EMPIRICAL INVESTIGATION OF INTERNET BANKING USAGE IN TURKEY

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EMPIRICAL INVESTIGATION OF INTERNET BANKING USAGE IN TURKEY

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ABSTRACT

EMPIRICAL INVESTIGATION OF
INTERNET BANKING USAGE IN TURKEY

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With the fast development of Information and Communication Technologies (ICT), internet banking has become more popular worldwide. This study empirically investigates the factors impact internet banking usage by Turkish bank customers. A unique Internet Banking Usage Model (IBUM) was developed in this study. The proposed model incorporated 10 factors named usefulness, ease of use, compatibility, control, social influence, risk, website features, alliance service, awareness of service and customization/personalization. Subsequently, the related measurement instrument was developed and then revised based on the results of reliability analyses for pilot study. Afterwards, the final measurement instrument was validated through investigation of convergent and discriminant validity. The proposed model and hypotheses were tested with Partial Least Square (PLS) as a Structural Equation Modeling (SEM) technique. The results of initial model testing indicated that compatibility has the most significant effect on internet banking usage which is followed by alliance service, usefulness, customization/personalization and ease of use. Consequently, the initial model was modified in order to find the inter-relationships among research factors. Finally, the results are discussed and suggestions for future researches presented by highlighting the effects of customization/personalization and alliance services on internet banking usage.

Keywords: Internet Banking, Technology Acceptance, Adoption Models, Structural Equation Modeling, Partial Least Squares Path Modeling.

ÖZ

TÜRKİYE'DE MOBİL BANKACILIK KULLANIMININ
DENEYSEL ARAŞTIRMASI

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Bilgi ve Iletişim Teknolojilerinin (BIT) hızla gelişmesiyle beraber, internet bankacılığı dünya çapında daha da popüler hale gelmektedir. Bu çalışma, Türkiye'deki banka müşterilerinin internet bankacılığı kullanımını etkileyen faktörleri deneysel olarak araştırmaktadır. Bu çalışmada özgün bir İnternet Bankacılığı Kullanım Modeli (İBKM) geliştirilmiştir. Bu model; kullanışlılık, kullanım kolaylığı, web site özellikleri, uyumluluk, kişiselleştirme/özelleştirme, risk, ortak hizmetler, toplumsal etkiler, hizmet farkındalığı ve kontrol adlı 10 faktörden oluşmaktadır. Ayrıca modelle bağlantılı bir ölçüm aracı geliştirilmiş ve pilot çalışma için yapılan güvenilirlik analizlerinin sonuçlarına göre revize edilmiştir. Sonrasında ölçüm aracı , yakınsak ve ayırt edici geçerlilikler kullanılarak doğrulanmıştır. Önerilen model ve hipotezler yapısal eşitlik modellemesi tekniklerinden kısmi en küçük kare yöntemi ile test edilmiştir. İlk model testlerinin sonuçları, internet bankacılığı kullanımı üzerinde en fazla etkisi olan faktörün uyumluluk olduğunu göstermektedir. Uyumluluk faktörünü; ortak hizmetler, kullanışlılık, kişiselleştirme/özelleştirme ve kullanım kolaylığı takip etmektedir. Bu araştırma faktörlerinin birbirleri arasındaki ilişkileri bulmak için ilk model güncellenmiştir. Çalışmanın sonunda, sonuçlar tartışılmış, kişiselleştirme/özelleştirme ve ortak hizmetlerin internet bankacılığı kullanımı üzerindeki etkileri vurgulanarak gelecekteki araştırmalar için öneriler sunulmuştur.

Anahtar Kelimeler: Internet Bankacılığı, Teknoloji Kabullenme, Benimseme Modelleri, Yapısal Denklem Modelleme, Parçalı En Küçük Kareler Yol Modelleme.

To my parents and my lovely sister Samira

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LIST OF ABBREVIATIONS

IT	Information Technology
ICT	Information and Communication Technology
IB	Internet Banking
IBUM	Internet Banking Usage Model
SEM	Structural Equation Modeling
PLS	Partial Least Squares
EFA	Explanatory Factor Analysis
CFA	Confirmatory Factor Analysis
LS	Least Square
ADF	Asymptotic Distribution Free
GFI	Goodness of Fit Index
AVE	Average Variance Extraction
IPA	Interpretative Phenomenological Analysis
TRA	Theory of Reasoned Action
TAM	Technology Acceptance Model
TPB	Theory of Planned Behavior
DOI	Diffusion of Innovation
UTAUT	Unified Theory of Acceptance and Use of Technology
ATM	Automatic Teller Machine
LV	Latent Variable
MV	Manifest Variable

CHAPTER 1

INTRODUCTION

The emergence of banking services is as old as commencement of trade and commerce among people. The Temple which was built (BC 3500) by Sumerians around Uruk sites has been known as the first bank like institution. Fundamental principles of banking activities were set based on Hammurabi's laws in Babylon around BC 2067-2025. The first modern banking activities were lunched by the establishment of Amsterdam Bank in Holland in 1609 (Yıldırım, 2006).

Today, all organizations invest to transform their traditional business models into electronically enabled business models (e-business). For example; e-commerce, e-learning, e-governance, e-health and e-banking are outcomes of improvements on computer and networking technologies. Additionally, banking is a highly information-intensive business, so Information Technology (IT) is absolutely essential when it comes to defining new business models in banking industry.

Electronic banking (e-banking) refers to delivery of all banking services to customers via electronic media. E-banking surpasses traditional brick and mortar branches by providing round-the-clock availability of banking services and increasing speed and convenience of banking activities. According to Abid and Noreen (2006), electronic banking is defined as "Any use of information and communication technology and electronic means by a bank to conduct transactions and have interaction with the stakeholders". The self-service technology in finance sector was initiated by the installation of first Automatic Teller Machine (ATM) in 1970s then it was followed by the presentation of telephone banking in 1980s. In the 1990s, the rapid growth of internet technology made a radical shift in the way which people lived and worked. Internet penetrated all aspects of human's personal and professional lives. Subsequently, banks extended their e-banking services by offering internet based banking in mid-1990s. Recently, the expansion of mobile device usage such as cell phones, PDAs and smart phones has motivated banks to offer mobile banking as well (Hoehle, Scornavacca, & Huff, 2012).

This study focuses on internet banking which is defined "as a channel that allows consumers to perform a wide range of financial and non-financial services through the

banks' websites" (Hoehle, Scornavacca, & Huff, 2012) without the hassle of going to the bank.

1.1 Problem statement

The primary requirement for practicing internet banking is to use internet. According to the Internet World Stats (2012), Turkey is the 5th in terms of largest internet usage in Europe and 15th in the world with 36.5 M internet users (45.7 % of population). Turkey also can be counted as one of the pioneer countries which have utilized information and telecommunication technologies to improve their banking sectors. Türkiye İş Bankası was the first bank which launched internet banking services in Turkey in 1997 (Polatoglu & Ekin, 2001) only two years after the development of first internet banking services in the USA by Wells Fargo bank.
Currently, 25 of 48 banks which operating in Turkey offer internet banking services and the number of registered internet banking users has reached to 21.6 M by September, 2012. Of course, the number of active users (who logged into internet banking websites at least once in the third quarter of 2012) was only 8.6 M.

The website of Turkish banks provide a variety of investment services such as Investment funds, Foreign currency transactions, Time deposit accounts, Realized share certificate transact, Repurchasing agreements, Bonds and bills, Gold transactions and VOB. Additionally, internet banking relies to customers' financial activities such as money transfer, payments, credit card activities and others.

The Bank Association of Turkey (2012) reported that the total amounts of TRY 77.3 Billion for investment transactions and TRY 370 Billion for financial transactions were performed through internet banking services in the third quarter of 2012. Statistics also reveal that the number of active users has increased by 29 percent in September, 2012 compared to the population in 2010 which indicates a growing trend in internet banking usage. On the other hand, if we consider all internet users as potential internet banking users, still there will be a big portion of non-users (75 %) in the market. According to Ozdemir, Trott, & Hoecht (2006), control beliefs, convenience, visibility, accessibility, cost and time savings are the most important benefits of internet banking. Additionally they defined security as the most significant barrier to adopt internet banking in Turkey.

Taking the market share of internet banking customers into consideration inspired us to develop a concrete and novel guideline for both new market entrants and for ones which want to improve their existing internet banking systems. This study is expected to contribute to expand the body of knowledge in internet banking area by investigating factors which increase and accelerate the usage of internet banking in Turkey.

In this study, we developed an Internet Banking Usage Model (IBUM). The model was neither based on a specific technology acceptance model nor employed from previous studies. The mixed model was used in order to make a differentiation in internet banking

adoption studies. This model included factors from well-known technology acceptance models and theories such as theory of planned behavior, technology acceptance model, diffusion of innovation theory and risk theory. Moreover, this model encompassed some other factors which demonstrated significant effects on internet banking usage in literature.

1.2 Research phases

This study was managed in four phases.

In the first phase of this study, an overview of technology acceptance theories was given. Additionally, a systematic literature review was made to explore the internet banking acceptance and adoption models. The results of the review were also used to understand the trend in the field. Subsequently, research factors were extracted and the relationships among factors were examined. Finally, an expert group analysis was conducted in order to select and classify research factors.

In the second phase, the proposed research model was introduced, hypotheses were formulated and measurement instrument was developed. Additionally, the pilot study was conducted with 30 respondents and then measurement instrument was revised based on the results of the reliability analysis.

In the third phase, data was collected from 300 people via paper-based questionnaire. Then validity of the measurement instrument was tested. Afterwards, quantitative analysis was conducted for testing hypotheses. Ultimately, a modified model was presented and tested through structural model.

In the last phase, discussions were made base on the results of quantitative analyses and then findings of the study were summarized and the suggestions for future works were presented. Figure 1 displays the progression of this study.

1.3 Research methodology

This study follows quantitative approach. The factors of the proposed model were selected based on literature review and expert group analysis. Data collected through paper-based questionnaire. Validation of the instrument and testing of hypotheses were performed by employing a quantitative methodology (PLS-SEM).

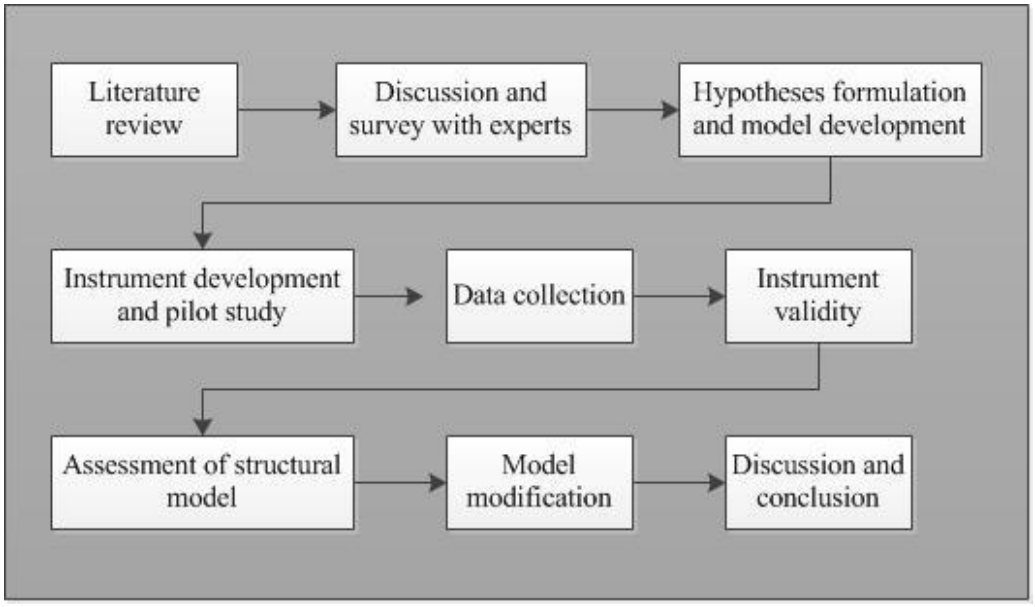

Figure 1 The progression of the study

CHAPTER 2

LITERATURE REVIEW

This chapter includes four sections. Section 2.1 gives an overview of technology acceptance theories. Section 2.2 covers the literature review in the field of internet banking adoption. Section 2.3 makes an insight into research factors and relationships among them which were examined in previous internet banking acceptance and adoption studies. Finally, section 2.4 provides an expert group analysis.

2.1 Technology Adoption Models

The success or failure rate of the new technology has a direct relationship with people's acceptance or rejection of the technology. Therefore, developing the models which predict an individual's intention to use of technological innovations was widely regarded by researchers in the IS domain. Theory of Reasoned Action, Theory of Planed Behavior, Technology Acceptance Model, Diffusion of Innovation and Unified Theory of Acceptance and Use Technology are the most common models in the field. The main goal of all models is to uncover factors which affect peoples' acceptance and adoption of technology.

