

RE-ASSESSMENT OF E-S-QUAL SCALE IN THE INTERNET BANKING
SERVICES IN TURKEY

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Thesis Abstract

Abdullah Behçet Teuman, “Re-assessment of E-S-Qual scale in the Internet banking services in Turkey”

Service quality and the effective measurement of service quality on the Internet has been drawing much attraction lately with the increasing use of the World Wide Web. Researchers and managers focus on the construction of scales to measure electronic service quality, which assess customer satisfaction and loyalty as an ultimate goal. E-S-Qual is the most recently developed and popular e-service quality measurement technique on which there are quite a number of testing efforts.

In this study, the E-S-Qual scale is re-assessed for Internet banking services in Turkey. The original E-S-Qual model has been adapted for Internet banking and the questionnaire has been developed accordingly. The reliability and factorial validity of adapted E-S-Qual model has been tested with the data of 382 observations. Confirmatory Factor Analysis has been conducted on the adapted E-S-Qual model and the model has been re-specified for a reliable, valid and conceptually sounding construct. After the evaluation of the findings following the successive testing of the re-specified E-S-Qual model, it is concluded that the refined scale is effective in Internet banking services in Turkey. Electronic Service Recovery Quality (E-RecS-Qual) is not included in this study because there are not enough observations to analyze.

Tez Özeti

Abdullah Behçet Teuman, “E-S-Qual modelinin ,Türkiye’deki internet bankacılığı hizmet kalitesi ölçümünde değerlendirilmesi”

Dünya Çapında Ağ (WWW)’ın artan kullanımı ile internet üzerindeki hizmetlerin kalitesi ve hizmet kalitesinin ölçümü son zamanlarda ilgi çeken bir konu olmaya başlamıştır. Araştırmacılar ve yöneticiler müşteri memnuniyeti ve sadakatini değerlendirmek maksadıyla, elektronik hizmet kalitesinin ölçümünü sağlayacak metodların geliştirilmesine odaklanmışlardır. Üzerinde çok sayıda test ve geliştirme çalışmaları yapılmış olan e-hizmet kalitesi ölçüm tekniği: E-S-Qual, en popüler ve güncel modeldir.

Bu çalışmada, E-S-Qual kalite ölçüm modeli, Türkiye’deki internet bankacılığı hizmetleri için değerlendirmeye alınmıştır. İnternet bankacılığı için uyarlanan model üzerinden, örneklem için anket oluşturulmuştur. 382 adet gözleme dayanarak yapılan faktör analizi ile E-S-Qual modelinin geçerliliği ve güvenilirliği sınanmıştır. E-S-Qual, doğrulayıcı faktör analizi ile geçerli, güvenilir ve iş kavramları ile uyumlu bir kalite ölçüm modeli olarak yeniden tanımlanmıştır.

Ardışık testler sonucundaki bulgular, internet bankacılığına uygun yeniden tanımlanan bu ölçüm modelinin Türkiye için geçerli bir model olduğu sonucunu işaret etmektedir. Problem çözümü ve telafisine ilişkin model E-RecS-Qual ise yeterli gözlem olmadığından analize dahil edilmemiştir.

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CHAPTER 1

INTRODUCTION

The effective measurement of service quality on the Internet is drawing much attention lately with the increasing use of the World Wide Web. E-S-Qual is the recently developed and popular e-service quality measurement technique on which there are quite a number of testing efforts (Boshoff, 2007; Connolly & Bannister, 2008; Swaid & Wigand, 2009; Connolly, Banister, & Kearney, 2010; Marimon, Vidgen, Barnes, & Cristobal, 2010; Akıncı, Atılğan-İnan, & Aksoy, 2010). The E-S-Qual scale is not fully compliant with Internet banking services and it needs to get adapted to align with the e-banking features. The main objective of the study is the assessment of the adapted E-S-Qual model by testing its reliability, validity and association with the customers' perceptions of service quality with the sample data collected via survey on internet banking users in Turkey.

Internet Banking Services

Internet banking is a self-service technology (SST). Nowadays, Internet banking transactions are developed to a point that almost all banking transactions can be executed online by the customers themselves with the exception of withdrawals and deposits.

Competition in the banking industry has become severe, just as in the other sectors of the economy. Globalization has sped up with the borderless finance sector. The impacts of globalization and financial crisis in the markets

have decreased the bank's profit margins due to the increasing cost of risk (defaults) and competitive pricing. Consequently, banks have focused on risk and cost management issues more than they have done in the past. In Turkey, the staff cost of banks constitutes half of that bank's total operational costs. As of Sept 2010, consolidated Turkish banks' financials show that personnel cost has a 46% share of total operating costs. It was 44% and 46% of total operating costs in 2008 and 2009 respectively (The Banks Association of Turkey, statistical reports, 2006-2010). Leveraging transaction per employee is crucial and encourages the deployment of SSTs in the banking sector. In the meantime, providing Internet banking services becomes inevitable in acting as a global financial service provider for the customers located in different geographies.

Besides the banks' intention to promote SSTs like Internet banking and ATMs (Automated Teller Machines), there are factors driving customers to prefer self-service alternatives. Internet banking service is superior on branch, ATM, kiosk-banking service with its anytime, anywhere functioning.

Adoption of Internet Banking

Several studies about the adoption of Internet banking in various countries have agreed on the same set of factors as the motivators to customers' preference of banking transactions on the web.

Tan and Teo (2000) completed a study about attitudinal, social, and perceived behavioral control factors that would influence the adoption of Internet banking three years after the Internet banking business started in Singapore. The theory of planned behavior (TPB) framework postulates that a

person's intention to adopt Internet banking is determined by three factors, i.e., (1) attitude, which describes a person's perception towards Internet banking, (2) subjective norms, which describe the social influence that may affect a person's intention to use Internet banking, and (3) perceived behavioral control, which describes the beliefs about having the necessary resources and opportunities to adopt Internet banking. Tan and Teo's (2000) findings have shown that intention to adopt Internet banking services could be predicted by attitudinal and perceived behavioral control factors, but not by subjective norms, probably because Internet banking was very new in Singapore. The attitudinal factors that are significant include relative advantage, compatibility with respondent's values, experience, and needs, trialability¹, and risk.

A Similar study of Iranian Internet banking users is published in the Master's Thesis of Baraghani (2008). She has a model composed of TPB, TAM (Technology Acceptance Model) and Trust Models and her work's results show that attitude, perceived behavioral control, perceived usefulness, perceived ease of use, and trust significantly influence customers' intention toward adopting Internet banking.

Ming-Chi (2009), tested TAM and TPB models in a study held in Taiwan and the results indicated that the intention to use online banking is adversely affected by the security/privacy risk, as well as the financial risk and is positively affected by perceived benefit, attitude and perceived usefulness.

¹ The level of cost and riskiness of the trial of the service. The trial of services are low-cost and low-risk in Internet banking.

Modified TAM model with the introduction of perceived risk and trust was tested in South Korea by Lee, Lee, and Kim (2007). They were confident that both perceived usefulness and trust had important effects on the adoption behavior of mobile banking. Perceived risk, however, had an indirect effect on adoption behavior even though it had an insignificant direct relationship with adoption behavior. Perceived risk was identified to exert a strong inhibiting influence on trust.

Malaysian consumers adopt the use of Internet banking because of hedonic oriented Internet banking sites, the perceived importance of Internet banking to banking needs and compatibility factors (Suki, 2010).

Dixit and Datta (2010) have put forward recommendations for banks which serve Indian adults older than 35. Banks should (1) ensure that online banking is as safe and secure as traditional banking, (2) organize seminars and conferences about security and privacy issues, (3) emphasize the convenience of using online banking (4) provide additional cost savings. They have explored five factors: security-privacy, trust, innovativeness, familiarity, and awareness. Security-privacy is discovered as the most influential factor for the acceptance and intention to use of Internet banking.

El-Kasheir, Ashour, and Yacout (2009) has identified “ease of use” as the only significant predictor of intention to continue to use Internet banking services in his study in Egypt.

An example of the studies on the same subject was carried out in Turkey (Durer, Özsüzgün-Çalışkan, Akbaş, & Gündoğdu, 2009). In the exploratory

analysis conducted in this work, factors extracted for decision to use Internet banking services include services& products, security, time convenience, cost&recovery, design&speed. Security and time convenience are the most critical factors on the decision of using internet banking services. “Trust in bank”, “secure internet web site”, and “protection of customer’s private information” are the measures of security. “Transactions without waiting in queue”, “anytime account and transaction monitoring”, and “no working-hours restriction” are the items under the time convenience factor. Factors for the decision *not* to use Internet banking are identified by Durer et al. (2009) as difficulty in use and cost, security problems, difficulty in adoption of technology, unbreakable habits. In the same study, the most frequent problem encountered in Internet banking is the loading speed of the pages. Services not satisfying the customer need, complexity of use, insufficient support and compensation in the recovery processes are among the other problems frequently encountered.

Internet Banking in Turkey

The first launch of Internet banking services in Turkey was in the year 1997 by İş Bankası and Garanti Bank. In 13 years, the sector has developed very rapidly. Since 1997, banks have promoted low-cost transactions on the Internet, while customers enjoyed paying no or lower fees on the Internet and picking more convenient times for their banking transactions. In the 24th National Informatics Convention of Turkey, it was reported that the “typical cost of a transaction executed in the branch is between 1-1.5 USD, however, it is less than 5 US cents on the Internet” (News>Banking transaction on Internet is cheaper, 2007). Banks having a large number of customers in the retail business try to shift

more transactions to the Internet to lower the burden and the costs in the branches. The maintenance of web sites is much cheaper and servicing 24 hours in a day are much cheaper. Banking transactions were promoted as free of charge during the immature periods of the Internet banking era. However, as the significant amount of transactions executed over the Internet and the banks' investment over the Internet technology increased, customers have started to pay for the Internet service. Nowadays, mobile banking in Turkey has a similar development pattern to the one the Internet banking has had in the past: banks try to attract Internet banking customers to do banking transactions for free on mobile banking while they are investing more on mobile technologies.

As the number of banks servicing on the web has increased, the supervising and the regulations of Internet banking in Turkey have been enhanced. Data about Internet banking services is collected by The Banks Association of Turkey (BAT). BAT collects data from all banks servicing on the Internet and publishes these statistics quarterly.

BAT has reported that 14.8 million *individual customers* were registered as Internet banking users in 26 banks in Turkey as of September 2010. *Legal persons* (corporate customers) who have access rights to Internet banking services were 1.6 million in September 2010².

Trends in Internet banking usage can be monitored from BAT statistics. As shown in Table 1, the number of active users almost doubled in 5 years. Users who have signed-in once in the last three month are 5.7 million

²BAT does not apply customer level consolidation on the aggregated figures. Some customers have an access to Internet banking facilities in more than one bank (in n banks) and the same customers are counted n -times in total customers statistics.

individuals and 0.6 million corporate customers. 7.7 million users were active in the 1-year period, whereas there were 0.8 million corporate customers (The Banks Association of Turkey, statistical reports, 2006-2010).

Table 1. Trend of Internet Banking Customers in Turkey

Period	Individuals		Legal Persons	
	Active (1 year)	Active (3 months)	Active (1 year)	Active (3 months)
Dec 2006	0 ^a	2,976,292	0	391,565
Dec 2007	4,920,907	3,795,627	588,211	478,737
Dec 2008	5,946,652	4,613,670	687,737	555,459
Sep 2009	6,810,632	5,153,036	702,414	600,240
Dec 2009	7,064,266	5,368,510	684,906	605,623
Sep 2010	7,725,302	5,715,626	786,972	637,145

Source: (The Banks Association of Turkey, statistical reports, 2006-2010)

^adata has been collected from 2007 and on.

In addition to customer data, the type and frequencies of the banking transactions executed on the Internet are reported. Online transfers via Internet banking are increasing its share in the total of money transfers. Recent reports show that one out of every two electronic fund transfers (EFT) are executed by Internet banking users. There are 70.6 millions EFTs executed over the Internet (Table 2) out of 129 million total number of EFTs in the banking system in 2009, i.e. the share of the Internet is 55%.

Table 2. Number of Money Transfers

Period	Electronic Fund Transfers	Intra-bank remittance	FX transfers
2006	48,604,875	22,866,318	69,807
2007	57,570,380	26,153,555	123,877
2008	61,902,264	24,895,240	142,451
2009	70,619,872	27,173,674	178,483
2010 Jan-Sep	57,628,305	21,925,990	198,735
2010 ^a	76,837,740	29,234,654	264,980

Source: (The Banks Association of Turkey, statistical reports, 2006-2010).

^aextrapolated from 2010 Q3 figures for whole year comparisons with past years' data.

Turkish Internet banking statistics point out the increasing trend of e-banking.

The convenience of internet banking elevates the shift in the physical money exchanges to banking via internet by lowering the risk of carrying cash, and everyday, more transactions take place in the virtual environment. Now, banks promote mobile banking to increase the convenience of e-banking by eliminating the requirement of personal computers and internet connections. Therefore, a measuring instrument for customer satisfaction and loyalty is becoming essential for the banks in the Internet and mobile banking services.

CHAPTER 2

LITERATURE REVIEW: E-SERVICE QUALITY

There have been extensive studies conducted on service quality for the last 30 years. However, electronic service quality studies are quite new and have been on the rise in the last 10 years.

Parasuraman, Zeithaml, and Malhotra (2005) have named non-Internet based servicing as traditional. Traditional service quality is mainly based on the comparison of customer expectations and company offerings (performance) in the customer interactions and experiences with the company. The comparison displays either a positive or a negative gap and this gap represents the satisfaction level of the customer in the transaction.

Service Quality measurements are based on the adaptation of the *disconfirmation paradigm* of Satisfaction Theory.

Satisfaction Theory Overview

Bagozzi (1974) has proposed “the exchange is the most basic element of marketing function”. He has defined the core concepts in the exchange paradigm and has set a conceptual framework of *exchange system*. He has interpreted exchange as a process of cause-and-effect relations that depends on the actions of actors (e.g. customer-salesman dyad) as well as external factors. Marketing transactions happen as soon as both customer and company expect to gain value by engaging in the exchange (Bagozzi, 1974).

Satisfaction after the exchange experience plays an important role for the ongoing and future relationship of related parties in the exchange process.

There are many dimensions in satisfaction: product or service types, types of consumers, time period for evaluation, and intense social interactions. These dimensions make satisfaction a difficult process to standardize and be formulated in one model. Satisfaction theory has roots in the psychological studies in the 1930s and early studies began in the 1960s. The most popular model is the *expectancy-disconfirmation (E-D) framework* and was built by Richard Oliver (1980).

Satisfaction is defined in the E-D paradigm as an outcome of purchase and use. Satisfaction is the judgment of the consumer by the comparison of the pre-purchase expectations and the actual performance or attributes of the product. If the realized performance is higher than the expectations, the disconfirmation is positive (favorable), and results in satisfaction. If the performance is lower than expected, the disconfirmation is negative and results in dissatisfaction. Disconfirmation is a linear function of expectations and performance ($D = P - E$). However, in the literature, disconfirmation is used in the models as an independent variable (like performance and expectations) to explain the dependent variable, which is satisfaction. When consumers (dis)confirm, they do not take pure arithmetic difference of expectations and performance. In reality, when the expected does not occur, the rating of the disconfirmation can be higher or lower than the difference of expectation and performance. It is similar when the unexpected occurs. This property of disconfirmation makes disconfirmation an independent antecedent of satisfaction.

Many researchers have discovered that satisfaction level is strongly affected by the disconfirmation variable, and the impact is much more than the expectation levels and performance of the products. Oliver, DeSarbo (1988), later warned that there is a possibility that some customers may be more expectations-influenced than being purely disconfirmation-influenced. These cases are explained by the assimilation and contrast theories.

Oliver (1981) has defined the satisfactions as the evaluation of the surprise in the purchase experience. This post purchase excitement has a finite duration. After the decay of the satisfaction, an attitude is constructed toward the store, product, and brand. He was not taking the re-purchasing and complaining as a part of the satisfaction process. However, current studies prefer not to separate them from the satisfaction process.

Modeling the processes with all antecedents and outcomes with the interactions between them is a fashionable approach. Building models on statistical evidences were very important in highly efficiency-concerned periods: 1970s and 1980s. As daily life started to become more and more complicated towards the 2000s, dynamics in the satisfaction process varied so much that it became difficult to explain satisfaction with one complete model. Various types of consumers, the variety in products, increased distribution channels, and high interactions in social life with increased mobility and technology have multiplied and diversified in this new millennium.

The studies on satisfaction are becoming more exploratory in nature. Researchers try to handle various cases by the different satisfaction models

rather than constructing models by survey outputs. Closed end questions and ratings on 7-point Likert scales of disconfirmation levels to find out the reasons of the (dis)satisfaction are not sufficient in the current environment. Open-ended questions and exploratory research methods are becoming more and more popular to find out the reasons for satisfaction.

Exploratory surveys display deficiencies in the traditional satisfaction model developed in the 1980s and bring new paradigms for the satisfaction theory. Research on technology products (computers, televisions, receivers etc.) has helped these findings.

The E-D model was criticized since it is based on cognitive elements more than emotional aspects. Affective satisfaction modes can compensate for the weakness of the model. Then, Oliver (1989) introduced five modes of satisfaction: satisfaction as contentment, pleasure, relief, novelty, and surprise. These modes can be considered as the overriding rules of the (traditional) satisfaction theory in which it has difficulties in explaining such cases with standard components (variables).

It has also been discovered that satisfaction has different meanings for different consumers and cultures. This is explicitly shown in the research by Fournier and Mick (1999). Consumers stating the same satisfaction level in the 7-point Likert Scale do not mean that they are in the same mode of satisfaction. Satisfaction has content. Otherwise it would not be satisfaction.

New satisfaction modes are identified in the data of Fournier and Mick (1999): (1) Satisfaction as awe, (2) Satisfaction as trust, (3) Satisfaction as helplessness, (4) Satisfaction as resignation, (5) Satisfaction as love.

Fournier and Mick (1999) have introduced a new “balancing paradigm” for the satisfaction of using technologies. Previous work done by the authors has introduced conflicting states of use of the technology like “*saves time-uses time*”, “*assimilates people-isolates people*”, “*users can think they are intelligent – stupid*”, “*facilitates control – create chaos*”, etc.

Those paradoxes are technology specific and inevitable for most of the cases because of differences in the uses of technology, differences in consumers and their background, subject, sector it is used in, etc. Satisfaction is described as successfully balanced paradoxes. Choosing the proper type of technology and identifying attributes aligned with the user abilities, knowledge and experience, deciding appropriate area or sector to implement, and automating the cumbersome applications may be given as examples of the efforts to balance paradoxes.

Criticism on comparison paradigms states that they are concentrated only on one purchasing event and do not include social interactions of the consumers. Focus groups of Fournier and Mick (1999) displayed the connection of product satisfaction with life satisfaction. In some cases, it has been observed that satisfaction of other members of the family have had an impact on the individual’s satisfaction and this adds a social dimension to the satisfaction process.

Service Quality Measurement

A well-known, generally accepted, and multiple-item scale for measuring consumer perception of service quality measure, SERVQUAL has been developed by Parasuraman, Zeithaml, and Berry (1988). This scale was originally developed for non-web based service settings, before the Internet era.

Before the development of the SERVQUAL, there were studies investigating the meaning of service quality. Weitz and Wensley (1985, p. 340) has counted the following studies as examples of such preliminary works: Sasser, Olsen and Wyckoff (1978), Grönroos (1982), Lehtinen and Lehtinen (1982), Lewis and Booms (1983). There were discussions on quality, satisfaction, and attitude. Definition of the perceived quality is simply the degree and direction of the discrepancy between expectation and perception in Expectancy-Disconfirmation theory perspective. Expectations are interpreted as desires or wants of the consumer. Perceived quality like attitude is an overall attitude but different than satisfaction which is related to specific transactions. Attitude is constructed after accumulation of series of (dis)confirmation experience and as Oliver (1981) stated satisfaction soon decays into one's overall attitude towards purchasing products.

Quality has objective and subjective dimensions which are described as mechanistic and humanistic quality components (Parasuraman, Zeithaml, & Berry, 1988). There are indicators like durability, performance, number of errors to measure quality of goods and most of them are physical attributes. However, service quality is abstract and difficult to express. Parasuraman et al. (1988) stated that intangibility, heterogeneity, and inseparability of production

and consumption features of service quality create difficulty in the objective measurement of service quality.

In their work, Parasuraman et al. (1988), have focused on five different service categories: appliance repair and maintenance, retail banking, long distance telephone, securities brokerage, and credit cards. Observations are limited to 40 in each service category and 200 respondents were surveyed with 97-item, 10-point scale questionnaire. Each question was asked two times: first, the Perception of the service performance of the entity, second the Expectation of the respondent in 7-point Likert scale. The difference between the scores of two questions (P - E) is used as the measure of the quality of service delivered. After Cronbach alpha tests of indicators of the sample collected, 54 items have been selected for a reliable construct. Exploratory Factor Analysis (EFA) has been conducted with oblique rotation; it has revealed better solution than orthogonal rotation. The number of valid indicators first decreased to 34 items on 7 factors and then, by checking the validity of model on different sub-sets of four firms' data, 22 items on 5 factors model was constructed. 10 dimensions which were conceptually constructed before the EFA work did not disappear totally, but five of them were combined into two other factors. Factors effective on measuring service quality are in Table 3.

Table 3. SERVQUAL Factors

Tangibles	Physical facilities and appearance of personnel
Reliability	Ability to perform the promised service dependably and accurately
Responsiveness	Willingness to help customers and provide prompt service
Assurance	Knowledge and courtesy of employees and their ability to inspire trust and confidence
Empathy	Caring, individualized attention the firm provides to its customers

Source: (Parasuraman, Zeithaml, & Berry, 1988)

SERVQUAL scale is reliable, valid, and applicable for broad spectrum of services scale. Retailers can use the scale to understand the expectations and perceptions of their customers. The periodic application of the scale helps to monitor the trend in service quality, clustering of customers with their expectations, detection of relative importance of the factors for specific category of the service. The improvement of the service with the interpretation and acting based on the outputs of the scale is attracting managerial attention and the use of SERVQUAL.

E-Service Quality Measurement

Remote format service delivery brings significant changes in customer interaction and behavior (Broderick & Supatra, 2002). The quality perception process has five key elements (1) customer expectation of the service (2) image and the reputation of the service, (3) aspects of service setting, (4) the actual service encounter, and (5) customer participation.

The service setting is perhaps the most obvious element which has an effect on the perceived value. This setting (website) is virtual on the Internet. The web site features like content, design, download speed, navigation and security impact customers' value perception. Broderick and Supatra (2002)

define service encounter dimensions as temporal duration, affective or emotional content and the spatial proximity of service provider and customers. For Internet banking, human interaction and intimate spatial proximity is considered to be low. However, before deciding to use the services of a specific bank, there is a high level of communication at branches, through e-mail and over the Internet. The degree of self determinism permitted to customers and how they participate are the key inputs to perceived service quality (Broderick & Supatra, 2002).

Findings of Broderick and Supatra (2002) have shown that customers' expectations are generally in the adequate level of service rather than ideal or desired level, because research has been done in the early stages of Internet banking. Image and reputation did not emerge as important factors for respondents. Key expectations were ease of use, good navigation, and strong interactivity and early response to service actions. Traditional concepts such as reliability, responsiveness, and assurance have had impact on service quality. The most immediate impact in service evaluation was cues in the service setting and events in the service encounters. Problems such as slowness, poor navigation capabilities, and interactivity in service setting, lack of help and empathy in the service encounters trigger negative word of mouth and switching of the service providers. Design and content have fewer comments in the Broderick and Supatra (2002) study.

Broderick and Supatra (2002) have identified four roles for Internet banking users and scripts for these roles are in Table 4.

Table 4. Roles of Internet Banking Users

R1	Activating the service setting (Logging on to web site)
R2	Initiating one-to-one service encounter
R3	Finalizing the service transaction via the Web site.
R4	Confirming a completed service transaction

Source: (Broderick & Supatra, 2002)

The customer is asked to integrate different scripts by himself. It is customer's responsibility to initiate the process and conform to finalize it. If the next step is unclear, customers need to interpret different signals and cues in the Web site and to know what should be the next script, which is not clear in Internet banking. Customers then choose to execute traditional scripts such as branch visits, asking via e-mail. Four roles described above have a key function in the satisfaction or dissatisfaction of customers.

Although service organizations may imagine the Internet as a remote service, customers do not regard Internet as such and expect strong interactivity, good interfacing and adequate support. The online education of customers on following up the transactions and confirmation of completed transaction are necessary investments for online service settings.

Parasuraman, Zeithaml and Malhotra (2005) indicated that the way people perceive the service quality in web-based settings differs from service quality in brick and mortar settings. This is due to the fact that the acceptance and usage of technology are not evenly distributed among customers.

There were studies to develop a suitable measurement scale for the evaluation of Web-sites. The studies completed until the work of Parasuraman et al. (2005), did not cover the full cycle of exchange on the web. Complete

coverage of e- purchase and post interaction service aspects are covered by the model called E-S-Qual and developed by Parasuraman et al.

Examples of major scholarly scale development studies on e-service quality measurement before E-S-Qual are in Table 5.

Table 5. E-Service Quality Studies

WebQual (Loiacono, Watson, & Goodhue, 2000)

WebQual (Barnes & Vidgen, 2001)

SITEQUAL (Yoo & Donthu, 2001)

e-Satisfaction (Szymanski & Hise, 2000)

eTailQ (Wolfinbarger & Gilly, 2003)

WebQual, developed by Loiacono et al. (2000), was constructed to help Web designers and does not measure service quality. The scale measures web sites in 12 dimensions which might influence customer satisfaction but does not measure anything related to purchase experience and direct service quality (Parasuraman, Zeithaml, & Malhotra, 2005). Response time, informational fit to task, design, interaction, intuitiveness, and business process are examples of the dimensions. The customer service dimension is excluded because of design of research methodology that only asks students to evaluate the sites they have visited without the experience of purchasing.

Another scale developed by Barnes and Vidgen (2001), which is also called as WebQual, measures the weighted customer perceptions in five dimensions: usability, design, information, trust, and empathy like the previous scale, data collection in this work did not entail real purchase experiences.

SiteQual by Yoo and Donthu (2001) has four dimensions (ease of use, aesthetic design, processing speed and security) measured in nine items. This measure was constructed with the data collected from the students who interacted with three web sites but without completing the whole purchasing process. The perceived value of the exchange process was lacking in this operationalization.

Syzmanski and Hise's (2000) attempts were criticized since they dealt with web site aspects' satisfaction of the customer more than the customer service and fulfillment.

eTailQ developed by Wolfinbarger and Gilly (2003) have 14 items in four factors: web site design (including personalization aspects), reliability/fulfillment (accurate information and delivery of promised services and goods), privacy/security, customer service (recovery and help). Their construct has resemblance to E-S-Qual study of Parasuraman et al.'s (2005) study. Web site design and customer service dimensions are less internally consistent and less distinct. The model needs to be tested.

A preliminary E-S-Qual study by Zeithaml, Parasuraman, and Malhotra (2002) has benefited from the previous e-service scale developments. The model abbreviated as E-SQ has five dimensions after analysis: (1) information availability and content (2) ease of use, (3) privacy/security, (4) graphic style, and (5) reliability and fulfillment. Later, Parasuraman, Zeithaml, and Malhotra refined their previous E-SQ scale in 2005 which covers all phases of web based purchasing transactions: shopping, purchasing and delivery. They have used

focus groups and evaluated responses of focus groups. They have proposed a theoretical framework to understand consumers' cognitive structures. In this framework, perceptual attributes of web sites are differentiated from more obvious concrete cues. Concrete technical attributes may change in time; however, abstract perceptual attributes do not change. These perceptual attributes are the global assessments and have direct influence on actual behavior. Perceptual attributes are more experimental than technical and can be easily assessed by customers and can be rated easily than other technical cues which consumers might not be aware of or be assessed easily.

The initial scale was formed with 121 items in the Parasuraman et al. study in (2005). E-SQ scale's 11 dimensions have been reduced to 4 with 22 items after EFA. Efficiency, fulfillment, system availability and privacy are the factors of the new model: E-S-Qual scale. Different scale for the recovery process for the customers who have encountered problems during purchasing process has been developed: E-RecS-Qual. It is an 11-item, 3-factor (responsiveness, compensation, and contact) model.

The theoretical framework of E-S-Qual and E-RecS-Qual has made the items easily measured without questioning technical details of web sites. Respondents can easily express their general perception or opinion about the service setting without knowing or exploring the technical aspects of the web site and feedback purchasing experience in the service encounter and post-purchase interactions, i.e., delivery and recovery process in case of problems. Items and factors of the E-S-Qual model are given in the Appendix-A: E-S-Qual Question List.

Parasuraman et al. (2005) have conducted Confirmatory Factor Analysis³ (CFA) following the Exploratory Factor Analysis (EFA) with different sample and they have shown goodness-of-fit signals of their model.

A study completed after the work of Parasuraman et al. (2005) was achieved by Bauer, Falk, and Hammerschmidt (2006). They have suggested a conceptual transaction process-based framework in order to capture all relevant quality aspects of the virtual service transaction. They have subdivided purchasing process into four transaction stages. It is aimed to improve the measurement of service quality by grouping user activities into stages by the support of task completion approach. The first stage is the information stage in which market offerings are examined and compared. Next is the agreement stage where market participants negotiate and conclude the contract. The fulfillment stage deals with the exchange of goods and services. Finally, the after sales stage addresses the importance of relationship related activities. Each of the tasks within the four stages must be completed for service delivery to take place. With this approach, it is expected to receive detailed information for improving service quality.

Bauer et al. (2006) have tried the E-S-Qual model with the introduction of two new factors: *responsiveness* and *enjoyment*. They have combined some E-S-Qual factors into the new factors in their new construct called as eTransQual. System availability and efficiency factors in E-S-Qual were joined under one factor they called as process. The remaining efficiency items of E-S-Qual have

³ See Appendix-E: Structural Equation Modeling for further explanation.

been classified under *functionality/design* factor of eTransQual. Fulfillment and privacy items of E-S-Qual were combined into the factor called *reliability*.

Bauer et al. (2006) criticized the Parasuraman et al.'s (2005) work because of missing hedonic service quality elements which are intangible and emotional. They have considered that Parasuraman et al.'s (2005) measurement of shopping experience was solely based on the utilitarian benefits. The perceived fun of using the Web site and the personalization of content and features in the first stage seem to be important quality criteria for Bauer et al. (2006) and they have constructed *enjoyment* latent variable with personalization of service, fun of using web site, excitement when shopping online, entertainment provided by web-site. They have also inserted the *responsiveness* factor which is originally in E-Recs-Qual model of Parasuraman et al. (2005) into the service quality measure. *Responsiveness* is measured with alternative communication channels' availability, return policy, and prompt reaction for the requests indicators. They have considered responsiveness is relevant to service quality and independent of actual problems.

In Bauer et al.'s (2006) study, 53 quality measures were ended with 25-item, 5-factor eTransQual model. However, the model had the problem of having not distinct factors. It was failed with Fornell and Larcker's (1981) discriminant validity test. *Functionality/design*, *process*, and *reliability* factors do not show that they were distinctively measuring the service quality, i.e., average variance among factor indicators is less than inter-factor correlations. Similarly, covariances of *reliability* factor with *functionality/design* and *process* factors are higher than the average of *reliability* indicators' variances that could be

explained by *reliability*. These are indicators of the lack of proper factor construction.

eTransQual model has shown good values for comparative fit indices. However, it had poor fit with the population when the error of approximation index⁴ was considered (RMSEA= .1). eTransQual quality measurement model requires further investigation on both the design and test steps before the use.

