's access privileges. Public portals aims to attract large numbers of general audiences with compelling demographics, whereas private portals target a restricted group only. Within this categorization scheme, a cultural heritage, archive portal likely belongs to the information-based, vertical, and public portal types.

## 2.4 Cultural Heritage Archive Portals

Cultural heritage institutions are becoming increasingly more digital. Cultural heritage, archive portals not only offer digital duplications of artifacts, but also provide users with distributed digital artifacts via multi-institution collaboration (Cha & Kim 2010; Concordia, Gradmann, & Siebinga 2010; Gibson, Morris, & Cleve 2007; Tanackoviæ, & Badurina 2008), provide users with the ability to personalize their experience (Giaccardi 2006; Yoshida, Yasuda, & Yokoi 2010), and even allow users to participate in the process of resource management (Cox 2007; Giaccardi 2006; Farber & Radensky 2008; Pruulmann-Vengerfeldt & Aljas 2009; Timcke 2008; Yakel 2006).

As with these trends, users of archives are changing from researchers to non-researchers (Adams 2007; Huvila 2008). Discussions on strategy to engage users are rising (Cox 2007; Durbin 2008; Farber & Radensky 2008; Huvila 2008; Pruulmann-Vengerfeldt & Aljas 2009), and understanding user needs and their motivations for using cultural heritage materials is recognized as a critical factor of cultural heritage, archive portals (Pruulmann-Vengerfeldt & Aljas 2009).

The aforementioned trends can be witnessed in many cultural heritage, archive portals. *Europeana* could be one of the most well-known examples. Launched as the first prototype of Europe's Digital Library, Museums and Archives, *Europeana* functions as a gateway to distributed European cultural heritage resources, and aggregates over 15 million digital items from 1500 museums, archives, libraries, and other cultural and scientific heritage institutions in Europe (<http://www.europeana.eu/portal/aboutus.html>). Users can access the portal with their own choice of the 28 official EU languages and personalize their experience with 'My Europeana'. Although individual users are not yet allowed to contribute digital objects, they can provide opinions to *Europeana*; user orientation has been stressed through one of *Europeana*'s projects, EuropeannaConnect.

*Picture Australia* and *Moving Here* are two other kinds of cultural heritage, archive portals that exhibit one or more of the aforementioned cultural heritage, archive portal trends: multi-institution collaboration, personalization, and user participation. Like *Europeana*, over 70 cultural agencies in Australia contribute to the *Picture Australia* portal, and a consortium of 30 archives, libraries and museums contribute to the *Moving Here* portal. Although *Picture Australia* and *Moving Here* do not provide individual users with the ability to personalize their experience, they allow the users to contribute personally owned images (<http://www.pictureaustralia.org/contribute/index.html>) or stories (<http://www.movinghere.org.uk/help/terms.htm>).

## 3. Conceptual Framework

### 3.1 Reasoning

As aforementioned in the previous section, to be a successful cultural heritage, archive portal, the portal should understand user needs and their usage motivations. Unfortunately, however, while more and more cultural heritage institutions are offering web portal services, limited studies have been conducted with/about the constituents of good cultural heritage, archive portals from the user perspective. This research, thus, attempts to provide a framework for future studies on quality, cultural heritage, archive portals.

To build a research model, the triangulation approach was chosen. That is, by combining multiple methods from the literature, this study endeavors to overcome the intrinsic biases. The proposed research model adapted three existing web portal quality models: service quality model, data quality model, and technology acceptance model.

### 3.2 Web Portal Quality Models

#### 3.2.1 Service Quality Model

Service quality model focuses on customers and is an assessment of how well a perceived service matches with their expectations. The higher the service quality, the smaller the gap between the expected service and the perceived service. As the gap becomes smaller, customers will have more satisfaction with the service. While researchers express different opinions about various mechanisms to encourage user loyalty for web portals, it seems that high service quality is recognized as a one of the most significant components impacting user satisfaction and thus yielding user retention (Lin et al. 2005; Telang & Mukhopadhyay 2005).

Studies on web portal service quality stems from the service quality study in the business field (e.g., Offutt 2002; Reichheld & Scheffer 2000), and service quality was understood as the customers' subjective assessment of whether the service they received was consistent with their expectations (Parasuraman, Zeithaml, & Berry 1985; Watson, Pitt, & Kavan 1998). SERVQUAL, the scale that has been used most widely in assessing service quality, recommends reliability, responsiveness, assurance, empathy, and tangibles as the five domains for measurement (Parasuraman et al. 1985, 1988). SERVQUAL has been modified by many web portal service quality studies as well as various domains of online services, such as e-commerce, e-government, e-learning, and library systems. Table 1 lists

a few example studies in these fields.

〈Table 1〉 Example studies that adapted SERVQUAL

Domains	Example Studies
Web portal	<ul style="list-style-type: none"> <li>• Gounaris &amp; Dimitiadis 2003</li> <li>• Kuo, Lu, Huang, &amp; Wu 2005</li> <li>• Moraga, Calero, &amp; Piattini 2004, 2006</li> <li>• Liu et al. 2009</li> </ul>
e-commerce	<ul style="list-style-type: none"> <li>• April &amp; Pather 2008</li> <li>• Devaraj, Fan, &amp; Kohli 2002</li> <li>• Negash, Ryan, &amp; Igbaria 2003</li> <li>• Siadat, Buyut, &amp; Selamat 2008</li> <li>• Wang &amp; Tang 2003</li> </ul>
e-government	<ul style="list-style-type: none"> <li>• Lee, Kim, &amp; Ahn 2011</li> <li>• Tan, Benbasat, &amp; Cenfetelli 2008, 2010</li> </ul>
e-learning	<ul style="list-style-type: none"> <li>• Udo, Bagchi, Kirs 2011</li> <li>• Wang, Zhang, &amp; Ma 2010</li> </ul>
Library systems	<ul style="list-style-type: none"> <li>• Banwet &amp; Datta 2002</li> <li>• Landrum &amp; Prybutok 2004</li> <li>• Van Dyke, Kappelman, &amp; Prybutok 1997</li> </ul>