2.1.1 Theory of Reasoned Action (TRA)

TRA is a social psychological model which developed by Fishbein & Ajzen (1975, 1980). It tries to predict actual human behavior from behavioral intention. According to Fishbein and Ajzen (1980), TRA assumes that "most behaviors of social relevance are under volitional control and are thus predictable from intention". TRA suggests that peoples' behavioral intention is a function of both attitude toward behavior and subjective norms factors (Figure 2).

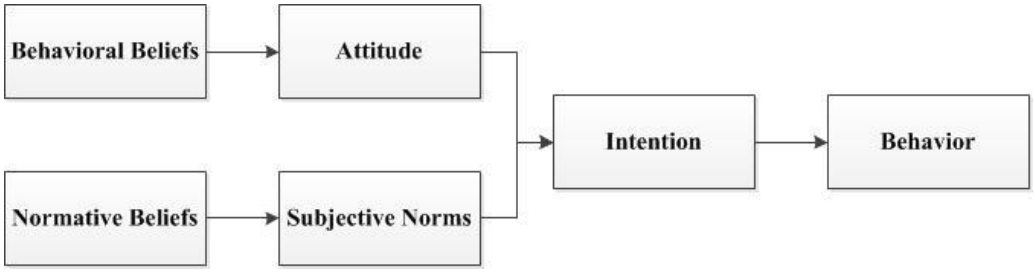

Figure 2 Theory of Reasoned Action

In this model, Attitude refers to the person's own performance of the behavior, rather than his or her performance in general (Fishbein & Ajzen, 1975). Subjective norm is "the person's perception that most people who are important to him or her think he/she should or should not perform the behavior in question". However TRA is a robust theory and has been tested in numerous studies, but it suffers to predict behavior when volitional control of individuals is violated (Ajzen, 1991). Additionally, TRA is not able to determine beliefs which are applicable in a specific behavior. Therefore, researchers have to define salient factors for subjects regarding the behavior in question.

2.1.2 Technology Acceptance Model (TAM)

TAM is a model which was developed by Fred Davis (1998). TAM was reported as the widely used model to assess users' usage of information technology or information systems (Chen, Li, & Li, 2011). The main goal of TAM was to declare factors which affect computer usage in general. Therefore, Davis took a small number of basic variables which were defined as significant determinants of computer usage in previous studies then utilized a psychological based theory; Theory of Reasoned Action (TRA) for modeling and hypothesizing the relationships among these variables (Davis, Bagozzi, & Warshaw, 1989). According to Davis, Perceived Usefulness (PU) and Perceived Ease of use (PEOU) are two fundamental determinants of technology adoption. Perceived usefulness is "the degree to which a person believes that using a particular system would enhance her/his job performance". Perceived ease of use is "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989). TAM assumes that the actual system usage is affected by intention to use and intention to use is determined by perceived usefulness and perceived ease of use (Figure 3). Davis's study revealed that the relationship between usefulness and usage is stronger than the relationship between ease of use and usage. "The regression results of study suggested that ease of use may be antecedent of usefulness". Subsequently, Davis (1989) claimed that the effect of ease of use on usage is also mediated by usefulness.

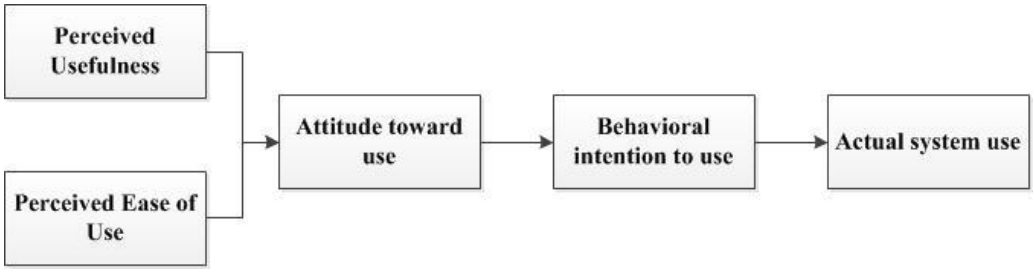

Figure 3 Technology Acceptance Model

Although TAM is a very popular model in predicting system use, there are some critics regarding the accuracy of model. Vijayasarathy (2004) sated parsimony as a key limitation of TAM to explain actual usage of system especially when use of new technology is based on users' voluntary choice (e.g. Online shopping, Internet banking). He also suggested that external factors such as compatibility, privacy, security, normative beliefs, and self-efficacy might be influential in adoption of online shopping.

Off course, Davis asserted the importance of external variables on internal variables which in turn affect system usage, but he did not offer an obvious guideline to detect the external variables. Moreover, Davis's model only is able to explain the indirect effect of external factors on system usage via perceived usefulness and perceived ease of use. However, factors such as age, educational level, system experience and other external factors can have direct effect on system usage.

2.1.3 Diffusion of Innovation (DOI)

Diffusion of innovation theory was initially introduced by Rogers (1995) in order to model the innovation-decision process. An individual's decision making process passes through five phases. In first step, individuals give insight into innovation. In second step, individuals make positive or negative attitude toward innovation. In third step, individuals make decision to adopt or reject innovation. In forth step, individuals implement the new idea (use innovation). Last phase is confirmation which individuals look for reinforcement of an innovation-decision which already made (Rogers, 1995). Moore & Benbasat (1991) explained the diffusion of innovation theory (Figure 4) based on five characteristics of innovation such as the ones that that follow.

- Relative advantages: "This is the degree to which an innovation is perceived as better than the idea it supersedes by a particular group of users".
- Compatibility: "This is the degree to which an innovation is perceived as being consistent with the values, past experiences, and needs of potential adopters".
- Complexity: "This is the degree to which an innovation is perceived as difficult to understand and use".
- Triability: "This is the degree to which an innovation may be experimented with before adoption".

- Observability: “This is the degree to which a result of an innovation, are observable to others”.

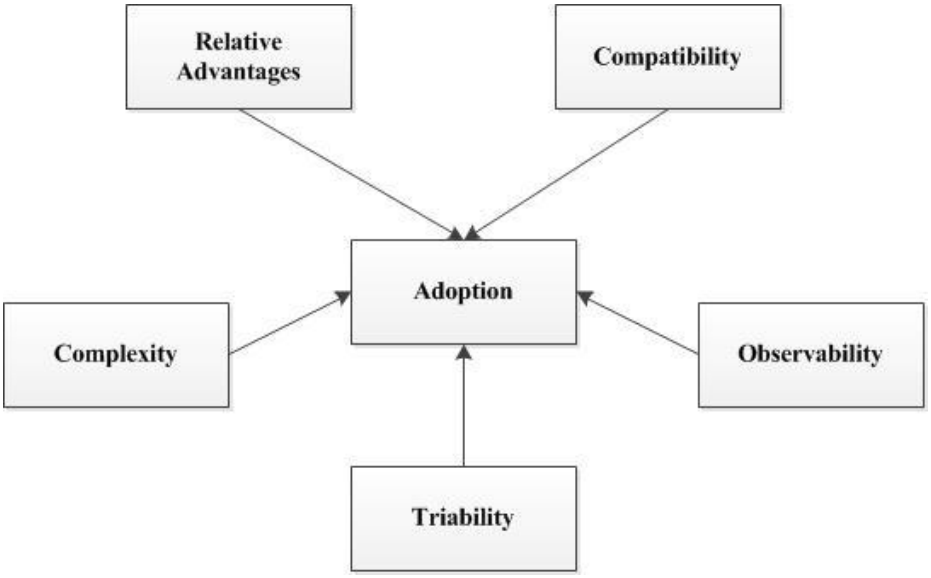

Figure 4 Diffusion of innovation theory

Moore & Benbasat (1991) carried the diffusion of innovation theory into the IS domain and developed an instrument which can be used to predict users’ adoption of information technology innovations. Their final model encompasses eight constructs: voluntariness to use which is defined as “the degree to which use of an innovation is perceived as being voluntary.”, image which is defined as “the degree to which use of innovation is perceived to enhance one’s image or status in one’s social system.”, relative advantage, compatibility, ease of use (complexity), triability, visibility, result demonstrability.

2.1.4 Theory of Planned Behavior (TPB)

Theory of planned behavior was developed by Ajzen (1985-1987) as an extension theory of TRA in order to predict and explain human behavior. Individual’s intention to perform a behavior is a central factor in theory of planned behavior. Intentions capture the motivational factors that influence a behavior. As a rule of thumb, if an individual have a strong motivation to participate in a behavior, more likely will perform it. According to Ajzen (1987) the performance of behavior not only depend on motivation factors but also on individual’s ability and availability of requisite opportunities and resources (e.g. time, money). Theory of planed behavior postulates that behavior is a function of perceived behavioral control and intention (Figure 5).

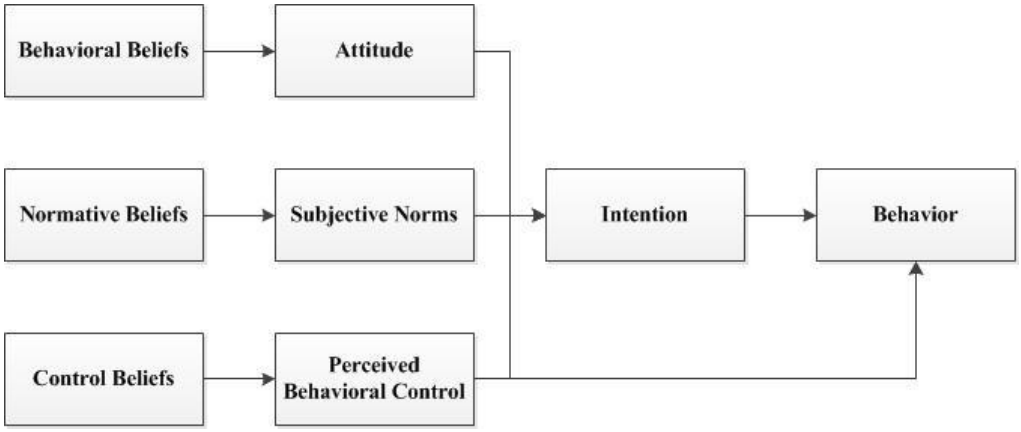

Figure 5 Theory of Planned Behavioral

In this model, the intention to perform a behavior is determined by attitude, Subjective norm and perceived behavioral control. According to Ajzen (1991), Attitude refers to "the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question". Subjective norm refers to "the perceived social pressure to perform or not to perform the behavior". Perceived behavioral control refers to "the perceived ease or difficulty of performing the behavior". In other word, perceived behavioral control refers to people's perceptions of their ability to perform a given behavior.

Moreover, theory of planned behavior concentrates on the salient beliefs as antecedents of attitudes, subjective norms and perceived behavioral control. There are three types of salient beliefs: behavioral beliefs which affect attitudes, normative beliefs which affect subjective norms and control beliefs which affect perceived behavioral control (Ajzen, 1991). Theory of planned behavioral is well-known for its high explanatory power.

2.1.5 Unified Theory of Acceptance and Use of Technology (UTAUT)

Venkatesh, Morris, Davis, & Davis (2003) reviewed eight prominent user acceptance models (TRA, TAM, TPB, a model combining TAM and TPB, Motivation theory, model of PC utilization, DOI, social cognitive theory) and compared them. Finally, they formulated the unified model which is called Unified Theory of Acceptance and Use of Technology. The model consisted of four constructs; Performance expectance, Effort expectance, Social influence and Facilitating conditions (Figure 6). This model also highlighted the effects of four key moderators such as gender, age, voluntariness and experience on users' intention to use technology. According to Venkatesh el at., (2003) UTAUT outperformed the eight individual models in predicting users' intention to use technology.