After 2005, many researchers have focused on E-S-Qual and E-RecS-Qual models and tested the validity of the model. Although they have re-specified the model for different service settings, different service categories and cultures, many of them agreed that the most effective scale to measure the quality of service offered by the Internet retailers is the E-S-Qual. They recommend E-S-Qual for the use of managerial purposes. Three examples of such works are as follows:

Boshoff (2007) has achieved his testing on an Internet web site selling books and music (DVDs, CDs) online. He has discovered 5 and 6 factor solutions in his exploratory factor analysis. He then compared original 4 factor model, 5, and 6 -factor models in the confirmatory work. Boshoff (2007) has concluded that six factor model fit better to his sample. Three items related to speed in efficiency and system availability factors were moved under a new factor he called as *Speed*. Three items under fulfillment factor related to delivery of promised product/services timely and accurately were moved under a new factor: *Reliability*. Boshoff (2007) suggested further exploration of the *reliability*

⁴ See Appendix-E: Structural Equation Modeling for detailed explanation.

factor that has particular importance in the delivery process of tangibles. In his study, *reliability* is the strongest predictor of value perceptions.

Boshoff (2007) concluded that “E-S-Qual instrument is a valid and reliable instrument to measure service quality in an electronic shopping environment.”

Marimon, Vidgen, Barnes, and Cristobal (2010), have tested the applicability of E-S-Qual in Spain for a supermarket. They have re-specified the model with 15 items and 4 factors by the analysis on a sample total of 113 observations. Factors and indicators of re-specified model are as follows:

- 3 items in efficiency factor
- 4 items in system availability (SYS1 indicator removed, EFF5 loaded by system availability not by efficiency)
- 5 items in fulfillment
- 3 items in privacy

Reliability tests of factors were passed. However, six of the indicators had lower loading coefficients than the acceptable level ($\lambda = .707$, $\lambda^2 = .50$; Fornell and Larcker, 1981) and re-specified model has shown severe convergent validity problems. In the meantime, they have discovered that high levels of loyalty are positively related to high level of purchases and efficiency and privacy factors have no impact on perceived value.

Another re-assessment of E-S-Qual study, which was conducted in Turkey on Internet banking service, was accomplished by Akıncı, Atılğan-İnan, and Aksoy (2010).

Akıncı et al. (2010) have adapted the E-S-Qual scale for Internet banking which is a pure service setting. Indicators related to delivery of products were eliminated because of inapplicability to Internet banking. There were enhanced and re-constructed items in adapted scale of Akıncı et al. (2010). They have conducted CFA on 20-item on 4-factor E-S-Qual scale. Details of Akıncı et al.'s (2010) scale are explained in detail later in this study. Adapted E-S-Qual scale passed goodness-of-fit tests but failed in discriminant validity tests for the sample of Akıncı et al. (2010). 12 items were removed to ensure the validity of the model both for the whole sample and the sub-groups composed of major banks' observations. The re-specified model for Internet banking has 4 factors and 2 items under each factor. Fit statistics have suggested adequate model fit for the re-specified E-S-Qual model of Akıncı et al. (2010) and the model has passed convergent, discriminant validity and reliability tests.

In the path analysis of the model, the magnitude of the standardized direct effect of efficiency was about two times more than system availability and about four times more than privacy. Privacy is relatively the weakest construct in measuring customers' perceived value.

Similarly, the E-RecS-Qual scale was adapted for Internet banking. The original model that has 11 items on 3 factors is operationalized with 8 items on 3 factors after Internet banking adaption. Reliability and validity tests are

passed and without any re-specification effort, adapted E-RecS-Qual model has indicated an acceptable fit of the model to the sample.

Akıncı et al. (2010) indicated that both scales provide evidence for reliability and validity issues and findings supported the four-dimensional electronic service quality and 3 dimensional electronic recovery service qualities constructs on a different service setting.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

Measuring Instrument

The construction of the scales to measure service quality for Internet banking is mainly based on the model E-S-Qual (Parasuraman, Zeithaml, & Malhotra, 2005). Later, Akıncı et al. (2010) have adapted Parasuraman et al.'s (2005) electronic service quality measurement model for banking.

Akıncı et al. (2010) have also re-assessed E-Recs-Qual scale which is covering service problems, the solution of these problems and perception of the customers in the recovery process. It is considered as valuable customer information, which brings new perspective on service recovery issues. Akıncı et al. (2010) have inserted branching question for the respondents who have encountered problems in the Internet banking services and asked for recovery. In contrast to many services delivered over the Internet, there is no exchange of tangible goods in the banking transactions. The main triggers of recovery process are sale of out-of-stock goods, defaults on delivery packaging and delivery times longer than promised and other problems of after sales services. However, transactions over the Internet banking are real-time and online. There are cases to be encountered in the Internet banking such as communication breakdown, site crashes, or unlucky searches of information on the site, which are also problems of other web sites selling tangible products. Therefore, recovery instances can be expected less in pure service settings like Internet banking than other web-shopping sites selling tangibles.

Akinci et al. (2010) have accomplished re-assessment of E-S-Qual on a large sample with the size of 2017 respondents who are the academic staff of 81 universities in Turkey. There were 338 valid responses for E-RecS-Qual section. i.e., it is 16% of the total responses in Akinci et al. (2010) study. Percentage of respondents experiencing difficulties is even lower in Parasuraman et al. (2005) study. 10% of total 858 respondents have answered E-Recs-Qual part, although tangible product selling companies' (amazon.com and walmart.com) customers were surveyed. Parasuraman et al. (2005) could not perform the CFA for E-Recs-Qual scale because of insufficient data.

The targeted sample size was around 400 before the deployment of the survey. The recovery part (E-Recs-Qual) is expected to be answered by approximately 40 respondents (calculated with the previous studies' statistics). Observations-to-variables ratio is recommended as 5 for SEM work (Hair, Anderson, Tatham, & Black, 1998), since there are 8 items in the adapted E-RecS-Qual scale of Akinci et al. (2010). The expected number of observations may not guarantee reaching observations-to-variables ratio level for a healthy CFA on E-Recs-Qual scale. As a result, it is decided not to include E-Recs-Qual scale in this study. The exclusion of E-Recs-Qual part, has made questionnaire shorter and lowered the risk of reluctance of respondents to complete lengthy surveys.

Preparation of Survey

The survey to be used in this thesis was conducted over the Internet by the service provided by www.limeservice.com. Limeservice.com's web-based

survey development tool was used to construct the questionnaire. Questions were displayed to users in 8 groups: (1) Demographics, (2) Internet Usage, (3) Efficiency, (4) System availability, (5) Fulfillment, (6) Privacy, (7) Perceived value and (8) Loyalty intentions. More than one language is supported in the design tool of Limeservice. English and Turkish versions of the survey copied in HTML-format are presented in the Appendix-B: Survey.

Demographic Questions

Additional to E-S-Qual measures, 12 questions were inserted under two groups: Demographics and internet usage. 7 questions were designed to collect demographic characteristics of the sample. Questions to identify the basic characteristics of the sample:

Q1. Gender

Q2. Year of birth

Q3. City of Residence

Q4. Highest degree of education achieved

Q5. Occupation

The users of the Internet banking should be eligible for banking business. Banks have their own customer acceptance policy for the account opening and credit applications (i.e., credibility of applicants). After all, customers can have their Internet banking facility as an alternative channel to do business with the bank. Asking long and detailed banking questions is not rational in apprehending whether the respondents are in the targeted population or not. People who

need Internet banking activities are generally required to make regular visits to do operational banking business, like credit payments, utility payments, investments of income/salary etc. Therefore, people who have Internet banking access can be described with the one or more of the following features:

- a) Having regular income,
- b) Having repeating payments,
- c) Having investments
- d) Bankable (passed customer acceptance and/or credibility procedures)

Two questions which are considered to be replied easily were added in demographics group of questionnaire to ensure the respondents are in the population of targeted Internet banking users:

Q6. Do you have regular income?

Q7. Your average monthly income?

Previous studies have shown that the use of Internet services requires high computer literacy and easy Internet access. Technical requirements to use the Internet banking activities are described by Akıncı et al. (2010) as,

- a) High computer literacy
- b) Internet access
- c) Having an e-mail account

With the increased security precautions, “having cellular phone or a password generator apparatus that works with bank/credit card” should be added in the

list above in Turkish banking sector. Banking Regulation and Supervision Agency (BRSA) in Turkey, has issued a communiqué about Internet banking security on Sep 14, 2007 which is forcing implementation of two-factor authentication⁵ (2FA) in Turkish Internet banking effective from Jan 1, 2010 (Banking Regulation and Supervision Agency legislation, 2007). Almost 100% “yes” answer is expected for “Do you have a cellular phone?” question and this survey does not aim to measure the password generator usage. Therefore, no question about cellular phone or password generator ownership has been asked in the study. 2FA is an important feature and has impact on sign-in process. It should be taken into consideration in the construction of privacy and efficiency dimensions.

Questions about the Internet and Internet Banking Usage inserted in the questionnaire were as follows:

Q8. Where do you get connected to the Internet?

Q9. Where do you prefer to get connected to Internet banking?

Q10. How long do you surf on the Internet?

Q11. How often do you use Internet banking services?

Respondents were asked to pick the most frequently used bank for Internet banking services and to answer the E-S-Qual questions by considering only the chosen bank’s services in the question 12:

⁵ 2FA typically is a signing-on process where a person proves his or her identity two of the three methods: “something you know” (e.g., password or PIN), “something you have”(e.g., smartcard or token), or “something you are” (e.g., fingerprint or iris scan).

Q12. Select the most frequent bank you have used for Internet banking services.

Name of the bank selected in Q12 was inserted into following E-S-Qual questions as a variable and respondent notifies his/her bank's web site while (s)he is answering the questions every time.

E-S-Qual Scale Questions

Original E-S-Qual scale was adapted by Akıncı et al. (2010) for Internet banking services either by removing irrelevant questions or adapting questions or reconstructing new ones.

E-S-Qual model has 22 questions in four dimensions.

- 1) Efficiency (8 questions)
- 2) System availability (4 questions)
- 3) Fulfillment (7 questions)
- 4) Privacy (3 questions)

Efficiency dimension contains items, which measures the ease of use and speed of the Internet site. In this study, original E-S-Qual *efficiency* factor questions are deployed as the same without any adaptation or addition and are kept as in the study of Akıncı et al. (2010)

Table 6. Efficiency Questions

	Question in E-S-Qual	Treatment in Akinci et al.'s survey	Question in this study ^a
EFF1	This site makes it easy to find what I need.	<i>Deployed as original</i>	<i>Deployed as original</i>
EFF2	It makes it easy to get anywhere on the site.	<i>Deployed as original</i>	<i>Deployed as original</i>
EFF3	This site enables me to complete a transaction quickly.	<i>Deployed as original</i>	<i>Deployed as original</i>
EFF4	Information at this site is well organized.	<i>Deployed as original</i>	<i>Enhanced: (Customer/ product/ transaction/ market) information at this site is well organized.</i>
EFF5	It loads its pages fast.	<i>Deployed as original</i>	<i>Deployed as original</i>
EFF6	This site is simple to use.	<i>Deployed as original</i>	<i>Deployed as original</i>
EFF7	This site enables me to get on to it quickly.	<i>Deployed as original</i>	<i>Parasuraman et al.'s EFF7 Enhanced: Authentication and authorization process is completed easily and I can get on to it quickly.</i>
EFF8	This site is well organized	<i>Deployed as original</i>	<i>Deployed as original</i>

^a Enhanced, adapted or newly added measures are translated into English from the deployed Turkish questionnaire in this study.

The EFF4 question was translated in Turkish by explanatory additions without changing its meaning. The EFF7 question was elaborated to measure how easy the sign-in process is. It is aimed to distinguish the EFF7 question from the EFF5 and SYS2 (Web site launches and runs right away). Translation from Turkish to English of these two elaborated questions can be found in the Table 6.

System availability questions measure the technical reliability of the Internet banking site. It has been considered that the questions in that factor are all applicable for Internet banking services and kept as the originals except with one small adaptation for internet banking (Table 7).

Table 7. System Availability Questions.

	Question in E-S-Qual	Treatment in Akıncı et al.'s survey	Question in this study
SYS1	Web site is always available for business.	<i>Deployed as original</i>	<i>Deployed as original</i>
SYS2	Web site launches and runs right away.	<i>Deployed as original</i>	<i>Deployed as original</i>
SYS3	Web site does not crash.	<i>Deployed as original</i>	<i>Deployed as original</i>
SYS4	Pages at Web site do not freeze after I enter my order information.	<i>Deployed as original</i>	<i>Parasuraman et al.'s SYS4 adapted:</i> Pages at Web site do not freeze after I click for a transaction.

Fulfillment indicators measure the level of satisfaction in the process of handling and executing customer orders as packing, shipping, payments, etc.

Fulfillment items that test the quality of delivery process are not applicable for the services most in the Internet banking, because of zero-time delivery process, no tangible product delivery, no product deterioration or breakdown, no after-sales service, and no out-of stock situations in banking services. The FUL2, FUL3, and FUL5 questions are in this class and were eliminated. For questions FUL4 and FUL6, re-constructed versions of Akıncı et al.'s (2010) study were inserted. The FUL1 and FUL7 questions were enhanced with some explanations for better understanding of respondents. Finally, there were four questions inserted in the questionnaire under *fulfillment* factor (Table 8).

Table 8. Fulfillment Questions

	Question in E-S-Qual	Treatment in Akıncı et al.'s survey	Question in this study
FUL1	It delivers orders when promised.	<i>Deployed as original</i>	<i>Enhanced:</i> Transactions like EFT, buying of mutual fund and stock are accomplished within promised time-slots.
FUL2	This site makes item available for delivery within suitable time frame.	<i>Not applicable, eliminated</i>	<i>Not applicable, eliminated</i>
FUL3	It quickly delivers what I order.	<i>Not applicable, eliminated</i>	<i>Not applicable, eliminated</i>
FUL4	It sends out the items ordered.	<i>Re-constructed:</i> My bank's Web site promptly informs about important situations (payments...)	<i>Akıncı et al.'s FUL4 enhanced and deployed:</i> My bank promptly informs about important situation (payments...) through various channels (SMS, call center etc.)
FUL5	It has in stock the items the company claims to have.	<i>Not applicable, eliminated</i>	<i>Not applicable, eliminated</i>
FUL6	It is truthful about its offerings.	<i>Re-constructed:</i> Records at my bank's Web site are always accurate.	<i>Akıncı et al.'s FUL6 enhanced and deployed:</i> Product/customer/transaction/market records at my bank's Web site are always accurate.
FUL7	It makes accurate promises about delivery of products.	<i>Deployed as original</i>	<i>Enhanced:</i> I buy products with promised properties (like interest rate, tenor, fee etc.).

The *Privacy* questions measure the confidentiality of customer information and security of electronic transactions (Table 9).

Table 9. Privacy Questions.

	Question in E-S-Qual	Treatment in Akıncı et al.'s survey	Question in this study
PRI1	It protects information about my Web-shopping.	<i>Deployed as original</i>	<i>Deployed as original</i>
PRI2	It does not share my personal information with other sites.	<i>Deployed as original</i>	<i>Deployed as original</i>
PRI3	My bank's Web site protects information about my credit card.	<i>Deployed as original</i>	<i>Reconstructed:</i> This site protects information about identity number and password/PIN.
PRI4	Does not exist	<i>Reconstructed:</i> I feel confident about the transactions I made at my bank's Web site.	<i>Deployed as Akıncı et al.'s PRI4</i>

Questions PRI1, PR2 are considered applicable for Internet Banking. Question PRI3 (This site protects information about my credit card) is used as the original in Akıncı et al.'s (2010) work. However, it is re-constructed in this study. Credit card is a payment tool in the Internet transactions and the theft of the card information causes financial loss to the holder. Generally, fee and interest payments of Internet banking services are directly debited in the demand deposits (current accounts) of the customers. But a few examples of payments made over the Internet banking using the credit cards. Internet banking customers realize financial losses not only by the theft of the credit card information; they can expose themselves to high risk of losses if their credentials (identification and password) are stolen. From this point of view, PRI3 (This site protects information about my credit card) is re-constructed as "My identification and password are well protected in my bank".

In the study of Akıncı et al. (2010), PRI3 is reconstructed as "I feel confident about the transactions I made at my bank's Web site". This phrase is considered as reflecting another question measuring perceived transaction security and it is inserted as a new question (PRI4) into the questionnaire as Akıncı et al.'s (2010). As a result, four Questions are presented under *privacy* factor (Table 9). Items of all E-S-Qual factors (*Efficiency, system availability, fulfillment and privacy*) were measured with the 5-point Likert scale from 1=strongly disagree to 5=strongly agree. Parasuraman et al. (2005) and Akıncı et al. (2010) have used the same scale.

Dependent variables are inserted in the questionnaire as in Akıncı et al. (2010) study:

a) Four-item *perceived value* measure with 10-point scale
(1=poor, 10=excellent): *price, overall value, perceived control, perceived convenience.*

b) Five-item *loyalty intentions* measure with 5-point scale
(1=Never do, 5=Certainly do): *positive word of mouth, recommend to others, encourage others to use, first choice for the future, do more business in future.*

Measures of *perceived value* and *loyalty intentions* were not altered and they were deployed as in the original work of Parasuraman et al. (2005) like Akıncı et al. (2010) did (Table 10).

Table 10. Perceived Value and Loyalty Intentions Questions

	Question in E-S-Qual	Treatment in Akıncı et al.'s survey	Question in this study
<i>Perceived Value</i>			
PEV1	The prices of the products and services available at this site (how economical the site is).	<i>Deployed as original</i>	<i>Deployed as original</i>
PEV2	The overall convenience of using this site.	<i>Deployed as original</i>	<i>Deployed as original</i>
PEV3	The extent to which the site gives you a feeling of being in control.	<i>Deployed as original</i>	<i>Deployed as original</i>
PEV4	The overall value you get from this site for your money and effort.	<i>Deployed as original</i>	<i>Deployed as original</i>
<i>Loyalty Intentions</i>			
LOI1	Say positive things about this site to other people?	<i>Deployed as original</i>	<i>Deployed as original</i>
LOI2	Recommend this site to someone who seeks your advice?	<i>Deployed as original</i>	<i>Deployed as original</i>
LOI3	Encourage friends and others to do business with this site?	<i>Deployed as original</i>	<i>Deployed as original</i>
LOI4	Consider this site to be your first choice for future transactions?	<i>Deployed as original</i>	<i>Deployed as original</i>
LOI5	Do more business with this site in the coming months?	<i>Deployed as original</i>	<i>Deployed as original</i>

The E-RecS-Qual factors are deployed in Akıncı et al.'s (2010) work and they had enough valid observations (N=338) to conduct CFA. As explained before,

because of insufficient expected observations to conduct CFA for the recovery part of service quality, the E-RecS-Qual questions were not inserted into questionnaire. No details about Recovery questions are given in this section. Factors and questions of the E-RecS-Qual are listed in the Appendix-C: E-RecS-Qual Questions.

Table 11. Number of Questions in Scales.

	Parasuraman et al. (2005)	Akinci et al. (2010)	In this study
Efficiency	8	8	8
System Availability	4	4	4
Fulfillment	7	4	4
Privacy	3	4	4
Total	22	20	20
Perceived Value	4	4	4
Loyalty Intentions	5	5	5

Deployment and Collection of Data

The survey was conducted over the Internet by the service provided by www.limeservice.com. Limeservice.com's web based survey development tool was used to construct the questionnaire. Answers to the survey were kept anonymous and participants could save partially finished surveys to continue later. Limeservice.com provides data storage, manual data input and data download services. Respondents have completed the questionnaire online and answers were stored in a remote database without requiring respondent's effort to send it back and re-entry of surveys into database. The online monitoring of the number of replies and descriptive statistics of available data could be observed with online access to remote database.

All questions were set as mandatory to fill in, except question nine which asks “preference order of location where respondent get connected to Internet banking”. Each group of questions was displayed on a separate web page and groups were loaded with *next* and *previous* buttons (This is a built-in facility of limeservice.com). It is not possible to see further question groups without completing the mandatory questions. Since all questions are set as mandatory, when the answers were submitted at the end of questionnaire, it was guaranteed to receive all questions as answered. There were no missing data problem and no efforts to handle missing data during CFA work.

Export of the answers from the remote database in Microsoft Excel or in SPSS data or text format is very handy in the survey conducting tool provided by limeservice.com.

Sample

Convenience sampling, (i.e., non-probabilistic sampling instead of probabilistic sampling) was favored since the study was based on voluntary participation. Snowball Technique of Goodman (1961) was employed to reach target response group. 79 people were asked to fill out the questionnaire and to kindly forward the link of the survey to anyone they know as an Internet banking user. As a result, total number of answered surveys is 447. However, 65 replies were started but not submitted. 65 incomplete observations were not taken into analysis, since there were enough completed samples (N=382) to handle CFA. There is low marginal benefit of introduction of incomplete observations when missing data handling burden considered. “Observations to measures” ratio

($382 / 20 \cong 19$) is more than 5 and adequate for CFA (Hair, Anderson, Tatham, & Black, 1998)

Basic Descriptive Statistics of the Sample

There is a balanced female and male distribution observed in 382 samples: 195 females and 187 males. Male respondents are 2 years older on average (Table 12).

Table 12. Sample Characteristics (Demographics)

	Female		Male		Total	
		<i>% in total</i>		<i>% in total</i>		<i>% in total</i>
N	195	51.0%	187	49.0%	382	100%
Age		<i>% in column</i>		<i>% in column</i>		<i>% in column</i>
Age < 25	6	3.1%	2	1.1%	8	2.1%
25 - 40	134	68.7%	115	61.5%	249	65.2%
41 - 55	55	28.2%	64	34.3%	119	31.2%
Age > 55	0	0.0%	6	3.2%	6	1.6%
Age	μ : 36.0	σ : 7.4	μ : 38.2	σ : 8.1	μ : 37.1	σ : 7.8
Education		<i>% in column</i>		<i>% in column</i>		<i>% in column</i>
Primary School	0	0.0%	0	0.0%	0	0.0%
High School	10	5.1%	9	4.8%	19	5.0%
Graduate	128	65.6%	110	58.8%	238	62.3%
Master	49	25.1%	57	30.5%	106	27.7%
Phd	8	4.1%	11	5.9%	19	5.0%
Income						
Regular Income	175	89.7%	165	88.2%	340	89.0%
No Regular Income	20	10.3%	22	11.8%	42	11.0%
Income Level						
0 - 599 TL	5	2.6%	2	1.1%	7	1.8%
600 - 1199 TL	10	5.1%	3	1.6%	13	3.4%
1.200 - 2.999 TL	45	23.1%	56	29.9%	101	26.4%
3.000 - 4.999 TL	45	23.3%	56	29.9%	101	26.4%
5.000 - 9.999 TL	36	18.5%	54	28.9%	90	23.6%
10.000 TL and more	14	7.2%	27	14.4%	41	10.7%
City of Residence						
Istanbul	155	79.5%	159	85.0%	314	82.2%
Izmir	17	8.7%	13	7.0%	30	7.9%
Ankara	9	4.6%	6	3.2%	15	3.9%
Eskisehir	9	4.6%	4	2.1%	13	3.4%
Other ^a	5	2.6%	5	2.7%	10	2.6%

^aOther cities in which females reside are Amasya, Bursa, Kocaeli, Malatya, Sakarya. Males reside in Bolu, Çanakkale, Konya, Muğla, Tekirdağ were classified under the city of residence called as "Other"

Females are 30% of total respondents in Akıncı et al. (2010) study and 75% in the study of Parasuraman et al. (2005). Mean of male respondents' age is slightly higher than the females' mean (Table 13). Age distribution of the sample in this study looks more like Akıncı et al.'s (2010) sample. Internet banking studies' respondents are younger than Parasuraman et al.'s (2005).

Table 13. Comparison of Age Distributions with Previous Studies.

Age	This Study N=382	Akıncı et al. study N=2071	Parasuraman et al. CFA study N=858
< 25	2.1%		10.1%
25 – 40	65.2%	70.2% ^a	41.0%
41 – 55	31.2%		34.3%
> 55	1.6%		14.6%

^a Only the age-range that its figure was given in Akıncı et al.'s (2010) study.

Respondents who have regular income are 89% of the total. 73.3% of respondents are wage/salary earners and 3.4% are retired. 16.5% have their own business.

Male respondents' income level is higher than female respondents'. Whereas 73.3% of males have income levels above 3000TL per month, only 48.7% of female respondents are in that range. Chi-square test indicates that the distribution of income levels are different in gender ($\chi^2 [5] = 21.85$ at $p = .0006$, i.e., H_0 rejected).

Only 5.2% of total respondents have less than 1200TL monthly income. The majority of respondents (84.3%) have regular and income levels above 1200TL / month.

Education level does not change within female and male groups. ($\chi^2 [3] = 2.32$ at $p = .508$ and H_0 cannot be rejected). 95% of total respondents have

completed university education and more, which can be considered as the eligibility criteria for the use of Internet banking, and the computer literacy.

Respondents who reside in Istanbul are 82.2% of the total. 7.9% of respondents reside in Izmir. Other 38 respondents live in 12 different cities of Turkey.

Table 14. Sample Characteristics (Use of Internet)

	Female		Male		Total	
Internet Use	<i>(% in column)</i>		<i>(% in column)</i>		<i>(% in column)</i>	
Very intense	62	31.8%	56	29.9%	118	30.9%
Intense	50	25.6%	51	27.3%	101	26.4%
Everyday	55	28.2%	60	32.1%	115	30.1%
Often	20	10.3%	15	8.0%	35	9.2%
Weekly	4	2.1%	1	0.5%	5	1.3%
Rare	3	1.5%	4	2.1%	7	1.8%
Very Rare	1	0.5%	0	0.0%	1	0.3%
Internet Banking Use						
Very Intense	41	21.0%	45	24.1%	86	22.5%
Intense	47	24.1%	40	21.4%	87	22.8%
Often	70	35.9%	72	38.5%	142	37.2%
Rare	27	13.8%	22	11.8%	49	12.8%
Very Rare	10	5.1%	8	4.3%	18	4.7%
<u>Internet connection point, first preference</u>						
Office	106	54.4%	122	65.2%	228	59.7%
Home	86	44.1%	60	32.1%	146	38.2%
Mobile Phone	2	1.0%	4	2.1%	6	1.6%
<u>Second preference</u>						
Home	82	42.1%	91	48.7%	173	45.3%
Office	50	25.6%	39	20.9%	89	23.3%
Mobile Phone	14	7.2%	18	9.6%	32	8.4%
Other	3	1.5%	3	1.6%	6	1.6%
School	5	2.6%	0	0.0%	5	1.3%
(Not Chosen)	41	21.0%	36	19.3%	77	20.2%
<u>Third preference</u>						
Mobile Phone	30	15.4%	37	19.8%	67	17.5%
Home	5	2.6%	14	7.5%	19	5.0%
Other	11	5.6%	4	2.1%	15	3.9%
School	4	2.1%	5	2.7%	9	2.4%
Office	4	2.1%	2	1.1%	6	1.6%
(Not Chosen)	141	72.3%	125	66.8%	266	69.6%

Internet banking connections in the *office* is considered to be the first choice of respondents. 60% of total respondents prefer *office* in the first rank to connect Internet. Naturally the number of transactions to be achieved during working hours is more than transactions achieved at home which took place late in the evening or early in the morning. *Office* connections are probably considered safer than Internet connection installments at home. Only 38% of respondents prefer *home* as the connection point for Internet banking in the first rank.

Second rank preferences for Internet banking connection points are 45% *home*, 23% *office*. 20% of respondents have declared nothing in the rank 2 (i.e., they prefer only one point of contact for Internet banking). Mobile devices for Internet banking connections are generally in the second and third rank of preference. 32 and 67 respondents have declared their preferences in the second and third ranks respectively. Only 42% of respondents have indicated that they have used mobile equipment to log into the Internet banking.

Respondents who have access to the Internet every day are 87.7% of the total. 30.9% of total respondents are Internet addicts and surf on the Internet more than 5 hours per day.

Respondents who use Internet banking 3 days and more in a month are 82.5% of the total. 9.4 % of total respondents are surfing on the Internet and are using Internet banking site very intensively. 80.6% of the total respondents surf on the internet often and more and use Internet banking frequently (Table 15).

Table 15. Internet Banking and Web Surfing Cross Tabulation.

<u>Internet Surfing</u>	<u>Internet Banking</u>				<u>Total</u>	
	<u>High Use</u>		<u>Low Use</u>			
High Use	308	80.6%	61	16.0%	369	96.6%
Low Use	7	1.8%	6	1.6%	13	3.4%
Total	315	82.5%	67	17.5%	382	100.0%

Note: Often, everyday, intense and very intense are considered as *High Use* for Internet Surfing. Often, intense and very intense were considered as *High Use* of internet banking.

Use of Internet and Internet banking frequency was coded with adverbs like intense, rare, often for data analysis purposes. However, in order to be more specific and to avoid different interpretations of adverbs, options were more precise for respondents to pick appropriate choice (Table 16).

Table 16. Options of Question 10.

<u>Q10. How long you surf on the Internet?</u>	
Very Intense....	Every day, very intense usage (5 hours and more in a day)
Intense.....	Every day, intense usage (2-5 hours in a day)
Everyday.....	Every day (Not more than 2 hours)
Often.....	3-6 days in a week (daily average less than 1 hour)
Weekly.....	1-2 days in a week
Rare.....	1-3 days in a month
Very Rare.....	1-2 days in every 3 months

Similarly respondents have answered Internet banking frequency question by checking one of the options precisely described in Table 17.

Table 17. Options of Question 11.

<u>Q11. How often do you use Internet banking services?</u>	
Very Intense....	15 and more days in a
Intense.....	8-15 days in a month
Often.....	3-7 days in a month
Rare.....	1-2 days in a month
Very Rare.....	1-2 days in every three

Although there were 26 banks presented in question 12 options as Internet banking activities, 382 respondents have declared that they have internet banking services only from 17 banks. There are only 9 banks which are evaluated with more than 10 observations. Most frequently used bank for Internet banking statistics are given in Table 18.

Table 18. Internet Banking Service Providers of Respondents.

	<u>Female</u>		<u>Male</u>		<u>Total</u>		<u>Ownership^a</u>
Türkiye Garanti Bankası A.Ş.	47	24.1%	58	31.0%	105	27.5%	Privately owned
Fortis Bank A.Ş.	31	15.9%	24	12.8%	55	14.4%	Foreign
Türkiye İş Bankası A.Ş.	20	10.3%	32	17.1%	52	13.6%	Privately owned
Yapı ve Kredi Bankası A.Ş.	28	14.4%	19	10.2%	47	12.3%	Privately owned
Akbank T.A.Ş.	16	8.2%	11	5.9%	27	7.1%	Privately owned
HSBC Bank A.Ş.	11	5.6%	12	6.4%	23	6.0%	Foreign
Türkiye Halk Bankası A.Ş.	12	6.2%	6	3.2%	18	4.7%	State bank
Finans Bank A.Ş.	5	2.6%	10	5.3%	15	3.9%	Foreign
Türkiye Vakıflar Bankası	11	5.6%	4	2.1%	15	3.9%	State bank
Türkiye Cumhuriyeti Ziraat B.	4	2.1%	3	1.6%	7	1.8%	State bank
Denizbank A.Ş.	3	1.5%	3	1.6%	6	1.6%	Foreign
ING Bank A.Ş.	3	1.5%	0	0.0%	3	0.8%	Foreign
Türk Ekonomi Bankası A.Ş.	2	1.0%	1	0.5%	3	0.8%	Privately owned
Citibank A.Ş.	0	0.0%	2	1.1%	2	0.5%	Foreign
Eurobank Tekfen A.Ş.	1	0.5%	1	0.5%	2	0.5%	Foreign
Anadolubank A.Ş.	0	0.0%	1	0.5%	1	0.3%	Privately owned
Şekerbank T.A.Ş.	1	0.5%	0	0.0%	1	0.3%	Privately owned
Total	195	100.0%	187	100.0%	382	100.0%	

^a Classification of banks are excerpted from BAT reports.

