
Analysis of e-service quality from the management perspective: an empirical study on e-government services

Nour-Mohammad Yaghoubi and
Fatemeh Rigi*

Department of Management,
University of Sistan and Baluchestan,
Sistan and Baluchestan, Iran
Email: yaghoubi@hamoon.usb.ac.ir
Email: fatemeh.rigi@chmail.ir

*Corresponding author

Abstract: The purpose of this paper as an empirical case study is to identify and rank the effective factors in e-service quality from the management perspective in the technical and vocational training organisation (TVTO) of the Tehran Province. First, effective factors in e-service quality are identified by the Delphi technique; then, the ranks are calculated using analytical hierarchy process (AHP). AHP can be used as a framework for improving the quality of electronic services. Current study is a descriptive research. A questionnaire is used to collect data. The results show that six criteria (delivery of services, organisational performance, web design, security, usefulness of information and customer satisfaction) and 25 sub-criteria are effective in improving the quality of electronic services in the field of intelligent building system and development agencies. Moreover, service delivery is the highest-ranked criterion, followed by customer satisfaction, usefulness of information, and organisational performance; security is the lowest ranked criterion.

Keywords: e-government; e-services; Delphi technique; analytical hierarchy process; AHP.

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Biographical notes: Nour-Mohammad Yaghoubi is an Associate Professor of public administration at the University of Sistan and Baluchestan, Zahedan, Iran. He received his PhD in the area of policy-making from Allameh Tabatabai University, Iran. He has published several papers in well-established international journals such as marketing, government, management, information and communications technology and e-government. His major teaching and research interests include e-government, enterprise architecture, government, management, entrepreneurship, knowledge management and organisational behaviour.

Fatemeh Rigi received her BS and MS respectively in 1998 and 2014, in Geology Engineering from the University of Sistan and Baluchestan, Zahedan, Iran (BS) and Information Technology Management from the University of

Sistan and Baluchestan, Zahedan, Iran (MA). Her research interests are knowledge management, information technology management, wireless technology, e-government and mobile government.

1 Introduction

Electronic government (e-government) and application of electronic services in public organisations, here called public e-services, are currently significant subjects on information systems (IS) and public administration (PA). Surprisingly, development and application of e-services is increasing in the public sector (Rothstein, 2010; Hassan et al., 2011). What might come as a surprise, however, is the large number of concepts used to describe e-services delivered by governmental agencies. Making by e-government researchers in many publications on e-services, the meaning of e-service seems to be taken for granted – many scholars do not define or discuss what the concept of e-service refers to at all (Cho and Larry, 2012). The variety of concepts and definitions used to study and describe e-services in the e-government context not only makes it difficult for researchers and practitioners to discuss the application and development of e-services in the public sector, but also makes e-government research on e-services an easy prey for the critics as it illustrates difficulties for researchers to build knowledge in a cumulative manner (Li and Dinlersoz, 2012). The community of researchers concerned with e-government and public e-services is truly multidisciplinary and the interests of individual e-government researcher guides of which these perspectives on the public e-service is adopted. The multidisciplinary nature of the field strengthens the e-government research in many ways (Scholl, 2009); however, it can make conceptual discussions difficult. The possibility to perceive and interpret the phenomenon to which the concept of e-service refers in several different ways might be an influencing factor on why the concept of (public) e-service is used synonymously with several other concepts. In order to increase the analytical generalisability, conceptual maturity and practical benefit of e-government research, researchers concerned with e-services need to define what they are referring to when discussing public e-services. Furthermore, multidisciplinary is not the same as interdisciplinary. Increased communication between researchers of different disciplines is required if the e-government field is to avoid the alleged ghettoisation and, in turn, stimulate knowledge accumulation (Thirumalai and Sinha, 2011).