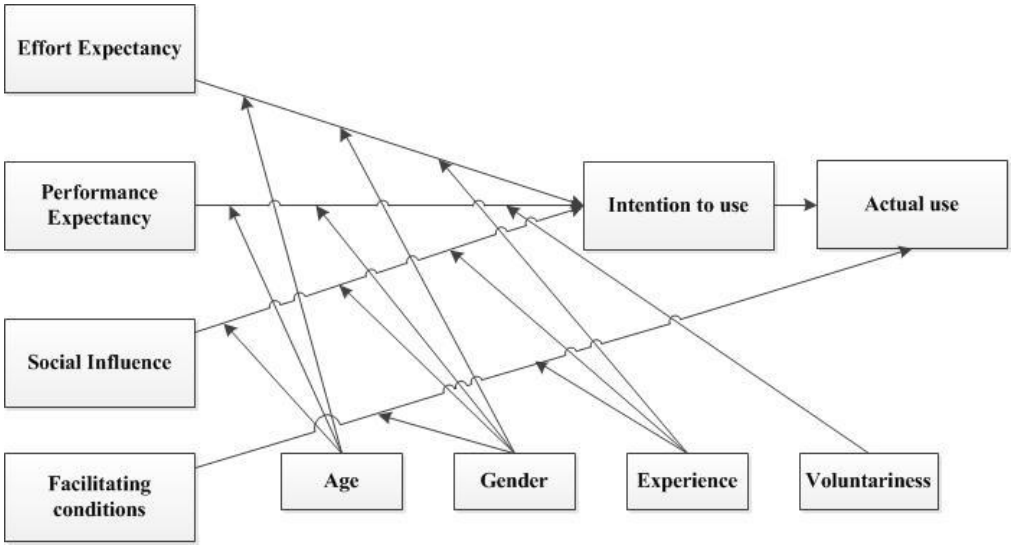

Figure 6 Unified Theory of Acceptance and Use of Technology

These attributes are defined by Venkatesh et al. (2003) as follows;

Performance expectancy refers to "the degree to which an individual believes that using the system will help him or her to attain gains in job performance". Performance expectancy was demonstrated as the strongest predictor of intention in UTAUT. Effort expectancy refers to "the degree of ease associated with the use of the system". Social influence refers to "the degree to which an individual perceives that important others believe he or she should use the new system". Facilitating conditions refer to "the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system".

2.2 Systematic review of internet banking studies

This section encompasses the systematic review of studies which empirically investigate acceptance, adoption and usage of internet banking. In order to make a comprehensive review, we utilized the Kitchenham's (2004) systematic review procedure which includes three main phases: planning the review, conducting the review and reporting the review. Initially we went through planning phase by developing a review protocol then studies were selected and reviewed based on review protocol and finally results were presented. Figure 7 demonstrates the review plan of this study.

2.2.1 Identifying research criteria

Only the studies which were written in English were considered. Keywords were limited to "internet banking", "acceptance", "adoption", "online banking" and "e-banking". Six combinations of keywords were applied such as the ones that follow.

- "Internet banking" was combined with "acceptance" by using the Boolean AND operator.
- "Internet banking" was combined with "adoption" by using the Boolean AND operator.
- "E-banking" was combined with "acceptance" by using the Boolean AND operator.
- "E-banking" was combined with "adoption" by using the Boolean AND operator.
- "Online banking" was combined with "acceptance" by using the Boolean AND operator.
- "Online-banking" was combined with "adoption" by using the Boolean AND operator.

In order to restrict the scope of review, we defined some criteria about timeline and format of studies as well. Regarding timeline, this review only covers studies from 2000 to October, 2012. Regarding Format, this review only includes studies published in journals and excluded conference proceedings, textbooks, unpublished papers, master theses and doctoral dissertations.

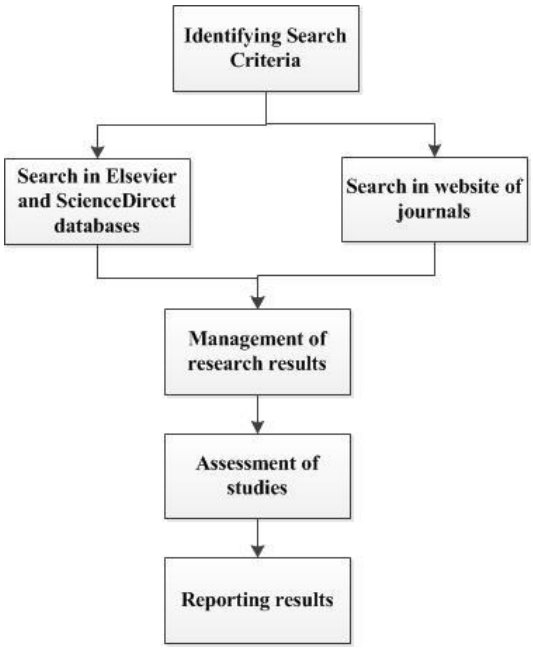

Figure 7 Systematic review protocol

2.2.2 Search in databases

The studies were searched in Elsevier and SinceDirect databases, because they are full-text scientific databases which include millions of journal articles and empower their users by sophisticated search tools. Moreover, these databases were easy accessible through METU Library (ww2.lib.metu.edu.tr).

2.2.3 Search in website of journals

The journals related to information systems, information technologies, internet researches, electronic commerce and electronic banking and also listed in SCI and SSCI (2012) were identified. Website of these journals were visited and investigated manually for achieving studies which may have been neglected when searching within databases. The list below includes the name of journals which searched manually.

- MIS quarterly
- Journal of the Association for Information Systems
- Behavior & information technology
- Data base for advances in formation
- European journal of information systems
- Information & management
- Information processing & management
- Information economics and policy
- Information processing & management
- Information research- an international electronic journal
- Information Systems and E-Business Management
- Information systems journal
- Information system research
- Information Technology & Management
- Information Technology & People
- International journal of information management
- Journal of Global Information Management
- Journal of Global Information Technology Management
- Journal of management information systems
- Journal of the American society for information science and technology
- Journal of the Association for Information Systems
- Journal of management and technology management
- South African Journal of Business Management
- Total quality management & business excellence Abacus-A Journal of Accounting Finance and Business Studies
- Journal of Business-to-Business Marketing
- Transformations in Business & Economics
- Electronic commerce research and applications
- Internet research

- Journal of business research
- Electronic Commerce Research
- Electronic Commerce Research and Applications
- International journal of electronic commerce
- Decision support system

2.2.4 Research result management

A database was developed to store essential information of retrieved studies. It included information such as name of authors, name of journals, country of origin, year of publish, employed research models, statistical analysis methods and statistical analysis tools.

2.2.5 Assessment of studies

Initially, the keywords, titles and abstracts of all studies in the database were inspected and the ones which were not applicable with the aim of this study were excluded. In next step, the full texts of studies were explored and studies which did not follow empirical study design with quantitative methods were eliminated from review as well. Moreover, studies which did not employ a theoretical model for identifying influential factors in acceptance, usage and adoption of internet banking were extracted from this review. In other words, investigating the influential factors in internet banking acceptance and adoption based on a theoretical model was the common point of all remaining studies.

2.2.6 Reporting results

The 28 studies were selected after applying exclusion/inclusion criteria and they were put into analyses. The results of descriptive analyses are precious from two points of view. First, they reveal what is going on in the field of internet banking acceptance and adoption. Second, they make an insight into the adoption models which were used in the field of internet banking.

Trend in the field

Figure 8 displays articles' distribution based on the year that they published. Figure 8 does not depict any study in the field in 2001. Interpretation for this phenomenon is that the articles which were published in mentioned year did not meet the predefined criteria for being reviewed through this study. Moreover, audience should consider that figure 8 only demonstrates the number of studies which were available online as of October 30, 2012. In general, the stable trend can be seen in the field which indicates that internet banking has never lost sight of its importance for researchers in the area of technology acceptance.

As seen in Figure 9, developing countries overtook developed countries in terms of carrying out studies on internet banking acceptance and adoption area. 89.2% of the studies were taken in developing countries while developed countries only counted for 10.71% of studies. Additionally, 78.57% of articles were from Asian countries. This high percentage demonstrates that internet banking sector is a trend and a rapidly growing market in Asia

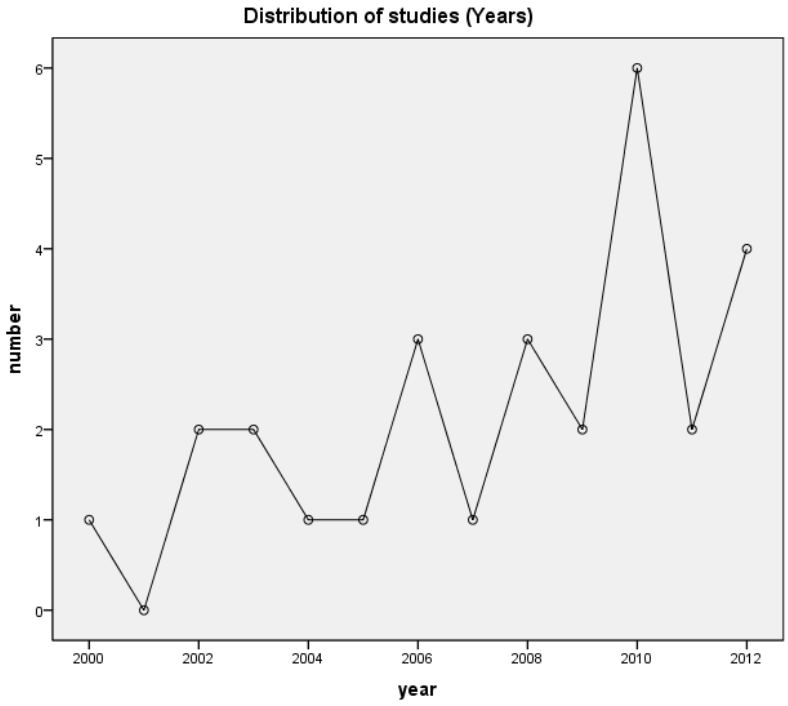

Figure 8 Distribution of studies over years

All studies followed quantitative methodology and employed questionnaires to collect data. 60.71 % of these studies applied paper-based questionnaire while 39.28 % of them conducted online surveys. Now the question arises as to why researchers preferred paper-based measurement instrument for examining the acceptance of an online service? One possible reason might be the high response rate of paper based questionnaires when compared to online ones.

Descriptive analysis revealed that 64.28 % of studies employed Structural Equation Modeling (SEM) as their statistical technique for testing hypothesized relationships among constructs. LISREL (33.3% of studies) was the most preferred statistical tool for SEM analysis which was followed by AMOS and PLS. On the other hand, 27.7% of studies did not mention the name of statistical tools which they utilized for analyzing data.

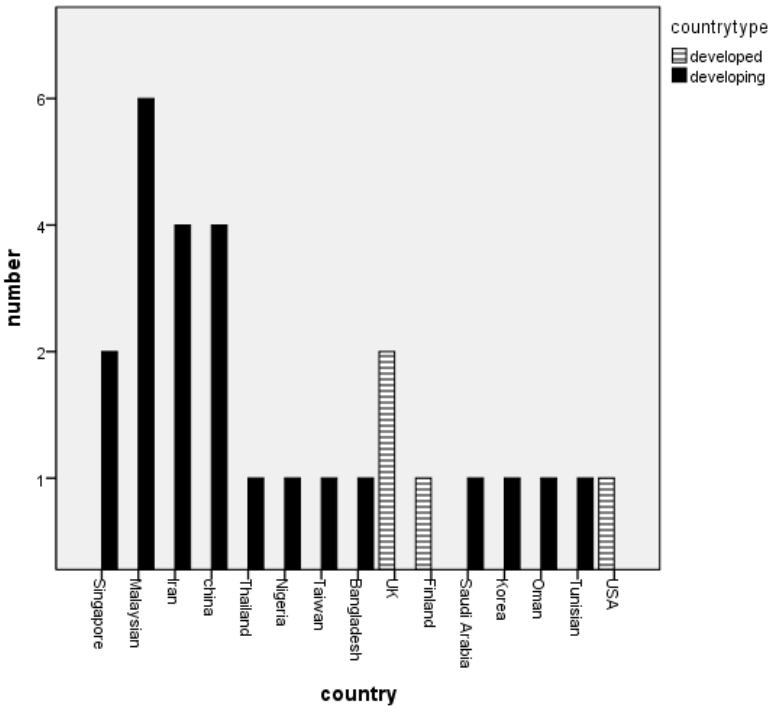

Figure 9 Distribution of studies based on population

All studies reported their sample sizes except one (Sadeghi & Farokhian, 2010). The average sample size of studies was 377 with maximum amount of 845 people and minimum of 125. Students, bank customers and employees of companies were the sample types of studies which used paper based questionnaires. In the case of online surveys, sample type included students, university staffs, online users and internet banking users. All studies suffered from generalizability power due to small sample size. Studies employed TAM, TRA, TPB, DOI, UTAUT, risk theory and the combination of these original models to investigate factors which affect acceptance and usage of internet banking. As seen in Figure 10, integrated models were the most commonly used models in internet banking acceptance and adoption studies. Various combinations of models were observed in studies: TAM and DOI (2 studies); TAM and TPB (4 studies); TAM, TRA and TPB (2 studies); Perceived risk and TPB; TPB and DOI; TAM and perceived risk. The data show that even today studies employ relatively outdated models instead of developing new models. Only One recent study proposed its own independent research model to investigate factors which affect actual use of internet banking (Yoon & Steege, 2012).

