

Ranking the technical dimensions of e-banking service quality evaluation models using Analytical Hierarchy Process

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Abstract

With the expansion of internet, delivering e-services are rapidly growing in the bank industry. Therefore improving e-service quality for delivering better services is one of the most important areas of activity for banks. One of the most important aspects of e-service quality is the technical aspect, so the aim of this paper is to evaluate these dimensions of e-service quality for identifying the most important dimensions. Therefore we first reviewed e-banking service quality models to identify technical aspects then ranked them with AHP method. Base on the results, we identified 8 major dimensions which the most important ones are security with a score of 0.226, technical sufficiency with a score of 0.131, and reliability with a score of 0.128. Regarding to the findings the least important dimension is outcome quality with a score of 0.089.

Keywords: *E-Service quality, Bank industry, AHP, Technical dimensions, Quality.*

1. Introduction

Nowadays the service sector is the leading part among other growing sectors. The type of services that people use, are gradually changing, in parallel with society changes. Therefore improving quality to achieve rapid growth in service contexts is one of the most important areas of activity. How quality in service sector is perceived and which activities are necessary for improving them, are today's main issues [1].

With the expansion of e-commerce, offering services in form of electronic has increased. Therefore, assessing services in the virtual world, especially in the field of financial services, was felt more than ever [2]. According to Wall Street financial report, if online stock trading and online insurance trading respectively were the first and second wave of revolution in the industry of financial services, it seems that electronic banking is the third internet revolution wave in this industry. Therefore banks are interested in e-banking services more than before and are looking for ways to provide high quality services that properly satisfy customer's requirements. The service

quality of electronic banking is defined by Daniel (1999) as bank information/services that are provided for customers by Computer, Telephone or Television [3] and because of the perceived risk at electronic banking in comparison with traditional banking, the service quality of e-banking needs more attention [4]. As well as, with the rapid growth of virtual markets, particularly the profound impact of the internet on daily life in the past and the current inevitable growth of electronic banking in the financial industry, banks in order to maintain their competitiveness and also achieve competitive advantages, are developing differentiated service quality strategies[5]. Therefore, improving the service quality of e-banking is the business strategic priority for each bank.

In bank industry as well as other industries, assessing the existing situation in order to improve e-service qualities, is the first step. After that, the desirable situation of the e-services should be determined and then at the last step the best strategies for achieving it should be chosen. Therefore, in this research after identifying and introducing a number of authentic assessment models of e- service quality, based on the literature a set of dimensions that emphasize the technical part of assessment models of e-service quality have been introduced. Then with the use of experts' opinions and analytical hierarchy process method, the dimensions have been ranked and high priority dimensions have been recognized.

1.1 Service concept

Fundamentally, services differ from goods because of various characteristics. Thus, defining the notion of service is more complex and difficult than the notion of goods. Modern definitions of services focus on the fact that a service in itself produces no tangible output, although it may be instrumental in producing some tangible output [1].

By the definition of Krin (2006), Service is a type of product that is created for solving a set of human needs and demands. Also in terms of Zthaml (1996), "Service" is an overt and covert set of benefits and advantages that is

emerged by facilitating products and supporting equipments.

1.2 E-banking service quality

Electronic banking for the first time was used in USA and then rapidly expanded among other countries. Electronic banking was implemented in four periods, first, back-office automation (1960s), second front-office automation (1970s), third connect customers to accounts (1980s) and fourth customer relationships with all banking operations and system integration [6].

For a long time, the developments in information collection, storage, processing, transmission and distribution technologies have influenced, and continue to influence all aspects of banking activity, and have become an integral part of product/services offering, delivery channels and internal management. These innovations are electronic self-service technologies which are defined as services driven by information technology that enable customers to acquire a service without direct employee involvement [7].

1.3 E-service quality models

Using new technologies on the one hand facilitates businesses and reduces costs, and on the other hand increases the number of customers and level of their satisfaction. But all of these would be possible if organizations that provide electronic services could respond to customers' expectations about e-service quality and ensure a desired level of quality. In this regard, according to the intangible characteristic of services, development of e-service quality is one of the competitiveness advantages that organizations should consider for their operations so they could be on the path of development and growth [8].

The subject of e-service and website quality is very rich in context of definitions, models, and measurement instruments. Nevertheless, different quality dimensions have been proposed and there is no consensus on the component dimensions. Collectively, the extant literature suggests that e-service quality is a multidimensional construct although the content of what constitutes e-service quality varies across studies [9].