Governments around the world are embracing the digital revolution to enhance services for their citizens. E-government is mentioned as application of internet and World Wide Web (WWW) for delivering effective and efficient information and services to citizens (Scholl, 2009). However, the development of e-service quality and effective delivery systems is one important aspect of e-government (Papadomichelaki and Mentzas, 2012; Venkatesh et al., 2012). The purpose of this paper is to discuss the effective factors in e-service quality using Delphi and analytical hierarchy process (AHP) and develop a broad conceptual framework for comprehending public e-services.

2 Background

2.1 E-government

Lenk and Traummüller (2002) assert that e-government is a powerful guiding vision for the transformation which governments must adapt to in the future. E-government is a term reflecting the application of information and communication technology (ICT) in PA to change structures and processes of government organisations. Furthermore, the concept refers to an attempt to facilitate the access to governmental information and services for citizens, businesses and government agencies; there is a great potential for improving and advancing the interaction between them (Axelsson et al., 2010). The objective is to improve the quality of services and to provide greater opportunities for participation in democratic institutions and processes. The potential of e-government can be fully realised only if it is harnessed to the existing social and political context of government (Bertot et al., 2012).

It has been emphasised that an important goal of e-government is to deliver faster and cheaper services and information to citizens, business partners, employees, public and non-public agencies. Easy and equitable access to public information and services has always been a goal of open democratic governments. However, e-government refers to a more substantial transformation than e-service delivery (Cullier and Piotrowski, 2009). E-government defines an area, the public sector, as well as the institutions, people, and processes which operate within this area. Obviously, it is not only about services or technology, but also about reinvention of a way in which governments interact with citizens, public agencies, businesses, employees, and other stakeholders. It is about enhancing democratic processes and using new ideas to make lives easier for citizens by, for example, transforming government processes, enabling economic development, and renewing the role of government in society (Skiftenes Flak et al., 2009). E-government is usually presented as application of IT to:

- 1 facilitate the access to government information and services for citizens and businesses
- 2 increase the quality of services, by acceleration, completeness and process efficiency
- 3 provide citizens with the opportunity to participate in different kinds of democratic processes.

The implementation of e-government involves not only a profound transformation in the way government interacts with people, but also the reinvention of its internal processes and organisation (Shuler et al., 2010). E-government concerns both internal and external application of IT for internal administration as well as for external services

2.2 E-service quality

Over the past decade, there has been a growing body of work focusing on conceptualisation, measure, and management of service quality and its effects on electronic environments. The concept of e-service emerged upon the growth of internet (Loonam and O'loughlin, 2008; Collier and Bienstock, 2015). E-service has recently become a popular research topic along with the growth of e-commerce. A number of

published studies have offered a variety of conceptual definitions (Sylvie and Ina, 2010). Electronic service or e-service, as it has become more commonly known, is now recognised as one of the key determinants for successful e-business. With the increased e-service adoption in businesses, the importance of measuring and monitoring e-service quality has been recognised in the virtual world. Over the past two decades, there has been significant advancement in service quality theory.

The concept of e-service represents one prominent application of ICT in different areas. However, it is difficult to provide an exact definition of e-service, as researchers have been using different definitions to describe e-service (Zhao and Zhao, 2010). Despite these different definitions, it can be argued that they all agree about the role of technology in facilitating the delivery of services electronically.

E-service (or eservice) is a highly generic term, usually referring to provision of services via internet (the prefix 'e' stands for 'electronic', as it does in many other usages); thus, e-service may also include e-commerce, although it may also include non-commercial services (online), which are usually provided by the government. E-service quality can be described as overall customer evaluations and judgments regarding the excellence and quality of e-service delivered in the virtual marketplace.

As already noted, quality of e-service approaches focuses on the quality of the delivered service, not on the way the client receives the services from the front office website. E-service is a customer-oriented approach, since it is motivated by customer needs. Quality dimensions of these approaches depend on the attributes of the delivered service including availability, usability and security as well as the receivers of the service, priorities and needs (Canarslan, 2013).