Figure 10 demonstrates the frequency of the models which were employed in reviewed studies over years. In general, TAM was used in 18 studies (as a single model or as a part of integrated models) and TPB were applied in nine studies (as integrated model in 8 studies). The high usage of TAM and TPB might be an indicator of their importance in the field. According to Taylor & Tood (1995), when the objective of study is to predict IT usage, TAM may be a better option; while, TPB may perform better in understanding

determinants of intention. Therefore, we can predict that the combination of TAM and TPB more likely results in higher explanatory power when it comes to understanding and predicting internet banking adoption.

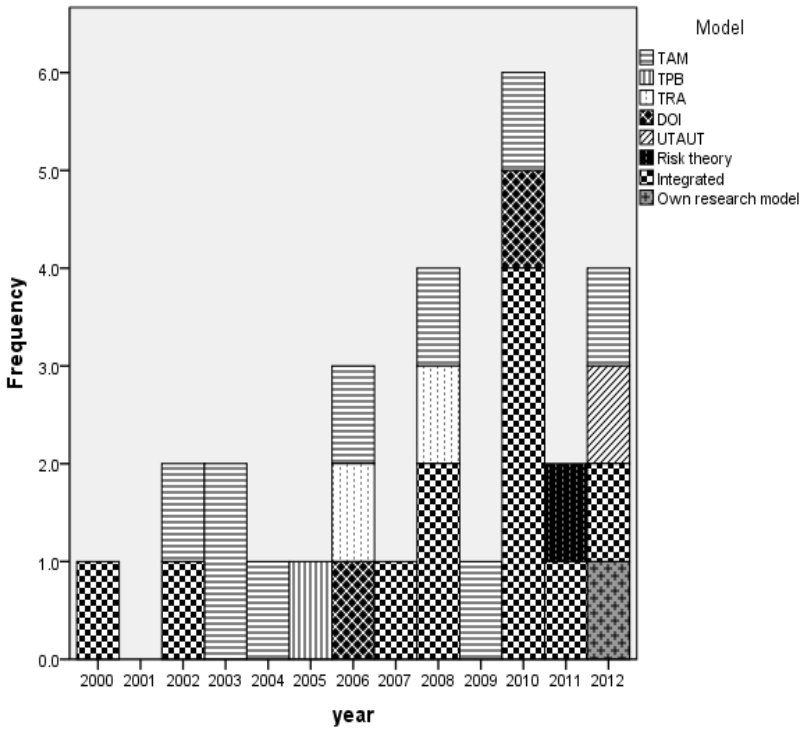

Figure 10 Distribution of studies based on theoretical background

2.3 Factor analysis

This section combined research factors of 28 reviewed studies and summarized the relationship among these factors.

2.3.1 Factor extraction

62 different research factors were extracted from studies (Table 1). Perceived usefulness (18), perceived ease of use (16), attitude (15), intention (13), subjective norms (9), security and privacy (9), perceived behavioral control (9), trust (5), perceived risk (4), self-efficacy (4) and compatibility (4) were among the top 11 factors which investigated in reviewed studies.

Table 1 Summary of factors in reviewed studies

Factor name	**Frequency**	**Studies**
Perceived usefulness	18	Lee (2008); Yaghoubi & Bahmani (2010); Yiu, Grant, & Edgar (2007); Jaruwachirathanakul & Fink (2005); Al-Somali, Gholami & Clegg (2009); Alsajjan & Dennis (2010); Pikkarainen, Pikkarainen, Karjaluoto, & Pahnila (2004); Lai , Chau, & Cui (2010); Ayo, Adewoye, & Oni (2010); Sadeghi & Farokhian (2010); Jahangir & Begum (2008); Chau & Lai (2003); Suh & Han (2002); Yousafzai, Foxall, & Pallister (2010); Ramayah, Jantan, Ling, Razak, & Noor (2003); Nasri & Charfeddine (2012); Ariff, Zakuan, Jusoh, & Bahari (2012); Cheng, Lam, & Yeung (2006)
Perceived ease of use	16	Lee (2008); Yaghoubi & bahmanin (2010); Yiu, Grant, & Edgar (2007); Al-Somali, Gholami, & Clegg (2009); Pikkarainen et al. (2004); Lai , Chau, & Cui (2010); Ayo, Adewoye, & Oni (2010); Jahangir & Begum (2008); Chau & Lai (2003); Nor, Pearson, & Ahmad (2010); Suh & Han (2002); (Yousafzai, Foxall, & Pallister (2010); Ramayah et al. (2003); Nasri & Charfeddine (2012); Ariff et al. (2012); Cheng, Lam, & Yeung (2006)
Attitude	15	Yaghoubi & bahmani (2010); Al-Somali, Gholami, & Clegg (2009); Alsajjan & Dennis (2010); Lai , Chau, & Cui (2010); Chau & Lai (2003); Nor, Pearson, & Ahmad (2010); Yaghoubi & Bahmani (2011); Suh & Han (2002); Nor, Shanab , & Pearson (2008); Yousafzai, Foxall, & Pallister (2010); Ramayah et al. (2003); Shih & Fang (2006); Nasri & Charfeddine (2012); Jaruwachirathanakul & Fink (2005); Cheng, Lam, & Yeung (2006)
Intention to use	13	Tan & Teo (2000); Lee (2008); Yaghoubi & bahmani (2010); Al-Somali, Gholami, & Clegg (2009); Lai , Chau, & Cui (2010); Yaghoubi & Bahmani (2011); Suh & Han (2002); Nor , Shanab , & Pearson (2008); Yousafzai, Foxall, & Pallister (2010); Shih & Fang (2006); Nasri & Charfeddine (2012); Ariff et al. (2012); Cheng, Lam, & Yeung (2006)

Table 1 (Cont.)

Factor name	Frequency	Studies
Social influence	3	Al-Somali, Gholami, & Clegg (2009); Riffai, Grant, & Edgar (2012); Yoon & Steege, (2012)
Awareness of service	2	Al-Somali, Gholami, & Clegg (2009); Riffai, Grant, & Edgar (2012)
Self-efficacy	4	Tan & Teo (2000); Al-Somali, Gholami, & Clegg (2009); Nasri & Charfeddine (2012); Ariff et al. (2012)
Quality of internet connection	3	Al-Somali, Gholami, & Clegg (2009); Pikkarainen (2004); Shih & Fang (2006)
Resistance to change	1	Al-Somali, Gholami, & Clegg (2009)
Trust	5	Al-Somali, Gholami, & Clegg (2009); Alsajjan & Dennis (2010); Ayo, Adewoye, & Oni (2010); Suh & Han (2002); Riffai, Grant, & Edgar (2012)
Security and privacy	9	Jaruwachirathanakul & Fink (2005); Pikkarainen et al. (2004); Sadeghi & Farokhian (2010); Jahangir & Begum (2008); (Yoon & Steege (2012); Nasri & Charfeddine (2012); Liao & Cheung, (2002); Shih & Fang (2006); Cheng, Lam, & Yeung (2006)
Perceived enjoyment	1	Pikkarainen et al. (2004)
Information on online banking	1	Pikkarainen et al. (2004)
Perceived risk	4	Tan & Teo (2000); Ndubisi & Sinti (2006); Yiu, Grant, & Edgar (2007); Ayo, Adewoye, & Oni (2010)
Organizational reputation	1	Ayo, Adewoye, & Oni (2010)
Customization/ Personalization	1	Chau & Lai (2003)

Table 1 (Cont.)

Factor name	Frequency	Studies
Alliance service	1	Chau & Lai (2003)
Task familiarity	1	Chau & Lai (2003)
Accessibility	1	Sadeghi & Farokhian (2010)
Prior experience	2	Ramayah et al. (2003); Liao & Cheung (2002)
Volume of transaction	1	Ramayah et al. (2003)
Training	1	Ramayah et al. (2003)
External pressure	1	Ramayah et al. (2003)
Relative advantages	3	Tan & Teo (2000); Lai , Chau, & Cui (2010); Nor, Pearson, & Ahmad (2010)
Compatibility	4	Tan & Teo (2000); Ndubisi & Sinti (2006); Lai , Chau, & Cui (2010); Nor, Pearson, & Ahmad (2010)
Complexity	3	Tan & Teo (2000); Ndubisi & Sinti (2006); Lai , Chau, & Cui (2010)
Importance to bank needs	2	Tan & Teo (2000); Ndubisi & Sinti (2006)
Internet experience	1	Tan & Teo (2000)
Triability	3	Tan & Teo (2000); Ndubisi & Sinti (2006); Nor, Pearson, & Ahmad (2010)
Subjective norms	9	Tan & Teo (2000); Lee (2008); Yaghoubi & bahmani (2010); Alsajjan & Dennis (2010); Yaghoubi & Bahmani (2011); Nor , Shanab , & Pearson (2008); Yousafzai, Foxall, & Pallister (2010); Shih & Fang (2006); Nasri & Charfeddine (2012)
Perceived technological support	2	Tan & Teo (2000); Nasri & Charfeddine (2012)

Table 1 (Cont.)

Factor name	Frequency	Studies
Perceived governmental support	2	Tan & Teo (2000); Nasri & Charfeddine (2012)
Perceived benefit	1	Lee (2008)
Performance risk	3	Lee (2008); Yaghoubi & Bahmani (2011); Shafei & Miran (2011)
Social risk	2	Lee (2008); Yaghoubi & Bahmani (2011)
Time risk	3	Lee (2008); Yaghoubi & Bahmani (2011); Shafei & Miran (2011)
Financial risk	3	Lee (2008); Yaghoubi & Bahmani (2011); Shafei & Miran (2011)
Security risk	3	Lee (2008); Yaghoubi & Bahmani (2011); Shafei & Miran (2011)
Legal risk	1	Shafei & Miran (2011)
Perceived behavioral control	6	Lee (2008); Yaghoubi & bahmani (2010); (Jaruwachirathanakul & Fink (2005); Yaghoubi & Bahmani (2011); Yousafzai, Foxall, & Pallister (2010); Nasri & Charfeddine; (2012)
Personal innovativeness	1	Yiu, Grant, & Edgar (2007)
Perceived manageability	1	Alsajjan & Dennis (2010)
Accuracy	2	Sadeghi & Farokhian (2010); Liao & Cheung (2002)
User involvement	1	Liao & Cheung (2002)
Convenience	2	Sadeghi & Farokhian (2010); Liao & Cheung (2002)
Bank image	1	Sadeghi & Farokhian (2010)
Information quality	1	Shih & Fang (2006)

Table 1 (Cont.)

Factor name	Frequency	Studies
User friendliness	2	Shih & Fang (2006); Liao & Cheung (2002)
Perceived playfulness	1	Riffai, Grant, & Edgar (2012)
Website design	2	Sadeghi & Farokhian (2010); Riffai, Grant, & Edgar (2012)
Personality	1	Yoon & Steege (2012)
Perceived credibility	1	Ariff et al. (2012)
Feature of website	1	Jaruwachirathanakul & Fink (2005)
Personal performance	1	Jaruwachirathanakul & Fink (2005)
Culture	1	Jaruwachirathanakul & Fink (2005)
External environment	1	Jaruwachirathanakul & Fink (2005)
Utilitarian oriented internet banking sites	1	Ndubisi & Sinti (2006)
Hedonism oriented internet banking sites	1	Ndubisi & Sinti (2006)
Transaction speed	2	Shih & Fang (2006); Liao & Cheung (2002)
Performance expectancy	1	Riffai, Grant, & Edgar (2012)
Effort expectancy	1	Riffai, Grant, & Edgar (2012)
Output quality	1	Riffai, Grant, & Edgar (2012)

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2.3.2 Relationship investigation

We summarized relationships which were tested across the reviewed studies and noted the significant and none-significant relationships (Table 2). Finally, we came up with 128 relationships. Only six studies tested the effect of research factors on actual internet banking usage and internet banking adoption (Pikkarainen et al., 2004; Yiu, Grant, & Edgar, 2007; Jahangir & Begum, 2008; Ndubisi & Sinti, 2006; Shafei & Miran, 2011; Yoon & Steege, 2012). Other studies only investigated the relationship among research factors and the intention to use internet banking which in turn affects the actual use of internet banking.

Table 2 Summary of relationships

Relationship tested	**Studies with Non-significant relationships**	**Studies with significant relationships**
Perceived usefulness → Attitude		Lee (2008); Yaghoubi & Bahmani (2010); Yiu, Grant, & Edgar (2007); Al-Somali, Gholami & Clegg (2009); Lai , Chau, & Cui (2010); Jahangir & Begum (2008); Chau & Lai (2003); Suh & Han (2002); Yousafzai, Foxall, & Pallister (2010); Cheng, Lam, & Yeung (2006)
Perceived usefulness → intention to use	Lai , Chau, & Cui (2010)	Lee (2008); Yaghoubi & bahmanin (2010); Yiu, Grant, & Edgar (2007); Nasri & Charfeddine (2012); Ariff et al. (2012); Cheng, Lam, & Yeung (2006); Jaruwachirathanakul & Fink (2005); Alsajjan & Dennis (2010); Suh & Han (2002); Ramayah, Jantan, Ling, Razak, & Noor (2003)
Perceived usefulness → use of internet banking		Pikkarainen et al. (2004)
Perceived usefulness →consumer continued use		Ayo, Adewoye, & Oni (2010)

Table 2 (Cont.)