Zeithaml, Parasuraman and Malhorta (2000) developed E-SERVQUAL model that was derived from SERVQUAL model to measure e-service quality. But building on three studies of focus groups and two phases of empirical data collection and analysis, the model dimensions have evolved [10]. Initially through the focus group interview that was done by Zeithaml et al. 7 dimensions were identified for this model. These dimensions consist of efficiency, reliability, fulfillment, privacy, responsiveness, compensation and contact. But at the next studies four dimensions: efficiency, reliability,

fulfillment, privacy were selected as main scale of E-SERVQUAL for assessing online service quality from the customer's perspective, and other three dimensions were provided as improvement and recovery service dimensions and they emphasized that when there are problems or questions for online customers, these dimensions become salient [11].

SiteQual model at 2001 was introduced by Yoo and Donthu for assessing quality perceived from an online retail [2]. This model was based on SERVQUAL model, which is a model for assessing traditional service qualities [12] and consists of four dimensions and 9 items to evaluate a retail website quality. The dimensions are: ease of use, design, process time, and security of personal and financial information [13].

Loiacono et al. (2002) provided a new method for assessing website quality. WebQualTM model focuses on website interface and is considered as one of the basic scales for evaluating e-service quality [14]. In general, WebQual focuses on technical dimensions of quality such as ease of use. The main dimensions of this model are: ease of use, usefulness, entertainment, and complementary relations [15].

Wolfenbarger and Gilly (2003) introduced eTailQ model for assessing e-service quality at online stores. They have examined quality from the online shoppers' perception with basic questions such as, what do customers really want from their online purchase? What characteristics in their judgments about the quality, satisfaction and loyalty are more important? Etc. [16].

eTransQual model was presented by Bauer et al. at 2006 In order to cover all aspects of a customer's assessment of service quality. They believed that the available scales have focused on e-purchasing behavior; therefore they introduced a model based on all phases of the purchasing process of online services so in addition to the previously provided dimensions in the literature other aspects such as enjoy website use, and support after purchase are also included [15].

Collier and Bienstock (2006) presented a more complex model. This model has a hierarchical structure that could be used for assessing quality of multi-dimensions e-services. In this model three initial dimensions consisting of included process, the output quality, and e-service quality improvement have been used for evaluating e-service quality [17].

2. Literature

Because of the expansion of electronic banking services in the past decade, limited researches have been done in this field. From these researches the following studies can be mentioned:

Venus and Saleh moman (2004) in their study identified factors that affect bank customers that tend to use bank ATM systems. Therefore based on the extracted components from research libraries, and factor analysis on 209 collected questionnaires from Mellat bank customers (both users and non-users of ATM systems), six factors that have effect on the tendency of customers to use ATM bank systems were identified. These factors include: location desirability, customer awareness, system integration, variety of services, ease of use/access and reliability. The results showed, location desirability for users of ATM systems and reliability for non-users are the most important factors [18].

Poorzarandi and Najafi (2011) have investigated the effect of e-banking service quality on customer satisfaction. In this research they have studied three e-banking areas including, internet banking (with dimensions such as efficiency, trust, responsibility, fulfillment, and reliability), ATM (with dimensions such as ease of use, customer awareness, reliability, location desirability, and system integration), and POS (with dimensions similar to ATM with the exception of location desirability dimension) [19].

Ghafari et al. (2012) they have studied the relationship between service quality dimensions and customer satisfaction at banking industry. This research pays attention to bank service quality, both traditional and electronic, from the customer perspective. The main purpose of this study is to identify the most important factors that affect banking service quality and in the end the relationship between service quality dimensions and customer satisfaction. Therefore a questionnaire was designed based on SERVQUAL model and some other factors that affect e-services and then it was distributed among customers of three best private banks of Islamic Republic of Iran with the 384 sample size. The analysis results has been obtained with SEM and results show that customer perception of e-service quality have greater impact on customer satisfaction than their perception of traditional service [20].

Several studies have been conducted in the field of e-banking in the world, which some of them are mentioned below:

Zarifopoulos and Economides (2009) in their thesis "evaluating mobile banking portals", presented Mobile Banking Evaluation Framework (MOBEF) with 164 sub-criteria, 26 criteria and 6 dimensions. These dimensions were included: Interface, Navigation, Content, Offered Services, Reliability, and Technical aspects. They have also evaluated 30 mobile banking portals from all over the world using MOBEF [21].