E-service quality, as defined by Santos (2003), is the overall customer perceptions, judgments and evaluations of the quality of service obtained from a virtual marketplace. According to Parasuraman et al. (2005), e-service quality is defined as the extent to which a website facilitates efficient and effective purchase and delivery. E-service quality covers all stages of interactions between customers and a wide range of aspects from facilitating effectiveness of a website in purchase and distribution. In order to determine the extent of e-service quality, many studies have been conducted and many scales have been developed (Davidavičienė and Tolvaišas, 2011). E-S Qual scale developed by Parasuraman et al. (2005) became prominent by covering both pre- and post-service aspects. The E-S-Qual scale has 4 dimensions. These dimensions are defined by Parasuraman et al. (2005) as follows:

- efficiency: the easy and fast access to the website
- fulfilment: the extent to which promises made by the website about delivery and availability are fulfilled
- system availability: the technical functioning of the site
- privacy: the degree to which the website is safe and protects customer information (Swaid and Wigand, 2009).

2.3 *Literature review*

Collier and Bienstock (2006) adopted the Mentzer et al. (2001) service quality model as a basis to conceptualise e-service quality. They argued that online customers need quality information to order easily, information on terms of the order and accurate online

transactions, as logistics customers do. According to Lee and Lin (2005), website design is an important factor in determining the customer-perceived e-service quality, because it has significant and positive effects on customer-perceived e-service quality.

Accordingly, Sahadev and Purani (2008) identified privacy, fulfilment, system availability and efficiency as variables of e-service quality. They examined the relationships between dimensions of e-service quality, customer satisfaction, trust and loyalty. The results indicated that dimensions of e-service quality positively influenced both customer satisfaction and trust. In addition, results revealed that customer satisfaction and trust directly influenced loyalty. Yen and Lu (2008) found that e-SQ dimensions of efficiency, privacy protection, contact, fulfilment, and responsiveness had significant effects on disconfirmation of online auctions which, subsequently, are positively associated with customer satisfaction; which, in turn, is positively associated with loyalty and intentions to repurchase a product or reuse a service.

Sun et al. (2009) identified privacy, fulfilment, system availability and efficiency as variables of e-service quality. They examined the causal relationships between dimensions of e-service quality, customer satisfaction, perceived value and loyalty. The results showed that dimensions of e-service quality influenced customer satisfaction and perceived value. In addition, the results indicated that e-customer satisfaction and perceived value influenced loyalty. Collier and Bienstock (2006) identified privacy as a dimension of e-service quality. They concluded that privacy positively influenced customer satisfaction. How to appraise e-service quality has become a subject of various scholars. In contrast, several contributions have been made to delineate the domain of e-service quality and identify its dimensions (Kim et al., 2009).

Chang et al. (2009) developed a model to represent the relationships between e-service quality, customer satisfaction, and customer loyalty. Moreover, they assumed a role for customer-perceived value mediating customer satisfaction and loyalty. Data was collected by means of a questionnaire completed by customers of an online website. The results of analysis indicated that e-service quality positively influenced customer satisfaction which led to loyalty. Moreover, the results revealed that customers with higher perceived value had higher degree of loyalty.

Wenying and Sun (2010) empirically examined the relationships between e-service quality, e-customer satisfaction, perceived value and loyalty. Data was collected from online customers using structural equations technique. Kassim and Abdullah (2010) examined the relationships between dimensions of e-service quality, customer satisfaction and trust. The results indicated the direct effect of service quality on customer satisfaction. Furthermore, the results showed that customer satisfaction positively influenced e-trust.

3 Objective

As noted earlier, this study analysed (identified and ranked) effective factors in e-service quality using Delphi and AHP approaches. Thus, the goals are:

- identifying effective factors and criteria in e-service quality using Delphi approach
- ranking each factors and criteria based on AHP approach.