Relationship tested	**Studies with Non-significant relationships**	**Studies with significant relationships**
Perceived usefulness →internet banking satisfaction		Sadeghi & Farokhian (2010)
Perceived ease of use→attitude	Nor, Pearson, & Ahmad (2010); Cheng, Lam, & Yeung (2006)	Lee (2008); Yaghoubi & bahmani (2010); Lai , Chau, & Cui (2010); Al-Somali, Gholami, & Clegg (2009); Jahangir & Begum (2008); Chau & Lai, (2003); Suh & Han (2002); Yousafzai, Foxall, & Pallister (2010)
Perceived ease of use→intention to use		Nasri & Charfeddine (2012); Ariffet al. (2012); Ramayah et al. (2003)
Perceived ease of use→ internet banking use		Pikkarainen et al. (2004)
Perceived ease of use→Internet banking adoption	Yiu, Grant, & Edgar (2007); Jahangir & Begum (2008)	
Perceived ease of use→perceived usefulness		Lee (2008); Yaghoubi & bahmani (2010); Lai , Chau, & Cui (2010); Al-Somali, Gholami, & Clegg (2009); Chau & Lai, (2003); Suh & Han (2002); Ramayah et al. (2003); Cheng, Lam, & Yeung (2006)
Perceived ease of use→consumer continued use		Ayo, Adewoye, & Oni (2010)
Social influence→ perceived usefulness		Al-Somali, Gholami, & Clegg (2009)

Table 2 (Cont.)

Relationship tested	**Studies with Non-significant relationships**	**Studies with significant relationships**
Attitude→ intention to use		Yaghoubi & bahmani, (2010); Yaghoubi & Bahmani (2011); Shih & Fang (2006); Nor , Shanab , & Pearson (2008); Nor, Pearson, & Ahmad (2010); Nasri & Charfeddine, (2012); Jaruwachirathanakul & Fink, (2005); Al-Somali, Gholami, & Clegg (2009); Lai , Chau, & Cui (2010); Yousafzai, Foxall, & Pallister (2010)
Social influence→ intention to use		Riffai, Grant, & Edgar (2012)
Awareness of service→ perceived usefulness		Al-Somali, Gholami, & Clegg (2009)
Awareness of service→intention to use		Riffai, Grant, & Edgar (2012)
Self-efficacy→ perceived ease of use		Al-Somali, Gholami, & Clegg (2009); Ariff et al. (2012)
Self-efficacy→ intention to use		Tan & Teo (2000)
Self-efficacy→ perceived behavioral control		Nasri & Charfeddine (2012)
Self-efficacy→ perceived usefulness		Ariff et al. (2012)
Social influence→ intention to use		Riffai, Grant, & Edgar (2012)

Table 2 (Cont.)

Relationship tested	**Studies with Non-significant relationships**	**Studies with significant relationships**
Self-efficacy→ perceived credibility		Ariff et al. (2012)
Quality of internet connection→ perceived ease of use		Al-Somali, Gholami, & Clegg (2009)
Quality of internet connection→ online banking use	Pikkarainen et al. (2004)	
Quality of internet →attitude		Shih & Fang (2006)
Resistance to change→ attitude		Al-Somali, Gholami, & Clegg (2009)
Trust→ attitude		Al-Somali, Gholami, & Clegg (2009); Suh & Han (2002); Alsajjan & Dennis (2010)
Trust→ intention to use		Riffai, Grant, & Edgar (2012)
Trust → customer continued use		Ayo, Adewoye, & Oni (2010)
Trust → perceived usefulness		Alsajjan & Dennis (2010)
perceived usefulness → trust		Suh & Han (2002)
Security and privacy→ internet banking satisfaction		Sadeghi & Farokhian (2010)

Table 2 (Cont.)

Relationship tested	**Studies with Non-significant relationships**	**Studies with significant relationships**
Security and privacy→ internet banking use	Pikkarainen et al. (2004)	Yoon & Steege (2012); Jaruwachirathanakul & Fink (2005); Jahangir & Begum (2008)
Security and privacy→ attitude	Cheng, Lam, & Yeung (2006)	Nasri & Charfeddine (2012); Jahangir & Begum (2008); Suh & Han (2002)
Security and privacy→intention to use		Cheng, Lam, & Yeung (2006)
System Security →perceived usefulness		Liao & Cheung (2002)
Perceive enjoyment→ internet banking use	Pikkarainen et al. (2004)	
Information on online banking→ internet banking use		Pikkarainen et al. (2004)
Perceived risk→ consumer continued use	Ayo, Adewoye, & Oni (2010)	
Perceived risk→intention to use		Tan & Teo (2000); Yiu, Grant, & Edgar (2007)
Perceived risk→ internet banking adoption	Ndubisi & Sinti (2006)	
Organizational reputation→ consumer continued use		Ayo, Adewoye, & Oni (2010)
Personalization→ perceived usefulness		Chau & Lai (2003)

Table 2 (Cont.)

Relationship tested	**Studies with Non-significant relationships**	**Studies with significant relationships**
Alliance service→ perceived usefulness		Chau & Lai (2003)
Task familiarity→ perceived usefulness	Chau & Lai (2003)	
Prior experience→ perceived ease of use		Ramayah et al. (2003)
Prior experience→ perceived usefulness	Liao & Cheung (2002)	Ramayah et al. (2003)
Volume of transaction→ perceived usefulness		Ramayah et al. (2003)
Volume of transaction→ perceived ease of use		Ramayah et al. (2003)
Training→ perceived usefulness		Ramayah et al. (2003)
Training→ perceived ease of use		Ramayah et al. (2003)
External pressure→ perceived usefulness		Ramayah et al. (2003)
External pressure perceived ease of use		Ramayah et al. (2003)
Relative advantages→ intention to use	Lai , Chau, & Cui (2010)	Tan & Teo (2000)
Relative advantages→attitude		Nor, Pearson, & Ahmad (2010)
Compatibility→ intention to use	Lai , Chau, & Cui (2010)	Tan & Teo (2000)
Compatibility→attitude		Nor, Pearson, & Ahmad (2010)

Table 2 (Cont.)

Relationship tested	**Studies with Non-significant relationships**	**Studies with significant relationships**
Compatibility→ internet banking adoption		Ndubisi & Sinti (2006)
Complexity→ intention to use	Tan & Teo (2000); Lai , Chau, & Cui (2010)	
Internet experience → intention to use		Tan & Teo (2000)
Complexity→ internet banking adoption		Ndubisi & Sinti (2006)
Experience→ intention to use		Tan & Teo (2000)
Importance to bank needs→ internet banking adoption		Ndubisi & Sinti (2006)
Importance to bank needs→ intention to use		Tan & Teo (2000)
Triability→ internet banking adoption		Ndubisi & Sinti (2006)
Triability→ intention to use		Tan & Teo (2000)
Triability→ attitude		Nor, Pearson, & Ahmad (2010)
Subjective norms→ intention to use	Tan & Teo (2000); Shih & Fang (2006)	Lee (2008); Yaghoubi & bahmani, (2010); Yaghoubi & Bahmani (2011); Nor, Pearson, & Ahmad (2010); Yousafzai, Foxall, & Pallister (2010); Nasri & Charfeddine (2012)
Subjective norms→ trust		Alsajjan & Dennis (2010)

Table 2 (Cont.)

Relationship tested	**Studies with Non-significant relationships**	**Studies with significant relationships**
Subjective norms→ perceived manageability		Alsajjan & Dennis (2010)
Perceived technological support→ intention to use		Tan & Teo (2000)
Perceived governmental support→ intention to use		Tan & Teo (2000)
Perceived technological support→ perceived behavioral control		Nasri & Charfeddine (2012)
Perceived governmental support→ perceived behavioral control		Nasri & Charfeddine (2012)
Perceived benefit→ intention to use		Lee (2008)
Perceived benefit→ attitude		Lee (2008)
Performance risk→ perceived usefulness		Lee (2008)
Performance risk→ attitude	Lee (2008)	Yaghoubi & Bahmani (2011)
Performance risk→ perceived ease of use		Shafei & Miran (2011)
Social risk→ subjective norms		Lee (2008)
Social risk→attitudes		Lee (2008); Yaghoubi & Bahmani (2011)

Table 2 (Cont.)

Relationship tested	**Studies with Non-significant relationships**	**Studies with significant relationships**
Time risk→ attitude		Lee (2008); Yaghoubi & Bahmani (2011)
Time risk→ internet banking use		Shafei & Miran (2011)
Financial risk→ attitude		Lee (2008); Yaghoubi & Bahmani (2011)
Financial risk→ internet banking use		Shafei & Miran (2011)
Security risk→ attitude		Lee (2008); Yaghoubi & Bahmani, (2011)
Security risk→ internet banking use		Shafei & Miran (2011)
Legal risk→ internet banking use		Shafei & Miran (2011)
Perceived behavioral control→ intention to use		Lee (2008); Yaghoubi & Bahmani (2011); Jaruwachirathanakul & Fink, (2005); Yaghoubi & Bahmani (2011); Yousafzai, Foxall, & Pallister (2010); Nasri & Charfeddine (2012)
Perceived behavioral control→attitude		Yousafzai, Foxall, & Pallister (2010)
Personal innovativeness→ intention to use		Yiu, Grant, & Edgar (2007)
Perceived manageability→ attitude		Alsajjan & Dennis (2010)
Perceived manageability→trust		Alsajjan & Dennis (2010)

Table 2 (Cont.)

Relationship tested	**Studies with Non-significant relationships**	**Studies with significant relationships**
Accuracy→ satisfaction of IB		Sadeghi & Farokhian (2010)
Accuracy→ perceived usefulness		Liao & Cheung (2002)
User involvement→ perceived usefulness		Liao & Cheung (2002)
Convenience→ satisfaction of IB		Sadeghi & Farokhian (2010)
Convenience→ perceived usefulness		Liao & Cheung (2002)
Bank image→ satisfaction of IB		Sadeghi & Farokhian (2010)
Information quality→ attitude		Shih & Fang (2006)
User friendliness→ attitude	Liao & Cheung (2002)	Shih & Fang (2006)
Transaction speed → attitude		Shih & Fang (2006)
Transaction speed →perceived usefulness		Liao & Cheung (2002)
Performance expectancy→ intention to use		Riffai, Grant, & Edgar (2012)
Effort expectancy→ intention to use		Riffai, Grant, & Edgar (2012)
Social influence → intention to use	Riffai, Grant, & Edgar (2012); Sadeghi & Farokhian (2010)	

Table 2 (Cont.)

Relationship tested	**Studies with Non-significant relationships**	**Studies with significant relationships**
Output quality→ intention to use		Riffai, Grant, & Edgar (2012)
Perceived playfulness→ intention to use		Riffai, Grant, & Edgar (2012)
Website design→ satisfaction of IB		Sadeghi & Farokhian (2010)
Website design→intention		Riffai, Grant, & Edgar (2012)
Personality→ internet banking use		Yoon & Steege (2012)
Perceived credibility→ intention to use		Ariff et al. (2012)
Feature of website→ intention to use		Jaruwachirathanakul & Fink (2005)
Personal performance→ intention to use		Jaruwachirathanakul & Fink (2005)
Culture→subjective norms		Jaruwachirathanakul & Fink (2005)
External environment→ perceived behavioral control		Jaruwachirathanakul & Fink (2005)
Utilitarian oriented internet banking sites→ internet banking adoption		Ndubisi & Sinti (2006)
Compatibility→ relative advantages		Lai , Chau, & Cui (2010)

Table 2 (Cont.)

Relationship tested	**Studies with Non-significant relationships**	**Studies with significant relationships**
Hedonism oriented internet banking sites→ internet banking adoption	Ndubisi & Sinti (2006)	
Compatibility→ ease of use		Lai , Chau, & Cui (2010)
Compatibility→ perceived usefulness	Lai , Chau, & Cui (2010)	
Compatibility→ complexity		Lai , Chau, & Cui (2010)
Complexity→ relative advantages		Lai , Chau, & Cui (2010)
Relative advantages→ perceived usefulness		Lai , Chau, & Cui (2010)
Perceived usefulness → internet banking adoption		Yiu, Grant, & Edgar (2007); Jahangir & Begum (2008)
Accessibility→ perceived ease of use		Lai , Chau, & Cui (2010)
Accessibility→ satisfaction of IB		Lai , Chau, & Cui (2010)
Task familiarity→ perceived ease of use	Lai , Chau, & Cui (2010)	

Relationships which tested in more than three studies are elaborated below.