Though SERVQUAL was originally developed for physical market services, its increasing popularity has prompted debates on its adoption into IS or IT contexts and on the appropriateness of its premise and stability of dimensions (Landrum, Prybutok, Zhang, & Peak 2009). To overcome these drawbacks, researchers recommend that the SERVQUAL scale needs to be adapted to fit a specific study context (Gounaris & Dimitriadis 2003; Ladhari 2009) or be validated through reliability and validity analysis (Ladhari 2009).

### 3.2.2 Data Quality Model

Data quality model is a measure of fitness for use in a given context (Cappiello, Francalanci, Pernici 2004; Knight & Burn 2005; Strong, Lee, & Wang 1997). With this perspective, the ability of data to meet user requirements, especially in terms of usefulness and usability, is considered important (Strong et al. 1997). If a portal offers a level of data quality that satisfies its users' needs, it will obtain and maintain the users' preferences (Caro, Calero, & Moraga 2011; Nam 2009).

Among the research on data quality, Wang and Strong's (1996) concept of quality information and knowledge has been widely accepted. They contend that data quality is a multi-dimensional concept, and researchers generally agree, but the definitions of dimensions have long been debated

(Cappiello et al. 2004) possibly due in part to the contextual nature of data quality. Twenty dimensions of data quality are most commonly identified in the literature: Accuracy, Consistency, Security, Timeliness, Completeness, Concise, Reliability, Accessibility, Availability, Objectivity, Relevancy, Usability, Understandability, Amount of data, Believability, Navigation, Reputation, Useful, Efficiency, and Value-added (Knight & Burn 2005).

Data quality originated in the context of information systems (Lee 2002), but in recent years, data quality research has been pursued by many researchers across different disciplinary areas (Madnick, Wang, Lee, & Zhu 2009) such as web portals, e-commerce, cooperative information systems, and enterprise resource planning systems. Table 2 lists a few example studies in these fields.

<Table 2> Example studies that adapted Data Quality Model

Domains	Example Studies
Web portal	<ul style="list-style-type: none"> <li>• Caro, Calero, Caballero, &amp; Piattini 2008</li> <li>• Caro, Calero, Caballero, &amp; Piattini 2007</li> <li>• Yang et al. 2005</li> </ul>
e-commerce	<ul style="list-style-type: none"> <li>• Katerattanakul &amp; Siau 2001</li> <li>• Xu &amp; Koronios 2004</li> </ul>
Cooperative information systems	<ul style="list-style-type: none"> <li>• Marchetti, Mercella, Scannapieco, &amp; Virgillito 2003</li> <li>• Mecella et al. 2002</li> </ul>
Enterprise resource planning systems	<ul style="list-style-type: none"> <li>• Hang, Arlbjørn, &amp; Pedersen 2009</li> </ul>

As indicated by the definition of data quality - fitness for use in a given context, data quality is relative. That is, acceptable data quality varies by the context in which it is being measured (e.g., different problem solving situations, different users, different organizations, etc.) (Tayi & Ballou 1998), and implies that dimensions of data quality need to be adjusted to support specific user needs in the context within which his/her particular interest resides.

### 3.2.3 Technology Acceptance Model

Technology Acceptance Model (TAM) is an instrument designed to explain the determinants of technology acceptance in a theoretically justified way and to predict the adoption of a new technology by users (Davis, Bagozzi, & Warshaw 1989; Laio, To, Liu, Kuo, & Chuang 2011; Turner, Kitchenham, Brereton, Charters, & Budgen 2010). TAM hypothesizes that user's internal beliefs, attitudes, and intentions are critical factors of technology acceptance and future technology use (Davis et al. 1989). TAM has proven to have a good predictive validity, not only in its initial adoption but also in its continued use of information technology, and still remains one of the most influential models



for explaining user's technology acceptance (Karahanna, Agarwal, & Angst 2006; Presley & Presley 2009). If a web portal is predicted to have a high level of actual usage behavior, which implicitly indicates user satisfaction of the portal, user retention will naturally be facilitated.

The original model of TAM, designed to assess the performance of software and IT adoption, indicates four internal variables (Davis et al. 1989) - perceived usefulness, perceived ease of use, attitude toward use, and behavioral intention to use. Among them, perceived usefulness and perceived ease of use were recognized as the two primary determinants (Davis 1989; Davis et al. 1989). TAM, however, has been modified by many researchers and has resulted in various dimensions, (Gounaris & Dimitriadis 2003) such as perceived playfulness/enjoyment and actual use. Adapted TAM has been used to predict adoption of web portals and other systems such as e-commerce, e-learning or web-based information systems, and the Web. Table 3 lists a few example studies in these fields.