Averages of E-S-Qual answers are tabulated for the banks grouped by their ownership classification. Garanti was not included in privately owned bank group and treated as a separate group since it has 105 observations (27.5% of the total).

Table 19. Statistics of Re-grouped Banks.

Bank Group		EFF	SYS	FUL	PRI	PEV	LOI
Foreign Banks	Mean	4.0	4.0	4.1	4.2	8.0	4.1
	N	106	106	106	106	106	106
	Std. Deviation	0.9	0.8	0.8	0.8	1.6	0.8
Garanti Bank	Mean	4.2	4.1	4.2	4.0	7.4	4.1
	N	105	105	105	105	105	105
	Std. Deviation	0.8	0.9	0.9	1.0	1.6	0.9
Privately Owned	Mean	4.0	3.8	4.1	4.2	7.4	3.9
	N	131	131	131	131	131	131
	Std. Deviation	0.8	0.9	0.9	0.8	1.8	0.9
State Banks	Mean	3.9	3.8	4.1	4.3	7.7	4.1
	N	40	40	40	40	40	40
	Std. Deviation	1.0	1.0	0.9	0.8	2.1	1.0
Total	Mean	4.0	4.0	4.1	4.2	7.6	4.0
	N	382	382	382	382	382	382
	Std. Deviation	0.8	0.9	0.9	0.9	1.7	0.9

Note. Banks grouped under *Other* are Türkiye Cumhuriyeti Ziraat Bankası A.Ş., Denizbank A.Ş., ING Bank A.Ş., Türk Ekonomi Bankası A.Ş., Citibank A.Ş., Euro Tekfen A.Ş., Şekerbank A.Ş., Anadolubank A.Ş.

EFF: Efficiency, SYS: System availability, FUL: Fulfillment, PRI: Privacy, PEV: Perceived value, LOI: Loyalty intentions.

Groups do not differ on factor scores significantly. Comparison of means of bank groups is presented in the Table 112 in Appendix-D: Statistics in the Bank Level.

Only two out of six variables have different means: *Efficiency* and *perceived value* (p values are .041 and .030 respectively). Therefore, detailed in the bank level results need to be drilled down. Averages of E-S-Qual answers were tabulated for the banks which have 15 or more respondents and residuals are cumulated under the “other” heading. Table 20.

Table 20. Mean Values of Responses of E-S-Qual Questions for Each Bank.

	N	EFF	SYS	FUL	PRI	PEV	LOI
Garanti Bankası	105	4.24	4.10	4.17	4.01	7.43	4.09
Fortis Bank	55	4.29	4.15	4.28	4.40	8.52	4.33
Türkiye İş Bank.	52	3.98	3.71	4.23	4.25	7.60	4.12
Yapı ve Kredi B.	47	4.16	3.99	4.08	4.26	7.30	3.91
Akbank	27	3.71	3.68	4.03	3.97	6.91	3.57
Other	25	3.58	4.02	4.10	4.11	7.86	4.07
HSBC	23	3.82	4.02	3.83	3.97	7.26	3.75
Türkiye Halk B.	18	4.54	4.39	4.40	4.63	8.69	4.64
Finans Bank	15	3.64	3.83	3.97	3.95	7.60	3.84
Vakıflar Bank	15	3.18	2.83	3.60	3.90	6.17	3.43
Total	382	4.04	3.96	4.13	4.15	7.59	4.04

Detailed graphs of averages of banks are illustrated in Appendix-D: Statistics in the Bank Level.

Garanti Bankası is above the mean almost in all factors: *Efficiency*, *system availability*, and *fulfillment*, except *privacy*. However, *perceived value* is below the mean and *loyalty* is close to average. Internet users of Garanti Bankası have slight concerns about the privacy issue in PRI2 question, which is about the sharing of personal information (Garanti: 3.86, Total: 4.07). Users evaluated Garanti Internet Banking more costly than the average by PEV1 answers (Garanti: 5.45. Total: 6.45). However, they like the overall convenience of the site and graded above the mean of the total in PEV2 Question⁶ (Garanti: 8.72. Total: 7.90). Statistics of *privacy* and *perceived value* indicators are displayed in the Table 21.

⁶ The overall convenience of using this site.

Table 21. Privacy and Perceived Value Indicators' Statistics.

Bank		PRI1	PRI2	PRI3	PRI4	PEV1	PEV2	PEV3	PEV4
Akbank T.A.Ş.	Mean	4.1	3.7	4.2	3.9	6.1	6.8	7.5	7.2
	N	27	27	27	27	27	27	27	27
	Std. Dev.	1.1	1.3	0.9	1.2	3.0	2.1	2.0	2.1
Finans Bank	Mean	4.0	3.7	4.1	4.1	6.9	7.6	7.9	8.0
	N	15	15	15	15	15	15	15	15
	Std. Dev.	1.0	1.1	1.0	1.1	3.0	2.3	2.4	2.6
Fortis Bank AŞ.	Mean	4.3	4.4	4.4	4.4	8.0	8.6	8.7	8.8
	N	55	55	55	55	55	55	55	55
	Std. Dev.	0.6	0.6	0.5	0.5	1.8	1.2	1.1	1.0
HSBC Bank A.Ş.	Mean	3.9	3.9	4.1	4.0	6.8	7.3	7.4	7.5
	N	23	23	23	23	23	23	23	23
	Std. Dev.	0.7	0.8	0.7	0.7	2.0	1.6	1.7	1.5
Other	Mean	4.2	4.2	4.1	4.0	7.6	7.6	8.2	8.0
	N	25	25	25	25	25	25	25	25
	Std. Dev.	1.1	1.3	1.2	1.4	2.2	2.2	2.2	2.2
T. Garanti B.	Mean	4.1	3.9	4.1	4.0	5.5	8.4	8.2	7.6
	N	105	105	105	105	105	105	105	105
	Std. Dev.	1.0	1.2	1.1	1.1	2.6	1.6	1.7	2.2
Türkiye HalkB.	Mean	4.6	4.6	4.7	4.6	7.9	8.7	9.1	9.1
	N	18	18	18	18	18	18	18	18
	Std. Dev.	0.5	0.5	0.5	0.6	1.7	0.8	0.9	1.0
Türkiye İş B.	Mean	4.2	4.2	4.3	4.3	6.8	7.5	8.1	7.9
	N	52	52	52	52	52	52	52	52
	Std. Dev.	1.0	0.9	0.9	1.0	2.6	2.1	2.0	2.1
Türkiye VakıfB	Mean	3.9	3.9	4.1	3.7	5.9	5.9	6.7	6.3
	N	15	15	15	15	15	15	15	15
	Std. Dev.	0.7	0.7	0.7	1.2	2.4	2.4	2.6	2.7
Yapı ve Kredi	Mean	4.2	4.2	4.3	4.3	5.4	7.9	8.1	7.9
	N	47	47	47	47	47	47	47	47
	Std. Dev.	0.7	0.8	0.7	0.7	2.3	1.5	1.4	1.9
Total	Mean	4.2	4.1	4.2	4.1	6.5	7.9	8.1	7.9
	N	382	382	382	382	382	382	382	382
	Std. Dev.	0.9	1.0	0.9	1.0	2.6	1.9	1.8	2.0

Note. PRI1: My bank protects information about my banking transactions; PRI2: My bank does not share my personal information with other sites; PRI3: This site protects information about identity number and password/PIN; PRI4: I feel confident about the transactions I made at my bank's Web site;

PEV1: The prices of the products and services available at this site (how economical the site is); PEV2: The overall convenience of using this site; PEV3: The extent to which the site gives you a feeling of being in control; PEV4: The overall value you get from this site for your money and effort.

Other privately owned banks: T. İş Bankası and Yapı Kredi are perceived to perform close to the average. However, respondents rated Akbank's performance below the average. Although the number of respondents (18) is not much for Türkiye Halk Bankası, it is always far above mean of the total with smaller variance compared to the total. (See Table 22). Another state bank (Vakıflar Bankası) has means always lower than total means with higher standard deviations than the total.

Internet banking services of Fortis is by far the most appreciated among foreign banks. Fortis bank means are all well above the total and there are quite high number of responses (55). HSBC grades are on average and respondents graded Finansbank below the average with high variance.

Table 22. Standard Deviations of E-S-Qual Answers.

	N	EFF	SYS	FUL	PRI	PEV	LOI
Türkiye Garanti	105	0.8	0.9	0.9	1.0	1.6	0.9
Fortis Bank A.Ş.	55	0.5	0.6	0.6	0.5	1.0	0.6
Türkiye İş	52	0.8	0.9	0.9	0.9	2.0	0.9
Yapı ve Kredi	47	0.6	0.9	0.7	0.7	1.4	0.7
Akbank T.A.Ş.	27	0.9	1.0	1.0	0.9	2.0	1.0
Other	25	1.1	1.0	0.9	1.2	1.9	1.0
HSBC Bank A.Ş.	23	0.8	0.7	0.7	0.6	1.5	0.9
Türkiye Halk	18	0.5	0.5	0.5	0.5	1.0	0.5
Finans Bank A.Ş.	15	1.0	1.2	1.0	1.0	2.5	1.0
Türkiye Vakıflar B	15	1.1	1.1	1.1	0.7	2.4	1.1
Total	382	0.8	0.9	0.9	0.9	1.7	0.9

Number of replies for state banks and foreign banks other than Fortis are far below 50 and it is not easy to generalize their level with the mean.

CHAPTER 4

DATA ANALYSIS

Structural Equation Modeling (SEM) techniques are used in this study. Exploratory and Confirmatory Factor Analyses are used in the re-assessment of E-S-Qual scale. Details of SEM and model fit indices are presented in the Appendix-E: Structural Equation Modeling.

Principles of Measurement

The indicators of constructs should be reliable and valid to avoid effects of measurement error. Reliable measures are free of random error (Kline, 1998, pp. 193-194). Trochim (2006) and Kline (1998) have explained four types of reliability as follows:

- *Alternate (parallel) forms reliability* is used to assess the consistency of the results of two tests constructed in the same way from the same content domain.
- *Test-retest reliability* is used to assess the consistency of a measure from one time to another. Time between the two measures have impact on the correlation.
- *Inter-rater or inter-observer reliability* is used to assess the degree to which different raters/observers give consistent estimates of the same phenomenon. Simply the calibration of observers.
- *Internal consistency reliability* is used to assess the consistency of results across items within a test.

In this study, only one of the four types of reliability tests has been applied:

Internal consistency reliability.

Test-retest reliability is not applicable because there is only one occasion of measurement. *Alternate forms reliability* is improper since there was only one form of questionnaire deployed. Technically it was not possible to deploy examiner(s) to assess the alignment of test scores of each individual and inter-rater reliability is not pertinent.

Kline (1998, p. 193) has emphasized the importance and has used split-half reliability in the name of last category together with internal consistency reliability. He has explained it as the stability of subject's responses across separate halves. Trochim (2006) has counted split-half reliability type as one of the four examples of measures of reliability. Other types are average inter-item consistency, average item-total correlation, and Cronbach's alpha. All *Internal consistency reliability* tests try to assess how similarly the subjects responded to the items within the same scale.

Cronbach's alpha is mathematically equivalent to the average of all possible split-half estimates although it is not measured by calculating so (Trochim, 2006).

Internal consistency reliability tests have been applied by SPSS and calculated Cronbach's Alpha's of scales are tabulated in the Table 23.

Table 23. Cronbach's Alpha Values of Factors.

	Cronbach's Alpha	Number of Items
Efficiency	.951	8
System Availability	.920	4
Fulfillment	.848	4
Privacy	.934	4
Perceived Value	.851	4
Loyalty	.940	5

All Cronbach's alpha values are well above the adequate level 0.7 (Kline, 1998, p. 194), and indicate excellent reliability of the scales, which have alpha values above .90. Individual items within the scales are checked for their contribution to alpha values and inter-item correlations. All items are highly correlated with the remaining items within the scale. Correlation values and items, which cause increase in the Cronbach's Alpha if they are moved, are listed in Table 24.

Table 24. Inter-item Correlations within Factors.

	Min (corrected item-total correlation)	Max (corrected item-total correlation)	Removal of items for better Cronbach's alpha
Efficiency	.763	.875	None
System Availability	.804	.831	None
Fulfillment	.520	.784	FUL4 (.892) ^a
Privacy	.827	.899	None
Perceived Value	.580	.796	PEV1 (.882) ^b
Loyalty	.771	.900	None

^a FUL4 {My bank promptly informs about important situation (payments...) through various channels (SMS, call center etc.)} item is adapted by Akıncı et al. (2010). This item has the lowest correlation (.520) with the sum of other items under *fulfillment* scale. If we consider to remove item (FUL4) from the *fulfillment* scale, alpha value increases from .848 to .892.

^b PEV1 (The prices of the products and services available at this site) has the minimum correlation with the summation of other items under *perceived value* scale. Expected alpha value is .882, if PEV1 is removed.

Items that are not mentioned in the last column of the table above, all have negative impact (decrease) on the alpha values if they are removed.

Recommended removals are not taken into consideration since alpha values are already above 0.7. Alpha values will be re-considered during re-specification process of the model during CFA.

Split-half reliability tests were also conducted and similar findings observed: FUL4 and PEV1 variables are decreasing the alpha values of the split forms.

Table 25. Split-half Reliability Tests

	Alpha	Correlation between forms	Spearman- Brown prophecy coeff. ^a	Guttman Split- Half Coefficient
Efficiency				
EFF1-EFF2-EFF3- EFF4	.916	.0869	.930 - .930	.929
EFF5-EFF6-EFF7- EFF8	.913			
System Availability				
SYS1-SYS2	.896	.812	.897 - .897	.894
SYS3-SYS4	.866			
Fulfillment				
FUL1-FUL2	.870	.741	.851 - .851	.850
FUL3-FUL4	.621			
Privacy				
PRI1-PRI2	.841	.887	.940 - .940	.940
PRI3-PRI4	.900			
Perceived Value				
PEV1-PEV2	.574	.806	.893 - .893	.892
PEV3-PEV4	.830			
Loyalty Intentions				
LOI1-LOI2-LOI3	.928	.845	.916 - .919	.877
LOI4-LOI5	.851			

^a First figure is the equal, second figure is the unequal length Spearman-Brown coefficient.

Assessment of Normality.

Table 26. Skewness and Kurtosis Values of Indicators.

	min	max	Skew	t-value	kurtosis	t-value
PRI4	1.0	5.0	-1.399	-11.163	1.945	7.758
PRI3	1.0	5.0	-1.412	-11.266	2.345	9.354
PRI2	1.0	5.0	-1.192	-9.509	1.058	4.223
PRI1	1.0	5.0	-1.308	-1.434	2.138	8.531
FUL3	1.0	5.0	-1.214	-9.690	1.019	4.065
FUL2	1.0	5.0	-1.155	-9.214	1.396	5.569
FUL1	1.0	5.0	-1.321	-1.544	1.568	6.254
SYS4	1.0	5.0	-.872	-6.959	.317	1.263
SYS3	1.0	5.0	-.706	-5.633	-.201	-.801
SYS2	1.0	5.0	-1.111	-8.864	1.261	5.033
SYS1	1.0	5.0	-1.195	-9.536	1.184	4.722
EFF8	1.0	5.0	-1.039	-8.293	1.022	4.078
EFF7	1.0	5.0	-1.045	-8.340	.451	1.798
EFF6	1.0	5.0	-1.160	-9.257	1.073	4.280
EFF5	1.0	5.0	-1.063	-8.480	1.158	4.621
EFF4	1.0	5.0	-.640	-5.104	-.018	-.074
EFF3	1.0	5.0	-1.438	-11.474	2.246	8.960
EFF2	1.0	5.0	-1.168	-9.317	1.191	4.750
EFF1	1.0	5.0	-1.270	-1.130	1.643	6.555
Multivariate					204.750	7.831

Maximum values in absolute terms are boxed in Table 26. Skewness and kurtosis values of indicators and below the normality test thresholds 2.0 and 7.0 respectively (Curran, West, & Finch, 1996). Therefore, Maximum Likelihood estimation can be applied to the sample.

Exploratory Factor Analysis (EFA)

The main aim of the study is to confirm the factor analysis results originally constructed by Parasuraman et al. (2005) and later adapted by Akıncı et al. (2010). Before the start of the CFA study, it has been checked whether the

collected data provide the same number of factors and the same indicator-factor loading patterns. Since CFA works confirm the previously constructed E-S-Qual model, there were no questions added other than the ones in the filtering and adaptation process of the original E-S-Qual questions/indicators for Internet banking services. Therefore, measures of 20 variables (questions) were inserted in the EFA work.

SPSS 15.0 for Windows is used for EFA. There are three factors extracted which have eigen values above one (Table 27).

Table 27. Total Variance Explained

Factor	<u>Initial Eigen values</u>			<u>Extraction Sum of Squared Loadings</u>			<u>Rotation Sum of Squared Loadings</u>		
	Total	% of Variance	Cum. %	Total	% of Variance	Cum. %	Total	% of Variance	Cum. %
1	11.67	58.35	58.35	11.29	56.47	56.47	5.83	29.12	29.12
2	1.75	8.73	67.09	1.57	7.86	64.33	3.97	19.84	48.97
3	1.17	5.84	72.93	0.90	4.48	68.80	3.97	19.84	68.80
4	0.95	4.75	77.68						
5	0.66	3.31	80.99						
6	0.503	2.51	83.50						
7	0.379	1.89	85.40						
8	0.333	1.66	87.06						
9	0.308	1.54	88.60						
10	0.298	1.49	90.09						
11	0.278	1.39	91.48						
12	0.255	1.28	92.76						
13	0.232	1.16	93.92						
14	0.226	1.13	95.05						
15	0.216	1.08	96.13						
16	0.181	0.90	97.03						
17	0.169	0.85	97.88						
18	0.156	0.78	98.66						
19	0.149	0.75	99.41						
20	0.119	0.59	100.00						

Extraction method is Maximum likelihood; rotation method is Varimax (orthogonal) with Kaiser Normalization and rotation converged in 5 iterations.

SPSS has extracted the factors, which have the eigen values below one. However, the fourth eigen value is only 5% less than one. It can be considered

as a new factor and SPSS forced to use four factors. Fifth factor is not included since it is 33% less than one.

Factor analysis was run a second time with four factors constraint set, instead of the eigen value being above one. Factors and loadings of indicators are in Table 28.

Table 28. Factor Analysis Output (Varimax Rotation).

	Factors			
	1	2	3	4
EFF1: This site makes it easy to find what I need.	.754			
EFF2: It makes it easy to get anywhere on the site.	.785			
EFF3: This site enables me to complete a transaction quickly.	.715			
EFF4: (Customer/product/transaction/market) information at this site is well organized.	.719			
EFF5: It loads its pages fast.	.594		.473	
EFF6: This site is simple to use.	.781		.309	
EFF7: Authentication and authorization process is completed easily and I can get on to it quickly.	.641		.318	
EFF8: Org. Q. This site is well organized.	.790			
SYS1: Web site is always available for business.	.390		.676	
SYS2: Web site launches and runs right away.	.465		.689	
SYS3: My bank's Web site does not crash.			.738	
SYS4: Pages at Web site do not freeze after I click for a transaction.	.319		.713	
FUL1: Transactions like EFT, buying of mutual fund and stock are accomplished within promised time-slots.	.334			.718
FUL2: Product/customer/transaction/market records at my bank's Web site are always accurate.	.315	.325		.711
FUL3: I buy products with promised properties (like interest rate, tenor, fee etc.).			.305	.627
FUL4: My bank promptly informs about important situation (payments...) through various channels (SMS, call center etc.)	.317			.362
PRI1: My bank protects information about my banking transactions.		.748		
PRI2: My bank does not share my personal information with other sites.		.790		
PRI3: This site protects information about identity number and password/PIN.		.885		
PRI4: I feel confident about the transactions I made at my bank's Web site.	.341	.763		

Extraction method is Maximum likelihood; rotation method is Varimax (orthogonal) with Kaiser Normalization and rotation converged in 5 iterations.

Loadings less than .3 are not displayed on the table. Factor-1: *Efficiency*, Factor-2: *Privacy*, Factor-3: *System availability* and Factor-4: *Fulfillment*. Findings and comments on EFA:

- Since orthogonal rotation is applied, correlations between factors are forced to zero, but existing inter-factor correlations are raised as cross loadings of indicators by the other factors. Correlations of factors 1 and 3 (EFF-SYS), factors 1 and 4 (EFF-FUL), factors 1 and 2 (SYS-EFF) are obviously read from cross loadings which are generally less than .50.

- FUL4 has no considerable interpretation of factor-4 (*fulfillment*) like the other *fulfillment* questions (.362 < .707, 0.707 is the acceptable level given by Fornell and Larcker, 1981). FUL4 has coefficient with *efficiency* (factor-1) that has almost the same strength as the explanation of *fulfillment* factor.

- SYS2 which is about the speed of Internet site explains the factor-3 (*System availability*) and it has considerable amount of loading coefficient (.465) to Factor-1 (*efficiency*)

- Similarly another speed related item in the *efficiency* group EFF5 has coefficient .473 with factor-3 (*System availability*).

- Another speed measuring item in the questionnaire is EFF7 which measures the quick get-into secure Internet site environment. As EFF5 measure, it has loading coefficient of factor-3 (*System availability*).

Findings about speed measures can lead to consideration of grouping of these measures under a new factor: *Speed*. Boshoff (2007) has discovered *speed* factor

with loadings of EFF5, EFF7 and SYS5 items in his EFA work. However, no new factor is extracted for these three speed related indicators.

Factor analysis results with promax (oblique) rotation and four factors constraint are tabulated in Table 29.

Table 29. Factor Analysis Output (Promax Rotation).

	<u>Factor</u>			
	1	2	3	4
EFF1	0.845			
EFF2	0.939			
EFF3	0.790			
EFF4	0.833			
EFF5	0.512		0.375	
EFF6	0.890			
EFF7	0.665			
EFF8	0.898			
SYS1			0.741	
SYS2			0.745	
SYS3			0.916	
SYS4			0.845	
FUL1				0.850
FUL6				0.837
FUL7				0.707
FUL4				0.348
PRI1		0.786		
PRI2		0.878		
PRI3		0.999		
PRI4		0.812		

Note. Extraction method is Maximum likelihood; rotation method is Promax (oblique) with Kaiser Normalization and rotation converged in 6 iterations.

FUL4-Fulfillment (Factor4) coefficient (.348) is still weak (i.e. less than .707) and other factors' loadings on FUL4 are attenuated in oblique rotation method.

When inter-factor correlations are allowed (oblique rotation), EFF5 which is mainly loaded by factor-1 still indicates the cross loading (0.375) of factor-3 (*System availability*), although correlation between factor 1 and factor 3 is the highest (.738) of all inter-factor correlations (Table 30).

Table 30 shows the inter-factor correlations after oblique rotation.

Table 30. Factor Correlation Matrix After Promax Rotation.

	Factor 1	2	3	4
Factor 1	1.000	.600	.738	.692
2	.600	1.000	.593	.642
3	.738	.593	1.000	.692
4	.692	.642	.692	1.000

EFA findings indicate that FUL4 and EFF5 indicators and their loadings with factors must be examined in the confirmatory work.

Confirmatory Factor Analysis (CFA)

AMOS 16.0.1.NET Framework version 2.0 has used in the CFA analysis of the E-S-Qual model that is adapted for Internet banking. Data for AMOS was prepared by SPSS v.15.0 in the SPSS data format. Microsoft Office Excel 2007 was used for the tabulation of data and calculation of chi-square and chi-inverse functions for significance checking and other mathematical calculations and graphical presentations.

E-S-Qual model adapted for Internet banking services portrayed in AMOS software is shown in the Figure 1.

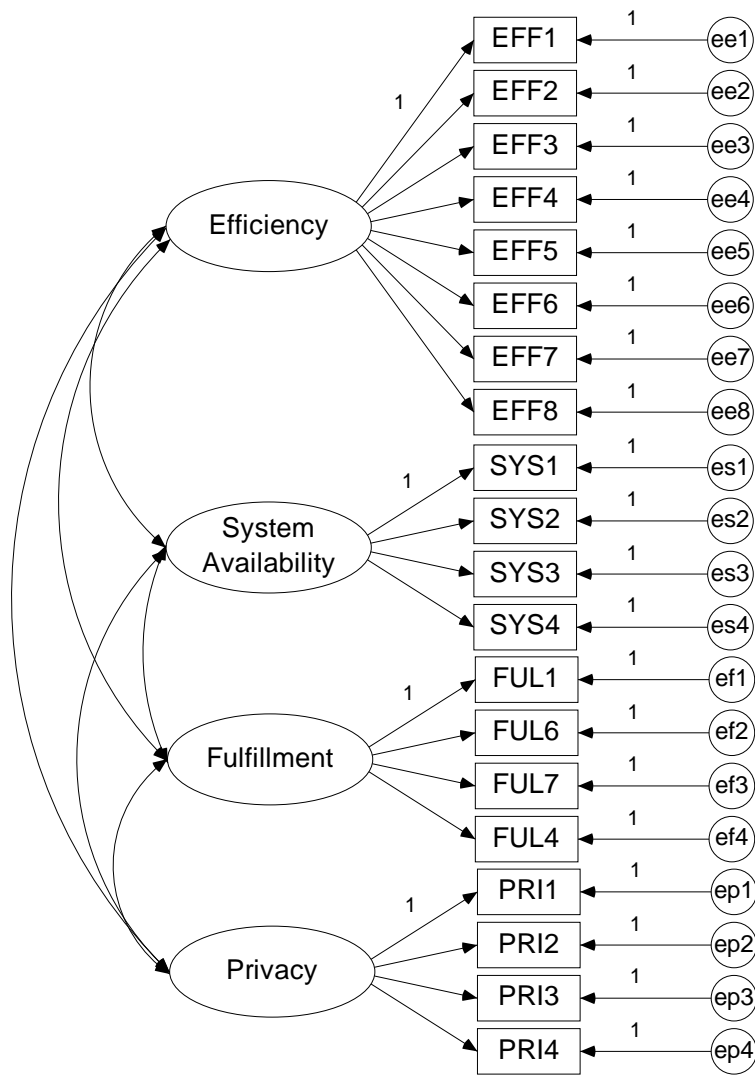


Figure 1. E-S-Qual model adapted for Internet banking services.

Coefficients of the first items in every factor are set to 1 (alternatively variance of each factor could be set to 1 to solve equations in AMOS). All errors have correlation 1 with the items they are related⁷. Using AMOS software, CFA has been run over the graphical representation of the model. Before checking how well the model fits into sample, it is good to check whether an admissible solution exists or not. There are no standardized loading coefficients that exceed one (Table 31) and there are no negative error variances calculated

⁷These are set by AMOS automatically.

(Table 32). These tests have shown that there are no Heywood-cases encountered for the first-time run of CFA on adapted E-S-Qual model.

Table 31. Regression Weights of Standardized Variables.

	Estimate	Squared Correlations
EFF1 ← EFF	.870	.757
EFF2 ← EFF	.856	.733
EFF3 ← EFF	.839	.704
EFF4 ← EFF	.815	.664
EFF5 ← EFF	.804	.646
EFF6 ← EFF	.884	.781
EFF7 ← EFF	.785	.616
EFF8 ← EFF	.895	.801
SYS1 ← SYS	.885	.783
SYS2 ← SYS	.908	.824
SYS3 ← SYS	.811	.658
SYS4 ← SYS	.830	.694
FUL1 ← FUL	.870	.757
FUL6 ← FUL	.868	.753
FUL7 ← FUL	.818	.669
FUL4 ← FUL	.568	.323
PRI1 ← PRI	.872	.760
PRI2 ← PRI	.856	.733
PRI3 ← PRI	.936	.876
PRI4 ← PRI	.883	.780

Table 32. Predicted Variances.

	Estimate	S.E.	C.R.	P
EFF	.647	.061	1.645	***
SYS	.736	.068	1.848	***
FUL	.704	.068	1.420	***
PRI	.605	.057	1.631	***
ee1	.208	.018	11.818	***
ee2	.252	.021	12.107	***
ee3	.248	.020	12.332	***
ee4	.346	.028	12.568	***
ee5	.309	.024	12.619	***
ee6	.216	.019	11.603	***
ee7	.474	.037	12.790	***
ee8	.192	.017	11.332	***
es1	.204	.020	1.243	***
es2	.153	.017	9.077	***
es3	.419	.036	11.699	***
es4	.327	.029	11.393	***
ef1	.226	.024	9.531	***
ef2	.202	.021	9.630	***
ef3	.366	.033	11.039	***
ef4	.965	.073	13.158	***
ep1	.191	.017	11.060	***
ep2	.293	.025	11.530	***
ep3	.101	.013	7.860	***
ep4	.213	.020	1.700	***

Note. Critical ratio(C.R.) is the ratio of Estimate to its Standard Error (S.E.), *** means $p < .001$

Variances explained by the square of correlations estimated (Brown, 2006). As seen in the Table 31, only 32% of the variance of FUL4 can be explained by *fulfillment* factor. Residual variance of FUL4 is explained by its error ef4 (Table 32). The error variable of FUL4, ef4 is larger than all other variances in order to contribute unexplained variance of the FUL4 (Table 32). This result is aligned with the findings in EFA work previously achieved in this study; FUL4 loadings were less than .5 in 4-factor models extracted. Cronbach's alpha calculations have revealed the indication that removal of FUL4 will increase the reliability, i.e., FUL4 has lower correlation with remaining items' sum. FUL4 was re-

constructed in Akıncı et al. (2010) study and it is not in original E-S-Qual model. All findings indicate that FUL4 is not a good measure of Internet banking fulfillment measure and that it needs to be trimmed.

Since the model has a weak chain (FUL4). AMOS software has re-run over the model with trimmed FUL4. Results of the CFA of adapted E-S-Qual model and the model with trimmed FUL4 are in Table 33.

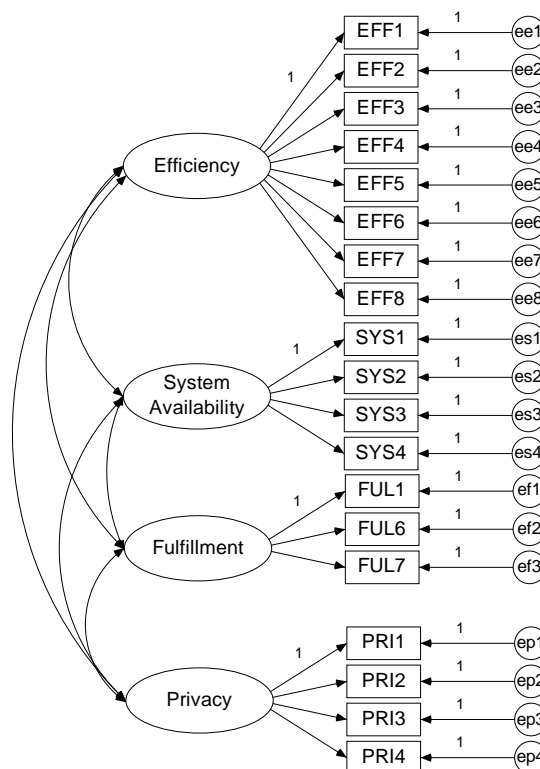


Figure 2. Adapted E-S-Qual with FUL4 item trimmed.

Table 33. Fit Measures of Adapted E-S-Qual and Adapted Model with FUL4 Item Trimmed.