The relationship between perceived usefulness and attitude was tested in nine studies which was significant in all studies. The relationship between perceived usefulness and intention to use was found to be significant in 10 studies while it was insignificant only in one study (Lai , Chau, & Cui, 2010). 10 studies investigated the relationship between perceived ease of use and attitude. The mentioned relationship was insignificant in two of studies (Nor, Pearson, & Ahmad, 2010; Cheng, Lam, & Yeung, 2006). Nine studies tested the relationship between perceived ease of use and perceived usefulness and all of them reported that perceived ease of use significantly affects perceived usefulness. The relationship between attitude and intention to use was significant in all of 11 studies which it was examined. The relationship between subjective norms and intention to use was tested in eight studies. Two of eight studies could not find the significant relationship between subjective norms and attitude (Tan & Teo, 2000; Shih & Fang, 2006). The relationship between perceived behavioral control and intention was found to be significant in all of six studies which it was explored.

2.4 Expert group analysis

We conducted a two phases expert group analysis with eight IS experts in order to group similar research factors and selecting research factors for this study. The IS expert group was composited of seven Ph.D. students and one instructor who had previously researched in the field of technology adoption.

2.4.1 Factor grouping

When we deeply inspected the definitions of extracted factors we noticed that some factors were the part of higher level factors. On the other hand we found some factors which conveyed same meanings and only differed by name. Subsequently, similar factors were put into same groups. In order to confirm the accuracy of the factor categorization, a list of grouped factors and their definitions were prepared and sent to the experts by e-mail. They were asked to declare their agreement/disagreement about the classification of factors and then assign the best name for each group of factors. Six of participants stated that they are completely agreed with the proposed categorization of factors. Two of participants make some controversies. After a discussion session, we settled with both opponents. Finally, the following eight groups were verified:

- Group1: Perceived usefulness, Perceived benefit, Relative advantages, Importance to bank needs, Performance expectancy.
- Group2: Perceived ease of use, Complexity, User friendliness, Task familiarity, Effort expectance.
- Group3: Perceived behavioral control, Self-efficacy, Perceived manageability.
- Group4: Culture, Social influence, External pressure, Subjective norms.

- Group5: Perceived risk, Social risk, Time risk, Performance risk, Financial risk, Legal risk, Security risk, Security and privacy.
- Group6: Hedonic orientation, Perceived Enjoyment, perceived playfulness.
- Group7: Utilitarian orientation, Feature of website, Quality of internet connection, Accessibility, Transaction speed, Website design.
- Group 8: Awareness of service, Information on online banking.

Table 3 demonstrates the names which assigned to each group of factors and the number of participants who selected the same name.

Table 3 Factor Grouping

Group #	**Group name**	**Number of agreed participants**
1	Usefulness	5
2	Ease of use	5
3	Control	5
4	Social influence	8
5	Risk	6
6	Enjoyment	7
7	Feature of website	7
8	Awareness of service	7

Table 4 demonstrates the total frequency of the grouping factors in previous studies.

Table 4 Frequency of factors

#	Factor name	Frequency
1	Usefulness	25
2	Ease of use	22
3	Control	11
4	Social influence	14
5	Risk	27
6	Enjoyment	3
7	Feature of website	6
8	Awareness of service	4

2.4.2 Research factors selection

The number of research factors declined from 62 to 34 after grouping. We reorganized the pull of factors and selected the ones with more than three frequencies. These constructs were usefulness, ease of use, control, social influence, risk, feature of website, awareness of service and compatibility. The frequency of trust was five, but it was not selected. According to Schoorman, Mayer and Davis (2007), there is an obvious relationship between trust and risk and "the need for trust only arises in risky situation". Internet banking transactions involve some level of risk, therefore it would be reasonable to only investigate customers' perception of risk in internet banking context. If customers regard internet banking as a risky channel for doing financial transactions, they will not trust internet banking and vice versa. Moreover, we decided to investigate two additional constructs which were not popular in the field of internet banking, but they were attracted the attention of IS researchers in other technology adoption areas. In this regard, customization/personalization was selected, because of its importance in previous e-commerce researches (Kassim and Ismail, 2009). The other construct was alliance services. Alliance services refer to integrated and comprehensive services offered by various public or private organizations which enable users to complete tasks in one-stop rather than visiting the websites of multiple organizations. E-government adoption studies usually investigate the citizens' attitude about these integrated services (Kanat, Cetin and Özkan, 2012). Therefore, we thought that alliance service also could be an influential factor in internet banking usage.

CHAPTER 3

RESEARCH METHODOLOGY

This chapter includes five sections. In section 3.1, the research model is developed and basic hypotheses are formulated. Section3.2 elaborates on development of the measurement instrument. In section 3.3, the pilot study is presented. Section 3.4 describes data collection step. Finally, section 3.5 introduces the statistical methods which used to analyze data in this study.

3.1 Model development and hypotheses formulation

The model which was proposed in this study was not directly adapted from a specific technology acceptance model. The unique research model was developed to evaluate the relationships between 10 research factors and internet banking usage. Figure 11 shows the hypothesized relationships between research factors and internet banking usage. The probable inter-relationships among research factors were not hypothesized in the initial model development.

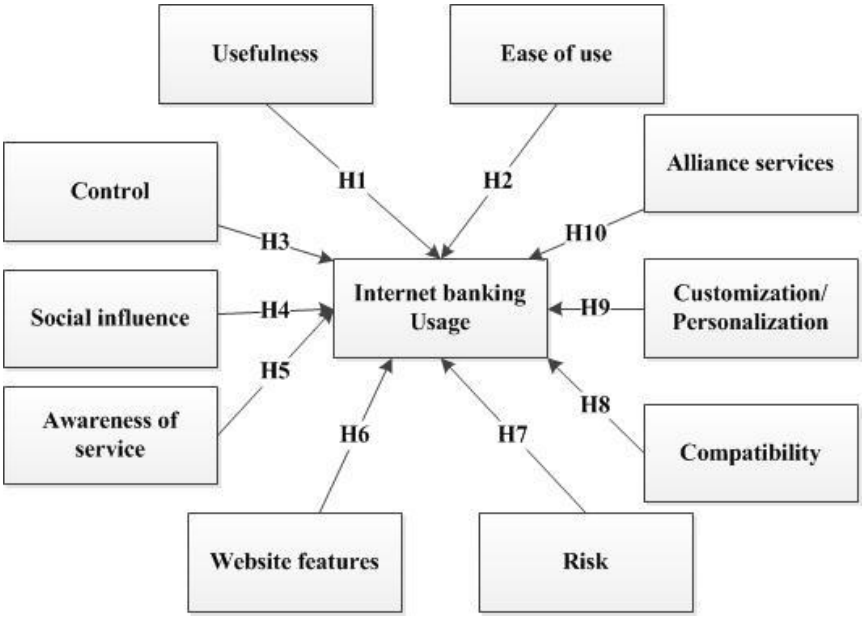

Figure 11 The initial proposed model for internet banking usage

3.1.1 Usefulness

In internet banking context, usefulness of internet banking services is the extent to which a customer believes that using the internet banking system would enhance the efficiency of his/her banking activities and provides more direct and indirect advantages for his/her when compared to traditional branch based banking (Davis, 1989; Ajzen, 1991; Venkatesh et al., 2003). We expected that usefulness affects the use of internet banking:

H1: Usefulness of internet banking positively affects the customer's use of internet banking.

3.1.2 Ease of use

In internet banking context, ease of use refers to how much customers believe that internet banking system is easy to understand and use. Additionally, it is associated with the amount of easy-to-follow instructions and simple operating procedures which are provided by internet banking system (Davis, 1989; Ajzen, 1991; Venkatesh et al., 2003; Shih & Fang, 2006). Therefore, the following proposition is presented:

H2: Ease of use of internet banking positively affects the customer's use of internet banking.

3.1.3 Control

In the internet banking setting, control is defined as the degree to which a customer believes that she/he has control over her/his banking activities when using internet

banking. It also reflects individual's self-confidence about her/his abilities, knowledge and skills to use internet banking (Ajzen, 1991; Tan & Teo, 2000; Alsajjan & Dennis, 2010). Accordingly, we posited that:

H3: Control over using an internet banking system positively affects the customer's use of internet banking.

3.1.4 Social influence

In the context of internet banking, social influence is defined as the degree to which a customer perceives that most important others (E.g. family members, Peers, colleges) believe that she/he should or should not use internet banking (Fishbein & Ajzen, 1975; Venkatesh et al., 2003). According to Davis, Bagozzi, & Warshaw (1989) customers might decide to use internet banking for complying with important others rather than their own feelings and beliefs. Thereby, the following hypothesis was presented:

H4: Social influence has a positive effect on the customer's use of internet banking.

3.1.5 Awareness of service

Customers might not have enough information about the benefits, advantages and disadvantages associated with the use of internet banking (Pikkarainen et al., 2004; Al-Somali, Gholami, & Clegg, 2009). We assumed that if customers are informed about opportunities and benefits of internet banking they might be more eager to use internet banking. As a result the following proposition was presented:

H5: Awareness of internet banking services has a positive effect on the customer's use of internet banking.

3.1.6 Website features

In the context of internet banking, website features is defined as the media that service delivery to customers of internet banking. Reliability to access the bank's web site, high speed of download and upload, high transactions speed of bank's website and short response times from bank's web site refer to website features of internet banking (Jaruwachirathanakul & Fink, 2005; Ndubisi & Sinti, 2006). Thus, the following proposition was made:

H6: Bank's website features have a positive effect on the customer's use of internet banking.

3.1.7 Risk

In the internet banking context, risk is define as a possible loss when doing financial activities through internet. Following types of losses might occur when using an internet banking system (Lee, 2008).

- Monetary loss due to transaction errors.
- Time loss due to slow download speed. Additionally, some customers consider internet banking as time wasting, because they need to spend time to learn how to operate with internet banking websites.
- Performance loss due to malfunctions and deficiencies of internet banking websites.
- Security and privacy loss due to frauds and hackers. Consumers are usually worried about security of their sensitive information such as username, passwords and credit card number when using internet banking. Additionally, they concern about uninformed data collectors and identity thefts which threat customers' privacy.

In general, people who feel anxious and doubtful about security and privacy of internet banking more likely resist using it. On the other hand, people who perceived internet banking as low risk undertaking would have high tendency to use it. Thus, the following hypothesis was stated:

H7: Risk has a negative effect on the customer's use of internet banking.

3.1.8 Compatibility

In the context of internet banking, compatibility refers to the degree to which a customer believes that the existing internet banking system is consistent with her/his values, past experiences and needs. Therefore, we assumed that if internet banking is compatible with customer's current ways of doing banking activities, they will use it more feasibly (Nor, Pearson, & Ahmad, 2010; Rogers, 1995). Hence, the following hypothesis was proposed:

H8: Compatibility of internet banking with the customer's values, needs and current experiences positively affects the customer's use of internet banking.

3.1.9 Customization/Personalization

In the field of internet banking, customization/personalization refers to the use of personalization engines that tailor the contents of the bank's web site to the particular needs of customers. Customized internet banking not only provides its customers by specially modified website interfaces, but also offer special services based on customers' preferences and histories of their banking activities (Rubin, 1998; Chau & Lai, 2003). Customized internet banking empowers its customers to accomplish their tasks more quickly and easily, therefore the following hypothesis was stated:

H9: Customization/personalization positively affects the customer's use of internet banking.

3.1.10 Alliance services

In the internet banking setting, alliance services refer to integrated and one-stop comprehensive financial and bank-related services which offered by banks through

internet banking system. These services are provided by means of bank's system integration with other financial parties. In other words, the bank's website acting as a gateway for accessing services which offered by third parties (Chau & Lai, 2003). These alliance services might impress customers to use internet banking, so we assumed that:

H10: Alliance services positively affect the customer's use of internet banking.

3.2 Measurement development

The instrument was designed to have a two-part questionnaire as seen in appendix A. The first part includes three demographic questions and five questions about the usage of internet and mobile banking. The second part includes five-point Likert scales, ranging from "completely disagree" (1) to "completely agree" (5). The first part was used to collect basic information about responders such as gender, age, educational level, internet and internet banking and mobile banking experiences. The items in second part of questionnaire were based on current literature which adjusted to fulfill the purpose of this study. Items were translated to Turkish language. In order to insure the content validity of instrument the two stages review was done. In first step, items were reviewed by an expert of English language and literature and questionnaire was reworded and revised from semantic and syntactic points of view. Finally, an IS expert rechecked all items. As a result, redundant items were removed, the orders of some items were changed and three items were modified.