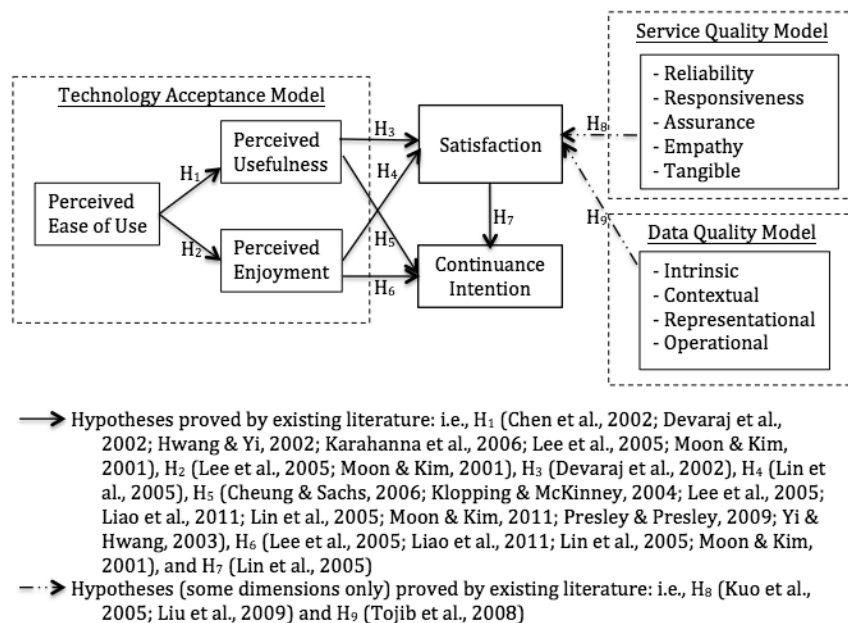
〈Table 3〉 Example studies that adapted Technology Acceptance Model (TAM)

Domains	Example Studies
Web portal	<ul style="list-style-type: none"> <li>• Lai &amp; Pires 2010</li> <li>• Liao et al. 2011</li> <li>• Presley &amp; Presley 2009</li> <li>• van der Heijden 2003</li> <li>• Yang et al. 2005</li> </ul>
e-commerce	<ul style="list-style-type: none"> <li>• Cao, Zhang, &amp; Seydel 2005</li> <li>• Chen, Gillenson, &amp; Sherrell 2002</li> <li>• Devaraj et al. 2002</li> <li>• Klopping &amp; McKinney 2004</li> </ul>
e-learning or web-based information systems	<ul style="list-style-type: none"> <li>• Cheung &amp; Sachs 2006</li> <li>• Lee, Cheung, &amp; Chen 2005</li> <li>• Roca, Chiu, Martinez 2006</li> <li>• Yi &amp; Hwang 2003</li> </ul>
The Web	<ul style="list-style-type: none"> <li>• Moon &amp; Kim 2001</li> </ul>

The wide use of TAM did not come without criticism: some researchers believed TAM's focus was only on functional or extrinsic motivational drivers, such as usefulness and ease-of-use (Lee et al. 2005). This suggests that to be able to better predict the adoption of a new technology, TAM needs to be adapted to include intrinsic motivational factors.

### 4. Proposed Model and Instrument

To derive a portal quality model within a specific context of cultural heritage, three widely used models are adapted: service quality model, data quality model, and technology acceptance model. Figure 1 shows the proposed research model. The relationship hypotheses depicted in Figure 1 are supported by existing literature.



<Figure 1> Proposed research model

As was noted in the previous section, although these three models have been used widely, researchers have also expressed concerns. For example, the SERVQUAL scale was said to be adapted to fit a specific study context, such as physical market service or web portal. The proposed instrument, thus, adapted Moraga et al.'s (2004) scale, which was specifically developed to measure web portal service quality. The data quality domain was removed because it was only a portion of what the data quality model covers, and four more questions that are not relevant to the cultural heritage, archive portals were deleted.

For the data quality model, researchers recommended that dimensions needed to be modified to support user needs in the context in which the user's particular interest resides, such as cultural heritage. Since the majority of the scales available from literature were for business information

systems, the proposed instrument first borrowed Caro et al.'s (2008) scale, which was designed to measure the data quality of generic web portals. After modifying questions to fit cultural heritage, archive portals, three questions were added to make the scale more context specific (e.g., interconnectedness, personalization, and user participation).

For the Technology Acceptance Model (TAM), researchers suggested to include intrinsic motivational factors. Two scales that contain a user enjoyment dimension (intrinsic motivation) were combined and then adapted: van der Heijden's (2003) scale for generic portals and Moon and Kim's (2001) scale for the Web. Satisfaction and continuance intension dimensions were added to the combined scale.

Table 4 below summarizes the scales used as a foundation of the proposed research instrument. After the adaption of the four scales, a 99-item instrument was constructed. Since the instrument was constructed based upon the literature, the face validity and content validity were partially supported. To strengthen its face validity and content validity more, however, the instrument was reviewed by three independent technology experts. During this process, some of the dimensions and questions were recognized as redundant since the instrument was aggregated from multiple sources. These redundant dimensions and questions, however, have been left unchanged with the expectation that the next phase of the study (i.e., test of construct validity) will address redundancy issues. Table 5 lists the questions for the proposed instrument that have been agreed upon by the experts.