	Adapted E-S-Qual Model	Model with FUL4 trimmed.
χ^2	465.1	429.4
	p=.000	p=.000
df, <i>a</i>	164 / 46	146 / 44
SRMR	.042	.040
RMSEA	.069	.071
	CI: .062- .077	CI=.064-.079
CFI	.957	.959
AGFI	.861	.864
NFI	.936	.939
TLI	.950	.952
AIC	557.1	517.4
N	382	382

Note. *a* is the number of freely estimated parameters. CI is Confidence Interval of RMSEA.

Hypothesis (H_0) that “the difference of estimated variance (Σ) and observed variance matrix (S) is zero” is rejected. Chi-square value of model with trimmed FUL4 (429.4) is above the χ^2 value for 146 df with .001 significance level which is 204.5.

SRMR (.04) is below .05 and indicates that more than 95% of correlations are explained by the model. Comparative fit indices, NFI and AGFI are in the acceptable fit range; CFI and TLI are in good fit range based on the criteria given in Table 117. RMSEA value (.071) is far from range of good fit (i.e., $RMSEA \leq .05$) and the model does not fit well in the population. Checking localized areas of strain and re-specifying the model may help on goodness of fit. Residual covariances are presented in Table 34.

Table 34. Standardized Residual Covariance Matrix (Model with Trimmed FUL4).

	PRI4	PRI3	PRI2	PRI1	FUL7	FUL6	FUL1	SYS4	SYS3	SYS2	SYS1	EFF8	EFF7	EFF6	EFF5	EFF4	EFF3	EFF2	EFF1
PRI4	0																		
PRI3	-0.044	0																	
PRI2	-0.229	0.311	0																
PRI1	0.067	-0.034	-0.292	0															
FUL7	0.739	-0.248	0.26	0.61	0														
FUL6	0.439	0.077	0.37	0.78	-0.133	0													
FUL1	-0.334	-0.73	-0.857	0.15	-0.018	0.102	0												
SYS4	0.539	-0.875	-0.181	0.32	0.557	-0.311	-0.047	0											
SYS3	0.084	-1.168	-0.666	0.08	-0.043	-0.505	-0.65	1.367	0										
SYS2	0.892	-0.462	-0.318	1.21	0.305	-0.199	-0.032	-0.167	-0.397	0									
SYS1	0.608	-0.23	0.113	0.88	0.634	-0.174	0.434	-0.378	0.136	0.069	0								
EFF8	0.287	-1.646	-1.45	0.16	-0.014	0.083	0.08	-0.597	-0.966	0.354	-0.183	0							
EFF7	2.329	0.229	-0.244	1.63	0.333	0.05	0.29	0.008	-0.851	1.563	0.34	0.214	0						
EFF6	0.966	-1.092	-1.196	0.16	-0.557	-0.524	-0.249	-0.643	-1.035	0.634	0.056	0.179	0.442	0					
EFF5	1.975	0.37	-0.069	1.52	0.834	0.381	0.889	1.552	1.053	2.917	1.462	-0.224	1.028	0.26	0				
EFF4	0.971	-0.511	-0.265	0.63	-0.231	0.577	-0.319	-0.601	-1.357	-0.415	-0.712	0.617	-0.557	-0.351	-0.28	0			
EFF3	0.922	-0.275	-0.46	0.75	0.169	-0.017	0.606	-0.397	-1.175	0.594	-0.082	-0.333	-0.15	-0.466	0.009	0.13	0		
EFF2	1.121	-0.887	-0.742	1.04	-0.264	-1.09	-0.471	-0.954	-1.272	-0.218	-0.746	0.004	-0.214	0.335	-0.682	-0.588	0.41	0	
EFF1	1.763	-0.591	-0.097	1.22	0.398	0.235	0.072	-0.61	-0.953	0.212	0.361	-0.177	-1.11	-0.177	-0.893	0.808	0.54	0.67	0

Two correlations which are underestimated (i.e., positive residuals⁸) by the model more than 2 standard deviations (σ) are highlighted on the table.

Correlation between SYS2 and EFF5 is underestimated by 2.92σ . EFF5 and SYS2 questions are all related with speed of the Internet site (Table 35). EFF7 is also about speed and its unexplained correlation with SYS2 is 1.56σ . Boshoff (2007) has extracted a new factor additional to original model in his EFA study and nominated as *speed*. EFF5, EFF7, and SYS2 are the indicators of Boshoff's (2007). *speed* factor.

Table 35. Questions Related with Speed of Internet Site.

	English	Turkish (displayed in Questionnaire form)
SYS2	Web site launches and runs right away.	Site hızla yüklenir ve hemen çalışır.
EFF5	It loads its pages fast.	İnternet Bankacılığı sayfaları çabuk yüklenmektedir.
EFF7	Authentication and authorization process is completed easily and I can get on to it quickly.	Giriş işlemleri (kimlik denetimi ve yetkilendirme) kolayca gerçekleşmekte ve siteye hızla girebilmekteyim.

EFA work achieved before the confirmatory analysis has revealed that there are only four factors that are exactly the same as original E-S-Qual has and there is no indication of a new factor. However, it has been checked whether the model will have a better explanation for underestimated correlations with the addition of *speed* as the fifth factor with the indicators SYS2, EFF5, and EFF7 in the model. In the modified model, it has been observed that discriminant validity is not attained because of high correlations of *speed-efficiency* and *speed-system availability* pairs (Table 36).

⁸ AMOS software standard.

Table 36. Correlations of Adapted E-S-Qual Model with the Introduction of Speed Factor

	Estimated Correlations
EFF ↔ SYS	.744
EFF ↔ FUL	.725
EFF ↔ PRI	.599
SYS ↔ FUL	.739
SYS ↔ PRI	.608
FUL ↔ PRI	.672
EFF ↔ SPE	.887
SYS ↔ SPE	.916
FUL ↔ SPE	.758
PRI ↔ SPE	.656

Inter-factor correlations above .80 are the indicators of discriminant validity problem (Brown, 2006, p. 131). It is recommended to combine the highly correlated factors. Therefore, the addition of *speed* as a new factor into the model is abandoned and it has been considered to eliminate one or two of the speed indicators. Removal of EFF5 from the model, makes substantial improvement on χ^2 (drop in χ^2_{diff} is significant⁹ against the change in df after removal) and better RMSEA value. However, trimming of EFF5 does not ease the standardized residual matrix. Residual of unexplained correlation between SYS2 and EFF7 has increased from 1.59σ to 1.90σ . Therefore, EFF7 is also trimmed and SYS2 is left as the only speed related indicator. The new model analyzed again and its outcomes are tabulated in Table 37.

⁹ $\Delta\chi^2 = 429.4 - 336.5 = 92.9$ and $\Delta df = 146 - 129 = 17$. $\chi^2(17, p = .001) = 40.8 < 92.9 (= \Delta\chi^2)$

Table 37. Fit Measures of EFF5 and EFF7 Trimmed Model

Index	Adapted E-S-	Adapted model	FUL4, EFF5, EFF7 trimmed
	QUAL model	FUL4 trimmed	model
χ^2	465.1 p=.000	429.4 p=.000	270.0 p=.000
df, a	164 / 46	146 / 44	113 / 40
SRMR	.042	.040	.033
RMSEA	.069	.071	.060
	CI= .062- .077	CI= .064- .079	CI= .051- .070
CFI	.957	.959	.974
AGFI	.861	.864	.899
NFI	.936	.939	.956
TLI	.950	.952	.969
AIC	557.1	517.4	350.0
N	382	382	382

Removal of EFF5 has significant drop in χ^2 after EFF trimming¹⁰ and acknowledges removal of two *speed* indicators.

As seen in Table 37, all fit measures are improved. RMSEA lower bound has touched goodness-of-fit level (.05) and upper bound is lower than the previous model's RMSEA value. AIC ($\chi^2 - 2a$), which penalizes heavily the decrease in the number of freely estimated parameters, has improved (lowered to 350.0) despite the drop in the number of freely estimated parameters.

Residual covariances after speed items trimmed are presented in Table 38.

¹⁰ $\Delta\chi^2 = 336.5 - 270.0 = 66.5$ and $\Delta df = 129 - 113 = 16$. $\chi^2(16, p = .001) = 39.3 < 66.5 (= \Delta\chi^2)$

Table 38. Standardized Residual Covariance Matrix (FUL4, EFF5 and EFF7 Trimmed Model)

	PRI4	PRI3	PRI2	PRI1	FUL7	FUL6	FUL1	SYS4	SYS3	SYS2	SYS1	EFF8	EFF6	EFF4	EFF3	EFF2	EFF1
PRI4	0.000																
PRI3	-0.041	0.000															
PRI2	-0.229	0.305	0.000														
PRI1	0.073	-0.034	-0.295	0.000													
FUL7	0.741	-0.250	0.256	0.612	0.000												
FUL6	0.438	0.071	0.363	0.776	-0.139	0.000											
FUL1	-0.327	-0.727	-0.856	0.157	-0.013	0.103	0.000										
SYS4	0.532	-0.886	-0.194	0.309	0.541	-0.331	-0.058	0.000									
SYS3	0.064	-1.192	-0.690	0.060	-0.073	-0.539	-0.675	1.310	0.000								
SYS2	0.934	-0.425	-0.285	1.245	0.340	-0.166	0.010	-0.142	-0.391	0.000							
SYS1	0.602	-0.240	0.101	0.874	0.618	-0.193	0.424	-0.414	0.081	0.098	0.000						
EFF8	0.516	-1.421	-1.242	0.379	0.143	0.245	0.252	-0.264	-0.658	0.776	0.170	0.000					
EFF6	1.265	-0.797	-0.923	0.448	-0.330	-0.289	-0.003	-0.235	-0.654	1.142	0.492	0.362	0.000				
EFF4	1.089	-0.395	-0.159	0.741	-0.189	0.619	-0.270	-0.401	-1.179	-0.148	-0.502	0.554	-0.319	0.000			
EFF3	1.098	-0.099	-0.299	0.921	0.272	0.088	0.721	-0.128	-0.931	0.944	0.203	-0.316	-0.355	0.011	0.000		
EFF2	1.238	-0.774	-0.639	1.148	-0.228	-1.056	-0.427	-0.757	-1.094	0.053	-0.536	-0.069	0.359	-0.790	0.278	0.000	
EFF1	1.768	-0.590	-0.098	1.223	0.314	0.144	-0.010	-0.535	-0.896	0.351	0.443	-0.410	-0.311	0.440	0.250	0.277	0

There are no over-explained or under-explained correlations with 2 or more standard deviations in the residual matrix (Table 38). However, it is obvious that PRI4 correlations are underestimated with all *efficiency* indicators (Table 38). Residuals of PRI4 correlations with *efficiency* indicators are around 1σ or even more. This problem exists before the trimming of EFF7 and EFF5 and it was even more than 2σ between EFF7-PRI4 (2.3σ in Table 34). These strains are observed in Modification Indices (M.I.) as well. M.I. values, which display how much χ^2 is expected to be increased by freeing PRI4 indicator to co-vary with all *efficiency* indicators, are between 4.2 and 14.2 for each pair of PRI with *efficiency* indicators (three out of six M.I. values are above 10.0).

It is conceptually not acceptable to let PRI4 loaded with *efficiency* factor in theory as indicated in the residual matrix, since PRI4 question has no directives of efficiency (Table 39).

Table 39. PRI4 Indicator in the Questionnaire.

	English	Turkish (displayed in Questionnaire form)
PRI4	I feel confident about the transactions I made at my bank's Web site.	Bankamın Internet sitesinde işlem yaparken kendimi güvende hissedirim.

PRI4 indicator measures how secure you feel when you are logged into Internet banking sites and it has no intention of measuring efficiency. Theoretically, loading of PRI4 with *efficiency* factor (EFF→PRI4) is meaningless and PRI4 is better off removed. PRI4 was re-constructed for Internet banking like FUL4 by Akıncı et al. (2010).

Fit measurements of new model with trimmed PRI4 are displayed together with previous versions of the model in Table 40.

Table 40. Fit Measures of Step 3.

		Step1	Step2	Step3
	Adapted E-S- QUAL model	FUL4 trimmed Model	FUL4, EFF5, EFF7 trimmed model	FUL4, EFF5, EFF7, PRI4 trimmed model
χ^2	465.1 p=.000	429.4 p=.000	270.0 p=.000	233.2 p=.000
df,a	164 / 46	146 / 44	113 / 40	98 / 38
SRMR	.042	.040	.033	.032
RMSEA	.069	.071	.060	.060
	CI=.062-.077	CI=.064-.079	CI=.051-.070	CI=.051-.070
CFI	.957	.959	.974	.976
AGFI	.861	.864	.899	.904
NFI	.936	.939	.956	.959
TLI	.950	.952	.969	.970
AIC	557.1	517.4	350.0	309.2
N	382	382	382	382

Although there is no significant improvement on the comparative fit models and RMSEA. AIC proves significant improvement in χ^2 by compromising 2 freely estimated variables (PRI4 itself and its error). χ^2_{diff} displays decrease of 36.8 by $\Delta df = -15$ with p value .0013 which indicates gain in χ^2 by the removal of PRI4 does not significant with the probability less than .002.

After the removal of PRI4, any ill-fit remark in the residual covariance matrix checked in Table 41.

Table 41. Standardized Residual Covariance Matrix After Step 3.

	PRI3	PRI2	PRI1	FUL7	FUL6	FUL1	SYS4	SYS3	SYS2	SYS1	EFF8	EFF6	EFF4	EFF3	EFF2	EFF1
PRI3	0															
PRI2	0.141	0														
PRI1	-0.018	-0.304	0													
FUL7	-0.181	0.304	0.786	0												
FUL6	0.132	0.402	0.947	-0.134	0											
FUL1	-0.667	-0.817	0.326	-0.007	0.094	0										
SYS4	-0.707	-0.041	0.583	0.552	-0.332	-0.058	0									
SYS3	-1.018	-0.543	0.326	-0.063	-0.541	-0.676	1.314	0								
SYS2	-0.233	-0.123	1.542	0.351	-0.168	0.009	-0.139	-0.389	0							
SYS1	-0.054	0.259	1.161	0.626	-0.199	0.419	-0.415	0.079	0.095	0						
EFF8	-1.076	-0.934	0.819	0.148	0.238	0.245	-0.266	-0.662	0.772	0.163	0					
EFF6	-0.449	-0.616	0.885	-0.322	-0.293	-0.006	-0.234	-0.653	1.142	0.488	0.356	0				
EFF4	-0.061	0.138	1.158	-0.181	0.616	-0.272	-0.4	-1.179	-0.147	-0.505	0.549	-0.319	0			
EFF3	0.244	0.003	1.348	0.281	0.084	0.718	-0.126	-0.931	0.945	0.2	-0.321	-0.356	0.011	0		
EFF2	-0.427	-0.331	1.588	-0.217	-1.057	-0.428	-0.753	-1.091	0.055	-0.537	-0.072	0.361	-0.788	0.28	0	
EFF1	-0.232	0.222	1.677	0.326	0.143	-0.01	-0.531	-0.892	0.355	0.443	-0.411	-0.307	0.444	0.253	0.28	0

PRI1 shows a similar problem that PRI4 has in Table 41. The underestimation of PRI1 correlations with *efficiency* indicators is observed in the residual matrix before trimming PRI4 (Table 38). Now, these residuals are increased and problem is more severe after the removal of PRI4 (Table 40). PRI1 and other indicator covariances (especially with *efficiency* indicators) are consistently all positive (i.e., under-estimated). Considering trimming PRI1 will be a good solution to cure the residual matrix.

It is better to re-consider *privacy* latent variable and its indicators (Table 41) in conceptual perspective to realize impact of trimming PRI1 better.

Table 42. Privacy Latent Variable and Indicators.

	English	Turkish (displayed in Questionnaire form)
PRI1	My bank protects information about my banking transactions.	İnternet üzerinde yaptığım bankacılık işlemlerine ilişkin kayıtlar, (3. şahıslara karşı) korunmaktadır.
PRI2	My bank does not share my personal information with other sites.	Bankam, benim kişisel bilgilerimi başka kurum ve kuruluşlarla paylaşmamaktadır.
PRI3	This site protects information about identity number and password/PIN.	Şifrem ve müşteri numaram, bankamda güvenle saklanmaktadır.
PRI4	I feel confident about the transactions I made at my bank's Web site.	Bankamın İnternet sitesinde işlem yaparken kendimi güvende hissedirim.

Privacy questions are basically measuring two issues: (1) *confidentiality* by PRI1 and PRI2, and (2) *security* by PRI3 and PRI4. Although PRI4 has been removed in the previous re-specification step, PRI3 which is also about security, still measures security dimension in *privacy* factor. Now, residual matrix indicates that the covariances of PRI1 are under-explained and can be considered to remove. If PRI1 has removed another indicator PRI2 can continue to measure

the confidentiality component¹¹. PRI1 question is about the confidentiality of shopping behavior of customer. It is meaningful when you consider customers of retailer like Amazon. PRI1 question tries to measure “Does Amazon share the information ‘*type of music I like*’ that can be discovered from my purchasing transactions on the web site of Amazon?” This question is not perfectly applicable for banking business. Privacy of customers’ assets and liabilities information measured by PRI2 is more critical than transactions in banking. Transactions are predictable when the assets and liabilities information of customer is known. Sharing of customer information with local authorities like tax office etc. and with regulatory bodies like BRSA, BAT is an obligation for the banks. Most of the customers are aware of this obligation. However, share of customer information with third parties is strictly prohibited. PRI1, which measures the security of transactional information, is probably confusing for the respondents in these respects. Therefore, removal of PRI1 is considered in the fourth step, and the results are displayed in Table 43.

¹¹ Despite the EFA works displayed there is no fifth factor in the model, it has been tried to split Privacy factor into two latent factor: CONFidentiality and SECurity. However, CON-SEC pair is measured above .9 which violates the discriminant validity.

Table 43. Fit Measures of Step 4

	Step1		Step2		Step3		Step4	
	Adapted E-S- QUAL model		FUL4 trimmed model		FUL4, EFF5, EFF7 trimmed model		FUL4, EFF5, EFF7, PRI4 trimmed	
χ^2	465.1	p=.000	429.4	p=.000	270.0	p=.000	233.2	197.7
							p=.000	p=.000
df,a	164 / 46		146 / 44		113 / 40		98 / 38	84 / 36
SRMR	.042		.040		.033		.032	.026
RMSEA	.069		.071		.060		.060	.060
	CI=.062-.077		CI=.064-.079		CI=.051-.070		CI=.050-.070	CI=.049-.070
CFI	0.957		0.959		0.974		0.976	0.978
AGFI	0.861		0.864		0.899		0.904	0.910
NFI	0.936		0.939		0.956		0.959	0.962
TLI	0.950		0.952		0.969		0.970	0.972
AIC	557.1		517.4		350.0		309.2	269.7
N	382		382		382		382	382

Removal of PRI1 in the last step has implications similar to PRI4 removal in the step 3. Comparative fit indices are slightly improved. SRMR, which is an absolute index, is improved 25% and dropped to .026. RMSEA is not changed. AIC proves significant improvement in χ^2 by compromising 2 freely estimated variables (PRI1 itself and its error). χ^2_{diff} displays decrease of 35.5 by $\Delta\text{df}=-14$ with p value .0012 which indicates the gain in χ^2 is not significant with probability less than .002 by the removal of PRI1.

Removal of PRI1 and PR4 does not change RMSEA value but helps on the improvement of absolute indices like SRMR and comparative indices TLI, AGFI etc. These removals have no effect on fitting of the model reasonably well in the model. Brown (2006, p. 83) explains that RMSEA compensates for the effect of the model complexity by conveying discrepancy in fit (not exact but reasonably fit) per each df. Remember the RMSEA formula:

$$RMSEA = \sqrt{\frac{\chi^2 - df}{(N - 1)df}}$$

Numerator in the formula is the fit (non-centrality parameter adjusted by sample size) and divided by degrees of freedom. *Without negatively effecting fitting of the model*, explanation power of hypothesized model is increased (smaller SRMR, less unexplained covariances) by PRI1 and PRI4 deletion. Standardized residual matrix of new model can be checked in the Table 44.

There are only 4 items which are above 1.0 σ in the residual table and 3 of them are related with SYS3 indicator in Table 44.

Table 44. Standardized Residual Covariance Matrix After Step 4.

	PRI3	PRI2	FUL7	FUL6	FUL1	SYS4	SYS3	SYS2	SYS1	EFF8	EFF6	EFF4	EFF3	EFF2	EFF1
PRI3	0														
PRI2	0	0													
FUL7	0.07	0.35	0												
FUL6	0.40	0.45	-0.14	0											
FUL1	-0.41	-0.77	-0.01	0.10	0										
SYS4	-0.37	0.11	0.55	-0.36	-0.06	0									
SYS3	-0.69	-0.40	-0.07	-0.54	-0.68	1.307	0								
SYS2	0.14	0.04	0.35	-0.17	0.02	-0.14	-0.39	0							
SYS1	0.31	0.42	0.62	-0.20	0.42	-0.42	0.07	0.10	0						
EFF8	-0.65	-0.71	0.15	0.23	0.24	-0.27	-0.67	0.78	0.16	0					
EFF6	-0.02	-0.39	-0.32	-0.30	-0.01	-0.24	-0.66	1.15	0.49	0.35	0				
EFF4	0.35	0.38	-0.18	0.62	-0.27	-0.40	-1.180	-0.14	-0.51	0.55	-0.32	0			
EFF3	0.66	0.23	0.28	0.08	0.72	-0.13	-0.93	0.95	0.20	-0.32	-0.36	0.01	0		
EFF2	-0.00	-0.10	-0.22	-1.06	-0.42	-0.75	-1.091	0.06	-0.54	-0.07	0.36	-0.79	0.28	0	
EFF1	0.21	0.46	0.33	0.14	-0.01	-0.53	-0.89	0.36	0.44	-0.41	-0.31	0.45	0.26	0.29	0

SYS3 correlations with EFF2 and EFF4 are over-explained but under-estimated with SYS3. The SYS3 (Web site does not crash) indicator can be removed to cure residual matrix. Table summarizes the impact of the removal of SYS3 on goodness-of-fit of data and explanation power of the model.

Table 45. Fit Measures of Step 5

	Step 1	Step2	Step3	Step4	Step5
	FUL4trimmed model	FUL4, EFF5, EFF7 trimmed model	FUL4, EFF5, EFF7, PRI4 trimmed	FUL4, EFF5, EFF7, PRI4, PRI1 trim.	FUL4, EFF5, EFF7, PRI1, PRI4,SYS3 tr.
χ^2	429.4	270.0	233.2	197.7	146.4
	p=.000	p=.000	p=.000	p=.000	p=.000
df, <i>a</i>	146 / 44	113 / 40	98 / 38	84 / 36	71 / 34
SRMR	.040	.033	.032	.026	.021
RMSEA	.071	.060	.060	.060	.053
	CI= .064- .079	CI= .051- .070	CI= .050- .070	CI= .049- .070	CI= .041- .065
CFI	.959	.974	.976	.978	.984
AGFI	.864	.899	.904	.910	.926
NFI	.939	.956	.959	.962	.969
TLI	.952	.969	.970	.972	.979
AIC	517,4	350.0	309,2	269,7	214,4
N	382	382	382	382	382

The removal of SYS3 has improved fit measure RMSEA substantially (.053), but exact fit is still a problem as in previous models. $\chi^2(71, p = .01) = 101.6 < 146.4$. AIC shows significant improvement in χ^2 by compromising 2 freely estimated variables (SYS3 itself and its error). χ^2_{diff} displays decrease of 51.3 by $\Delta\text{df}=-13$ with p value¹² less than .001.

With the indication of SRMR value of 0.02, it is expected that the residual matrix will display a few strains (Table 46).

¹² $\Delta\chi^2 = 197.7 - 146.4 = 51.3$ and $\Delta\text{df} = 84 - 71 = 13$. $\chi^2(13, p=.001)=34,5 < 51.3 (= \Delta\chi^2)$

Table 46. Standardized Residual Covariance Matrix of Step 5.

	PRI3	PRI2	FUL7	FUL6	FUL1	SYS4	SYS2	SYS1	EFF8	EFF6	EFF4	EFF3	EFF2	EFF1
PRI3	0													
PRI2	0	0												
FUL7	0.07	0.36	0											
FUL6	0.40	0.47	-0.13	0										
FUL1	-0.41	-0.76	-0.01	0.09	0									
SYS4	-0.23	0.25	0.76	-0.12	0.15	0								
SYS2	-0.13	-0.20	0.12	-0.41	-0.24	0.05	0							
SYS1	0.23	0.35	0.59	-0.23	0.38	0.01	-0.03	0						
EFF8	-0.65	-0.70	0.15	0.24	0.24	-0.17	0.37	-0.01	0					
EFF6	-0.03	-0.39	-0.33	-0.3	-0.02	-0.15	0.74	0.31	0.34	0				
EFF4	0.35	0.37	-0.18	0.62	-0.27	-0.30	-0.51	-0.66	0.55	-0.32	0			
EFF3	0.66	0.23	0.28	0.08	0.71	-0.04	0.56	0.03	-0.33	-0.37	0.01	0		
EFF2	-0.02	-0.09	-0.21	-1.048	-0.43	-0.65	-0.32	-0.69	-0.07	0.36	-0.77	0.28	0	
EFF1	0.20	0.47	0.33	0.15	-0.01	-0.43	-0.04	0.28	-0.41	-0.31	0.46	0.25	0.3	0

All residuals are less than 1 σ value except for one (over-explained EFF2-FUL6 covariance 1.048 σ).

Elements in the Modification Index (M.I.) tables are shortened after the fifth re-specification step. EFF2-FUL6 strain is observed from M.I. of Regression weights table (Table 47).

Table 47. Modification Indices of Regression Weights of Step 5.

	M.I.	Par Change
FUL1 \leftarrow PRI2	4.063	-0.055
EFF2 \leftarrow FUL6	5.717	-0.072
EFF2 \leftarrow EFF4	4.086	-0.054

Note. Par change column is the expected estimate of correlation of pair if the calculation allowed freely.

There is no conceptual proof of cross loadings of FUL1 by PRI2, EFF2 by FUL6 or EFF4. Next step is to observe the M.I. of error correlations in Table 48.

Table 48. Modification Indices of Covariances After Step 5.

	M.I.	Par Change
ef1 ↔ ep2	4.240	-0.035
ee8 ↔ PRI	7.966	-0.053
ee6 ↔ SYS	5.687	0.035
ee6 ↔ es2	5.648	0.030
ee6 ↔ ee8	5.552	0.030
ee4 ↔ SYS	5.046	-0.038
ee4 ↔ ef2	10.209	0.052
ee4 ↔ ee8	9.428	0.0470
ee2 ↔ EFF	4.255	0.030
ee2 ↔ ef2	8.132	-0.040
ee2 ↔ ee6	4.529	0.030
ee2 ↔ ee4	13.701	-0.060
ee1 ↔ es1	5.105	0.029
ee1 ↔ ee8	9.162	-0.035
ee1 ↔ ee6	4.402	-0.026
ee1 ↔ ee4	6.162	0.036

Par change column in Table 48 indicates some errors are negatively correlated.

Efficiency questions are all affirmative and measuring in the same direction (1- strongly disagree, 5- strongly agree) like all E-S-Qual indicators. Therefore, negatively correlated errors have no theoretical explanation, and only positively correlated relations are taken into consideration (ee4↔ee8, ee6↔ee8, ee2↔ee6, ee1↔ee4). The covariance of two errors is freely calculated when two questions are similarly worded or measuring the same thing with reversed wording (Brown, 2006, p. 160). This situation is an example of the influence of method effects. Brown (2006) has explained the covariance among such items is not based on the influence of distinct and substantively important latent dimensions and that it reflects an artifact of response styles associated with the

items' wording. The remaining *efficiency* questions' wording can be checked by using the Table 49.

Table 49. Efficiency Questions After Step 5.

	English	Turkish (displayed in Questionnaire form)
EFF1	This site makes it easy to find what I need.	Site, ihtiyacım olan hizmetleri kolayca bulmamı sağlamaktadır.
EFF2	It makes it easy to get anywhere on the site.	İnternet Bankacılığı sitesi içinde gezinmek çok kolaydır.
EFF3	This site enables me to complete a transaction quickly.	Site, işlemleri hızla sonuçlandırmamı sağlamaktadır.
EFF4	(Customer/product/transaction/market) information at this site is well organized.	Sitede gösterilen bilgiler (müşteri/ ürün/ işlem/ piyasa) çok iyi düzenlenmiştir.
EFF6	This site is simple to use.	Sitenin kullanımı basittir.
EFF8	This site is well organized.	Sitenin düzenlemesi başarılıdır.

ee4↔ee8: A reasoning such as “If the information is well organized, site considered to be well organized or vice versa” indicates that EFF4 and EFF8 are similarly worded and the correlation of errors between these two indicators can be observed.

ee6↔ee8: reasoning such as “Well organized information on the site makes it simple to use or vice versa” may indicate correlation of errors between these two indicators.

ee2↔ee6: reasoning such as “Easy navigation on the site, makes it simple to use or vice versa” may indicate correlation of errors between these two indicators.

ee1↔ee4: reasoning such as “Well organized information on the site makes me to find what I need or If I find what I need easily, the information on this site is well organized” may indicate correlation of errors between these two indicators.

In model re-specification process, Brown (2006) warns about setting transitive error correlations, i.e., there should not be $e1 \leftrightarrow e3$ error correlations after setting of $e1 \leftrightarrow e2$ and $e2 \leftrightarrow e3$ correlations. There is no correlation set in transitive manner in the discussions so far in this study.

CFA output is displayed on Table 50 and calculated by estimating the parameters with the error correlations indicated above.

Table 50. Fit Measures After Step 6.

	Step1	Step2	Step3	Step4	Step5	Step6 ee4↔ee8, ee6↔ee8, ee2↔ee6, ee1↔ee4
χ^2	429.4	270.0	233.2	197.7	146.4	108.0
	p=.000	p=.000	p=.000	p=.000	p=.000	p=.001
df, <i>a</i>	146 / 44	113 / 40	98 / 38	84 / 36	71 / 34	67 / 38
SRMR	.040	.033	.032	.026	.021	.020
RMSEA	.071	.060	.060	.060	.053	.040
	CI=.064-.079	CI=.051-.070	CI=.050-.070	CI=.049-.070	CI=.041-.065	CI=.025-.054
CFI	.959	.974	.976	.978	.984	.991
AGFI	.864	.899	.904	.910	.926	.942
NFI	.939	.956	.959	.962	.969	.977
TLI	.952	.969	.970	.972	.979	.988
AIC	517.4	350.0	309.2	269.7	214.4	184.0
N	382	382	382	382	382	382

RMSEA value (.04) is now lower than good fit threshold (.05) and its upper bound is .054, which means all RMSEA distribution is almost in the good fit range. All comparative indices are close to 0.99 and AGFI model parsimony correction is 0.94 which is also in good fit range.

AIC has improved as the number of parameters freely estimated has increased by 4 (i.e., ee4↔ee8, ee6↔ee8, ee2↔ee6, ee1↔ee4). χ^2_{diff} displays decrease of 38.4 by $\Delta\text{df}=-4$ with p value¹³ much less than .001.

Table 51. Standardized Residual Covariance Matrix After Step 6.