Table 5 Factors' items and references

#	**Items**	**Pertinent literature**
Usefulness		
U1	I think that using internet banking would enable me to accomplish banking activities more quickly.	(Cheng, Lam, & Yeung, 2006; Pikkarainen et al., 2004; Yiu, Grant, & Edgar, 2007; Lee, 2008; Ndubisi & Sinti, 2006; Tan & Teo, 2000; Davis, 1989; Moore & Benbasat, 1991)
U2	I think that using internet banking would enable me to have greater control over financial banking activities.	
U3	I think that using internet banking enables me to improve performance of utilizing banking services.	
U4	I think that using internet banking can offer me a wider range of banking products, services and investment opportunities.	

Table 5 (Cont.)

#	Items	Pertinent literature
U5	I think that using internet banking can save the transaction handling fees in performing banking transactions.	
U6	Overall, I think that using internet banking is advantageous (useful).	
Ease of use		
EOU1	I think that interacting with internet banking site is clear and understandable.	(Cheng, Lam, & Yeung , 2006; (Pikkarainen et al., 2004; Yiu, Grant, & Edgar, 2007; Davis, 1989; Moore & Benbasat, 1991; Tan & Teo, 2000; Chau & Lai, 2003)
EOU2	I think that interacting with internet banking does not require a lot of mental effort.	
EOU3	I think that there is a clearly known way to do banking tasks I normally encounter when using internet banking.	
EOU4	I think that I can rely on established practices to do banking tasks I normally encounter.	
EOU5	Overall, I think that using internet banking is an easy way for me to conduct banking transaction.	
Control		
C1	I think that I am able to use internet banking well for financial transactions.	(Lee, 2008; Nasri & Charfeddine, 2012; Tan & Teo, 2000; Al-Somali, Gholami, & Clegg, 2009; Ajzen, 1991)
C2	I think that using internet banking is entirely within my control.	
C3	I think that I have the resources, knowledge, and ability to use internet banking.	
C4	I can conduct internet banking transactions if I had only the system manuals for reference.	
C5	I can conduct internet banking transactions if I can call someone for help if I got stuck.	

Table 5 (Cont.)

#	**Items**	**Pertinent literature**
C7	I am confident of using internet banking system even if I have never used such a system before.	
C8	I can conduct internet banking transactions if I see someone else using it before trying it myself.	
Social influence		
SI1	I have many friends or colleagues or family members who use internet banking.	(Jaruwachirathanakul & Fink, 2005; Venkatesh et al., 2003; Al-Somali, Gholami, & Clegg, 2009; Tan & Teo, 2000; Nasri & Charfeddine, 2012)
SI2	People who are important to me think that I should use internet banking.	
SI3	When trying new technology, I trust my own instinct more than advice from others.	
SI4	I would consider using internet banking if someone personally recommended it.	
SI5	I prefer internet banking, because it lessens face-to-face contact with banks.	
SI6	I prefer internet banking, because it gives up personal relationships when dealing with banks.	
Website features		
WEB 1	The internet enables me to access the bank's website 7/24 at anywhere in the world.	Al-Somali, Gholami, & Clegg, 2009; Pikkarainen, Pikkarainen et al., 2004; Shih & Fang, 2006)
WEB 2	I think that it is important that little time is required to connect to the banks' website.	
WEB 3	I think that the internet enables me to handle my online financial transactions accurately.	
WEB 4	I think that the bank's web design and navigation makes it comfortable to conduct a transaction.	

Table 5 (Cont.)

#	**Items**	**Pertinent literature**
WEB 5	I think that it is important that instructions on internet banking website are easy to read, comprehensive and clear.	
WEB 6	I think that it is important that the bank's website provides for communication with service personnel (such as text, voice and video chat).	
WEB 7	I think that it is important that icons and colors on the website of bank have close resemblance with the real bank.	
Compatibility		
COM 1	I think that internet banking is compatible with my lifestyle.	(Ndubisi & Sinti, 2006; Tan & Teo, 2000; Moore & Benbasat, 1991; Lai , Chau, & Cui , 2010)
COM 2	I think that internet banking fits into my working style.	
COM 3	I think that internet banking fits well with the way I like to manage my finances.	
Awareness of service		
AW1	I received information about internet banking from my bank.	Pikkarainen, 2004; Al-Somali, Gholami, & Clegg, 2009)
AW2	I receive enough information about internet banking services.	
AW3	I receive enough information about the financial benefits and incentives which using internet banking brings for me such as no money transfer fee, lower EFT rate and etc.	

Table 5 (Cont.)

#	**Items**	**Pertinent literature**
Customization/Personalization		
PER1	I prefer internet banking, because it enables me to customize the presentation of information on a bank's web site according to my personal needs.	(Chau & Lai, 2003)
PER2	I prefer internet banking, because it enables me to customize the content of information on a bank's web site according to my needs.	
PER3	I prefer internet banking, because it enables a bank to deliver personalized messages to me.	
PER4	I prefer internet banking, because it enables a bank to personalize service/product offerings to me after learning my banking behaviors and preferences.	
Risk		
R1	I believe that internet banking protect my privacy (personal information).	(Pikkarainen et al., 2004; Ndubisi & Sinti, 2006; Lee, 2008; Jaruwachirathanakul & Fink, 2005; Cheng, Lam, & Yeung , 2006)
R2	I trust in internet banking, because the bank's web site displays the logo of an independent security guaranteeing party.	
R3	I am not worry about risk of fraud when using internet banking.	
R4	I am sure that internet banking do actually what I want.	
R5	When transferring money on the internet, I am not afraid that I will lose money due to careless mistakes such as wrong input of account number and wrong input of the amount of money.	
R6	When transaction errors occur, I do not worry that I cannot get compensation from banks.	
R7	I think that there is not any risk that a transaction of transferring money or a standing order may not be processed.	

Table 5 (Cont.)

#	Items	Pertinent literature
Alliance services		
AS1	I think that by system integration with other parties via the internet, banks can provide me with integrated services, which are traditionally offered by separate units/organizations.	(Chau & Lai, 2003)
AS2	I think that by system integration with other parties via the internet, banks can provide one-stop services to me.	
AS3	By system integration with other parties via the internet, banks can provide expanded services to me.	
Usage		
USE1	I use internet banking a lot to do my financial activities.	(Selim, 2003; Jones, Sundaram, & Chin, 2002)
USE2	I use internet banking to its fullest potential for supporting my financial activities.	
USE3	I use internet banking frequently to do my financial activities.	
USE4	I use all capabilities of internet banking in the best fashion to help me handling my financial activities.	

3.3 Pilot study

The pilot study was conducted to evaluate and refined the measurement instrument. The paper based questionnaire was distributed to convenience sample of 40 people and 30 valid responses were collected. The pilot study was only analyzed for reliability. According to Field (2005), reliability refers to "the consistency of instrument when measuring a specific construct". Cronbach's alpha is the most common measurement of instrument reliability. According to Field (2005), the following criteria should be considered when testing internal consistency:

- Overall Coronbach's alpha should be grater that 0.8. A cut-off of 0.7 and below might be reliable when dealing with diversity of constructs (Kline 1999; as cited in Field, 2005).
- A negative alpha does not make much sense, but it might be happened because of reverse phrased-items in questionnaire.
- When questionnaire includes subscales (various constructs), Cronbach's alpha should be applied separately to all subscales.
- Cronbach's alpha if item deleted should be calculated for each item. If removal of particular item results in noticeable improvement in the value of alpha it should be omitted.

In this study, Cronbach's alpha was calculated for all constructs in order to test the internal consistency of the items which measure the same construct.

Cronbach's alpha value for "Usefulness" construct is 0.8. If any item is deleted, the value of alpha will diminish. It simply demonstrates the contribution of each item to the reliability of the construct.

Cronbach's alpha value for "Ease of Use" construct is 0.046. This is an unacceptable value for alpha. Removal of EOU4 increases the alpha value to 0.67 which is not extremely differing from the required value (0.7).

Cronbach's alpha value for "Control" construct is 0.288 which is problematic. If any item is deleted, the value of alpha will not improve in a noticeable manner. It demonstrates that items relating to "control" construct do not measure the same underlying attribute.

Cronbach's alpha value for "Social influence" construct is 0.42 which is also problematic. If any item is deleted, the value of alpha will not improve in a noticeable manner. It reveals the inconsistency among items which measure same constructs.

Cronbach's alpha value for "Website features" construct is 0.691. Removal of WEB6 increases the alpha value to 0.742 which is a significant improvement.

Cronbach's alpha values for "Compatibility", "awareness of serves", "risk", "Customization/Personalization", "Alliance service" and "Usage" constructs are above 0.8 which indicates excellent internal consistency for each construct. If any item is deleted, the value of alpha will not be increase dramatically.

As a result, the items related to "Control" and "Social influence" constructs were removed. Moreover, items which reduce the alpha value of their related constructs (EOU4 and WEB6) were also omitted. Finally, 40 items remained in the questionnaire.

The overall Cronbach's alpha value of instrument enhanced from 0.8 to 0.936 after refining the instrument.

3.3.1 Demographic profile of the respondents for pilot study

The number of male and female respondents (15 people) was equal in pilot study. 90% of respondents were between 25 and 34 years old. 66.7% of respondents had graduate (MSc and PhD) degree, 30% of respondents had university degree and 3.3% of respondents had college degree. All respondents were active user of internet banking. Table 6 demonstrates respondents' habits about internet and mobile banking usage for pilot study.

Table 6 Respondents' internet and mobile banking habits

Item	Option	Percentage (%)
Internet Usage	7-9 years	10
	10-12 years	63.3
	More than 12 years	27.7
Internet banking Usage	1-2 years	10
	3-4 years	33.4
	5-6 years	26.7
	7-8 years	23.3
	9-10 years	3.3
	More than 10 years	3.3
Mobile banking Usage	Yes	70
	No	30

Additionally, 80% of mobile banking users stated that they do not prefer mobile banking to internet banking while 20% of respondents preferred mobile banking to internet banking.

3.4 Data collection

The altered instrument was distributed in paper-pencil format to 500 people over a period of two and half months. Participation to the survey was voluntary and the respondents

were not earned any incentive for it. Total of 336 responses were received, so the average response rate was 67.2 %. Out of 336 responses 15 were not valid, because their respondents did not use any internet banking system. As the instrument was designed to target the customers of internet banking, invalid responses were excluded from the sample. Additionally, the subjects which had missing data were eliminated from whole analyses as well. Please refer to Chapter 4, Section 4.2.2 for detailed information about missing data analysis. Final dataset included 300 samples which were put into analyses.

3.5 Data analysis

Structural Equation Modeling (SEM) is a second generation data analysis technique which is used to test multivariate models. In contrast to first generation statistical tools such as regression and analysis of variance (ANOVA), SEM allows for measuring and testing of multiple relationships among constructs in a single run of the analysis. Additionally, SEM enables researchers to model the measurement errors. In general SEM can be thought as a combination of factor analysis and path analysis. SEM not only evaluates the measurement model, but also assesses the structural model (Weston, Paual, & Gore, 2006).

According to Weston, Paual, & Gore (2006), "measurement model of SEM describes the relationships between observed variables (e.g., items in a questionnaire) and construct or constructs those variables are hypothesized to measure". Confirmatory Factor Analysis (CFA) is used for evaluating the measurement model. Structural model of SEM describes the relationships among dependent and independent constructs.

3.5.1 SEM types

There are Covariance base SEM and Partial Least Square (PLS) based SEM. Covariance base SEM can be performed by LISREL, EQS and AMOS. PLS based SEM can be carried out by PLS-PC and PLS-Graph. These two types differ in terms of requirements and persuade goals. Normal data distribution and big data sample which is required by covariance based SEM are not essential in PLS based SEM. On the other hand, covariance based SEM has more statistical power than PLS based SEM. Subsequently, results of covariance based SEM can be generalized to public, but results of PLS base SEM only can be used to make predictions (Gefen , Straub , & Boudreau , 2000).

3.5.2 SEM steps

In general, experts define following six basic steps for SEM :

- Model specification: in this step, researchers should formulate hypothesized relationships among Manifest Variables (MV)[1] and Latent Variables (LV)[2].

[1] Also called observed or measured variables and they can be observed directly.

MVs are used to estimate LVs. These relationships should be taken from existing literature and previous theories. Figure 12 demonstrates the simple SEM PLS diagram. The latent variables are depicted by ellipses and manifest variables are shown by rectangles. Arrows display the hypothesized relationships.