<Table 4> Scales adapted for the construction of the proposed instrument

Scale	Model	Context	Framework Structure	Adapted Structure
Moraga et al. (2004)	Service quality	Generic model for web portals	Six domains and 42 items	Five dimensions and modified 33 question items
Caro et al. (2008)	Data quality	Generic model for web portals	Four categories and 33 attributes	Four dimensions and modified 36 question items
van der Heijden (2003)	TAM	Generic portal	Five dimensions and 16 questions	Three dimensions and modified seven question items
Moon and Kim (2001)	TAM	World Wide Web	Six dimensions and 37 questions	Three domains and modified 19 question items

〈Table 5〉 Proposed Instrument

Origin	Dimension	Question		
Service Quality	Reliability	1. Portal is available all the time.		
		2. The achievable service level is stated on the portal.		
		3. Several channels are available to access a page at all times.		
		4. Different hyperlinks lead to the same page.		
Responsiveness		5. The portal address is included in all existing documentation, publicity and advertising channels.		
		6. The portal uses suitable names.		
		7. The portal uses multiple websites.		
		8. The portal provides increasing service speed and bandwidth to maximize hit rate.		
		9. Links to related portals or search portals are available.		
		10. The result of a demand service is returned quickly to the user independently of the kind of answer: e-mail, specific pages, etc.		
		11. The response e-mails are relevant and accurate.		
		12. The portal content is appropriate for user requirements.		
		13. Callback or e-mail system tells user the time of response necessary to perform a service.		
		14. The design allows minimum upload time. .		
		Assurance		15. Privacy is stated on the portal.
		Empathy		16. Callback (services reporting individually about the result of certain service) exists to report to the user.
				17. Portal graphics, sound and video exist to make the website visually appealing.
				18. Portal offers language or geographic options.
19. Navigation on the portal is intuitive.				
20. The tone of content is consistently courteous.				
21. Relevant FAQs (Frequently Asked Questions) help user to solve problems by themselves.				
22. Various FAQs help different users.				
23. Web pages and answer to the e-mail are offered individually (Possibility of personalizing the portal is offered).				
24. Feedback is continuously updated in response to users.				
25. Users might be invited to special events (The registered users are sent information related to events that may be interesting for them).				
26. E-mails and questionnaires are used to perform surveys to understand the user's satisfaction with portal.				
27. The portal design is solid.				
28. The framework of the portal is easily understandable.				
29. The visual appearance of the portal is carefully worked.				
30. Portal offers the possibility of a personalized interface.				
31. Portal offers easy access to information for persons with disabilities.				
32. All hyperlinks within the portal are relevant.				
33. The portal maintains a consistent look throughout..				
34. The design of the portal offers minimum distractions.				
Tangible/ Stability				35. E-mail system is both inbound and outbound to deal with user concerns.
		36. Regardless of computer configuration (e.g., web browser type, web browser version, network speed, etc.), the web portal can be accessed.		

Origin	Dimension	Question	
Data Quality	Intrinsic	37. The portal content is correct, reliable, and certified as being free of error. (Accuracy)	
		38. The portal content is impartial and bias-free. (Objectivity)	
		39. The data and their sources are accepted as correct. (Believability)	
		40. The portal content is worthy of great respect regarding content and sources. (Reputation)	
		41. The portal content is up-to-date. (Currency)	
		42. The portal does not contain duplicate data when accessed. (Duplicates)	
		43. The ability to know how long the data contained on the portal can be considered up-to-date is prevalent. (Expiration)	
		44. The portal content is well documented, verifiable and easy to attribute to a single source. (Traceability)	
		Contextual	45. The portal content is specific, useful and easily applicable for the target community. (Applicability)
			46. The portal content is of sufficient breadth, depth, and scope for the task at hand. (Completeness)
			47. The data contained on the portal comes from a large shared collection of multiple institutions. (Interconnectedness)
			48. The portal content is adaptable and applicable to different requirements. (Flexibility)
			49. The portal provides novelty content.
			50. The data contained on the portal has an influence on my knowledge and the decisions I have to make. (Novelty)
51. The portal content can be trusted as appropriate. (Reliability)			
52. The portal content is suitable to meet my needs. (Relevancy)			
53. The portal content is detailed enough. (Specialization)			
54. The portal gives me the data I need within a time period that suits my needs. (Timeliness)			
55. The data contained on the portal can be judged and seen to be valid from my point of view. (Validity)			
56. The data contained on the portal provides me with advantages and benefits. (Value-added)			
Representational	57. The portal content is presented in a language that is appropriate and easy to interpret. (Interpretability)		
	58. The data contained on the portal (in each link, as the result of a search on each page, etc.) is clear, unambiguous, and easy to understand. (Understandability)		
	59. The portal content is presented in a form that is compact, free of superfluous data and of elements that are not at all pertinent. (Concise Representation)		
	60. The portal content is always presented in the same format. (Consistent Representation)		
	61. The quantity of data delivered by the portal (in each link, as the result of a search on each page, etc.) is appropriate. (Amount of Data)		
	62. The portal is attractive for its users. (Attractiveness)		
	63. The portal gives information about the author and/or the source of the data contained on the portal. (Documentation)		
	64. The portal content is organized according to certain criteria, and that it uses a consistent combination of visual controls and/or stylistic devices (e.g., colors, text, different types and sizes of font, pictures, and so on). (Organization)		