	PRI3	PRI2	FUL7	FUL6	FUL1	SYS4	SYS2	SYS1	EFF8	EFF6	EFF4	EFF3	EFF2
PRI3	0												
PRI2	0	0											
FUL7	0.064	0.361	0										
FUL6	0.408	0.477	-0.123	0									
FUL1	-0.418	-0.764	-0.023	0.098	0								
SYS4	-0.226	0.254	0.752	-0.109	0.144	0							
SYS2	-0.13	-0.202	0.109	-0.4	-0.248	0.054	0						
SYS1	0.226	0.35	0.582	-0.227	0.367	0.007	-0.034	0					
EFF8	-0.563	-0.613	0.292	0.405	0.39	-0.023	0.535	0.143	0.024				
EFF6	0.03	-0.328	-0.219	-0.169	0.097	-0.033	0.862	0.427	0.091	0.011			
EFF4	0.541	0.551	0.078	0.908	-0.006	-0.039	-0.219	-0.381	0.014	0.274	-0.025		
EFF3	0.487	0.073	0.128	-0.059	0.551	-0.199	0.375	-0.145	-0.214	-0.297	0.279	0	
EFF2	-0.108	-0.191	-0.29	-1.115	-0.509	-0.74	-0.417	-0.791	0.147	0.051	-0.421	0.112	0
EFF1	0.1	0.37	0.255	0.087	-0.089	-0.513	-0.127	0.181	-0.185	-0.133	-0.052	0.087	0.225

There is no unexplained covariance with 1 σ error with the only exception that is FUL6-EFF2 covariance with the value of 1.04.

¹³ $\Delta\chi^2 = 146.4 - 108.0 = 38.4$ and $\Delta\text{df} = 71 - 67 = 4$. $\chi^2(4, p=.001)=18.5 < 38.4 (= \Delta\chi^2)$

Table 52. Modification Indices for Covariances After Step 6

	M.I.	Par Change
ef1 ↔ PRI	4.07	-0.043
ef1 ↔ ep2	4.28	-0.035
ee8 ↔ PRI	7.94	-0.052
ee6 ↔ SYS	6.37	0.037
ee6 ↔ es2	4.72	0.027
ee4 ↔ ef2	8.05	0.045
ee2 ↔ SYS	5.06	-0.033
ee2 ↔ EFF	7.2	0.038
ee2 ↔ ef2	6.75	-0.036
ee2 ↔ ee4	6.74	-0.041
ee1 ↔ es1	5.42	0.029
ee1 ↔ ee2	4.48	0.025

M.I. table indicates that EFF1 and EFF2 are positively correlated and expected correlation value is .025 (Table 52), if they are freely estimated. M.I.values of regression weights on Table are the same elements as in Table 47 and there is no conceptual rational to handle these indicators.

Table 53. Modification Indices for Regression Weights After Step 6.

	M.I.	Par Change
FUL1 ← PRI2	4.12	-0.055
EFF2 ← FUL6	6.08	-0.073
EFF2 ← SYS1	4.12	-0.056

Error correlation ee1↔ee2 can be set by the conceptual reasoning that is “Navigation in this site is easy and make me to find what I need or vice versa”. In step 7, ee1↔ee2 correlation was set and CFA has been conducted again (Table 54).

Table 54. Fit Measures of Step 7.

Index	Step1	Step2	Step3	Step4	Step5	Step6	Step 7 ee1↔ee2
χ^2	429.4	270.0	233.2	197.7	146.4	108.0	101.8
	p=.000	p=.000	p=.000	p=.000	p=.000	p=.001	p=.003
df, <i>a</i>	146 / 44	113 / 40	98 / 38	84 / 36	71 / 34	67 / 38	66 / 39
SRMR	.040	.033	.032	.026	.021	.020	.019
RMSEA	.071	.060	.060	.060	.053	.040	.038
A	CI=.064-.079	CI=.051-.070	CI=.050-.070	CI=.049-.070	CI=.041-.065	CI=.025-.054	CI=.022-.052
CFI	.959	.974	.976	.978	.984	.991	.992
AGFI	.864	.899	.904	.910	.926	.942	.944
NFI	.939	.956	.959	.962	.969	.977	.979
TLI	.952	.969	.970	.972	.979	.988	.99
AIC	517.4	350.0	309.2	269.7	214.4	184.0	179.8
N	382	382	382	382	382	382	382

CFI and TLI values are above .99, AGFI is .94, and NFI is .98, which indicates good fit of the model (Schermelleh-Engel, Moosbrugger, & Müller, 2003). AIC is improved with free estimation of ee1↔ee2, since the decrease in χ^2 is more than 2 (i.e., 2a).

Modification indices tables are presented in Table 55 and Table 56 in which there is no correlation observed that can be conceptually proved for further free calculation of parameters.

Table 55. Modification Indices of Covariances After Step 7.

	M.I.	Par Change
ef1 ↔ PRI	4.07	-0.043
ef1 ↔ ep2	4.23	-0.035
ee8 ↔ PRI	8.01	-0.052
ee6 ↔ SYS	5.45	0.034
ee6 ↔ es2	4.22	0.026
ee4 ↔ ef2	7.34	0.043
ee2 ↔ EFF	5.32	0.032
ee2 ↔ ef2	6.19	-0.034
ee1 ↔ es1	6.65	0.032

Table 56. Modification Indices of Regression Weights After Step 7.

	M.I.	Par Change
FUL1 ← PRI2	4.11	-0.055
EFF2 ← FUL6	4.71	-0.064

SYS1 → EFF2 value has dropped below 4.0 and did not appear anymore in the regression weights¹⁴. There is no more conceptually sounding clue to amend the model for better fit.

Estimated regression weights of the final (re-specified) model are presented in the Table 57.

Table 57. Regression Weights of Re-specified Model.

	Estimate	S.E.	C.R.	p	Standardized Estimate
EFF1 ← EFF	1				.880
EFF2 ← EFF	1.015	0.04	24.5	***	.852
EFF3 ← EFF	0.957	0.04	22.6	***	.851
EFF4 ← EFF	0.991	0.05	22.1	***	.795
EFF6 ← EFF	1.052	0.05	22.7	***	.863
EFF8 ← EFF	1.06	0.05	23.5	***	.879
SYS1 ← SYS	1				.881
SYS2 ← SYS	1.004	0.04	25.3	***	.919
SYS4 ← SYS	0.977	0.05	20.3	***	.808
FUL1 ← FUL	1				.873
FUL6 ← FUL	0.935	0.04	22	***	.871
FUL7 ← FUL	1.023	0.05	19.8	***	.819
PRI2 ← PRI	1				.877
PRI3 ← PRI	0.918	0.05	19.1	***	.937

Note. *** Characters on the probability column mean that p value is less than .001

Critical ratio (C.R.), which is ratio of Estimate to Standard Error (S.E.), shows calculated regression weights and all weights are approximately 20σ above zero and significantly different from zero at p value less than .001 in all variables.

¹⁴ AMOS displays M.I. values above 3.84, i.e., critical value of $\chi^2(df=1, p=.05)$. (Brown, 2006, p. 122)

The standardized estimates of loadings of the re-specified model are presented in the last column of the Table 57. There is no negative loading which can be the signal of false loading relation or reversed question. All standardized loadings are greater than .707, i.e. more than half of the indicators' variances are explained by their factors.

The covariance and correlation tables of the re-specified model are given in Table 58 and Table 59 respectively.

Table 58. Predicted Covariances of Re-specified Model.

	Estimate	S.E.	C.R.	P
EFF ↔ SYS	0.560	0.052	10.753	***
EFF ↔ FUL	0.503	0.005	10.110	***
EFF ↔ PRI	0.413	0.005	8.253	***
SYS ↔ FUL	0.543	0.053	10.212	***
SYS ↔ PRI	0.466	0.054	8.588	***
FUL ↔ PRI	0.501	0.055	9.108	***
ee4 ↔ ee8	0.007	0.018	3.895	***
ee6 ↔ ee8	0.039	0.016	2.475	0.013
ee2 ↔ ee6	0.038	0.016	2.388	0.017
ee1 ↔ ee4	0.006	0.017	3.552	***
ee1 ↔ ee2	0.036	0.015	2.406	0.016

Estimated Covariances of errors are significant with $p < .02$ whereas covariances among factors have significance with p value less than 0.001. Directions (signs) of covariances are as expected.

Table 59. Predicted Correlations of Re-specified Model.

	Estimated correlations
EFF ↔ SYS	0.804
EFF ↔ FUL	0.734
EFF ↔ PRI	0.552
SYS ↔ FUL	0.754
SYS ↔ PRI	0.594
FUL ↔ PRI	0.649
ee4 ↔ ee8	0.241
ee6 ↔ ee8	0.165
ee2 ↔ ee6	0.15
ee1 ↔ ee4	0.224
ee1 ↔ ee2	0.163

All correlations are positive as they are expected and correlations are in the range between one and zero. There are no offending estimates.

Table 60. Predicted Inter-item Correlations of Re-specified Model.

	PRI3	PRI2	FUL7	FUL6	FUL1	SYS4	SYS2	SYS1	EFF8	EFF6	EFF4	EFF3	EFF2	EFF1
PRI3	1													
PRI2	.822	1												
FUL7	.498	.466	1											
FUL6	.529	.495	.713	1										
FUL1	.53	.496	.715	.76	1									
SYS4	.45	.421	.499	.531	.532	1								
SYS2	.511	.479	.567	.603	.605	.742	1							
SYS1	.49	.459	.544	.579	.58	.712	.81	1						
EFF8	.455	.426	.529	.562	.563	.571	.649	.623	1					
EFF6	.446	.418	.519	.552	.553	.561	.637	.611	.798	1				
EFF4	.411	.385	.478	.508	.51	.517	.587	.563	.768	.686	1			
EFF3	.44	.412	.512	.544	.546	.553	.629	.603	.748	.734	.677	1		
EFF2	.441	.413	.513	.545	.546	.554	.63	.604	.749	.775	.677	.725	1	
EFF1	.455	.426	.529	.563	.564	.572	.65	.624	.773	.759	.764	.749	.79	1

Table 61. Estimated Variances of Re-specified Model.

	Estimate	S.E.	C.R.
EFF	0.663	0.062	10.723
SYS	0.73	0.068	10.704
FUL	0.708	0.068	10.437
PRI	0.842	0.085	9.955
ee1	0.193	0.019	9.95
ee2	0.258	0.024	10.554
ee3	0.231	0.021	11.129
ee4	0.379	0.033	11.667
ee6	0.252	0.024	10.51
ee8	0.22	0.021	10.24
es1	0.21	0.022	9.635
es2	0.136	0.018	7.552
es4	0.371	0.032	11.702
ef1	0.222	0.024	9.188
ef2	0.197	0.021	9.259
ef3	0.364	0.034	10.861
ep2	0.253	0.039	6.445
ep3	0.099	0.03	3.294

Heywood cases are not observed and the solution is admissible.

Table 62. Standardized Residual Covariance Matrix of Re-specified Model.

	PRI3	PRI2	FUL7	FUL6	FUL1	SYS4	SYS2	SYS1	EFF8	EFF6	EFF4	EFF3	EFF2	EFF1
PRI3	0													
PRI2	0	0												
FUL7	0.067	0.366	0											
FUL6	0.404	0.476	-0.12	0										
FUL1	-0.42	-0.76	-0.02	0.093	0									
SYS4	-0.22	0.258	0.76	-0.11	0.148	0								
SYS2	-0.13	-0.20	0.111	-0.41	-0.25	0.05	0							
SYS1	0.231	0.358	0.593	-0.22	0.374	0.015	-0.04	0						
EFF8	-0.62	-0.67	0.179	0.279	0.266	-0.15	0.389	0.014	0.014					
EFF6	-0.01	-0.37	-0.31	-0.27	-0.01	-0.13	0.74	0.321	0.089	0.016				
EFF4	0.499	0.514	-0.01	0.809	-0.1	-0.13	-0.33	-0.48	-0.01	0.2	-0.02			
EFF3	0.463	0.053	0.059	-0.14	0.473	-0.28	0.281	-0.22	-0.29	-0.35	0.232	0		
EFF2	-0.01	-0.09	-0.21	-1.04	-0.43	-0.66	-0.34	-0.71	0.267	0.051	-0.29	0.283	-0.01	
EFF1	0.181	0.45	0.303	0.13	-0.04	-0.47	-0.08	0.234	-0.11	-0.03	-0.09	0.22	-0.07	-0.02

All residuals are less than 1 σ value except over-explained EFF2-FUL6 covariance (1.042 σ).

Re-specified (14-item) model after step 7 is displayed with standardized parameters in the Figure 3.

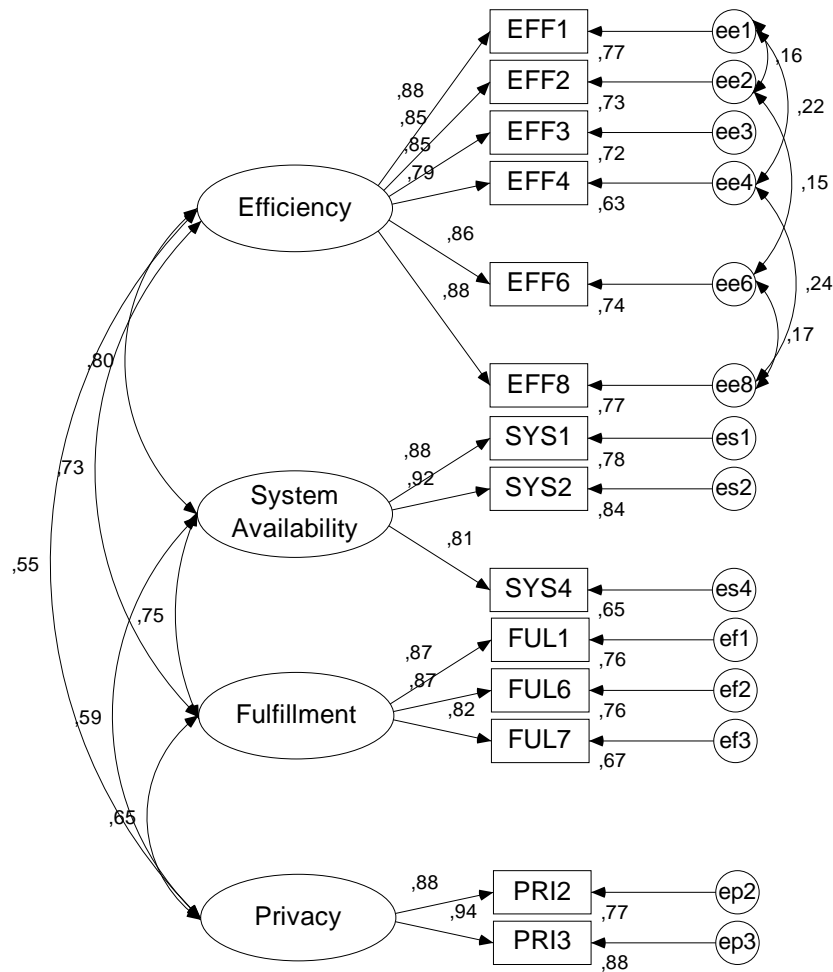


Figure 3. Re-specified (14-item) E-S-Qual model with standardized parameter estimations.

Goodness-of-fit indices of the 14-item model: $\chi^2=101.8$, $p=.003$, $df=66$,

SRMR=.02, RMSEA=.038 (CI=.022-.052), CFI=.99, AGFI=.94, NFI=.98, TLI=.99.

Convergent and Discriminant Validity of Re-specified Model

Shared variance figures are above the diagonal; Average Variance Extracted

(AVE) figures are bold and on diagonal and correlations are below the diagonal of Table 63.

Table 63. Shared Variance and Average Variance Extracted.

	EFF	SYS	FUL	PRI
EFF	.74	.65	.54	.30
SYS	.80	.76	.57	.35
FUL	.73	.75	.74	.42
PRI	.55	.59	.65	.82

Variance extracted estimates are .50 and above, and significant t-values indicated convergent validity among items in a given scale Fornell and Larcker (1981). For all of the four subscales, *efficiency*, *system availability*, *fulfillment*, and *privacy*, the factor loadings were high and significant, satisfying the criteria for convergent validity (the last column of Table 57).

AVE is calculated with the formula given by Fornell and Larcker (1981):

$$\rho = \frac{\sum_{i=1}^p \lambda_i^2}{\sum_{i=1}^p \lambda_i^2 + \sum_{i=1}^p Var(\varepsilon_i)}$$

Range of inter-factor correlations, which are below the diagonal of Table 63, is between .55 and .80 and all are not exceeding cutoff criterion, i.e., .85 for problematic discriminant validity (Brown, 2006, p. 166). Although factor correlations are fulfilling the discriminant validity cutoff criterion, AVE values (i.e., diagonal of Table 63) must be compared with covariances of factors (i.e., above diagonal of Table 63). Comparison of each AVE figure as follows:

- i) AVE for *efficiency* is .74 and (.74 > .65) and (.74 > .54) and (.74 > .30)
- ii) AVE for *system availability* is .76 and (.76 > .65) and (.76 > .57) and (.76 > .35)
- iii) AVE for *fulfillment* is .74 and (.74 > .57) and (.74 > .54) and (.74 > .42)

iv) AVE for *privacy* is .82 and (.82 > .42) and (.82 > .35) and (.82 > .30).

Each factor's average variance extracted is larger than its respective covariance with the other factors. Therefore, the re-specified model of this study has passed the discriminant validity test suggested by Fornell and Larcker (1981).

Another method to assess the discriminant validity is tested by setting each of the inter-factor correlations (one at a time) to one (unity) in the model. CFA outputs of each step displayed in Table 64.

Table 64. Discriminant Validity Test of Factors in Re-specified Model.

Model and changes	χ^2	$\Delta\chi^2$	df	Δdf	Comparison for discrimination
Re-specified Model	101.8		66		
Model with EFF↔SYS=1	139.2	37.4	67	1	$\chi^2(1.p=.001)=10.8 < 37.4 (= \Delta\chi^2)$
Model with SYS↔FUL=1	140.4	38.6	67	1	$\chi^2(1.p=.001)=10.8 < 38.6 (= \Delta\chi^2)$
Model with FUL↔PRI=1	144.1	42.3	67	1	$\chi^2(1.p=.001)=10.8 < 42.3 (= \Delta\chi^2)$
Model with EFF↔FUL=1	149.3	47.5	67	1	$\chi^2(1.p=.001)=10.8 < 47.5 (= \Delta\chi^2)$
Model with EFF↔PRI=1	162.7	60.9	67	1	$\chi^2(1.p=.001)=10.8 < 60.9 (= \Delta\chi^2)$
Model with SYS↔PRI=1	149.6	47.8	67	1	$\chi^2(1.p=.001)=10.8 < 47.8 (= \Delta\chi^2)$

All changes in the χ^2 after setting the correlation between factors to one each time, are above the chi-square value (10.8) which is significant at $p < .001$ with $df=1$. Second test of discriminant validity is passed.

Reliability

Since there are correlations between error items of *efficiency* indicators, Cronbach's alpha calculations probably mislead for the reliability of factor. (Fornell & Larcker, 1981). The reliability for a construct given by Fornell and Larcker (1981) given by the formula:

$$\rho = \frac{(\sum_{i=1}^p \lambda_i)^2}{(\sum_{i=1}^p \lambda_i)^2 + \sum_{i=1}^p Var(\varepsilon_i)}$$

Alpha values calculated in Table 65 and are above .9. Reliability of factors is maintained when *fulfillment* is considered as .9.

Table 65. Reliability of Re-specified Model's factors.

	EFF	SYS	FUL	PRI
Alpha	.945	.905	.893	.903

Nomological Validity

For the nomological validation of model, factors were introduced as indicators of *perceived value* and they have been calculated as the averages of indicators in the re-specified 14-item model. *Perceived value* and *loyalty* scores are similarly calculated averaging the answers under each construct.

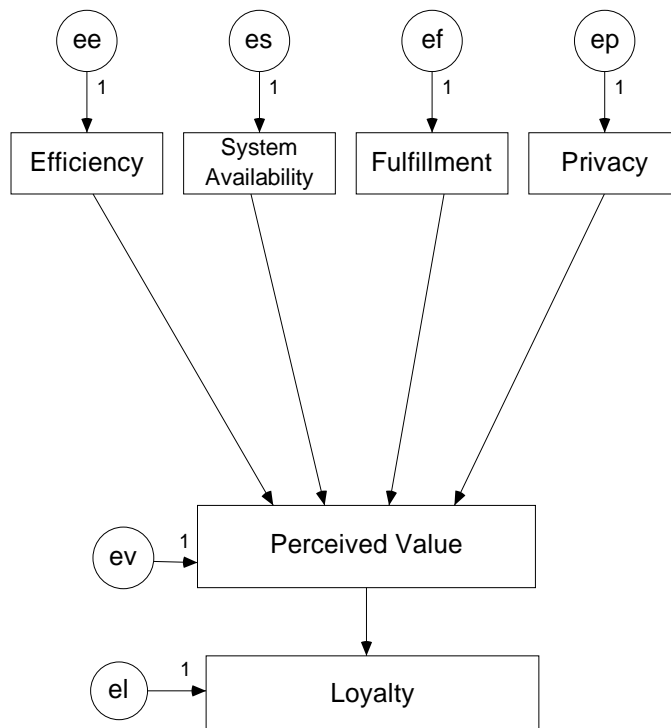


Figure 4. Nomological model

Table 66. Regression Weights of Nomological Model.

	Estimate	S.E.	C.R.	P
Perceived Value ← Efficiency	0.418	0.075	5.534	***
Perceived Value ← System Availability	0.335	0.072	4.624	***
Perceived Value ← Fulfillment	0.359	0.074	4.886	***
Perceived Value ← Privacy	0.470	0.07	6.734	***
Loyalty ← Perceived Value	0.391	0.02	19.266	***

All estimates are significant and as seen from Table 66, *privacy* has the highest contribution on *perceived value* (.470), others relatively lower impact. All variables are in the same metric (5-point Likert) and their un-standardized coefficients can be comparable as well as the correlations. *Loyalty* has loading coefficient value of 0.391. *Perceived value* has values one to ten, whereas *loyalty* values are one to five.

Since Maximum Likelihood estimation is used, it is expected to see the same results in SPSS. Two models were constructed

$$PEV = \beta_1 EFF + \beta_2 SYS + \beta_3 FUL + \beta_4 PRI + C_1 \quad (\text{Model 1})$$

$$LOY = \beta_5 PEV + C_2 \quad (\text{Model 2})$$

Table 67. Regression Output-1 of Nomological Model.

Model1	Unstandardized Coefficients		Std. Coef.	T-value	Sig.
	B	Std. Error	Beta		Std. Error
(Constant)	1.109	0.363		3.056	0.002
EFF	0.417	0.117	0.207	3.557	***
SYS	0.335	0.116	0.173	2.875	0.004
FUL	0.359	0.113	0.183	3.181	0.002
PRI	0.470	0.089	0.252	5.276	***

Note. Dependent Variable: *Perceived value*

Perceived value and *loyalty* model has been constructed similarly regressed in SPSS and results are tabulated in Table 68.

Table 68. Regression Output-2 of Nomological Model.

	Unstandardized Coefficients		Standardized Coefficient		Sig.
	B	Std. Error	Beta	T	
Model 2					
(Constant)	1.072463	0.13242		8.098957	7.62E-15
Perceived Value	0.390524	0.017006	0.762369	22.96449	8.11E-74

Note. Dependent Variable: *Loyalty*

Akinci et al. (2010) have found standardized path coefficients as 0.29 (EFF), 0.15 (SYS), 0.20 (FUL), 0.07 (PRI). Values are close to the ones in this study except for the *privacy* dimension. In this study, *privacy* has three times higher impact on *perceived value* than in Akinci et al.'s (2010) study. However, as seen in the studies about adoption of Internet banking, confidentiality and security issues are the top important issues for Internet banking users. Re-constructed PRI3 question in this study has provided strong measurement power for *privacy* and makes it to have the highest direct effect on *perceived value*. However, PRI3 has eliminated in Akinci et al.'s (2010) study.

Table 69. R-squared Values of Regression Estimates.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Predictors
1	.68372	.467473	.461823	1.272818	(Constant), PRI, EFF, FUL, SYS
2	.762369	.581206	.580104	0.575913	(Constant), Perceived value

Loyalty-perceived value regression (model 2) has better R-squared value than 4-factor *perceived value* model has (Table 69).

As it has been observed in the reliability analysis, Cronbach's alpha calculations of *perceived value* warned about the removal of PEV1 indicator which makes remaining PEV indicators more reliable. Therefore, PEV score is calculated by averaging PEV2, PEV3 and PEV4 indicators and regression on the

SPSS has been re-run. Outcomes are summarized in the Table 70 with previous regressions with 4-item PEV score.

Table 70. Comparison of Regressions with 4-item and 3-item PEV Scales

	Model 1					Model 2	
	Predictors: PRI, EFF, FUL, SYS					Predictor: PEV	
	Dependent: PEV					Dependent: LOI	
	EFF	SYS	FUL	PRI	Adj. R ²	PEV	Adj. R ²
4-item PEV	.21	.17	.18	.25	.48	.76	.58
3-item PEV	.31	.16	.16	.24	.52	.77	.60

Values in the table are standardized values and the weight of *efficiency* changes to the value (.31) with the highest effect on *perceived value* with the removal of PEV1 variable. R-square values have little improvement with 3-item PEV scale. Coefficients calculated for 3-item PEV in the models are significant at .005 or less probability.

Comparison of Akıncı et al.'s Model

Akıncı et al.'s (2010) re-specified model in

Figure 6 is tested with the sample used in this study and compared with model developed in the Table 71. Items in Akıncı et al.'s model (

Figure 6) have been deployed as the same in this study and data collected in this study for these indicators can be used to test Akıncı et al.'s model. In this comparison, the re-specified model in this study has better goodness-of-fit results and delivered a more parsimonious solution with the sample of this study.

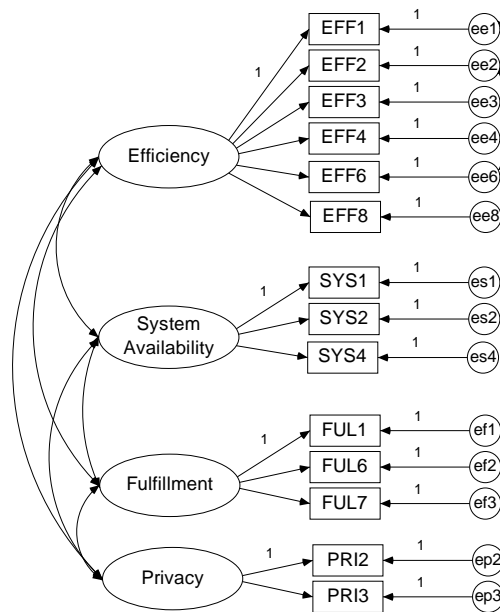


Figure 5. Re-specified model of this study.

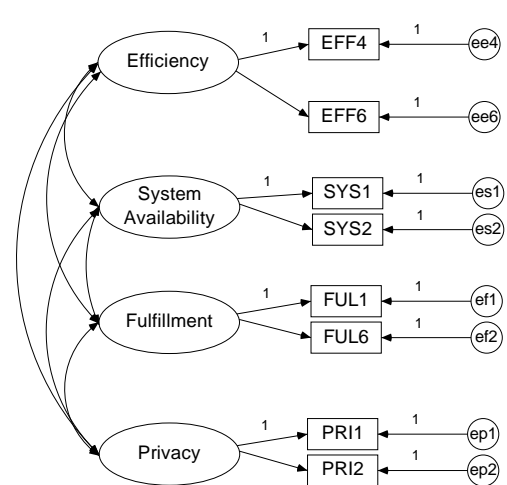


Figure 6. Akıncı et al.'s (2010) re-specified model.

Table 71. Fit Measures' Comparison of Internet Banking Models.

	Akıncı et al.'s (2010) re-specified model	Re-specified Model of this study(after step7)
χ^2	32.2 p=.004	101.8 p=.003
df, <i>a</i>	14 / 22	66 / 39
SRMR	.020	.019
RMSEA	.058	.038
	CI= .032-.085	CI= .022-.052
CFI	.991	.992
AGFI	.945	.944
NFI	.984	.979
TLI	.982	.99
AIC	76.2	179.8
N	382	382

CHAPTER 5

CONCLUSION

In this study, the 22-item E-S-Qual model developed by Parasuraman et al. (2005) is adapted for Internet banking, and then the model re-specified with sample of 382 observations. Akıncı et al. (2010) have operationalized E-S-Qual previously in the same service category. Questions adapted for internet banking by Akıncı et al. (2010) were taken into consideration in the model design of this study.

Akıncı et al. (2010) have surveyed the academic staff of 81 universities in Turkey. In this study, a more diversified sample in occupation attribute is targeted in order to verify that E-S-Qual is a valid model to measure service quality in Internet banking services as Akıncı et al. (2010) discovered.

As briefly explained in the literature review section of this study, there were several studies on the adoption of Internet banking (Durer, Özsüzgün-Çalışkan, Akbaş, & Gündoğdu, 2009; Lee, Lee, & Kim, 2007; Ming-Chi, 2009; Dixit & Datta, 2010). In these studies, security and privacy are the essential dimensions in customers' intention to use the e-banking services. Security-privacy was discovered as the most influential factor for the acceptance and intention to use of internet banking by Dixit and Datta (2010). However, the *privacy* factor has lowest direct effect in Akıncı et al.'s (2010) path model analysis. Standardized factor loadings for *efficiency*, *system availability*, *fulfillment* and *privacy* factors are .29, .15, .20 and .07, respectively. The magnitude of the standardized direct effect of *privacy* is by far lower than that of

the other factors (one fourth of Efficiency, half of the *system availability* and one third of *fulfillment*). In order to construct a model which has a *privacy* dimension with strong contribution to the customer's perceived value and is not contrary to previous research findings, E-S-Qual *privacy* indicators were examined closely, and PRI3 indicator was re-constructed as explained in the Research Design section in this study. With reliable and valid PRI3 measure, *privacy* is positioned relatively stronger in direct effect outcomes in the re-specified model of this study.

The final construct has 4 factors and 14 items. Four factors with the number of their indicators are as follows:

- *Efficiency* (6)
- *System availability* (3)
- *Fulfillment* (3)
- *Privacy* (2)

Factors in re-specified 14-item model are measured with the following indicators.

Table 72. Efficiency Indicators of Re-specified Model.

EFF1	This site makes it easy to find what I need.
EFF2	It makes it easy to get anywhere on the site.
EFF3	This site enables me to complete a transaction quickly.
EFF4	(Customer/ product/ transaction/ market) information at this site is well organized (Original Question: Information at this site is well organized.)
EFF6	This site is simple to use.
EFF8	This site is well organized

EFF5 (*It loads pages fast*) and EFF7 (*Authentication and authorization process is completed easily and I can get on to it quickly*) are eliminated after the CFA analysis. They are both related how fast the site is. The speed of the web-site is measured with a similar question SYS2 (*Web site launches and runs right away*) under *system availability* factor. SYS2 question measures initial launching speed of the site and how fast it gets action. SYS2 sounds very similar to the original EFF7 question (*This site enables me to get on it quickly*). So as to differentiate these two questions, EFF7 question is elaborated by augmenting authentication¹⁵ and authorization¹⁶ steps: *Authentication and authorization process is completed easily and I can get on to it quickly*. Therefore, EFF7 was positioned to detect the complexity and speed of the authentication process. Speed related questions are so entangled that efforts of enhancements do not create an expected discrepancy between the speed questions' perception by the users, probably because of users' knowledge about technical details. As a result, two of the speed related items were trimmed in the re-specification steps.

In the last two steps of the re-specifications in the data analysis, error correlations are observed between *efficiency* indicators because of similarity in their wordings.

Table 73. System Availability Indicators of Re-specified Model.

SYS1	Web site is always available for business.
SYS2	Web site launches and runs right away.
SYS4	Pages at Web site do not freeze after I click for a transaction (<i>Original question: Pages at Web site do not freeze after I enter my order information</i>).

¹⁵ Who is the user ?

¹⁶ What can user do ?

SYS3 (*My bank's Web site does not crash*) is eliminated because of the model over-estimation or under-estimation of its correlations with *efficiency* indicators. Novice Internet users can have difficulty in identifying the reason for a blank web page; whether it is because of the user connection problems or Internet banking site server is down or there is a missing link. However, our sample consists of frequent Internet users and experts on such problems. Therefore, web site crashes are expected to be evaluated correctly.