Ibrahim et al. (2006) in an article titled "Customers' perception of electronic service delivery in the UK retail banking sector" have studied the main factors of e-service quality. In this analysis 6 factors were identified, including

the provision of convenient/accurate electronic banking operations; the accessibility and reliability of service provision; good queue management; service personalization; the provision of friendly and responsive customer service; and the provision of targeted customer service [3].

Singh and Grover (2013) in a study titled "Evaluating of service quality in banks using AHP: A typical case of Indian banks" have developed a framework for evaluating service quality. This framework includes three factors: Customer service quality, Portal quality, and Product Service quality which portal quality focuses on e-banking. This factor contains 6 criteria: Contents, Accuracy, Ease of use, Timelines, Aesthetics and Security, and 16 sub-criteria. This research showed that Customer service quality is the most important factor and portal quality is the second factor. Between the portal quality factors, contents and accuracy are the most important sub-criteria [22].

Ismail Hussien and Abd El Aziz (2013) have studied e-service quality in one of Egypt's banks. The main purpose of this research is to study the effect of variety of dimensions of internet banking quality on customer's satisfaction from providers and consumers perspective, with an emphasis on bank websites. The e-service quality dimensions that were included are: usability, reliability, responsiveness, privacy/security, incentive, fulfillment, efficiency, assurance, and empathy. The results showed that service quality has an important role on customer satisfaction and each of the 9 dimensions has a significant effect on their satisfaction [23].

2.1 Technical dimensions of e-service quality models

As explained, several studies have been conducted in different areas of e-service quality. Some of the researches have led to valid and global models and some else, benefiting from previous studies, have assessed e-service quality in particular places, or with previous models' dimensions they have introduced a native and combination model.

In table 1 the technical aspects of e-service quality evaluation models based on previous works are expressed, and in this article with the help of the AHP method and expert panel the dimensions are rated.

Table 1: Technical dimensions and their definitions

<i>Technical dimensions</i>	<i>References</i>	<i>Definition</i>
Security	[13],[16], [17], [23] , [25], [26] ,[27], [28], [29], [30], [31], [32], [33], [22], [34], [35]	Safety and preservation of the networks against hackers and scam [24].
Reliability	[3], [7], [16], [15], [19], [18], [21], [23], [26], [30], [31], [32], [34], [37], [38],	The ability to perform the promised services accurately. Service reliability is one of the customers' expectations that
Fulfillment (Information, Operations)	[16], [19], [23], [25], [27], [28], [29], [33], [34], [39], [40]	Fulfillment is one of the most important factors for judging the quality of online services and indicates that how much the provided services are coordinated with the services that the provider has promised [12].
Efficiency	[16], [17], [19], [35], [39], [40], [42], [43]	Efficiency at e-banking mostly includes the loading speed and helps users perform faster transactions [41].
Information availability	[25], [33], [34], [37], [38]	According to Wolfinbarger and Gilly (2003), availability of information is one of the most important aspects in the use of online services [2].

Outcome quality	[17], [15]	Refers to what the customer is left with after service delivery [44].
System integration	[18], [19]	The existing relationship between a bank's system and other banks [18].
Technical adequacy	[21], [33]	Citizens while using online applications look for two aspects: availability and responsiveness. This means that they expect the process to be undertaken rapidly and the

3. Research Methodology

In order to rank the dimensions identified in Table 1, analytical hierarchy process is used. The Research tool is a pairwise comparison questionnaire based on AHP-5 and the statistical population of the research is banking professionals and experts, therefore 17 questionnaires are distributed among ICT experts of Iranian banks. The research steps are expressed in figure 1.

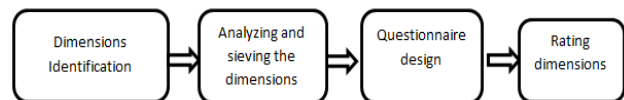


Figure 1: The research process

3.1 AHP

In today's world, decision-making are complex and consist of multiple criteria that should be considered in the decision-making. Advancement in statistic and mathematic science established several multi criteria decision-making methods and models that one of the most powerful multi criteria decision-making techniques is AHP. This method was developed primarily by Saaty (1980).