Origin	Dimension	Question
Data Quality (Continued)	Operational	65. The portal provides sufficient navigation mechanisms for visitors to reach their desired data faster and easier. (Accessibility) 66. The portal content is protected from unauthorized manipulation. (Security) 67. The portal content is adaptable to my personal preferences through interactive elements. (Interactivity) 68. The portal content is available through the portal. (Availability) 69. The portal provides on-line support by means of text, e-mail, telephone, etc. (User support) 70. The portal content is easy to handle and control for the tasks I perform. (Ease of operation) 71. The time taken between a request for information (entry to a page, or through a query, etc.) and the satisfactory and complete answering of that request is appropriate to my needs. (Response time) 72. The portal provides me with the opportunity to contribute to the content (e.g., uploading texts, audios, pictures, videos, etc.) (User participation) 73. The portal provides me with the ability to personalize elements of the portal features (e.g., save digital items, the search results, etc.). (Personalization)
Technology Acceptance Model	Perceived ease-of-use	74. Learning how to use the portal is easy. 75. I find it easy to get the portal to do what I want it to do 76. It is easy to remember how to use the portal. 77. The portal is easy to navigate. 78. It is quick to find the information I need. 79. The portal is user-friendly.
	Perceived usefulness	80. Using the portal enables me to accomplish tasks more quickly 81. Using the portal enables me to have more accurate information. 82. Using the portal enables me to access much information. 83. Using the portal enables me to access the newest information. 84. Using the portal enables me to acquire high quality information. 85. The information on the portal is interesting to me. 86. The portal adds value.
	Perceived enjoyment	87. When interacting with the portal, I do not realize the time elapsed. 88. When interacting with the portal, I am not aware of any noise. 89. When interacting with the portal, I often forget the work I must do. 90. Using the portal gives enjoyment to me during my task. 91. Using the portal stimulates my curiosity. 92. Using the portal leads to my exploration. 93. Using the portal arouses my imagination. 94. The portal is entertaining. 95. Browsing the portal is an agreeable way of passing time.
	Satisfaction	96. Using the portal makes me feel satisfied. 97. Using the portal makes me feel pleased.
	Continuance Intention	98. Using the portal makes me want to come back on a regular basis over the next several years. 99. Using the portal makes me want to come back frequently (e.g., daily, at least every other day, or once in a week) in the future.

## 5. Conclusion and Future Direction

Over the past decade, the popularity of web portals grew significantly, and an abundance of web portal quality models have been proposed. Unfortunately, however, study of the portal quality model for domain-specific non-commerce web portals, especially cultural heritage, archive portals, has been limited. This paper endeavored to contribute to the literature by proposing a research model, which explains the user retention of domain-specific non-commerce web portals, especially cultural heritage, archive portals; and by suggesting an instrument that measures the quality of cultural heritage, archive portals. By adapting four existing scales, which abound from the three widely used models (service quality, data quality, and technology acceptance models), a 99-item instrument was suggested.

While this study offers a new, triangulation approach to domain-specific portal quality, one major limitation needs to be considered. While the proposed instrument was based upon published scales, only those by van der Heijden (2003) and Moon and Kim (2001) had proven reliability data. The reliability (Cronbach Alpha) of perceived ease-of use, usefulness, and enjoyment of van der Heijden's scale were 0.81, 0.83, and 0.82, respectively. The reliability (Cronbach Alpha) of perceived ease-of use, usefulness, and enjoyment of Moon and Kim's scale were 0.9348, 0.9348, and 0.9644, respectively. Proven reliability data for the other two scales was not available. Also, since all four scales were adapted, and new domains of questions were added to the proposed instrument, the instrument needs to be empirically tested. In the next phase of this study project, it is, thus, planned that the proposed instrument will be tested for its construct validity. With an exploratory factor analysis, the proposed instrument will be assessed to determine the extent to which it maintains the theoretical factor structure.

Another concern with the study is on the degree to which the continuance intention represents user retention in the real world. While it was proven that higher behavioral intention impacts users' actual use (Chen et al. 2002; Hwang & Yi 2002; Moon & Kim 2001; Presley & Presley 2009; Yi & Hwang 2003), the relationship between continuance intention and retention will need to be empirically tested. Only then can questions about the factors that impact user retention for cultural heritage, archive portals be answered.

## References

- Adams, M. 2007. Analyzing archives and finding facts: use and users of digital data records. *Archival Science*, 7: 21-36.

- Al-Mudimigh, A. S., Ullah, Z., and Alsubaie, T. A. 2011. A framework for portal implementation: A case for Saudi organizations. *International Journal of Information Management*, 31: 38-43.
- Anderson, P. 2007. February 1. *What is web 2.0? Ideas, technologies and implications for education*. [cited 2011. 4. 12]. <<http://www.jisc.ac.uk/media/documents/techwatch/tsw0701b.pdf>>.
- April, G. D. and Pather, S. 2008. Evaluating Service Quality Dimensions within e-Commerce SMEs. *Electronic Journal of Information Systems Evaluation*, 15(3): 155-170.
- Bannan, K. J. 2002. Personalization and portals: if you build it (right) they will come. *EContent*, 25(10): 17-21.
- Banwet, D. K. and Datta, K. 2002. Effect of service quality on post visit intentions over time: The case of a library. *Total Quality Management*, 13(4): 537-546.
- Cao, M., Zhang, Q., and Seydel, J. 2005. B2C e-commerce web site quality: B2C e-commerce an empirical examination. *Industrial Management & Data Systems*, 105: 645-661.
- Cappiello, C., Francalanci, C., and Pernici, B. 2004. Data quality assessment from the user's perspective. *Proceedings of the 2004 international workshop on Information quality in information systems, Paris, France*, 68-73.
- Caro, A., Calero, C., and Moraga, M. A. 2011. Are Web Visibility and Data Quality Related Concepts? *Internet Computing*, 15(2): 43-49.
- Caro, A., Calero, C., Caballero, I., and Piattini, M. 2007. Towards a Data Quality Model For Web Portals: Research in Progress. J. Filipe, J. Cordeiro, & V. Pedrosa (Eds). *WEBIST 2005/2006, LNBIP 1* (228-237). [cited 2011. 4. 15]. <<http://www.springerlink.com/content/u40848rg60132317/fulltext.pdf>>.
- Caro, A., Calero, C., Caballero, I., and Piattini, M. 2008. A Proposal for a set of Attributes relevant for Web Portal Data Quality. *Software Quality Journal*, 16: 513-542.
- Cha, S. and Kim, J. W. 2010. Constructing a Foundation for Semantic Structure of Korean Heritage Information: A Study on Creating a Substructure of Korean Heritage Portal by Implementing CIDOC CRM. *Proceedings of IEEE Fourth International Conference on Semantic Computing, Pittsburgh, PA*, 513-518.
- Chen, L., Gillenson, M. L., and Sherrell, D. L. 2002. Enticing online consumers: an extended technology acceptance perspective. *Information & Management*, 29: 705-719.
- Cheung, E. Y. M. and Sachs, J. 2006. Test of the technology acceptance model for a web-based information system in a Hong Kong Chinese sample. *Psychological Reports*, 99: 691-703.
- Concordia, C., Gradmann, S., and Siebinga, S. 2010. Not just another portal, not just another digital library: A portrait of Europeana as an application program interface. *International Federation*