Capacity issues caused by high number of user connections and high data traffic over the Internet servers end up with lower response time and sometimes with site crashes. Therefore, site crashes after very slow Internet connections may be considered as the low speed of the Internet site. Up-time statistics followed up closely in IT departments and figures are typically around 99.9%. Very small down-time periods are observed because of optimum investments on IS Technologies and recovery plans for emergency cases like back-up servers in case of malfunctioning (Boru, 2010).

Because of site crashes' correlation with speed and very low observation of down time of Internet services, SYS3 is not considered to be a good measure for Internet banking services' quality.

Table 74. Fulfillment Indicators of Re-specified Model.

FUL1	Transactions like EFT, buying of mutual fund and stock are accomplished within promised time-slots (<i>Original question: It delivers orders when promised</i>).
FUL6	Product/client/transaction/market records at my bank's Web site are always accurate (<i>Original question: It is truthful about its offerings</i>).
FUL7	It makes accurate promises about delivery of products.

Fulfillment items, which are related with delivery of the tangible product, were eliminated before the operationalization because of the Internet banking products characteristics (FUL2: *This site makes item available for delivery within suitable time frame.* FUL3: *It quickly delivers what I order.* FUL5: *It has in stock the items the company claims to have.* FUL4: *It sends out the items ordered*). In this study, three E-S-Qual *fulfillment* indicators applicable for internet banking services were preserved in the model after re-specification process of CFA conducted. FUL4 is re-constructed as “*My bank promptly informs about important situation (payments...) through various channels (SMS, call center etc.)*” by Akıncı et al. (2010). As explained in the research design section, post purchase services are not common via internet due to the zero-time delivery process. Transaction acknowledgement messages are considered as post-purchase service in the in-depth interview with the senior managers of two banks done by Akıncı et al. (2010), and it is inserted as the fulfillment measure. However, FUL4 has been eliminated in the re-specification steps in the analysis of Akıncı et al. (2010). The item is removed from the model because of its low explanation power of *fulfillment* in this study. Transaction acknowledgement feed-back is performed by banks for security purposes. However, there are no cross loadings of the *privacy* factor observed in the EFA work and in modification indices’ tables.

Table 75. Privacy Indicators of Re-specified Model.

PRI2	My bank does not share my personal information with other sites.
PRI3	This site protects information about identity number and password/PIN.

Privacy questions are discussed in detail in the re-specification step 4 in this study. Eliminated indicator PRI4 (*I feel confident about the transactions I made at my bank's Web site*) does not exist in the original E-S-Qual model and re-constructed by Akıncı et al. (2010). PRI4 was not preserved as a measure of *privacy* in the re-specified model of Akıncı et al. (2010) as in this study. In this study, PRI3 which is "This site protects information about my credit card" in E-S-Qual model was reconstructed as "*This site protects information about identity number and password/PIN*". PRI3 is about the security dimension of *privacy* whereas PRI2 is about confidentiality. Akıncı et al.'s (2010) re-specified model in

Figure 6 has only confidentiality items, PRI1 and PRI2. That could be the reason for the relatively smaller magnitude of the standardized direct effect of *privacy* factor in Akıncı et al.'s (2010) study, although *privacy* is considered as the key element by the customers for the intention to use Internet banking services.

Findings give strong empirical evidence for the E-S-Qual scale in the e-service quality measurement of Internet banking business. Further research may focus on the *efficiency* construct by the re-construction of items by enhancing the wordings of items to make customers differentiate the indicators. Parasuraman et al. (2005) have developed E-S-Qual for the settings which sell tangible products. By this study and by Akıncı et al.'s (2010) research, E-S-Qual model is applied for service settings: Internet banking. However, Banks have

physical service encounters (branches) which can provide affective or emotional content and the high spatial proximity of service provider for customers whereas these are very low for Internet banking. Services provided through the physical settings of banks could have a substantial influence on customer satisfaction on e-banking services. However, there are service providers on the Internet which have no brick and mortar setting. Further empirical tests of E-S-Qual may be deployed on the totally virtual service settings.

APPENDICES

Appendix-A: E-S-Qual Question List

Table 76. Legend for Tables

Latent Var.	<i>Name of the factor/scale that indicator constructs</i>
Q. Code	<i>Code for the indicator</i>
Org. Q.	<i>Statement of the indicator by Parasuraman et al. (2005)</i>
Adp.Q	<i>Adapted statement of the indicator by Akıncı et al. (2010)</i>
Q. Turkish	<i>Turkish translation of the indicator which is inserted in survey.</i>
Q.English	<i>English translation of indicators in Turkish and used only for documentation</i>

Web site's performance rated on each scale item using a 5-point Likert scale: 1 = strongly disagree (Kesinlikle katılmıyorum), 5 = strongly agree (Tamamen katılıyorum).

Table 77. EFF1

Latent Var.	Efficiency
Q. Code	EFF1
Org. Q.	This site makes it easy to find what I need.
Adp.Q	My bank's Web site makes it easy to find what I need.
Q. Turkish	Site, ihtiyacım olan hizmetleri kolayca bulmamı sağlamaktadır.
Q.English	This site makes it easy to find what I need.

Table 78. EFF2

Latent Var.	Efficiency
Q. Code	EFF2
Org. Q.	It makes it easy to get anywhere on the site.
Adp.Q	My bank's Web site makes it easy to get anywhere on the site.
Q. Turkish	İnternet Bankacılığı sitesi içinde gezinmek çok kolaydır.
Q.English	It makes it easy to get anywhere on the site.

Table 79. EFF3

Latent Var.	Efficiency
Q. Code	EFF3
Org. Q.	This site enables me to complete a transaction quickly.
Adp.Q	My bank's Web site enables me to complete a transaction quickly.
Q. Turkish	Site, işlemleri hızla sonuçlandırmamı sağlamaktadır.
Q.English	This site enables me to complete a transaction quickly.

Table 80. EFF4

Latent Var.	Efficiency
Q. Code	EFF4
Org. Q.	Information at this site is well organized.
Adp.Q	Information at my bank's Web site is well organized.
Q. Turkish	Sitede gösterilen bilgiler(müşteri/ürün/işlem/piyasa) çok iyi düzenlenmiştir.
Q.English	(Customer/product/transaction/market) information at this site is well organized.

Table 81. EFF5

Latent Var.	Efficiency
Q. Code	EFF5
Org. Q.	It loads its pages fast.
Adp.Q	My bank's Web site loads its pages fast.
Q. Turkish	İnternet Bankacılığı sayfaları çabuk yüklenmektedir.
Q.English	It loads its pages fast.

Table 82. EFF6

Latent Var.	Efficiency
Q. Code	EFF6
Org. Q.	This site is simple to use.
Adp.Q	My bank's Web site is simple to use.
Q. Turkish	Sitenin kullanımı basittir.
Q.English	This site is simple to use.

Table 83. EFF7

Latent Var.	Efficiency
Q. Code	EFF7
Org. Q.	This site enables me to get on to it quickly.
Adp.Q	My bank's Web site enables me to get on to it quickly.
Q. Turkish	Giriş işlemleri (kimlik denetimi ve yetkilendirme) kolayca gerçekleşmekte ve siteye hızla girebilmekteyim.
Q.English	Authentication and authorization process is completed easily and I can get on to it quickly.

Table 84. EFF8

Latent Var.	Efficiency
Q. Code	EFF8
Org. Q.	This site is well organized
Adp.Q	My bank's Web site is well organized.
Q. Turkish	Sitenin düzenlemesi başarılıdır.
Q.English	This site is well organized.

Table 85. SYS1

Latent Var.	System Availability
Q. Code	SYS1
Org. Q.	Web site is always available for business.
Adp.Q	My bank's Web site is always available for business.
Q. Turkish	İnternet sitesi her zaman işlem yapmaya uygun ve ulaşılabilir durumdadır.
Q.English	Web site is always available for business.

Table 86. SYS2

Latent Var.	System Availability
Q. Code	SYS2
Org. Q.	Web site launches and runs right away.
Adp.Q	My bank's Web site launches and runs right away.
Q. Turkish	Site hızla yüklenir ve hemen çalışır.
Q.English	Web site launches and runs right away.

Table 87. SYS3

Latent Var.	System Availability
Q. Code	SYS3
Org. Q.	Web site does not crash.
Adp.Q	My bank's Web site does not crash.
Q. Turkish	İnternet bankacılığı sitesi hiç çökmez
Q.English	My bank's Web site does not crash.

Table 88. SYS4

Latent Var.	System Availability
Q. Code	SYS4
Org. Q.	Pages at Web site do not freeze after I enter my order information.
Adp.Q	Pages at my bank's Web site do not freeze after I enter my order information.
Q. Turkish	Sitede, bir işlemi gerçekleştirmek için tıkladığımda, sayfa donmaz.
Q.English	Pages at Web site do not freeze after I click for a transaction.

Table 89. FUL1

Latent Var.	Fulfillment
Q. Code	FUL1
Org. Q.	It delivers orders when promised.
Adp.Q	My bank's Web site delivers services when promised.
Q. Turkish	EFT, fon-hisse senedi alım vb hizmetler taahhüt edildiği zaman aralıklarında gerçekleşmektedir.
Q.English	Transactions like EFT, buying of mutual fund and stock are accomplished within promised time-slots.

Table 90. FUL2

Latent Var.	Fulfillment
Q. Code	FUL2
Org. Q.	This site makes item available for delivery within suitable time frame.
Adp.Q	<i>Not Applicable (N.A.) for Internet banking & eliminated</i>
Q. Turkish	
Q.English	

Table 91. FUL3

Latent Var.	Fulfillment
Q. Code	FUL3
Org. Q.	It quickly delivers what I order.
Adp.Q	<i>N.A. & eliminated</i>
Q. Turkish	
Q.English	

Table 92. FUL4

Latent Var.	Fulfillment
Q. Code	FUL4
Org. Q.	It sends out the items ordered.
Adp.Q	My bank's Web site promptly informs about important situations (payments...)
Q. Turkish	İnternetten yaptığım önemli işlemlerle ilgili (ödeme vb), bana çeşitli kanallardan (SMS, çağrı merkezi araması gibi) anında bilgi verilir.
Q.English	My bank promptly informs about important situation (payments...) through various channels (SMS, call center etc.)

Table 93. FUL5

Latent Var.	Fulfillment
Q. Code	FUL5
Org. Q.	It has in stock the items the company claims to have.
Adp.Q	<i>N.A. & eliminated</i>
Q. Turkish	
Q.English	

Table 94. FUL6

Latent Var.	Fulfillment
Q. Code	FUL6
Org. Q.	It is truthful about its offerings.
Adp.Q	Records at my bank's Web site are always accurate.
Q. Turkish	Sitedeki bilgiler (ürün/müşteri/işlem/piyasa kayıtları) her zaman doğrudur.
Q.English	Product/customer/transaction/market records at my bank's Web site are always accurate.

Table 95. FUL7

Latent Var.	Fulfillment
Q. Code	FUL7
Org. Q.	It makes accurate promises about delivery of products.
Adp.Q	My bank's Web site makes accurate promises about delivery of services.
Q. Turkish	Hizmet ve ürünleri taahhüt edildiği özelliklerde (faiz oranı, vade, ücret/komisyon) almaktayım.
Q.English	I buy products with promised properties (like interest rate, tenor, fee etc).

Table 96. PRI1

Latent Var.	Privacy
Q. Code	PRI1
Org. Q.	It protects information about my Web-shopping.
Adp.Q	My bank protects information about my Web-shopping.
Q. Turkish	İnternet üzerinde yaptığım bankacılık işlemlerine ilişkin kayıtlar, (3. şahıslara karşı) korunmaktadır.
Q.English	My bank protects information about my banking transactions.

Table 97. PRI2

Latent Var.	Privacy
Q. Code	PRI2
Org. Q.	It does not share my personal information with other sites.
Adp.Q	My bank does not share my personal information with other sites.
Q. Turkish	Bankam, benim kişisel bilgilerimi başka kurum ve kuruluşlarla paylaşmamaktadır.
Q.English	My bank does not share my personal information with other sites.

Table 98. PRI3

Latent Var.	Privacy
Q. Code	PRI3
Org. Q.	This site protects information about my credit card.
Adp.Q	My bank's Web site protects information about my credit card.
Q. Turkish	Şifrem ve müşteri numaram, bankamda güvenle saklanmaktadır.
Q.English	This site protects information about identity number and password/PIN.

Table 99. PRI4

Latent Var.	Privacy
Q. Code	PRI4
Org. Q.	Does not exist
Adp.Q	I feel confident about the transactions I made at my bank's Web site.
Q. Turkish	Bankamın internet sitesinde işlem yaparken, kendimi güvende hissedirim.
Q.English	I feel confident about the transactions I made at my bank's Web site.

Table 100. PEV1

Latent Var.	Perceived Value
Q. Code	PEV1
Org. Q.	The prices of the products and services available at this site (<i>how economical the site is</i>).
Adp.Q	The prices of the products and services available at this site
Q. Turkish	Sunulan hizmet ve ürünlerin bedeli (faiz, ücret ve komسیونlar).
Q.English	The prices of the products and services available at this site (interest, fees & commissions).

Table 101. PEV2

Latent Var.	Perceived Value
Q. Code	PEV2
Org. Q.	The overall convenience of using this site.
Adp.Q	The overall convenience of using this site.
Q. Turkish	Genel olarak İnternet Bankacılığı sitesinin kullanım kolaylığı.
Q.English	The overall convenience of using this site.

Table 102. PEV3

Latent Var.	Perceived Value
Q. Code	PEV3
Org. Q.	The extent to which the site gives you a feeling of being in control.
Adp.Q	The extent to which the site gives you a feeling of being in control.
Q. Turkish	Sitenin, işlemlerinizi kontrollü ve güvenli bir şekilde gerçekleştirdiğinizi hissettirmesi.
Q.English	The extent to which the site gives you a feeling of being in control.

Table 103. PEV4

Latent Var.	Perceived Value
Q. Code	PEV4
Org. Q.	The overall value you get from this site for your money and effort.
Adp.Q	The overall value you get from this site for your money and effort.
Q. Turkish	Ödediğiniz bedel ve harcadığınız zamanın karşılığında aldığınız hizmetin sizin için değeri.
Q.English	The overall value you get from this site for your money and effort.

Table 104. LOI1

Latent Var.	Loyalty Intentions
Q. Code	LOI1
Org. Q.	Say positive things about this site to other people?
Adp.Q	Say positive things about this site to other people?
Q. Turkish	Başkalarına xxxx Bank internet bankacılığı sitesi hakkında olumlu şeyler söyler misiniz?
Q.English	Say positive things about xxxx Bank Internet banking site to other people?

Table 105. LOI2

Latent Var.	Loyalty Intentions
Q. Code	LOI2
Org. Q.	Recommend this site to someone who seeks your advice?
Adp.Q	Recommend this site to someone who seeks your advice?
Q. Turkish	Size tavsiyenizi soranlara, xxxx Bank internet bankacılığı sitesini önerir misiniz?
Q.English	Recommend xxxx Bank site to someone who seeks your advice?

Table 106. LOI3

Latent Var.	Loyalty Intentions
Q. Code	LOI3
Org. Q.	Encourage friends and others to do business with this site?
Adp.Q	Encourage friends and others to do business with this site?
Q. Turkish	Arkadaşlarınızı ve başkalarını xxxx Bank internet bankacılığı sitesini kullanmaları için teşvik eder misiniz?
Q.English	Encourage friends and others to do business with xxxx Bank Internet banking site?

Table 107. LOI4

Latent Var.	Loyalty Intentions
Q. Code	LOI4
Org. Q.	Consider this site to be your first choice for future transactions?
Adp.Q	Consider this site to be your first choice for future transactions?
Q. Turkish	Xxxx Bank internet bankacılığı sitesini, bundan sonra yapacağınız işlemler için ilk tercihiniz olarak değerlendirir misiniz?
Q.English	Consider xxxx Bank Internet banking site to be your first choice for future transactions?

Table 108. LOI5

Latent Var.	Loyalty Intentions
Q. Code	LOI5
Org. Q.	Do more business with this site in the coming months?
Adp.Q	Do more business with this site in the coming months?
Q. Turkish	Önümüzdeki aylarda, xxxx Bank internet bankacılığı sitesinden daha fazla hizmet almayı düşünür müsünüz?
Q.English	Do more business with xxxx Bank Internet banking site?

Appendix-B: Survey

Internet Banking Service Quality Measurement

This survey is a part of research about re-assessment of service quality measure (-E-S-Qual) in Internet banking of Turkey

Demographics

1- * Gender

- ☐ Female
- ☐ Male

2- * Year of Birth

19

Only numbers may be entered in this field

3- * City of Residence

4- * Highest Degree of Education Achieved

- ☐ Primary School
- ☐ High School
- ☐ Graduate
- ☐ Master
- ☐ PhD
- ☐ None

5- *Occupation

- ☐ Wage/salary earner
- ☐ Retired
- ☐ Own Business
- ☐ Housewife
- ☐ Student
- ☐ Jobless
- ☐ Other:

6- *Do you have regular income?

- ☐ Yes
- ☐ No

7- * Your Average monthly income?

- ☐ 0 - 599 TL
- ☐ 600 - 1199 TL
- ☐ 1.200 - 2.999 TL
- ☐ 3.000 - 4.999 TL
- ☐ 5.000 - 9.999 TL
- ☐ 10.000 TL and above

Next >>

Internet Banking Service Quality Measurement

This survey is a part of research about re-assessment of service quality measure (-E-S-Qual) in Internet banking of Turkey

You have completed 12% of this survey

Internet Usage

8- *Where do you get connected to the Internet?

- ☐ Home
- ☐ Office
- ☐ School
- ☐ Mobile Phone
- ☐ Other:

9- Where do you prefer to get connected to Internet banking?

Your choices:

Your ranking:

1: ✂

2: ✂

3: ✂
4: ✂
5: ✂

Click on the scissors next to each item on the right to remove the last entry in your ranked list

10- *How long do you surf on the Internet?

- ☐ Everyday, very intense usage (5 hours and more in a day)
- ☐ Everyday, intense usage (2-5 hours in a day)
- ☐ Everyday (Not more than 2 hours)
- ☐ 3-6 days in a week (daily average less than 1 hour)
- ☐ 1-2 days in a week
- ☐ 1-3 days in a month
- ☐ 1-2 days in every 3 months

11- *How often do you use Internet banking services?

- ☐ 15 and more days in a month
- ☐ 8-15 days in a month
- ☐ 3-7 days in a month
- ☐ 1-2 days in a month
- ☐ 1-2 days in every three months

12- *Select the most frequent bank you have used for Internet banking services

- ☐ Türkiye Cumhuriyeti Ziraat Bankası A.Ş.
- ☐ Türkiye İş Bankası A.Ş.
- ☐ Türkiye Garanti Bankası A.Ş.
- ☐ Akbank T.A.Ş.
- ☐ Yapı ve Kredi Bankası A.Ş.
- ☐ Türkiye Vakıflar Bankası T.A.O.
- ☐ Türkiye Halk Bankası A.Ş.
- ☐ Finans Bank A.Ş.
- ☐ Denizbank A.Ş.
- ☐ ING Bank A.Ş.
- ☐ Türk Ekonomi Bankası A.Ş.
- ☐ HSBC Bank A.S.

- ☐ Fortis Bank A.Ş.
- ☐ Şekerbank T.A.Ş.
- ☐ Türkiye Sınai Kalkınma Bankası A.Ş.
- ☐ Citibank A.Ş.
- ☐ Anadolubank A.Ş.
- ☐ Eurobank Tekfen A.Ş.
- ☐ Alternatif Bank A.Ş.
- ☐ Tekstil Bankası A.Ş.
- ☐ BankPozitif Kredi ve Kalkınma Bankası A.Ş.
- ☐ Turkland Bank A.Ş.
- ☐ The Royal Bank of Scotland N.V.
- ☐ Millennium Bank A.Ş.
- ☐ Turkish Bank A.Ş.
- ☐ Aktif Yatırım Bankası A.Ş.

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Internet Banking Service Quality Measurement

This survey is a part of research about re-assessment of service quality measure (-E-S-Qual) in Internet banking of Turkey

You have completed 25% of this survey

Efficiency

13- *Rate the efficiency level of Türkiye Cumhuriyeti Ziraat Bankası A.Ş. between 1 and 5 on the items below.

	1- Strongly disagree	2	3	4	5- Strongly agree
This site makes it easy to find what I need.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It makes it easy to get anywhere on the site.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This site enables me to complete a transaction quickly.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
(Customer/product/transaction/market) information at this site is well organized.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It loads its pages fast.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

This site is simple to use.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Authentication and authorization process is completed easily and I can get on to it quickly.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This site is well organized.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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	1- Strongly disagree	2	3	4	5- Strongly agree
This site makes it easy to find what I need.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It makes it easy to get anywhere on the site.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This site enables me to complete a transaction quickly.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
(Customer/product/transaction/market) information at this site is well organized.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It loads its pages fast.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This site is simple to use.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Authentication and authorization process is completed easily and I can get on to it quickly.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This site is well organized.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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You have completed 37% of this survey

System Availability

14- *Rate Türkiye Cumhuriyeti Ziraat Bankası A.Ş. Internet banking service between 1 and 5 on system availability questions.

	1-Strongly disagree	2	3	4	5-Strongly agree
Web site is always available for business.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Web site launches and runs right away.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My bank's Web site does not crash.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pages at Web site do not freeze after I click for a transaction.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Internet Banking Service Quality Measurement

This survey is a part of research about re-assessment of service quality measure (-E-S-Qual) in Internet banking of Turkey

You have completed 50% of this survey

Fulfillment

15- *Rate Türkiye Cumhuriyeti Ziraat Bankası A.Ş. Internet banking services between 1 and 5 on Fulfil ment

	1-Strongly disagree	2	3	4	5-Strongly agree
Transactons like EFT, buying of mutual fund and stock are accomplished within promised time-slots.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Product/client/ransaction/market records at my bank's Web site are always accurate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I buy products with promised properties (like interest rate, tenor, fee etc).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My bank promptly informs about important situation (payments...) through various channels (SMS, call center etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Internet Banking Service Quality Measurement

This survey is a part of research about re-assessment of service quality measure (-E-S-Qual) in Internet banking of Turkey

You have completed 62% of this survey

Gizlilik

16- *Rate Türkiye Cumhuriyeti Ziraat Bankası A.Ş. Internet banking service between 1 and 5 on privacy issues.

	1- Strongly disagree	2	3	4	5-Strongly agree
My bank protects information about my banking transactions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My bank does not share my personal information with other sites.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
This site protects information about identity number and password/PIN.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel confident about the transactions I made at my bank's Web site.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Internet Banking Service Quality Measurement

This survey is a part of research about re-assessment of service quality measure (-E-S-Qual) in Internet banking of Turkey

You have completed 75% of this survey

Perceived Value

17- *Rate Türkiye Cumhuriyeti Ziraat Bankası A.Ş. Internet banking services' value between 1 and 10.

	1 Poor	2	3	4	5	6	7	8	9	10 Excellent
The prices of the products and services available at this site (how economical the site is).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The overall convenience of using this sit .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The extent to which the site gives you a feeling of being in control.
☐
☐
☐
☐
☐
☐
☐
☐
☐
☐

The overall value you get from this site for your money and effort.
☐
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Internet Banking Service Quality Measurement

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You have completed 87% of this survey

Bankaya Olan Bağlılığınız

18- *Rate Türkiye Cumhuriyeti Ziraat Bankası A.Ş. Internet banking services between 1 and 5 on loyalty dimension.

	1- Strongly disagree	2	3	4	5-Strongly agree
Say positive things about Türkiye Cumhuriyeti Ziraat Bankası A.Ş. Internet banking site to other people?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recommend Türkiye Cumhuriyeti Ziraat Bankası A.Ş. site to someone who seeks your advice?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Encourage friends and others to do business with Türkiye Cumhuriyeti Ziraat Bankası A.Ş. Internet banking site?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Consider Türkiye Cumhuriyeti Ziraat Bankası A.Ş. Internet banking site to be your first choice for future transactions?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do more business with Türkiye Cumhuriyeti Ziraat Bankası A.Ş. Internet banking site?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Submit

İnternet Bankacılığında Hizmet Kalitesi Ölçümü

Bu anket, internet üzerinden verilen hizmetlerin kalitesini ölçmeye yönelik kriterlerin test edilmesi ve doğrulanması amaçlı, internet bankacılığı için yapılan bir araştırmadır.

Öncelikle anketi doldurarak vermiş olduğunuz destek için teşekkür ederim.

Bu çalışma ile toplanan veriler, Türkiye dışında geliştirilmiş internet servis kalitesi ölçeğinin, Türkiye'deki internet bankacılığı hizmetlerine uygunluk derecesini gösterecektir. Ölçüm kriterleri arasında, özellikle Türkiye için uygun olanlar tespit edilmiş olacak ve Türkiye'deki internet bankacılığı hizmetine özgü kriterler alt kümesi de oluşturulacaktır.

Ayrıca şunu da bilmenizi isterim ki, **bu ankette toplanan veriler tamamen akademik amaçlı kullanılacaktır ve anket ticari bir gaye taşımamaktadır.**

Ankette toplam 18 adet soru bulunmaktadır.

Saygılarımla,

Behçet Teuman

<mailto:behcette@yahoo.com>

Kaydedilmiş Anketi Yükle

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İnternet Bankacılığında Hizmet Kalitesi Ölçümü

Bu anket, internet üzerinden verilen hizmetlerin kalitesini ölçmeye yönelik kriterlerin test edilmesi ve doğrulanması amaçlı, internet bankacılığı için yapılan bir araştırmadır.

Tamamladığınız anket yüzdesi: 0%

Demografik Bilgiler

1- *Cinsiyetiniz

- ☐ Kadın
- ☐ Erkek

2- *Doğduğunuz Yıl

19

Bu alana yalnız sayılar yazılabilir

3- *İkamet ettiğiniz il

4- *En son tamamladığınız eğitim programı

- ☐ İlkokul/ortaokul

- ☐ Lise
- ☐ Lisans
- ☐ Yüksek Lisans
- ☐ Doktora
- ☐ Hiçbiri

5- *Mesleğinizin dahil olduğu grup

- ☐ Ücretli Çalışan
- ☐ Emekli
- ☐ İşveren/Serbest Meslek
- ☐ Evkadını
- ☐ Öğrenci
- ☐ Çalışmıyor
- ☐ Diğer:

6- *Maaş, kira gibi düzenli aylık geliriniz

- ☐ Var
- ☐ Yok

7- *AYLIK ORTALAMA NET geliriniz hangi aralıktadır?

- ☐ 0 - 599 TL
- ☐ 600 - 1199 TL
- ☐ 1.200 - 2.999 TL
- ☐ 3.000 - 4.999 TL
- ☐ 5.000 - 9.999 TL
- ☐ 10.000 TL ve üzeri

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İnternet Bankacılığında Hizmet Kalitesi Ölçümü

Bu anket, internet üzerinden verilen hizmetlerin kalitesini ölçmeye yönelik kriterlerin test

edilmesi ve doğrulanması amaçlı, internet bankacılığı için yapılan bir araştırmadır.

Tamamladığınız anket yüzdesi: 12%

İnternet Kullanımı

8- *İnternete hangi noktalardan ulaşıyorsunuz (birden fazla seçeneği işaretleyebilirsiniz)?

- ☐ Evden
- ☐ İş Yerinden
- ☐ Okuldan
- ☐ Cep Telefonundan
- ☐ Diğer:

9- İnternet Bankacılığına nereden bağlanmayı tercih ediyorsunuz?

Soldaki "Seçimleriniz" listesinden, en yüksek dereceli öğeden başlayarak, en düşük dereceli öğeye doğru sırayla tıklayın. Size uygun olamayan seçeneği sıralamaya dahil etmeyebilirsiniz.

Seçimleriniz:

Derecelendirmeniz:

- 1: ✕
- 2: ✕
- 3: ✕
- 4: ✕
- 5: ✕

Sıralanmış listenizden son öğeyi çıkarmak için her öğenin sağ yanındaki makasa tıklayın

10- *İnternet kullanım sürenizle ilgili size en uygun seçeneği iş retleyiniz.

- ☐ Her gün, çok yoğun kullanım (günde 5 saat ve üzeri)
- ☐ Her gün, yoğun kullanım (günde 2-5 saat arasında)
- ☐ Her gün (2 saate kadar)
- ☐ Haftada 3-6 gün (Günlük ortalama 1 saati aşmayan)
- ☐ Her hafta 1-2 gün
- ☐ Ayda 1-3 gün
- ☐ 3 ayda 1-2 gün

? Seçimi yaparken, kişisel amaçlı internet kullanımlarının yanısıra iş ve eğitim amaçlı internet bağlantılarınızı da dikkate almalısınız.

11- *İnternet Bankacılığı hizmetinden, hangi sıklıkta faydalanmaktasınız?

- ☐ Ayda 15 günün üzerinde

- ☐ Ayda 8- 15 gün
- ☐ Ayda 3 -7 gün
- ☐ Ayda 1-2 gün
- ☐ 3 ayda 1-2 gün

12- *İnternet Bankacılığı hizmetini en sık kullandığınız bankayı seçiniz.

- ☐ Türkiye Cumhuriyeti Ziraat Bankası A.Ş.
- ☐ Türkiye İş Bankası A.Ş.
- ☐ Türkiye Garanti Bankası A.Ş.
- ☐ Akbank T.A.Ş.
- ☐ Yapı ve Kredi Bankası A.Ş.
- ☐ Türkiye Vakıflar Bankası T.A.O.
- ☐ Türkiye Halk Bankası A.Ş.
- ☐ Finans Bank A.Ş.
- ☐ Denizbank A.Ş.
- ☐ ING Bank A.Ş.
- ☐ Türk Ekonomi Bankası A.Ş.
- ☐ HSBC Bank A.Ş.
- ☐ Fortis Bank A.Ş.
- ☐ Şekerbank T.A.Ş.
- ☐ Türkiye Sınai Kalkınma Bankası A.Ş.
- ☐ Citibank A.Ş.
- ☐ Anadolubank A.Ş.
- ☐ Eurobank Tekfen A.Ş.
- ☐ Alternatif Bank A.Ş.
- ☐ Tekstil Bankası A.Ş.
- ☐ BankPozitif Kredi ve Kalkınma Bankası A.Ş.
- ☐ Turkland Bank A.Ş.
- ☐ The Royal Bank of Scotland N.V.
- ☐ Millennium Bank A.Ş.
- ☐ Turkish Bank A.Ş.
- ☐ Aktif Yatırım Bankası A.Ş.

? Lütfen Dikkat: Ankette bundan sonraki soruları yanıtlarken, sadece yukarıda seçtiğiniz bankanın hizmetlerini değerlendiren cevaplar veriniz.

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İnternet Bankacılığında Hizmet Kalitesi Ölçümü

Bu anket, internet üzerinden verilen hizmetlerin kalitesini ölçmeye yönelik kriterlerin test edilmesi ve doğrulanması amaçlı, internet bankacılığı için yapılan bir araştırmadır.

Tamamladığınız anket yüzdesi: 25%

Verimlilik

13- *Türkiye Cumhuriyeti Ziraat Bankası A.Ş. İnternet Bankacılığı Sitesinin verimlilik düzeyini, size sağladığı fayda ve kolaylıklar açısından, 1 ile 5 arasında değerlendiriniz.