4 Methodology

The purpose of this research is to investigate the effective factors in e-service quality using Delphi and AHP approaches. For this purpose, the studies conducted in this field were reviewed.

Then, factors and criteria were identified by Delphi method and ranked by AHP method.

4.1 Model

Considering previous studies, the effective factors in e-service quality were identified. The proposed model is shown in Figure 1 and Table 1.

Figure 1 The proposed hierarchy structure (see online version for colours)

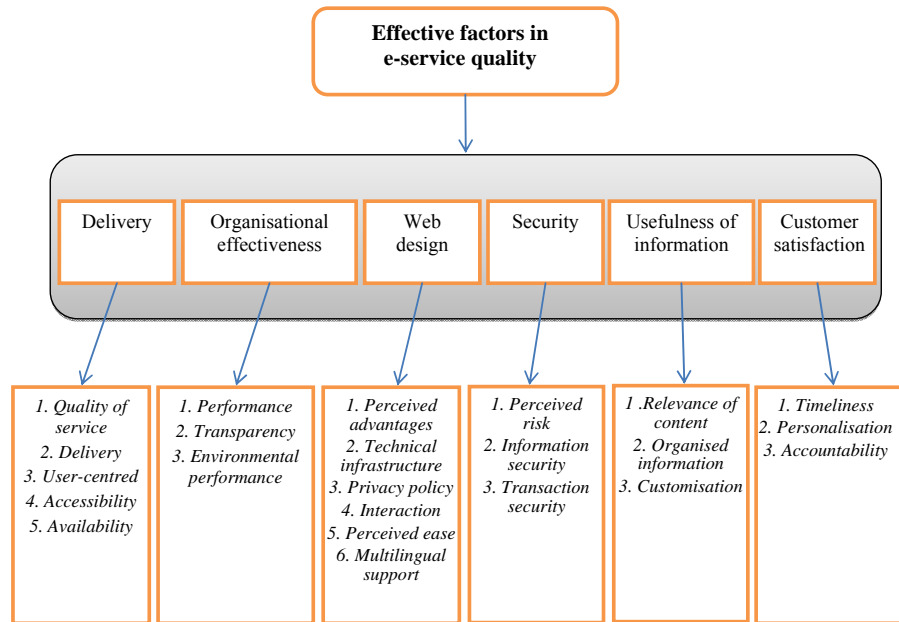


Table 1 The proposed research model

<i>Resources</i>	<i>Criteria</i>	<i>Main factors</i>	Effective factors in e-service quality
Karunasena and Deng (2012)	Quality of service	Delivery	
Wu et al. (2010)	Delivery		
Alanezi et al. (2011)	User-centred		
Kassim and Abdullah (2010)	Accessibility		
Wenying and Sun (2010)	Availability		
Collier and Bienstock (2006)	Performance	Organisational effectiveness	
Sahadev and Purani (2008)	Transparency		
Sylvie and Ina (2010)	Environmental performance		
Swaide and Wigand (2009)	Perceived advantages	Web design	
Natarajan et al. (2012)	Technical infrastructure		
Smith and Pitta (2009)	Privacy policy		
Ali et al. (2014)	Interaction		
	Perceived ease		
	Multilingual support		
	Perceived risk	Security	
	Information security		
	Transaction security		
	Relevance of content	Usefulness of information	
	Organised information		
	Customisation		
	Timeliness	Customer satisfaction	
	Personalisation		
	Accountability		

5 Results

5.1 Structure of Delphi method

The Delphi method is a relational process to solve a problem. One has to try to reach a consensus on specific subjects through the interrogation of experts. The experts are able to clarify the areas of uncertainty and to provide a decision support. The Delphi method is based on investigation by a dialectical approach: thesis (an established opinion), antithesis (a contradictory opinion) and a synthesis (a new consensus). The synthesis becomes the new thesis. This method can establish an agreement on a complex topic. The process is repeated until a consensus is reached. It can be used in the field of management, economics, technology, as well as social science.