- of Library Associations and Institutions*, 36: 61-69.
- Cox, R. J. 2007. Machines in the Archives: Technology and the Coming Transformation of Archival Reference. *First Monday*, 12(11). [cited 2011. 2. 28].  
<<http://www.uic.edu/htbin/cgiwrap/bin/ojs/index.php/fm/article/viewArticle/2029/1894>>.
- Davis, F. D. 1989. Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13: 319-343.
- Davis, F. D., Bagozzi, R. P., and Warshaw, P. R. 1989. User Acceptance of Computer technology: A Comparison of Two Theoretical Models. *Management Science*, 35: 982-1002.
- Deltor, B. 2000. The corporate portal as information infrastructure: towards a framework for portal design. *International Journal of Information Management*, 20: 91-101.
- Devaraj, S., Fan, M., and Kohli, R. 2002. Antecedents of b2C channel satisfaction and preference: Validation e-Commerce Metrics. *Information Systems Research*, 13: 316-333.
- Durbin, G. 2008. Just Do It! Web 2.0 As Task, Not Technology. *Museums and the Web 2008*, Toronto, Canada, April 9-12, 2008. [cited 2011. 3. 1].  
<<http://www.archimuse.com/mw2008/papers/durbin/durbin.html>>.
- Farber, A. and Radensky, P. 2008. Living Museum®: Supporting the Creation of Quality User-Generated Content. *Museums and the Web 2008*, Toronto, Canada, April 9-12, 2008. [cited 2011. 4. 24].  
<<http://www.archimuse.com/mw2008/papers/farber/farber.html>>.
- Giaccardi, E. 2006. Collective Storytelling and Social Creativity in the Virtual Museum: A Case Study. *DesignIssues*, 22(3): 29-41.
- Gibson, H., Morris, A., and Cleeve, M. 2007. Links between libraries and museums: investigating museum-library collaboration in England and the USA. *Libri*, 57: 53-64.
- Gilmore, J. H. and Pine, B. J., II. 2000. Introduction: Customization that counts. In J. H. Gilmore & B. J. Pine II (Eds.), *Markets of one: Creating customer-unique value through mass customization* (pp.vii-xxv). Boston: Harvard Business School Press.
- Gounaris, S. and Dimitiadis, S. 2003. Assessing service quality on the web: Evidence from business to cosumer portals. *Journal of Services Marketing*, 17: 529-548.
- Ha, L. 2003. Crossing offline and online media: a comparison of online advertising on TV websites and online portals. *Journal of Interactive Advertising*, 3(2): 33-48.
- Hargittai, E. 2000. Open portals or closed gates? Channeling content on the World Wide Web. *Poetics*, 27: 233-253.
- Hang, A., Arlbjørn, J. S., and Pedersen, A. 2009. A classification model of ERP system data quality. *Industrial Management & Data Systems*, 109: 1053-1068.

- Huvila, I. 2008. Participatory archive: towards decentralized curation, radical user orientation, and broader contextualization of records management. *Archival Science*, 8: 15-36.
- Hwang, Y. and Yi, M. Y. 2002. Predicting the Use of Web-based Information Systems: Intrinsic Motivation and Self-Efficacy. *Proceedings of the Eighth Americas Conference on Information Systems*. [cited 2011. 6. 18]. <[http://sigs.aisnet.org/SIGHCI/amcis02\\_minitrack/CR/Hwang.pdf](http://sigs.aisnet.org/SIGHCI/amcis02_minitrack/CR/Hwang.pdf)>.
- Kalyanaraman, S. and Sundar, S. S. 2006. The Psychological Appeal of Personalized Content in Web Portals: Does Customization Affect Attitudes and Behavior? *Journal of Communication*, 56: 110-132.
- Karahanna, E., Agarwal, R., and Angst, C. M. 2006. Conceptualizing Compatibility Beliefs in Technology Acceptance Research. *MIS Quarterly*, 30: 781-804.
- Katerattanakul, P. and Siau, K. 2001. Information quality in Internet commerce design. In M. Piattini, C. Calero, & M. Genero (Eds.), *Information and database quality* (pp.45-56). New York: Kluwer Academic Publishers.
- Klopping, I. M. and McKinney, E. 2004. Extending the Technology Acceptance Model and the Task-Technology Fit Model to Consumer E-Commerce. *Information Technology, Learning, and Performance Journal*, 22(1): 35-48.
- Knight, S. A. and Burn, J. M. 2005. Developing a framework for assessing information quality on the world wide web. *Informing Science Journal*, 8: 159-172.
- Kobsa, A., Koenemann, J., and Pohl, W. 2011. Personalized hypermedia presentation techniques for improving online customer relationships. *The Knowledge Engineering Review*, 16: 111-155.
- Kuo, T., Lu, I.-Y., Huang, C.-H., and Wu, G.-C. 2005. Measuring user's perceived portal service quality: An empirical study. *Total Quality Management & Business Excellence*, 16: 309-320.
- Ladhari, R. 2009. A review of twenty years of SERVQUAL research. *International Journal of Quality and Service Sciences*, 1(2): 172-198.
- Lai, C. S. K. and Pires, G. 2010. Testing of a Model Evaluating e-Government Portal Acceptance and Satisfaction. *Electronic Journal Information Systems Evaluation*, 13(1): 35-46.
- Laio, C., To, P.-L., Liu, C.-C., Kuo, P.-Y., and Chuang, S.-H. 2011. Factors influencing the intended use of web portals. *Online Information Review*, 35: 237-254.
- Landrum, H. and Prybutok, V. R. 2004. A service quality and success model for the information service industry. *European Journal of Operational Research*, 156(2): 628.
- Landrum, H., Prybutok, V., Zhang, X., and Peak, D. 2009. Measuring IS System Service Quality with SERVQUAL: Users' Perceptions of Relative Importance of the five SERVPERF Dimensions. *International Journal of an Emerging Transdiscipline*, 12: 17-35.