	1-Kesinlikle katılmıyorum	2	3	4	5-Tamamen katılıyorum
Site, ihtiyacım olan hizmetleri kolayca bulmamı sağlamaktadır.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
İnternet Bankacılığı sitesi içinde gezinmek çok kolaydır.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Site, işlemleri hızla sonuçlandırmamı sağlamaktadır.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sitede gösterilen bilgiler(müşteri/ürün/işlem/piyasa) çok iyi düzenlenmiştir.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
İnternet Bankacılığı sayfaları çabuk yüklenmektedir.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sitenin kullanımı basittir.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Giriş işlemleri (kimlik denetimi ve yetkilendirme) kolayca gerçekleşmekte ve siteye hızla girebilmekteyim.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sitenin düzenlemesi başarılıdır.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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İnternet Bankacılığında Hizmet Kalitesi Ölçümü

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Tamamladığınız anket yüzdesi: 37%

Sistemin Sürekliliği

14- *Türkiye Cumhuriyeti Ziraat Bankası A.Ş. İnternet Bankacılığı sitesinin sürekliliğini aşağıdaki başlıklarda 1 ile 5 arasında değerlendiriniz.

	1-Kesinlikle katılmıyorum	2	3	4	5-Tamamen katılıyorum
İnternet sitesi her zaman işlem yapmaya uygun ve ulaşılabilir durumdadır.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Site hızla yüklenir ve hemen çalışır.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
İnternet bankacılığı sitesi hiç çökmez.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sitede, bir işlemi gerçekleştirmek için tıkladığımda, sayfa donmaz.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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İnternet Bankacılığında Hizmet Kalitesi Ölçümü

Bu anket, internet üzerinden verilen hizmetlerin kalitesini ölçmeye yönelik kriterlerin test edilmesi ve doğrulanması amaçlı, internet bankacılığı için yapılan bir araştırmadır.

Tamamladığınız anket yüzdesi: 50%

Hizmet Düzeyi

15- *Türkiye Cumhuriyeti Ziraat Bankası A.Ş. İnternet Bankacılığı sitesinde verilen hizmetin düzeyini, 1 ile 5 arasında değerlendiriniz.

	1-Kesinlikle katılmıyorum	2	3	4	5-Tamamen katılıyorum
EFT, fon-hisse senedi alım vb hizmetler taahhüt edildiği zaman aralıklarında gerçekleşmektedir.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sitedeki bilgiler (ürün/müşteri/işlem/piyasa kayıtları) her zaman doğrudur.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hizmet ve ürünleri taahhüt edildiği özelliklerde (faiz oranı, vade, ücret/komisyon) almaktayım.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

İnternette yaptığım önemli işlemlerle ilgili (ödeme vb), bana çeşitli kanallardan* anında bilgi verilir.

*SMS, e-posta, Çağrı Merkezi araması gibi

☐ ☐ ☐ ☐ ☐

Sonraki >>

İnternet Bankacılığında Hizmet Kalitesi Ölçümü

Bu anket, internet üzerinden verilen hizmetlerin kalitesini ölçmeye yönelik kriterlerin test edilmesi ve doğrulanması amaçlı, internet bankacılığı için yapılan bir araştırmadır.

Tamamladığınız anket yüzdesi: 62%

Gizlilik

16- *Türkiye Cumhuriyeti Ziraat Bankası A.Ş. İnternet Bankacılığı sitesinin güvenlik seviyesini 1 ile 5 arasında değerlendiriniz.

	1-Kesinlikle katılmıyorum	2	3	4	5-Tamamen katılıyorum
İnternet üzerinde yaptığım bankacılık işlemlerine ilişkin kayıtlar, (3. şahıslara karşı) korunmaktadır.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bankam, benim kişisel bilgilerimi başka kurum ve kuruluşlarla paylaşmamaktadır.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Şifrem ve müşteri numaram, bankamda güvenle saklanmaktadır.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bankamın internet sitesinde işlem yaparken kendimi güvende hissedirim.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Sonraki >>

İnternet Bankacılığında Hizmet Kalitesi Ölçümü

Bu anket, internet üzerinden verilen hizmetlerin kalitesini ölçmeye yönelik kriterlerin test edilmesi ve doğrulanması amaçlı, internet bankacılığı için yapılan bir araştırmadır.

Tamamladığınız anket yüzdesi: 75%

Sağladığı Fayda

17- *Türkiye Cumhuriyeti Ziraat Bankası A.Ş. internet bankacılığı hizmetlerinin size sağladığı faydayı aşağıdaki başlıklarda, 10 üzerinden değerlendiriniz.

	1	2	3	4	5	6	7	8	9	10
	Çok									Mükemmel
	Kötü									
Sunulan hizmet ve ürünlerin bedeli (faiz, ücret ve komisyonlar).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Genel olarak İnternet Bankacılığı sitesinin kullanımı kolaylığı.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sitenin, işlemlerinizi kontrollü ve güvenli bir şekilde gerçekleştirdiğinizi hissettirmesi.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ödediğiniz bedel ve harcadığınız zamanın karşılığında aldığınız hizmetin sizin için değeri.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Sonraki >>

İnternet Bankacılığında Hizmet Kalitesi Ölçümü

Bu anket, internet üzerinden verilen hizmetlerin kalitesini ölçmeye yönelik kriterlerin test edilmesi ve doğrulanması amaçlı, internet bankacılığı için yapılan bir araştırmadır.

Tamamladığınız anket yüzdesi: 87%

Bankaya Olan Bağlılığınız

18- *Türkiye Cumhuriyeti Ziraat Bankası A.Ş. internet bankacılığı sitesine olan bağlılığınızı aşağıdaki sorulara, 1 ile 5 arasında cevap vererek değerlendiriniz.

	1-	2	3	4	5-
	Kesinlikle				Kesinlikle
	Yapmam				Yaparım
Başkalarına Türkiye Cumhuriyeti Ziraat Bankası A.Ş. internet bankacılığı sitesi hakkında olumlu şeyler söyler misiniz?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Size tavsiyenizi soranlara, Türkiye Cumhuriyeti Ziraat Bankası A.Ş. internet bankacılığı sitesini önerir misiniz?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Arkadařlarınızı ve bařkalarını Türkiye Cumhuriyeti Ziraat Bankası A.ř. internet bankacılıęı sitesini kullanmaları iin teřvik eder misiniz?

☐ ☐ ☐ ☐ ☐

Türkiye Cumhuriyeti Ziraat Bankası A.ř. internet bankacılıęı sitesini, bundan sonra yapacaęınız ilemler iin ilk tercihiniz olarak deęerlendirir misiniz?

☐ ☐ ☐ ☐ ☐

Önümüzdeki aylarda, Türkiye Cumhuriyeti Ziraat Bankası A.ř. internet bankacılıęı sitesinden daha fazla hizmet almayı düşünür müsünüz?

☐ ☐ ☐ ☐ ☐

Gönder

Appendix-C: E-RecS-Qual Questions

Table 109. Indicators for Responsiveness

Responsiveness	
RES1	It provides me the convenient options for returning items
RES2	This site handles product returns well
RES3	This site offers meaningful guarantee
RES4	It tells me what to do if my transaction is not processed
RES5	It takes care of problems promptly

Source: (Parasuraman, Zeithaml, & Malhotra, 2005)

Table 110. Indicators for Compensation

Compensation	
COM1	This sites compensates me for problems it creates
COM2	It compensates me when what I ordered doesn't arrive on time
COM3	It picks up items I want to returned from my home or business

Source: (Parasuraman, Zeithaml, & Malhotra, 2005)

Table 111. Indicators for Contact

Contact	
CON1	This site provides a telephone number to reach the company
CON2	This site has customer service representatives available online
CON3	It offers the ability to speak to a live person if there is a problem

Source: (Parasuraman, Zeithaml, & Malhotra, 2005)

Appendix-D: Statistics in the Bank Level

Table 112. ANOVA Factor Scores of Bank Groups

		Sum of Squares	df	Mean	F	Sig.
EFFICIENCY * Bank Groups	Between Groups	5.894	3	1.965	2.772	.041
	Within Groups	267.948	378	0.709		
	Total	273.842	381			
SYSTEM AVAILABILITY * Bank Groups	Between Groups	6.079	3	2.026	2.476	.061
	Within Groups	309.290	378	0.818		
	Total	315.368	381			
FULFILLMENT * Bank Groups	Between Groups	0.561	3	0.187	0.254	.858
	Within Groups	278.027	378	0.736		
	Total	278.588	381			
PRIVACY * Bank Groups	Between Groups	3.440	3	1.147	1.504	.213
	Within Groups	288.129	378	0.762		
	Total	291.569	381			
PERCEIVED VALUE * Bank Groups	Between Groups	26.807	3	8.936	3.015	.030
	Within Groups	1120.111	378	2.963		
	Total	1146.918	381			
LOYALTY * Bank Groups	Between Groups	2.115	3	0.705	0.892	.445
	Within Groups	298.837	378	0.791		
	Total	300.952	381			

Note. The grouping variable Bank Group is a string, so the test for linearity cannot be computed. Bank Groups are Foreign Banks, Garanti Bank, Privately Owned, State Banks.

Efficiency measure for each bank is presented in Figure.7 Number of observations for each bank is on the bars with scale on the left. High-low lines are drawn ± 1 standard deviation from the mean that is in the center and read with the scale on the right.

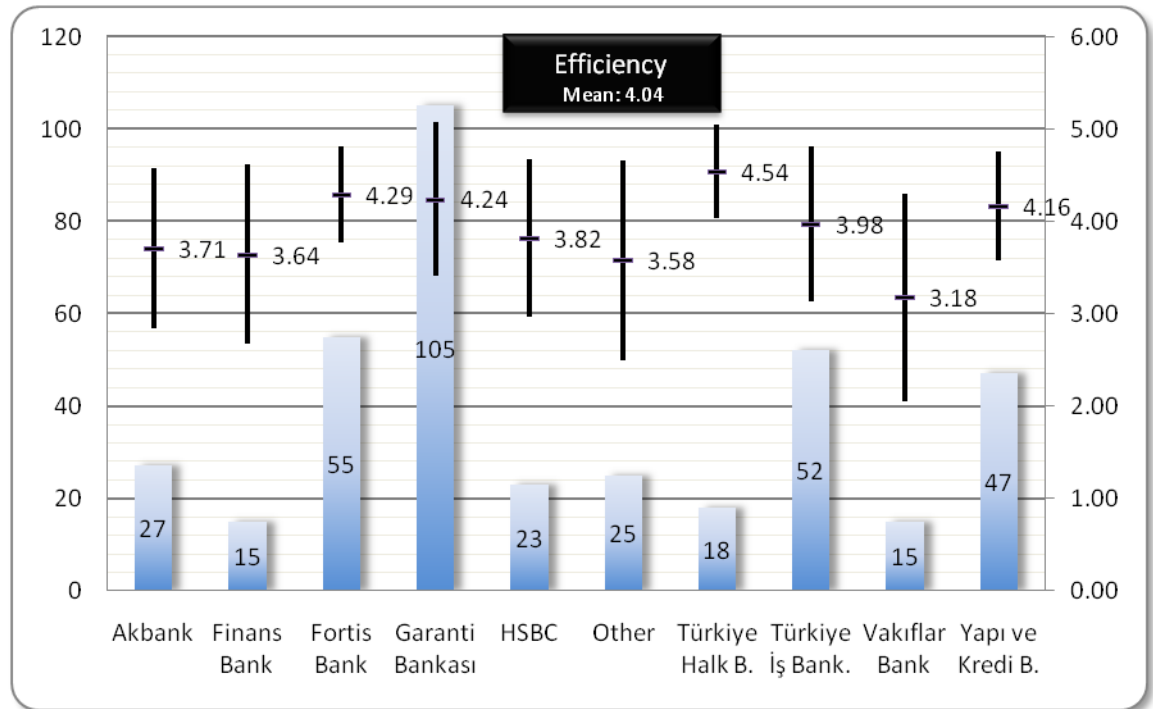


Figure 7. Efficiency scale in the bank level.

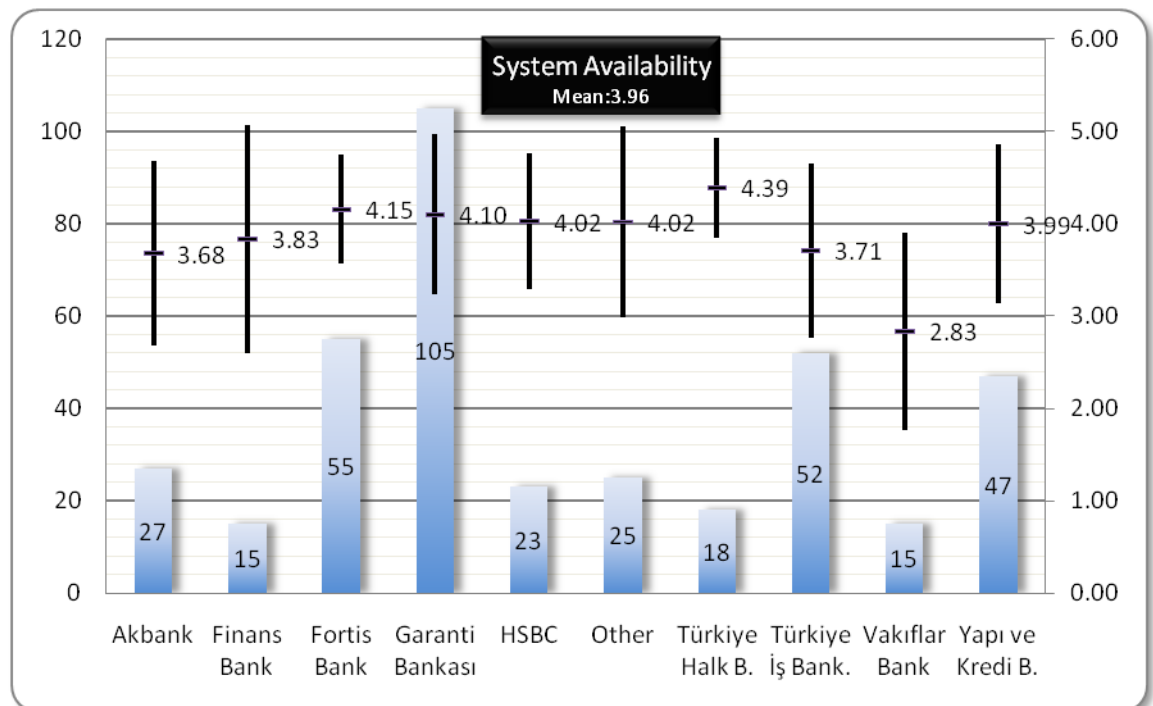


Figure 8. System availability scale in the bank level.

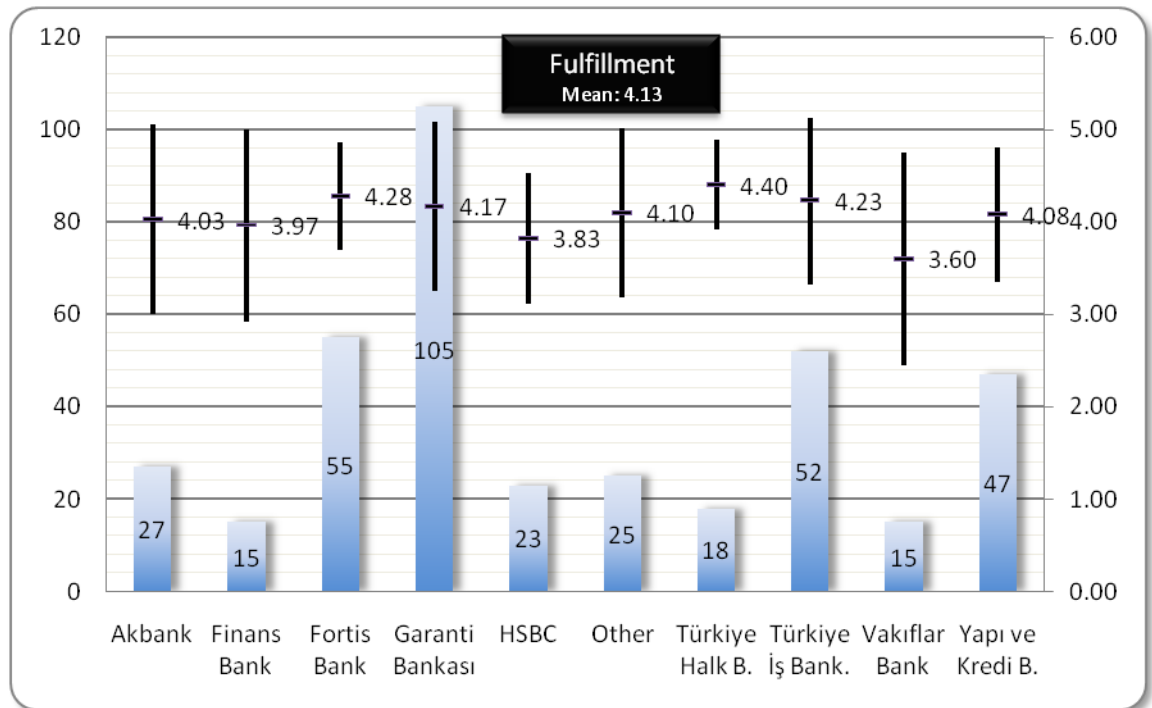


Figure 9. Fulfillment scale in the bank level.

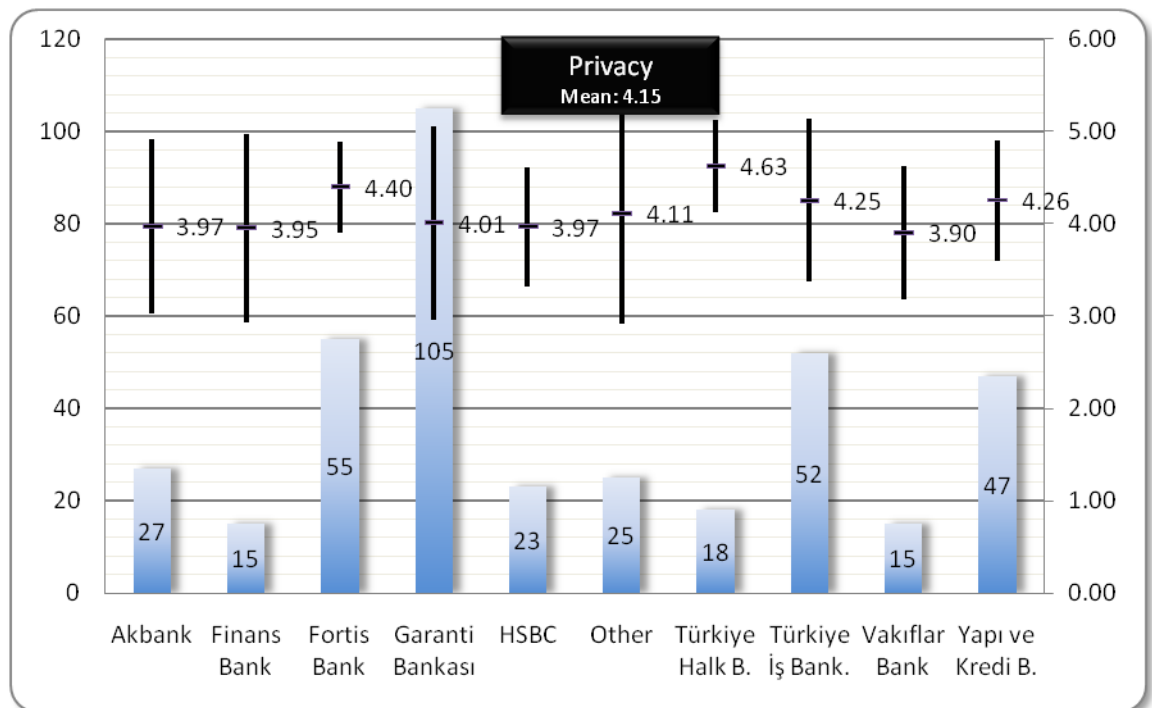


Figure 10. Privacy scale in the bank level.

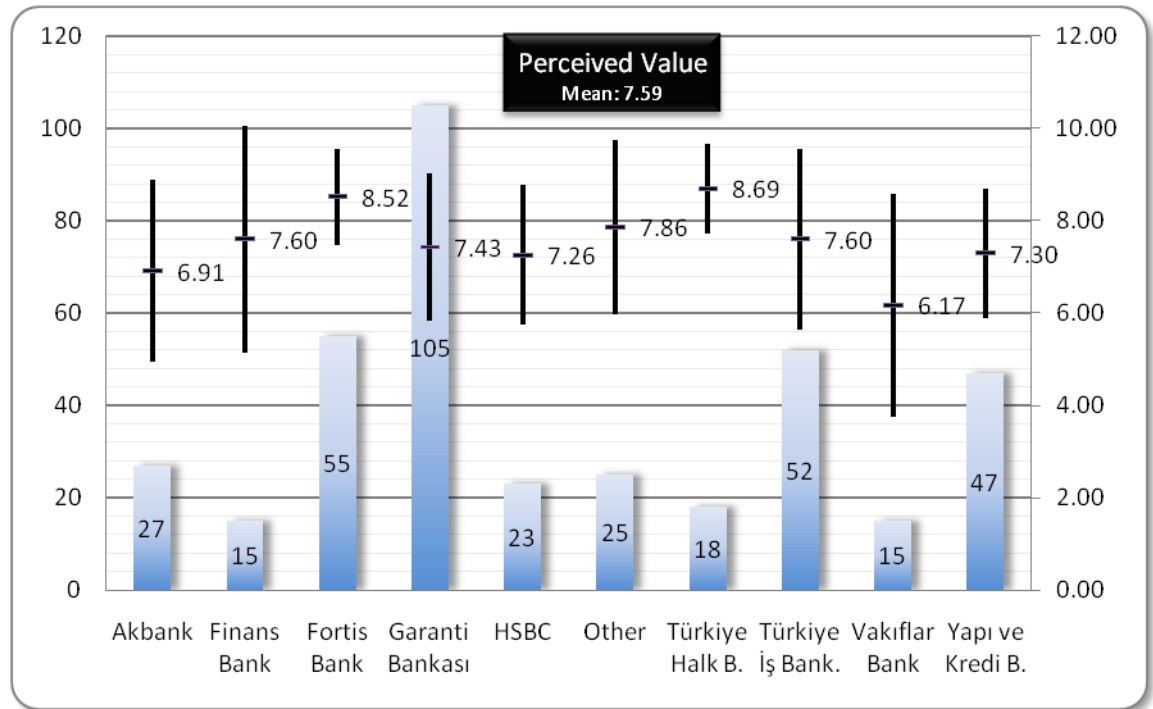


Figure 11. Perceived value in the bank level.

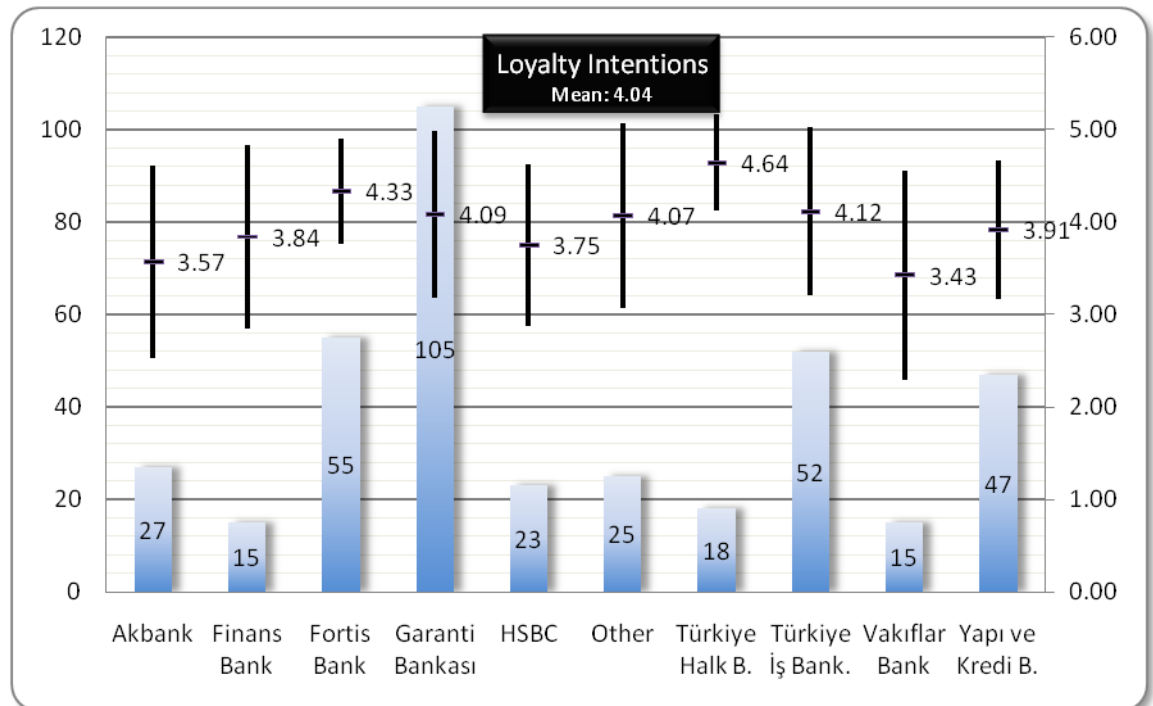


Figure 12. Loyalty intentions in the bank level.

In the re-specified model, there are 14 items left after the elimination of indicator (*Efficiency*: EFF1, EFF2, EFF3, EFF4 and EFF6; *System availability*: SYS1, SYS2 and SYS4; *Fulfillment*: FUL1, FUL6 and FUL7; *Privacy*: PRI2, PRI3).

Means and standard deviations of the latent variables were changed with the new composition. Charts are re-produced and displayed in the following figures and ranking orders of banks in E-S-Qual dimensions have shown some changes (Table 113).

Table 113. Ranking Orders of Banks in E-S-Qual Dimensions¹⁷

Bank	Loyalty	Perceived Value	Efficiency	System Availability	Fulfillment	Privacy
Türkiye Halk B.	1	1	1-1	1-1	1-1	1-1
Fortis Bank	2	2	2-2	2-2	2-2	2-2
Türkiye İş Bank.	3	4	5-5	8-8	3-3	4-4
Garanti Bankası	4	6	3-3	3-3	4-4	8-6
Other	5	3	9-9	6-5	7-5	5-5
Yapı ve Kredi B.	6	7	4-4	4-6	5-6	3-3
Finans Bank	7	5	8-8	7-7	8-8	10-9
HSBC	8	8	6-6	5-4	9-9	7-8
Akbank	9	9	7-7	9-9	6-7	9-7
Vakıflar Bank	10	10	10-10	10-10	10-10	6-10

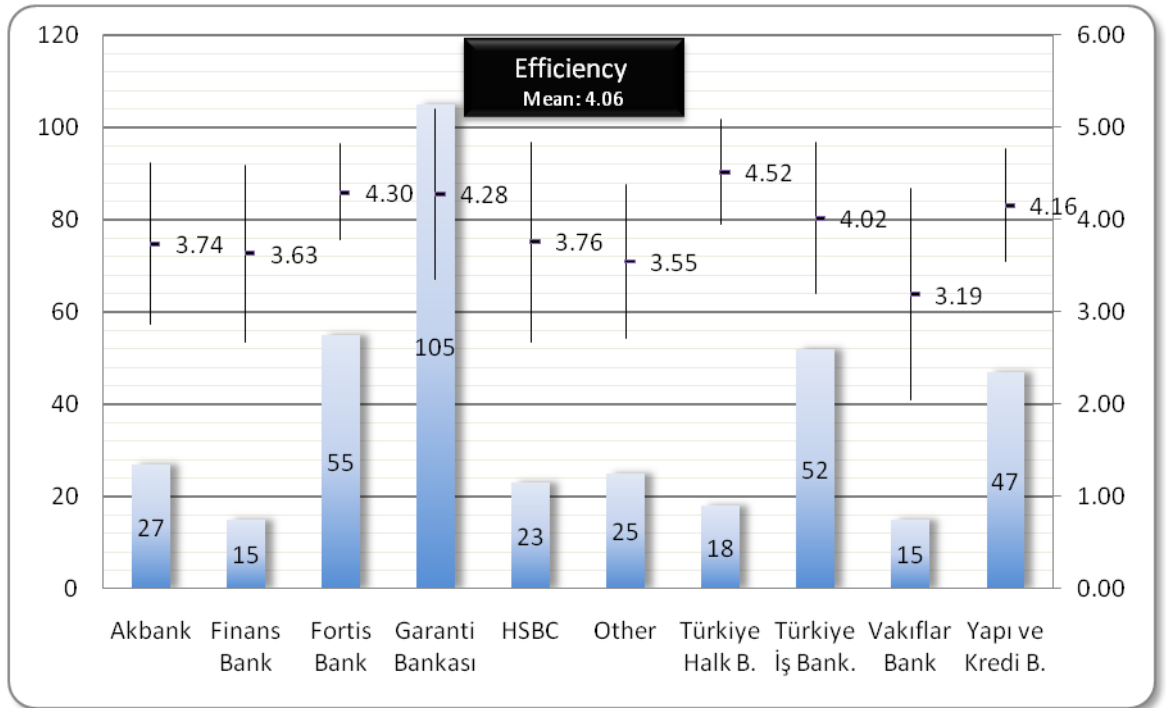


Figure 13. Efficiency in the bank level (re-calculated for 14-item model).

¹⁷ First figures in the cells are the scores calculated with adapted E-S-Qual (20-item model), second figures are the scores of 14-item respecified model. E.g. HSBC has moved from 5th to the 4th place when the system availability was calculated with SYS1, SYS2 and SYS4 variables in the 14-item model.

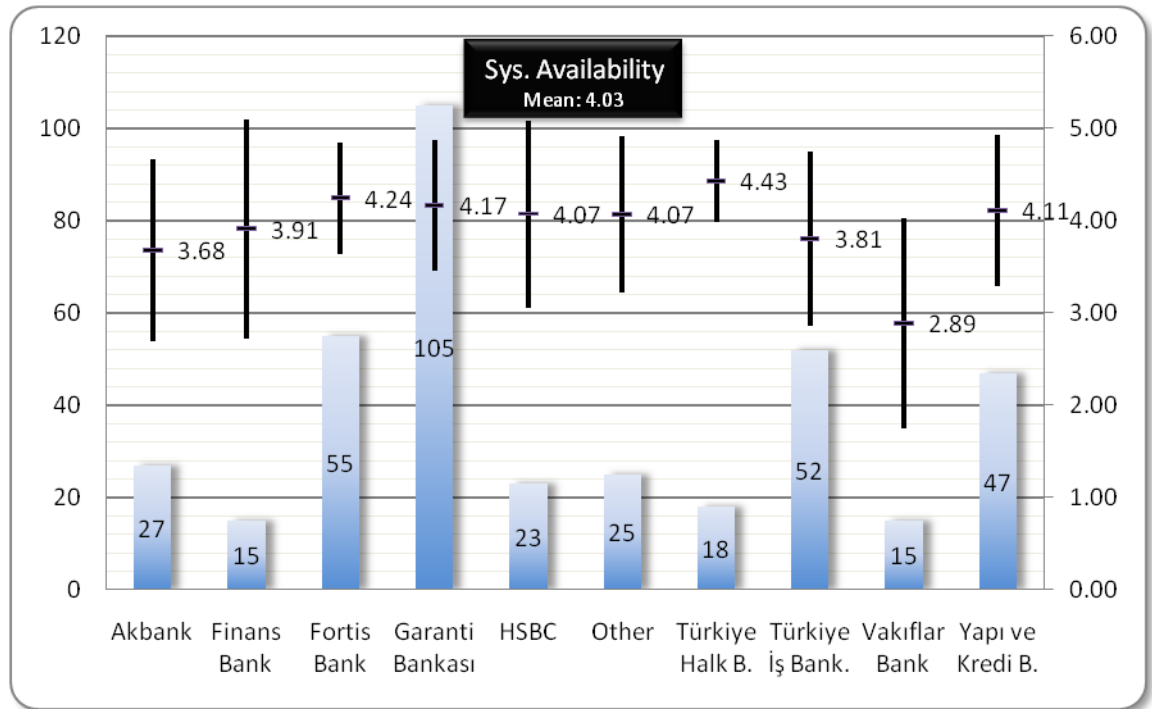


Figure 14. System availability in the bank level (re-calculated for 14-item model).