The different phases of the Delphi method include:

- Step 1 Formulating the problem and developing the questionnaire: this is a fundamental stage, because it is important to define the problem clearly. The questionnaire is made according to certain rules based on which items must be accurate, independent and quantifiable.
- Step 2 Choosing the experts: the experts are selected based on their ability to envision the future. One must isolate the experts in order to avoid a distorted opinion issued from a group. Their opinions are collected anonymously by postal services.
- Step 3 Exploring the results: the questionnaire is sent to the experts (100 min to get at least 25 at a final stage), explaining them the goals and the practical conditions of the investigation. In the second round, the experts must give new responses. They are informed of the results of the first round, so they can justify their responses if they deviate from the ones of the group. In the third round, they have to express their views on the arguments of the deviants. In the fourth round, the definitive response clarifies the final opinion. Successive questionnaires are sent to reduce the fragmentation of opinions.

The studied group included TVTO experts. In this study, simple random sampling was used. To determine the sample size, the Cochran formula was used.

$$n = \frac{Z^2 pqN}{(N-1) + Z^2 pq} \quad (1)$$

According to the formula, the total sample consisted of 23 experts.

As noted, the objective of the questionnaire is to collect opinions of experts to identify the effective factors on electronic service quality. Therefore, experts scored the variables. Qualitative variables give more freedom to the experts. Qualitative variables include 'very low', 'low', 'medium', 'high' and 'very high'. The results of the first questionnaire are listed in Table 2.

Table 2 The results of the first questionnaire

		Main factors					Criteria						
1		Very low	Low	Medium	High	Very high	1		Very low	Low	Medium	High	Very high
Delivery	Impact of effective factors	-	-	5	13	5	1-1	Impact of effective factors	-	-	3	12	8
							1-2		-	-	4	11	8
							1-3		-	1	4	10	8
							1-4		-	-	2	7	14
							1-5		-	-	2	9	12

Table 2 The results of the first questionnaire (continued)

		Main factors						Criteria						
2	Organisational effectiveness	Impact of effective factors	Very low	Low	Medium	High	Very high	2	Impact of effective factors	Very low	low	Medium	High	Very high
-			-	4	8	11	2-1	-		-	1	15	7	
							2-2	-		-	5	6	12	
							2-3	-		-	4	9	10	
3	Web design	Impact of effective factors	Very low	Low	Medium	High	Very high	3	Impact of effective factors	Very low	Low	Medium	High	Very high
-			-	4	12	7	3-1	-		2	6	9	6	
							3-2	-		2	3	9	9	
							3-3	-		2	6	5	10	
							3-4	-		-	3	13	7	
							3-5	-		-	6	10	7	
						3-6	-	-	5	12	6			
4	Security	Impact of effective factors	Very low	Low	Medium	High	Very high	4	Impact of effective factors	Very low	Low	Medium	High	Very high
-			2	3	11	6	4-1	-		-	6	10	7	
							4-2	-		-	2	9	12	
							4-3	-		-	5	6	12	
5	Usefulness of information	Impact of effective factors	Very low	Low	Medium	High	Very High	5	Impact of effective factors	Very low	Low	Medium	High	Very high
-			-	4	5	14	5-1	-		-	2	14	7	
							5-2	-		-	2	9	12	
							5-3	-		-	5	6	12	
6	Customer satisfaction	Impact of effective factors	Very low	Low	Medium	High	Very High	6	Impact of effective factors	Very low	Low	Medium	High	Very high
-			-	4	6	13	6-1	-		-	1	7	15	
							6-2	-		-	5	9	9	
							6-3	-		-	3	6	14	

In the present study, two criteria were added, updated information to usefulness of information and informed customers to customer satisfaction. Then, the final model was approved by six main factors and 25 criteria.