- Lee, Y. 2002. AIMQ: a methodology for information quality assessment. *Information & Management*, 40: 133-146.
- Lee, M. K. O., Cheung, C. M. K., and Chen, Z. 2005. Acceptance of Internet-based learning medium: the role of extrinsic and intrinsic motivation. *Information & Management*, 42: 1095-1104. doi:10.1016/j.im.2003.10.007
- Lee, S. and Cho, J. E. 2007. Usability Evaluation of Korean e-Government Portal. *Proceedings of the 4th international conference on Universal access in human-computer interaction: applications and services, Beijing, China*, 64-72.
- Lee, J., Kim, H. J., and Ahn, M. J. 2011. The willingness of e-Government service adoption by business users: The role of offline service quality and trust in technology. *Government Information Quarterly*, 28: 222-230.
- Liao, C., To, P-L., Liu, C-C., Kuo, P-Y., and Chuang, S-H. 2011. Factors influencing the intended use of web portals. *Online Information Review*, 35: 237-254.
- Lin, C. S., Wu, S., and Tsai, R. J. 2005. Integrating perceived playfulness into expectation-confirmation model for web portal context. *Information & Management*, 42: 683-693.
- Liu, C-T., Du, T. C., and Tsai, H-H. 2009. A study of the service quality of general portals. *Information & Management*, 46: 52-56.
- Madnick, S. E., Wang, R. Y., Lee, Y. W., and Zhu, H. 2009. Overview and Framework for Data and Information Quality Research. *Journal of Data and Information Quality*, 1(1): article 2.
- Maltz, L. 2005. *Portals: A Personal Door to the Information Enterprise*. [cited 2010. 11. 17]. <<http://www.educause.edu/Resources/PortalsAPersonalDoortotheInfor/154694>>.
- Marchetti, C., Merella, M., Scannapieco, M., and Virgillito, A. 2003. Enabling data quality notification in cooperative information systems through a web-service based architecture. *Proceedings of the Fourth International Conference on Web Information Systems Engineering, Rome, Italy*, 329-332.
- Mecella, M., Scannapieco, M., Virgillito, A., Baldoni, R., Catarci, T., and Batini, C. 2002. Managing Data Quality in Cooperative Information Systems. *Confederated International Conferences DOA, CoopIS and ODBASE 2002*, Irvine, California, October 30 - November 1, 2002. [cited 2011. 3. 22]. <<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.12.7508&rep=rep1&type=pdf>>.
- Moon, J.-W. and Kim, Y.-G. 2001. Extending the TAM for a World-Wide-Web context. *Information & Management*, 28: 217-230.
- Moraga, M. A., Calero, C., and Piattini, M. 2004. A first proposal of a portal quality model. *Proceedings*