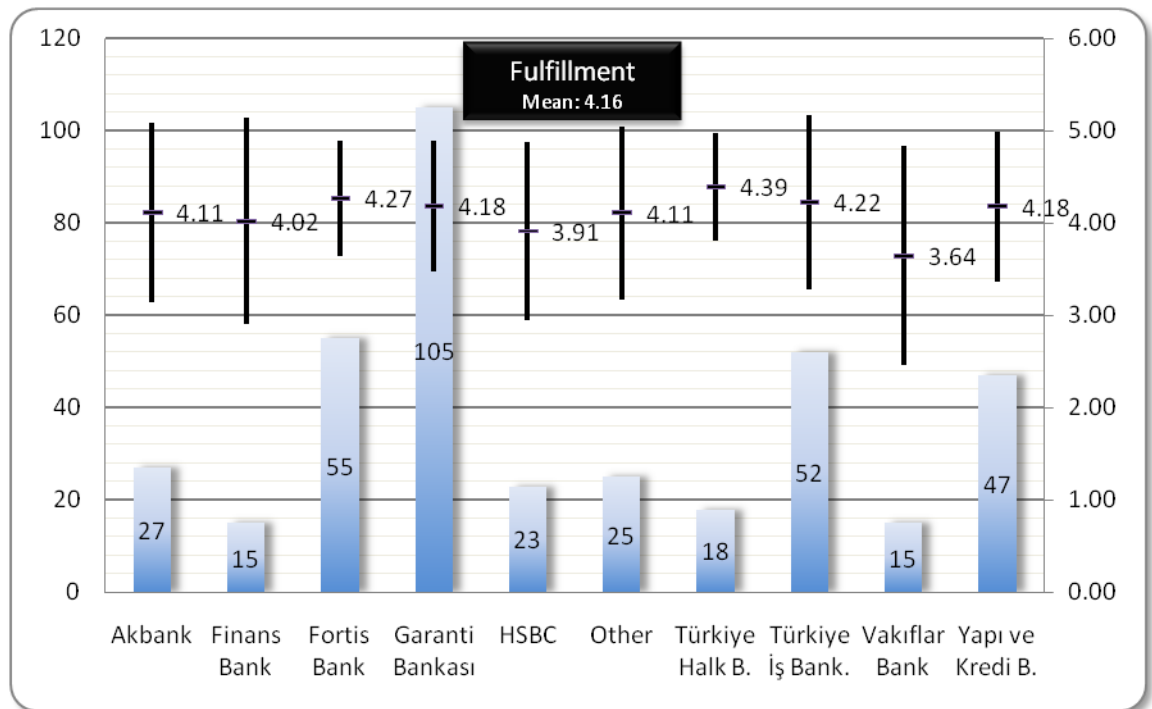


Figure 15. Fulfillment in the bank level (re-calculated for 14-item model).

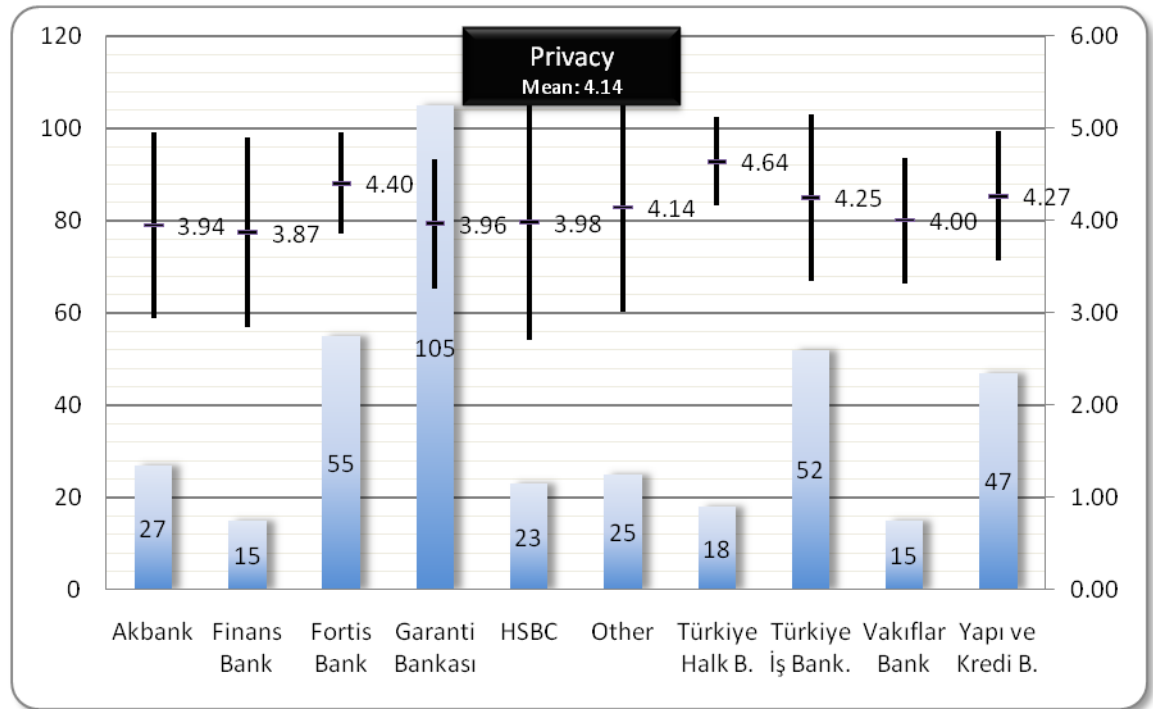


Figure 16. Privacy in the bank level (re-calculated for 14-item model).

In the meantime, it has been observed in the reliability analysis that the removal of PEV1 indicator will make the remaining PEV indicators more reliable. Therefore, PEV score is recalculated by averaging PEV2, PEV3 and PEV4 indicators.

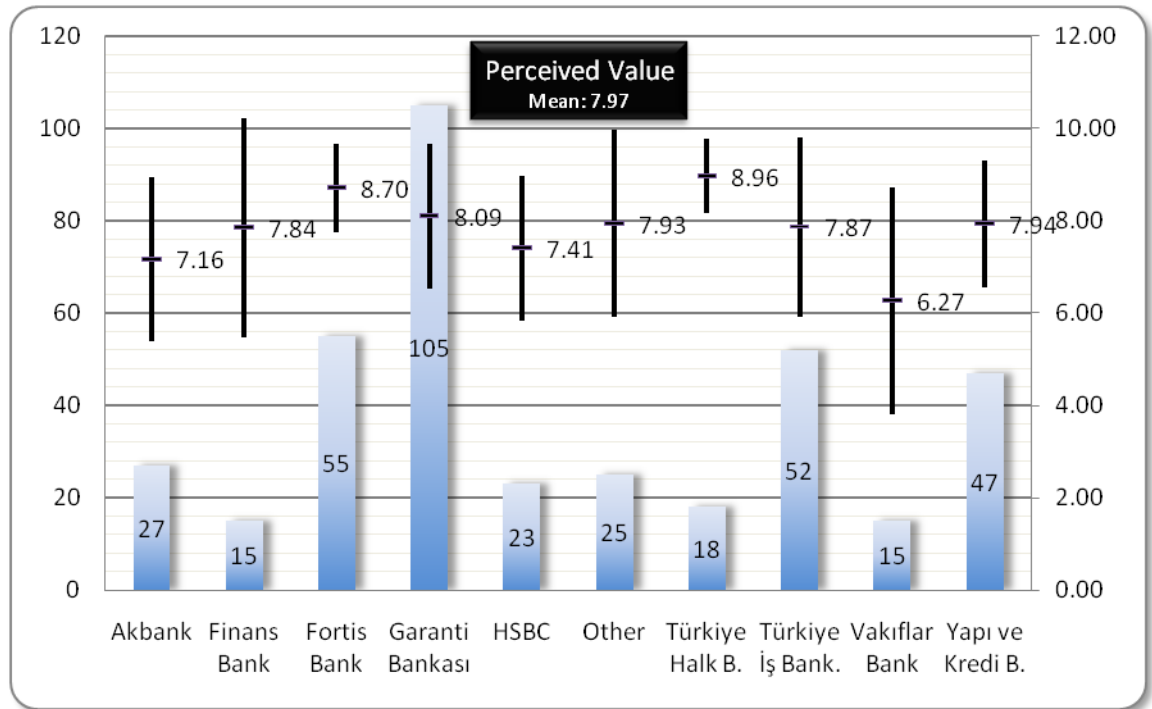


Figure 17. Perceived value in the bank level (re-calculated with PEV2, PEV3 and PEV4 variables)

Table 114. Perceived Value and Loyalty Ranking Orders

	Perceived Value: PEV1-PEV2-PEV3-PEV4	Perceived Value: PEV2-PEV3-PEV4	Loyalty
Türkiye Halk B.	1	1	1
Fortis Bank	2	2	2
Other	3	5	5
Türkiye İş Bank.	4	6	3
Finans Bank	5	7	7
Garanti Bankası	6	3	4
Yapı ve Kredi B.	7	4	6
HSBC	8	8	8
Akbank	9	9	9
Vakıflar Bank	10	10	10

Perceived value ranking order of these 7 banks are exactly the same as their ranking order of *loyalty* when the *perceived value* is calculated with the PEV1 indicator excluded. However, there are only 5 banks that have the same ranking order in *perceived value* with original E-S-Qual indicators and *loyalty* dimensions.

Appendix-E: Structural Equation Modeling

Structural Equation Modeling (SEM) refers to a family of related statistical techniques (Kline, 1998, p. 7). It is an extension of several multivariate techniques, most notably multiple regression and factor analysis and SEM examines the series of dependence relationships simultaneously (Hair, Anderson, Tatham, & Black, 1998, p. 578). Covariance structure analysis, analysis of covariance structures, and casual modeling are among the other terms used interchangeably for SEM in the literature (Kline, 1998, p. 8).

SEM allows evaluation of entire models on macro level perspective and it is distinguished by two characteristics: Estimation of multiple and interrelated dependence relationships and the ability to represent unobserved concepts. Unobserved and hypothesized variables are called latent variables (Hair, Anderson, Tatham, & Black, 1998, p. 585). Latent variables are created by Exploratory Factor Analysis (EFA). Observed (manifest) variables are used to explore the latent variables (factors) and their relationships with observed variables. Exploratory Factor Analysis is used to define possible relationships and by using the multivariate techniques, tries to estimate the relationships. Once the researchers' hypotheses are constructed, SEM is applied in the confirmatory sense. Confirmatory Factor Analysis (CFA) uses multivariate techniques to confirm pre-specified relationships.

Closest analogy of SEM is multiple regressions, which estimate a single relationship. However, SEM calculates many equations at once and allows researchers to construct complex models. (Hair, Anderson, Tatham, & Black, 1998).

Relationships in the series of regression like equations are portrayed graphically in a path diagram. Path diagram is graphical equivalent of mathematical representation of model. Causal relationships are indicated by straight arrows, which start from predictor variables and pointing to dependent variables with arrowhead. Double-headed and curved arrows represent correlations between dependent and independent variables without indicating causation (Hair, Anderson, Tatham, & Black, 1998). Latent (unobserved) variables are depicted with ellipses whereas observed variables are represented with rectangles.

There are software programs that can utilize graphical and/or mathematical drawings of the hypothesized model and resolve the relationships.

Kline (1998) has explained that observed variables (exogenous) are called independent variables in experimental studies and called as predictors in non-experimental studies. In the literature, use of this terminology is generally mixed and indicator term is generally preferred and used in both types of studies. Latent variables (endogenous¹⁸) differ again with the type of study, and called dependent variable in experimental works and they are called criterion for non-experimental studies.

There are two complementary schools in the field of SEM: covariance based SEM and component based SEM (Tenenhaus, 2008). Covariance based school developed around Karl Jöreskog. The second school developed around

¹⁸ There could be exogenous latent variables which may cause fluctuations in the values of other latent variables in the model. Changes in the exogenous variables can not be explained by model and influenced by other factors external to the model like gender, age etc. (Byrne, 2010, p. 5)

Herman Wold under the name Partial Least Squares. Covariance based SEM has model validation objective whereas component based is used for score computation of latent variables. Covariance based SEM requires sample sizes of generally 200 and more observations. However, Component based same SEM can be conducted with relatively smaller sample sizes. Component based SEM is called as Generalized Structure Component Analysis (GSCA) since 2004 and the name introduced by Hwand and Takane (Tenenhaus, 2008).

Principal component analysis assumes that the scores on measured variables have perfect reliability, i.e. error terms are considered as zero. If the sample is reasonably representing the population data the sample factors should match the population factors (Thompson, 2004). Two complementary schools in the SEM is summarized in the Table 115

Table 115. Main Characteristic of Two SEM Approaches

<u>Covariance based SEM</u>	<u>Component based SEM</u>
Developed around Karl Jöreskog	Developed around Herman Wold
Objective: model validation	Objective: score computation of latent variables
Assumes measurement on the sample has error terms	Assumes scores on measured variables have perfect reliability.
Try to reproduce covariances in population	Try to reproduce covariances in the sample
Requires sample sizes of generally 200 and more observations	Conducted with relatively smaller sample sizes

Source: (Thompson, 2004)

There are various methods of estimation of covariances

- Alpha factor analysis focuses on creating factors with maximum reliability,

- Maximum likelihood analysis focuses on creating factors that reproduce the correlation or covariance matrix in the population,
- Image factor analysis focuses on creating factors of the latent variables that exclude or minimize *unique factors* consisting of essentially only one measured variable,
- Canonical factor analysis seeks to identify factors that are maximally related to the measured variables (Thompson, 2004).

In this study, Maximum likelihood estimation (covariance based-SEM) is deployed to generalize the e-service quality model that is developed for Internet banking users' population.

Maximum Likelihood Estimation

Most of the model-fitting programs use Maximum Likelihood (ML) estimation as the default method. ML and multiple regression estimates identical values for the path coefficients. Only the way of estimation differs in these methods. Multiple regressions run separate analysis for each endogenous variable, whereas ML calculates all model parameters at once. ML estimation process is based on iterative calculations. Initial estimates are generated by the software programs. For just-identified iterations, predicted covariances become equal to observed ones after a few consecutive estimations. However, for most of the over identified models, observed and estimated variables are not equal. ML process checks how close the estimated covariances and the sample covariances after every iteration and recalls the estimation process if the improvement (difference) with the previous one is substantial. When the improvement in the

last iteration is not substantial, estimation process stops. Occasionally, iteration process does not converge and it is unsuccessful. Grossly mis-specified model, scaling of indicators, and the adequacy of the starting values, are the possible reasons for the fail of convergence given by Brown (2006, pp. 74-75).

The differences between ML and multiple regressions are explained with the two exceptions of the assumptions of ML estimation has (Kline, 1998). First is the correlation between the disturbances (cause of unexplained covariance in the endogenous variable) that ML allows to exist in the model and estimates it. This feature makes ML to be applicable for non-recursive¹⁹ path models. Second exception of ML is that it requires multivariate normality of continuous indicators/predictors (Kline, 1998, pp. 126-127). However, multivariate normality is not a prerequisite for multiple regressions. As compared with other estimators ML needs large sample sizes (Brown, 2006, p. 75). In case of non-normality in the sample, Weighted Least Squares (WLS, also known as Asymptotic Distribution Free-ADF), and Unweighted Least Squares (ULS) are the other estimations suggested by Brown (2006).

CFA, which uses maximum likelihood estimation, tries to minimize the following fitting function (Brown T, 2006 p 72)

$$F_{ML} = \ln|\mathbf{S}| - \ln|\mathbf{\Sigma}| + \text{trace}[(\mathbf{S})(\mathbf{\Sigma}^{-1})] - p$$

$|\mathbf{S}|$ and $|\mathbf{\Sigma}|$ are the determinants of the sample and estimated covariance matrices respectively. Formula has two parts: (1) differences of natural logarithms of the determinants and (2) the difference of trace function of matrix

¹⁹ Non-recursive models have correlations between disturbances and feedback loops (i.e. causes and effects on a pair of variables). However, recursive models have uncorrelated disturbances and all causal effects are unidirectional.

that is the multiplication of \mathbf{S} and the inverse of $\mathbf{\Sigma}$ and the number of indicators. Trace function's output is the sum of diagonal of a matrix. When $\mathbf{S} = \mathbf{\Sigma}$, the outcome of $\mathbf{S} \mathbf{\Sigma}^{-1}$ is expected to be identity matrix. Therefore sum of diagonals (trace function outcome) is expected to be equal to number of indicators and second part will converge to zero (i.e., $p - p$) while $\mathbf{\Sigma}$ converges to \mathbf{S} .

Functions of WLS (ADF) and ULS are as follows (Schermelleh-Engel, Moosbrugger, & Müller, 2003)

$$F_{WLS} = \frac{1}{2} \text{trace}([\mathbf{S} - \mathbf{\Sigma}] \mathbf{V}^{-1})^2$$

\mathbf{V}^{-1} is a $p \times p$ weight matrix. If \mathbf{S} matrix is used as the weights (\mathbf{V}) in the above formula, then function is called Generalized Least Square. Unweighted Least Squares function does not give any weight and *identity* \mathbf{I} matrix used instead of \mathbf{V} matrix.

$$F_{GLS} = \frac{1}{2} \text{trace}([\mathbf{S} - \mathbf{\Sigma}] \mathbf{S}^{-1})^2$$

$$F_{ULS} = \frac{1}{2} \text{trace}([\mathbf{S} - \mathbf{\Sigma}])^2$$

Schermelleh-Engel et al. (2003) indicated that "robust maximum likelihood estimation needs relatively large sample sizes of at least $N \geq 400$ or even $N \geq 2,000$.

Multivariate Normality

Multivariate normality is the fundamental assumption of ML method. In case of non-normality, ML produces incorrect parameter estimates and better to choose another estimation method. Multivariate normality is attained in three

levels. (1) All univariate distributions are normal, (2) joint distribution of the variables are normal, (3) All bivariate scatter plots are linear and homoscedastic. It is difficult to assess all levels of multivariate normality because of difficulties in calculation of joint distributions when there are more than 4 or more variables. Univariate normality gives indication of multivariate non-normality most of the times (Kline, 1998, pp. 82-83).

Skewness and Kurtosis values above 2.0 and 7.0 are the indicators of univariate non-normality (Curran, West, & Finch, 1996).

Hoyle (1995, p. 63) warns that non-normality leads modest underestimation of fit indices such as NFI, TLI and CFI²⁰ and it is usual to expect moderate to severe underestimation of standard errors of parameter estimates.

Fit Indices

Chi-SQUARE (χ^2).

The most basic fit index is Pearson chi-square (χ^2) statistics with degrees of freedom (= {*number of observations*} - {*number of parameters*}). χ^2 is a form of generalized likelihood ratio for large samples. χ^2 is calculated with the following formula in ML estimation²¹ (Brown, 2006, p. 81).

$$\chi^2 = (N-1) F_{ML}$$

For just identified models, F_{ML} , df, and χ^2 are all zero. For the over identified models, χ^2 usually different than zero and interpreted as the test of significance of Hypothesis (H_0) that “the difference of estimated variance (Σ) and observed

²⁰ Details of these measures will be given under the *Fit Indices* title.

²¹ For the estimation models like ULS and WLS, F_{ULS} and F_{WLS} functions are used instead of F_{ML} .

variance matrix (**S**) is zero". If the calculated χ^2 is above the critical value (e.g. $\alpha=0.05$ i.e., probability of 95% not to accept it), H_0 is rejected. In contrast to traditional statistical procedures, H_0 should not to be rejected to attain good fit.

Corrections have been developed to adjust ML estimators to account for non-normality Satorra-Bentler scaled χ^2 is computed on the basis of the model (Schermelleh-Engel, Moosbrugger, & Müller, 2003).

That is very obvious from the formula that, χ^2 is sensitive to sample size and difficult to use in absolute terms since there is no standardization. χ^2/df ratio is calculated for standard use of chi-square. However, there is no clear level and consensus on what should be the χ^2/df ratio. χ^2 is used for the comparison of nested models²².

χ^2 is very stringent condition because of difficulty of assessing $\mathbf{S} = \mathbf{\Sigma}$ equality and sensitivity to sample size, model fit cannot be attained by χ^2 statistic. Therefore there are other fit indices to consider for the level of model fitness.

Root Mean Square Residual (RMR).

RMR is an absolute fit index like χ^2 . It is the measure of average difference of the predicted and observed covariances. It is difficult to interpret and not appropriate for compare of models since every model has their own metric of RMR.

$$\sum_{i=1}^p \sum_{j=i}^p \frac{(S_{ij} - \Sigma_{ij})^2}{p(p+1)}$$

²² Nested models are the models contain the same indicators but differs in degrees of freedom.

Standardized Root Mean Square (SRMR).

SRMR is the comparable version of RMR and it is the measure of average discrepancy between estimated and observed correlations. The calculation formula is identical to RMR formula above. Instead of covariances, difference of correlation matrices' elements is squared in the numerator. SRMR is widely used for comparison of the models and values less than .05 are considered as good fit indication. In other words, a model is considered to be goodness-of-fit when it explains the correlations within an average error of .05.

Root Mean Square Error of Approximation (RMSEA).

A widely used goodness-of-fit is class of indices is called the RMSEA. When $\mathbf{S} \neq \mathbf{\Sigma}$, the χ^2 statistic has a non-central χ^2 distribution. Non-centrality Parameter (NCP) expresses the degree of model misspecification (Brown, 2006, p. 83) and estimated as $\text{Max}(\chi^2 - df, 0)$. When the value of $\chi^2 - df$ is negative, max function sets NCP as zero and NCP takes zero value as minimum. Brown (2006) explains that RMSEA is an *error of approximation* index because it assesses the extent to which a model fits reasonably well in the population (as opposed to testing whether the model holds exactly in the population; like χ^2 does). Exact fit ($\mathbf{S} = \mathbf{\Sigma}$) in the H_0 hypothesis is replaced with close fit and measured with

$$RMSEA = \sqrt{\frac{\chi^2 - df}{(N - 1)df}}$$

RMSEA is calculated as such that NCP (i.e., $\chi^2 - df$) is rescaled by the sample size (N-1) and then rescaled again with degrees of freedom, which takes into account the model parsimony. Brown (2006, p. 84) says there is no upper limit

for RMSEA but it has been rarely seen above one and values near zero indicate good model fit. Confidence intervals are used for the precision of RMSEA point estimate (90% is typical). Schermelleh-Engel et al. expressed that RMSEA values less and equal to .05 are accepted as close fit (Browne & Cudeck, 1992). RMSEA values between .05 and .08 are considered as indicating adequate fit, .08, and .10 are mediocre fit and above .10 are not acceptable (Brown, 2006, p. 87). Hu and Bentler (1999) considered RMSEA statistics above .06 as doubtful.

Comparative Fit Indices

There are measures for comparison of models which are called as Incremental Fit Indices evaluate the fit of the model tested with more restricted, nested baseline model (Brown, 2006, p. 84).

Schermelleh-Engel et al. explain how this comparison is constructed as follows: "This baseline model is a very restrictive model in which only p parameters, namely the variances of the variables, have to be estimated. An even more restrictive baseline model than the independence model is the null model, a model in which all parameters are fixed to zero and hence, no parameters have to be estimated. The fit index for a baseline model will usually indicate a bad model fit and serves as a comparison value. The issue is whether the target model has an improvement relative to the baseline model."

For the baseline model estimations covariances between indicators are all set to zero and only indicator variances calculated freely.

Comparative Fit Index (CFI).

$$CFI = 1 - \frac{\max [(\chi_T^2 - df_T), 0]}{\max [(\chi_T^2 - df_T), (\chi_B^2 - df_B), 0]}$$

χ_T^2 and df_T are the target model's chi-square and degrees of freedom values and χ_B^2 and df_B are baseline model's chi-square and degrees of freedom values.

Expression in the nominator is simply the Non-Centrality Parameter (NCP) of the target model and it is divided by NCP of baseline or itself, whichever is the larger. If NCP_T is zero CFI is 1 and indicates good model fit. For the NCP_T values greater than zero but small in absolute terms and much smaller than NCP_B cases ratio on the right converges to zero and CFI index approaches to one.

Goodness of Fit Index (GFI).

GFI is the measure of how much the sample variance is explained by the model. This implies testing how much better the model fits as compared to "no model at all" (null model), i.e., when all parameters are fixed to zero. If the GFI value is one, it indicates the perfect fit and zero value indicates no-fit. GFI values like .90 and above are indicating good fit (Byrne, 2001, p. 82). Adjusted GFI (AGFI) is adjusted form of GFI with degree of freedom. Both indices are exposed to sample size changes.

$$GFI = 1 - \frac{\chi_T^2}{\chi_N^2} = 1 - \frac{F_T}{F_N}$$

χ_N^2 is the chi-square of the null (saturated) model and χ_T^2 is the chi-square of the target model. F's are minimized fitting functions of null and target models.

$$AGFI = 1 - \frac{df_N}{df_T} (1 - GFI) = 1 - \frac{\chi_T^2 / df_T}{\chi_N^2 / df_N}$$

df_N {i.e., $s = p(p + 1)/2$ } is the number of degrees of freedom for the null model, and df_T $\{= s - t\}$ is the number of degrees of freedom for the target model.

AGFI values are typically in the range of 0-1. Larger values of AGFI indicate a better fit, but it is also possible that a large N in combination with small df_T can result in a negative AGFI. If the number of degrees of freedom for the target model approaches the number of degrees of freedom for the null model, the AGFI approaches the GFI. A rule of thumb for this index is that .90 is indicative of good fit relative to the baseline model, whereas values greater than .85 may be considered as an acceptable fit.

Normed Fit Index (NFI)

NFI is also known as the Bentler-Bonett normed fit index) sensitive to sample size and NFI is not a good indicator when the sample size is small. When NFI value is one, this indicates perfect fit. Values above .95 are good, between .90 and .95 are acceptable.

$$NFI = 1 - \frac{\chi_T^2}{\chi_B^2} = 1 - \frac{F_T}{F_B}$$

χ_B^2 is the chi-square of the independence model (baseline model) and χ_T^2 is the chi-square of the target model. F 's are minimized fitting functions of baseline and target models.

Parsimony Goodness of Fit Index (PGFI) and Parsimony Normed Fit Index (PNFI)

PGFI was introduced by James, Mulaik, and Brett (1982) and takes into account the number of freely estimated parameters (i.e., df) and GFI evaluation together. Values of PGFI should be expected less than GFI values (Byrne, 2001, p. 82).

PNFI and PGFI (James, Mulaik, & Brett, 1982) are modifications of GFI and NFI

$$PGFI = \frac{df_T}{df_B} GFI$$

df_T is the degree of freedom of the target model and df_B is the df of baseline (null) model. Similarly,

$$PNFI = \frac{df_T}{df_B} NFI$$

Higher values of PGFI and PNFI indicate a more parsimonious fit. Both indices may be used for choosing between alternative models.

Tucker and Lewis Index (TLI)

TLI which is also called as Non-Normed Fit Index (NNFI) is preferred to NFI because of its reflection of parsimony and it is less affected by sample size (Schermelleh-Engel, Moosbrugger, & Müller, 2003).

$$TLI (NNFI) = \frac{\left[\left(\frac{\chi_B^2}{df_B} \right) - \left(\frac{\chi_T^2}{df_T} \right) \right]}{\left(\frac{\chi_B^2}{df_B} \right) - 1}$$

90 - .95 ranges is acceptable for TLI and CFI indices (Brown T, p.87)

Different indices are used for comparison of the models according to their types. For nested (hierarchical) models, $\chi^2_{\text{difference}}$ statistic is used for comparison. χ^2_{diff} is simply the difference between χ^2 values of two nested model and its degree of freedom is equal to difference of df values of both models. A non-significant value of χ^2_{diff} suggests that overall fits of the two models are comparable (Kline, 1998, p. 133).

Comparison Indices for Non-nested Models (AIC, CAIC and ECVI)

Examples of the measures for the comparison of non-nested (un-hierarchical) models are AIC, CAIC and ECVI. Akaike's Information Criterion (AIC), is calculated with the following formula (Akaike, 1987).

$$AIC = \chi^2 - 2df$$

Some software programs may use different AIC formulations, which are very similar to the above formula, and values produced from the same software program must be compared. The formula used in LISREL and AMOS software programs is

$$AIC = \chi^2 - 2a$$

and a is the number of freely estimated parameters (Brown, 2006, p. 175).

Complexity of the model is harshly punished and models with different degrees of freedom are compared with the AIC measure and the one with the smaller AIC is preferred. The modified version of AIC by Bozdogan (1987) takes into account the sample size (Kline, 1998).

$$CAIC = \chi^2 - \ln(N + 1) df$$

If the same sample (N) has been used to test the two models to be compared, there is no help difference in using AIC or Consistent AIC (CAIC).

Expected Cross Validation (ECVI) like AIC takes into account the model fit (cf. χ^2) and model parsimony. Additionally ECVI takes into account the sample size and great penalty for the small sized and non-parsimonious models with the formulation (Brown, 2006, p. 180):

$$ECVI = \frac{\chi^2 + 2a}{N - 1} = F_{ML} + \frac{2a}{N - 1}$$

If the estimation method is not Maximum Likelihood, proper fit function should be replaced with F_{ML} variable. AIC and ECVI does not provide statistical comparison of two models like χ^2_{diff} does. They compare the overall fit of the models adjusted with their complexities.

Table 116. Characteristics of Indices.

	Absolute Fit	Complexity, Model Parsimony	Sample Size	Trimmed/ Baseline model comparisons	Comparison with other models
χ^2 , RMR, F_{ML} , F_{WLS} ...	√				
χ^2_{diff}				√	
SRMR	√				√
RMSEA		√	√		√
CFI, GFI, NFI				√	
AGFI, PGFI, PNFI, TLI		√		√	
AIC		√			√
CAIC, ECVI		√	√		√

Source: tabulated with the characteristics given by Schermelleh-Engel et al. (2003)

Recommendations for Model Evaluation: Rule of thumbs by Schermelleh-Engel et al. (2003).

Table 117. Goodness of fit Criteria.

	<u>Good Fit</u>	<u>Acceptable Fit</u>
χ^2	$0 \leq \chi^2 \leq 2df$	$2df < \chi^2 \leq 3df$
p value	$.05 < p \leq 1.00$	$.01 < p \leq .05$
χ^2/df	$0 \leq \chi^2/df \leq 2$	$2 < \chi^2/df \leq 3$
RMSEA	$0 \leq p \leq .05$	$.05 < p \leq .08$
p value for test of close fit (RMSEA <.05)	$.10 < p \leq 1.00$	$.05 < p \leq .10$
Confidence interval CI	Close to RMSEA , Left boundary=.00	Close to RMSEA
SRMR	$0 \leq SRMR \leq .05$	$.05 < SRMR \leq .10$
NFI	$.95 \leq NFI \leq 1.00$	$.90 \leq NFI < .95$
TLI (NNFI)	$.97 \leq TLI \leq 1.00$	$.95 \leq TLI < .97$
CFI	$.97 \leq CFI \leq 1.00$	$.95 \leq CFI < .97$
GFI	$.95 \leq GFI \leq 1.00$	$.90 \leq GFI < .95$
AGFI	$.90 \leq AGFI \leq 1.00$	$.85 \leq NFI < .90$
	Close to GFI	Close to GFI
AIC, CAIC, ECVI	Smaller than comparison model value	

Source: (Schermeleeh-Engel, Moosbrugger, & Müller, 2003)

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