5.2 Applying AHP

Nowadays, it is important for companies to make decisions quickly and select the best alternative in order to gain competitive advantage in a complex environment (Tuş Işık et al., 2013). An AHP model is developed to structure the criteria for selection of the most appropriate layout for each stage (Abdi, 2009). In tradition to AHP, pair-wise comparison is made using a nine-point scale, which converts human preferences (i.e., numbers 3, 5, 7 and 9 representing ‘generally important’, ‘strongly important’, ‘very important’, and ‘absolutely important’; and 2, 4, 6 and 8 for compromises between 3, 5, 7 and 9). Thus, AHP uses only absolute scale numbers for judgments and for their resulting priorities. Even though the discrete scale of AHP has the advantages of simplicity, it is not sufficient to take into account the uncertainty associated with the mapping of one’s perception of a number (Chen and Wang, 2010). AHP numbers are shown in Table 3.

Table 3 AHP scale

<i>Definition</i>	<i>Numbers</i>
Equally important	1
Judgement values between equally and moderately	2
Moderately more important	3
Judgement values between moderately and strongly	4
Strongly more important	5
Judgement values between strongly and very strongly	6
Very strongly more important	7
Judgement values between very strongly and extremely	8
Extremely more important	9

The results of AHP are presented in Table 4.

Table 4 The results of AHP

<i>The relative weights of criteria</i>	<i>Criteria</i>	<i>The relative weights of main factors</i>	<i>Main factors</i>
0.403	Quality of service	0.311	Delivery
0.203	User-centred		
0.178	Accessibility		
0.123	Availability		
0.094	Delivery services		
0.462	Performance	0.098	Organisational effectiveness
0.351	Transparency		
0.191	Environmental performance		

Table 4 The results of AHP (continued)

<i>The relative weights of criteria</i>	<i>Criteria</i>	<i>The relative weights of main factors</i>	<i>Main factors</i>
0.209	Interaction	0.071	Web design
0.197	Perceived advantages		
0.175	Perceived ease		
0.164	Technical infrastructure		
0.137	Privacy policy		
0.118	Multilingual support		
0.427	Information security	0.049	Security
0.354	Transaction security		
0.227	Perceived risk		
0.335	Updated information	0.195	Usefulness of information
0.321	Relevance of content		
0.234	Organised information		
0.112	Customisation		
0.374	Accountability	0.276	Customer orientation and satisfaction
0.336	Informed customers		
0.214	Timeliness		
0.082	Personalisation		

As shown in Table 4, delivery is the highest-ranked main factor followed by customer satisfaction, usefulness of information and organisational effectiveness. In the meantime, security is the lowest-ranked factor.

6 Conclusions

E-service can play a critical role in improving the quality of services delivered to customers, as it can achieve survival, increase satisfaction and trust and generate the competitive success for organisations. Management needs to improve its service quality to meet customer expectations. Therefore, findings of this study may help practitioners to understand the sources of management-perceived service quality. It was theorised in this study that e-service quality is determined by six major sectors: delivery, organisational effectiveness, web design, security, usefulness of information and customer satisfaction as well as 25 criteria. Based on the ranks of the main factors to improve the electronic service quality, the main factors include quality of service, delivery, user-centred, accessibility and availability which have a paramount importance, as authors believe. Among the criteria for delivery of services, the quality of service is the highest ranked. Customer satisfaction which can be considered as a supplement to delivery of services is the second top. Accountability is the first top among criteria of customer satisfaction. The third factor is 'usefulness of information'. The first top criterion of this factor is updated information. E-service can play a critical role in improving the quality of services delivered to customers, as it can achieve survival, increase satisfaction and trust and

generate the competitive success for organisations. In order to provide a high level of service quality, management and decision makers should pay attention to all of these six dimensions which were identified in this study. For the extension of this work, AHP method in fuzzy environment (Azadeh et al., 2010; Nazari-Shirkouhi et al., 2011; Keramati et al., 2013) for ranking of Effective factors in E-service quality can be used.

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