The first step in the analytic hierarchy process is to decompose the problem into a hierarchical structure consisting of purpose, criteria, sub criteria and alternatives. After that, with the created structure, pairwise comparisons between elements are done by decision makers. In this step decision makers in each judgment, compare two elements

relative to the element immediately on the level above. According to table2 when $i=j$, $r_{ij}=1$. The value of w_i may vary from 1 to 5, and 1/1 indicates equal importance, whereas 5/1 indicates extreme or absolute importance.

Table 2: Evaluation Scale

Num Value	Verbal Scale
1	Equal importance
3	Moderate importance
5	Absolute importance
2, 4	Intermediate values

At the third section of the process, in order to calculate the weights of the pairwise comparisons, adaptive matrix are formed based on the collected data in the previous step. Therefore, the judged elements are located in the adaptive matrix rows and columns. If i -th row element is superior to j -th column element, the intersection number of these two elements will be greater than 1, the otherwise, it will be smaller than 1. It should be noted that, in Analytical Hierarchy Process the element r_{AB} is inverse of r_{BA} and this is one of the adaptive matrix principles.

At the next step, with the aim of eliminating the different scales of the measurement, the adaptive matrix will be normalized by Saaty norm and the mean of the elements of each row will express the weight of the corresponding alternative.

In the comparisons, some inconsistencies can be expected and accepted; therefore Saaty demonstrated a consistency index (CI). The general rule is that $CR \leq 0.1$ should be maintained for the matrix to be consistent. If a matrix isn't consistent, the pairwise comparisons and the results are unreliable.

3.2 Results

Due to the growing trend of electronic banking services, what improves banks in a competitive market is obtaining competitive advantages in this field. Addressing the issue of e-service quality and long –term planning in this area can have a large influence on the formation of effective and efficient e-banking. This research ranks the technical dimensions of e-service quality evaluation by expert opinion and through the AHP analysis. This ranking in turn could solve some of the difficulties in providing e-banking services in order to improve the customer satisfaction of the services.

In order to rank the technical dimensions, after collecting pairwise comparison questionnaires the information was entered in Expert Choice software and then the analysis was performed. The Expert Choice output that shows dimensions ranks and weights are expressed in figure 2.

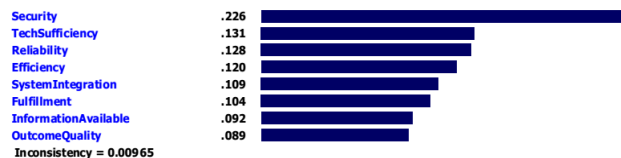


Figure 2:Expert Choice output

According to the AHP results, among the examined technical aspects in this study, the security dimension with a score of 0.226 and the output quality dimension with a score of 0.089 were respectively ranked at the first and last places. Tech sufficiency dimension with 0.131, Reliability with 0.128, Efficiency with 0.120, System integration with 0.109, Fulfillment with 0.104 and Information availability with a score of 0.092 are respectively placed at ranks 2nd through 6th.

As it be seen in Figure 2, Consistency index value is smaller than 0.1 (CI = 0.00965) therefore the comparisons are satisfactory consistent and the results are reliable.

4. Conclusions

The technical dimension in the e-banking service quality area is more important than other dimensions of this field and ICT managers of banks should particularly invest in this area. Therefore it should be determined that investments in which components of technical dimension leads to better service quality in banking.

According to the AHP analysis in this research, from the perspective of banking industry experts, policy makers and e-banking service managers, banks should have a particular focus on security issues in e-banking so the network security would be ensured and protects the networks against hackers and scam. After security dimension, Tech Sufficiency has the next priority. Therefore necessary technical infrastructures should be provided to satisfy banks customers' expectations. According to the results presented in Figure 2, reliability is the next priority, which is one of the main factors affecting the adoption of electronic banking [45]. For this purpose, managers of e-banking service sector should develop infrastructures that offer promised services accurately. The next priority is efficiency. Efficiency in e-banking often includes the loading speed that helps users to do transactions rapidly [41]. Therefore managers should have a specific focus on their services speed. System integration is the fifth priority. Bank managers should create integrated systems so customers could do their banking activities from other banks as well. According to figure 2, fulfillment dimension is at the next priority. This dimension indicates that how much the provided services are coordinated with the services that the provider (Bank) has promised [12]. Seventh priority is the availability of

information. Bank managers should offer relevant information of e-services in a way that is understandable for bank customers. For example, when using ATM services simple information should be accessible to customers so they could do their activities easily. Finally, the last priority is the outcome quality. Outcome quality refers to whatever that remains after providing asked services to the customers [44].

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