- of the IADIS International Conference, E-society*, 1(2): 630-638.
- Moraga, A., Calero, C., and Piattini, M. 2006. Comparing different quality models for portals. *Online Information Review*, 30: 555-568.
- Nam, J. 2009. Web portal quality. *Proceedings of the IEEE/INFORMS International Conference on Service Operations, Logistics and Informatics, Chicago, IL*, 163-168.
- Negash, S., Ryan, T., and Igbaria, M. 2003. Quality and effectiveness in web-based customer support systems. *Information and Management*, 40: 757-68.
- Offutt, A. J. 2002. Quality attributes of web software applications. *IEEE Software*, 19(2): 25-32.
- Parasuraman, A., Zeithaml, V. A., and Berry, L. L. 1985. A Conceptual Model of Service Quality and Its Implications for Future Research. *Journal of Marketing*, 49(4): 41-50.
- Parasuraman, A., Zeithaml, V. A., and Berry, L. L. 1988. SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing*, 64(1): 12-40.
- Presley, A. and Presley, T. 2009. Factors influencing student acceptance and use of academic portals. *Journal of Computing in Higher Education*, 21: 167-182.
- Pruulmann-Vengerfeldt, P. and Aljas, A. 2009. Digital Cultural Heritage - Challenging Museums, Archives and Users. *Journal of Ethnology and Folkloristics*, 3(1). [cited 2011. 4. 1]. <[http://www.jef.ee/index.php/journal/article/view/24/pdf\\_23](http://www.jef.ee/index.php/journal/article/view/24/pdf_23)>.
- Reichheld, F. F. and Scheffer, P. 2000. E-Loyalty: Your Secret Weapon on the Web. *Harvard Business Review*, 78(4): 105-113.
- Roca, J. C., Chiu, C.-M., and Martinez, F. J. 2006. Understanding e-learning continuance intention: An extension of the Technology Acceptance Model. *International Journal of Human-Computer Studies*, 64: 683-696.
- Siadat, S. H., Buyut, V. C., and Selamat, H. 2008. Measuring service quality in E-retailing using SERVQUAL model. *Proceedings of the International Symposium on Information Technology, Kuala Lumpur*, 1-7.
- Strong, D., Lee, Y., and Wang, R. Y. 1997. Data Quality in Context. *Communications of the ACM*, 40(5): 103-110.
- Sundar, S. S. and Nass, C. 2001. *Conceptualizing sources in online news*. *Journal of Communication*, 51: 52-72.
- Tan, C.-W., Benbasat, I., and Cenfetelli, R. T. 2008. Building Citizen Trust towards e-Government Services: Do High Quality Websites Matter? *Proceedings of the 41st Hawaii International Conference on System Sciences, Waikoloa, Hawaii*, 217-226.
- Tan, C.-W., Benbasat, I., and Cenfetelli, R. 2010. Understanding The Antecedents And Consequences

- Of E-Government Service Quality: Transactional Frequency As A Moderator Of Citizens' Quality Perceptions. *Proceedings of the 18th European Conference on Information Systems*, Pretoria, South Africa, June 6-9, 2010. [cited 2011. 1. 7].  
<<http://web.up.ac.za/ecis/ECIS2010PR/ECIS2010/Content/Papers/0339.pdf>>.
- Tanackoviæ, S. F. and Badurina, B. 2008. Collaboration as a wave of future: exploring experiences from Croatian archives. *Library Hi Tech*, 26: 557-574.
- Tayl, G. K. and Ballou, D. P. 1998. Examining Data Quality. *Communications of the ACM*, 41(2): 54-57.
- Telang, R. and Mukhopadhyay, T. 2005. Drivers of Web portal use. *Electronic Commerce Research and Applications*, 4: 49-65.
- Timcke, S. 2008. Open archives and collaboration: where to now? *Innovation*, 36: 64-77.
- Tojib, D. R., Sugianto, L-F., and Sendjaya, S. 2008. User satisfaction with business-to-employee portals: conceptualization and scale development. *European Journal of Information Systems*, 17: 649-667.
- Turner, M., Kitchenham, B., Brereton, P. Charters, S., and Budgen, D. 2010. Does the technology acceptance model predict actual use? A systematic literature review. *Information and Software Technology*, 52: 463-479.
- Udo, G. J., Bagchi, K. K., and Kirs, P. J. 2011. Using SERVQUAL to assess the quality of e-learning experience. *Computes in Human Behavior*, 27: 1272-1283.
- van der Heijden, H. 2003. Factors influencing the usage of websites: the case of a generic portal in The Netherlands. *Information & Management*, 40: 541-549.
- Van Dyke, T. P., Kappelman, L. A., and Prybutok, V. 1997. Measuring information systems service quality: Concerns on the use of the SERVQUAL questionnaire. *MIS Quarterly*, 21: 195-208.
- Wang, R., Zhang, M., and Ma, S. 2010. Higher order factor analysis of SERVQUAL - Empirical findings from an e-learning system. *Proceedings of the International Conference on Progress in Informatics and Computing, Shanghai, China*, 1293-1297.
- Wang, R. Y. and Strong, D. M. 1996. Beyond accuracy: What data quality means to data consumers. *Journal of Management Information Systems*, 12(4): 5-34.
- Wang, Y.-S. and Tang, T.-I. 2003. Assessing customer perceptions of website service quality in digital marketing environments. *Journal of End User Computing*, 15(3): 14-28.
- Watson, J. and Fenner, J. 2000. Understanding portals. *Information Management Journal*, 34(3): 18-22.
- Watson, R. T., Pitt, L. F., and Kavan, C. B. 1998. Measuring Information Systems Service Quality:

- Lessons From Two Longitudinal Case Studies. *MIS Quarterly*, 22(1): 61-79.
- Yakel, E. 2006. Inviting the user into the virtual archives. *OCLC Systems & Services: International digital library perspectives*, 22: 159-163.
- Yang, Z., Cai, S., Zhou, Z., and Zhou, N. 2005. Development and validation of an instrument to measure user perceived service quality of information presenting Web portals. *Information & Management*, 42: 575-589.
- Yang, S.-M., Yang, M.-H., and Wu, J-T, B. 2005. The impacts of establishing enterprise information portals on e-business performance. *Industrial Management & Data Systems*, 104(3/4): 349-368.
- Yi, M. Y. and Hwang, Y. 2003. Predicting the use of web-based information systems: self-efficacy, enjoyment, learning goal orientation, and the technology acceptance model. *International Journal of Human-Computer Studies*, 59: 431-449.
- Yoshida, C., Yasuda, T., and Yokoi, S. 2010. The archive and community system for preserving traditional culture in rural areas. *Journal of US-China Public Administration*, 7(4): 65-73.
- Xu, H. and Koronios, A. 2004. Understanding Information Quality in e-Business. *Journal of Computer Information Systems*, 45: 73-81.