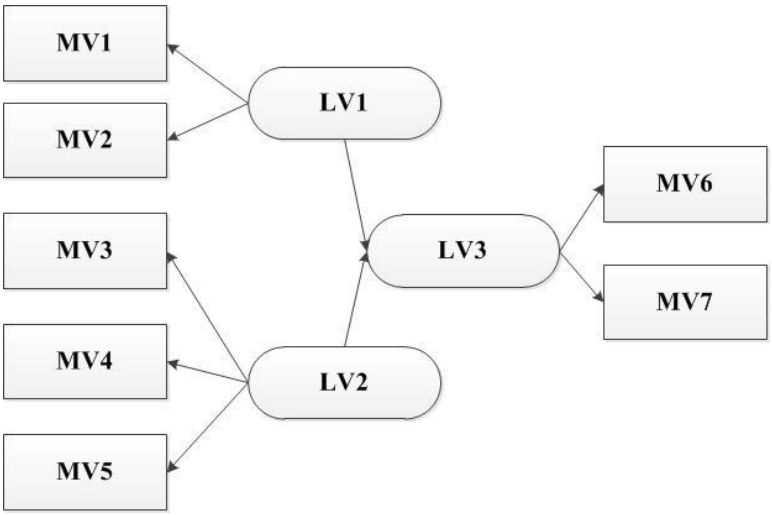

Figure 12 A simple SEM path diagram

- Model identification: in order to determine whether a model is over, under or just identified, the number of degree of freedom should be calculated. Degree of freedom of the model is calculated by subtracting the number of parameters [3]to be estimated from number of known elements[4]. When the degree of freedom is more than zero, the model is called over-identified (Gefen , Straub , & Boudreau , 2000). A model should be over-identified to be analyzable. Model identification is not an issue in PLS, because PLS path modeling is always identified.
- Data requirements: sample size, multicollinearity, outliers, normality and missing data are issues related to data in SEM. According to Gefen , Straub , & Boudreau (2000), the minimum sample size should be 10 times the number of items in the most complex construct. According to Kline (1998) as cited in Weston, Paual, & Gore (2006), 10 to 20 participants are required per hypothesized relationships between two variables. Weston, Paual, & Gore (2006) suggested the minimum sample size of 200 for any SEM.

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[2] Also called factors or constructs and they are theoretical constructs which cannot be observed directly.

[3] Parameter refers to hypothesized relationships between two variables.

[4]Known elements is equal to $\frac{Number\ of\ observed\ variables \times (Number\ of\ observed\ variables+1)}{2}$

Multicollinearity refers to the situation where there is a strong relationship among measured variables (r> 0.85). Multicollinearity can be treated in two ways; the items which cause multicollinearity are removed or options were noted as potential problems to be reconsidered in estimation step (Weston, Paual, & Gore, 2006).

According to Field (2005), outliers refer to cases which are substantially different from the main trend of the data. Outliers can lead the model to be biased. Therefore, outliers should be removed or recoded before SEM analysis.

Normality is another issue in SEM analysis. None-normal distributed data might incorrectly suggest that the model is a good fit to the data or the model is a poor fit to the data. None-normal distribution is not a crucial matter in PLS base SEM (Weston, Paual, & Gore, 2006).

Missing data should be removed before data analysis. Researchers at least should identify how they handled missing data (Weston, Paual, & Gore, 2006).

- Estimation: estimation of model "involves determining the value of unknown parameters and the error association with the estimation value". There are several estimation procedures such as ML, Least Squares (LS), unweighted LS, generalized LS and Asymptotic Distribution Free (ADF). Each of the procedures should be selected based on the structure of the data (Weston, Paual, & Gore, 2006). The confirmatory factor analysis can be used to test the measurement model before estimation the full structural model (Anderson & Gerbing, 1988; as cited in Weston, Paual, & Gore, 2006).
- Model fit and interpretation: the goal of this step is to evaluate the model's fit to the data. According to Weston, Paual, & Gore (2006), researchers should evaluate fit in terms of (a) significant and strength of hypothesized relationships, (b) variance accounted for endogenous[5] observed and latent variables, (c) how well the overall model fits the observed data. There are various indicators for evaluate model fit. There are absolute and comparative fit indices. Goodness-of-Fit Index (GFI) and x^2 are sample of absolute fit. GFI refers to the variance accounted for the entire model. CFA ranges from 0 to 1 and values closer to 1 depicting better fit. A significant x^2 means that the model does not fit the data and vice versa.
- Model modification: in this step, researchers modify the model to increase model fit and explanatory power of model. Therefore, some new relationships might be added to model while non-significant relationships are removed from the model. Off course, researchers should consider the theoretical background of their model before making any modification (Weston, Paual, & Gore, 2006).

[5] Endogenous variable is independent latent variable.

CHAPTER 4

RESULTS OF QUANTITATIVE ANALYSES

This chapter includes five sections. Section 4.1 describes an overview of data analyses which are employed in this study. In section 4.2, the preliminary analyses are explained in order to test that if the data met requirements of SEM analysis or not. Section 4.3 includes Explanatory Factor Analysis (EFA). Section 4.4 contains the analysis of initial model with SEM. Finally, Section 4.5 provides a modified model and presents the results of SEM analysis for new model.

4.1 Overview of data analyses

PASW Statistics 19, MS Excel 2010 and SmartPLS 2.0 were used to analyze data in this study. Descriptive analysis, missing data detection, outliers' detection, reliability test, normality test and explanatory factor analysis were conducted by PASW Statistics 19. MS Excel was used to transfer data from PASW to SmartPLS. Confirmatory Factor Analysis (CFA) and structural model analysis were done by SmartPLS 2.0.

4.2 Preliminary analysis

Initially, the descriptive statistics were done in order to expose the main feature of the data in this study. Then the data was explored for missing values, outliers, normality assumption and multicollinearity. The last part of this section includes the results of Explanatory Factor Analysis (EFA).

4.2.1 Demographic profile of responders for main study

Table 7 demonstrates the demographic profiles of respondents including gender, age, education level, internet experience, internet banking and mobile banking usage. All respondents were active user of internet banking. From the sample size of 300, 65% were

male while 35% were female. Additionally, 60% of participants were between 25 and 34 years old. The most of respondents (49%) had university degree. Moreover, 80.7% of mobile banking users stated that they do not prefer mobile banking to internet banking while 19.3% of respondents preferred mobile banking to internet banking.

Table 7 Demographic profile of respondents for main study

Item	**Option**	**Percentage (%)**
Gender	Female	35
	Male	65
Age	18-24	4.7
	25-34	60
	35-44	26
	45-54	7.3
	55-+	2
Educational level	Primary school	-
	Middle school	1.3
	High school	17.7
	College	12.7
	University	49
	Graduate (M.Sc., Ph.D.)	19.3

Table 7 (Cont.)

Item	Option	Percentage (%)
Internet usage	1-3	7.3
	4-6	14
	7-9	14.7
	10-12	30.7
	More than 12	33.3
Internet banking usage	1-2	19
	3-4	26.3
	5-6	25.7
	7-8	16
	9-10	7.7
	More than 10	5.3
Mobile banking Usage	Yes	32.3
	No	67.7

4.2.2 Missing data analysis

According to Field (2005), a dataset can have missing values because of different reasons: in long questionnaires, participants may miss out questions abruptly or they may get bored and deliberately ignore some parts; and participants may do not want to answer to private or delicate questions. Field (2005) suggested three approaches to handle missing data:

- Listwise deletion: excluding the case which has a missing score from whole analysis.
- Pairwise deletion: instead of deleting a case with any missing score, the case is only excluded form analysis of a missing variable.
- Replacing a missing score with the mean score: a missing data is replaced by the mean score of corresponding variable.

The Listwise approach was used to deal with missing data in this study. The original sample size of dataset was 321. The sample size fell to 300 after removing the cases with missing values. Of course, 300 samples were still enough for PLS-SEM analysis. Please refer to chapter 3, section 3.5.2 for detailed information.

4.2.3 Outliers detection

According to Walfish (2006), there are several ways to detect outliers: Box plot, Trimmed means, Extreme studentized deviate and Dixon-type tests. In this study, trimmed mean method was used to detect effect of possible outliers. "A trimmed mean is calculated by discarding a certain percentage of the lowest and the highest scores and then computing the mean of the remaining scores" (Walfish, 2006). The large difference between mean and %5 trimmed mean indicates the strong influence of possible outliers. Appendix C demonstrates mean and 5% trimmed mean of all items. There was not severe deviations between mean and trimmed mean for all items in this study. Subsequently, any case was not deleted from analyses at this point. According to Field (2005), for deleting any case from the sample, we should have a good reason to believe that this case does not belong to the population. In this study, all questionnaires were distributed by hand and respondents were shortly informed about the objectives of research, so we did not assume a big effect of outliers in advance.

4.2.4 Normality analysis

According to Field (2005), the Kolmogorov-Smirnov and Shapiro-Wilk tests are used to investigate the normality assumption of data. If the test is non-significant ($p > 0.05$) then it tells us that the distribution is probably normal and when test is significant ($p<0.05$) then the distribution in question might be non-normal. On the other hand, large sample size easily can cause significant results in both tests which are a signal of non-normal distribution. Therefore, the skewness and kurtosis statistics should also be examined when it comes to checking normality of the distribution. The results of the Kolmogorov-Smirnov tests were significant ($p< 0.05$) for all items which shows that the data might be non-normal (Appendix D). Afterwards, the skewness and kurtosis statistics were done. Appendix E displays the results of skewness and kurtosis statistics. All values were significantly different from zero and some of them were extreme which indicates non-normal distribution of the dataset. As mentioned before SEM-PLS is robust for non-normal distributions, so we did not make any attempt to transform data to meet the normality assumption.

4.2.5 Multicollinearity detection

The correlation matrix of all items of the questionnaire was calculated. We did not find any strong correlation ($R>.85$) among items. The results showed that there was no evidence of multicollinearity.

4.2.6 Explanatory Factor Analysis (EFA)

Exploratory factor analysis is used for identifying groups or clusters of mostly related measurement items then those highly correlated items put into factors. EFA is suitable when the number and content of the factors were not stated by researches in advance (Gefen , Straub , & Boudreau , 2000). In this study, research factors were selected based on literature review and expert group analysis, therefor EFA is not essential for this research. The exploratory factor analysis was performed in order to make clear whether the factor structure is in line with the expectations (predefined factors) or not.

The reliability of EFA is dependent on sample size, so the Kaiser-Meyer-Olkin Measure of Sampling Adequacy was calculated in order to make sure that the sample size is enough for the analysis or not. Kaiser (1974; as cited in Field, 2005) defined the KMO values greater than 0.5 as barely acceptable

According to Table 8 the KMO value was 0.912 for this study, which fell into the range of being superb based on criteria of Hutcheson and Sofroniou (1999; as cited in Field, 2005).

Table 8 KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.912
Bartlett's Test of Sphericity	Approx. Chi-Square	7045.734
	df	780
	Sig.	.000

EFA was conducted in PASW Statistics 18 with Maximum Likelihood Estimation and direct oblimin rotation. The results of EFA are given in Table 9. The loadings of the items to their respective factors are written in bold. All items had the strongest loading in their respective constructs expect WEB1, WEB2, WEB3 and WEB7. The cross-loading of website features with compatibility and awareness of service is the most important problems of exploratory factor analysis (problems are shown with underline). On the other hand, some items have low loading on their corresponding factors such as R6 and R7.In general, factor extraction was as expected with minor problems.

Table 9 Results of EFA

	Factors								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
U1	.102	.317	-.426	.117	**.590**	.538	-.434	.238	.363
U2	.222	.285	-.424	.325	**.729**	.392	-.404	.295	.334
U3	.128	.220	-.318	.252	**.790**	.369	-.367	.172	.136
U4	.308	.215	-.402	.333	**.540**	.291	-.409	.268	.117
U5	.155	.265	-.240	.158	**.434**	.339	-.326	.235	.276
U6	.154	.403	-.410	.194	**.633**	.565	-.477	.265	.270
EOU1	.272	.308	-.362	.351	.346	**.719**	-.363	.394	.138
EOU2	.172	.191	-.248	.265	.229	**.552**	-.294	.307	.137
EOU3	.245	.336	-.330	.269	.293	**.651**	-.337	.396	.169
EOU5	.273	.319	-.438	.198	.419	**.772**	-.475	.298	.308
WEB1	.226	.131	-.446	.206	.328	.437	-.459	.293	**.435**
WEB2	.193	.241	-.505	.228	.385	.417	-.549	.360	**.442**
WEB3	.319	.292	-.502	.330	.412	.427	-.444	.395	**.324**
WEB4	.296	.312	-.434	.362	.380	.420	-.378	.347	**.527**
WEB5	.240	.226	-.381	.216	.363	.352	-.426	.246	**.613**
WEB7	.202	.052	-.272	.290	.320	.223	-.398	.167	**.301**
COM1	.263	.413	-.482	.211	.413	.457	**-.841**	.264	.336
COM2	.252	.504	-.502	.215	.388	.556	**-.823**	.370	.305
COM3	.314	.533	-.506	.177	.436	.467	**-.766**	.326	.212
AW1	**.868**	.092	-.246	.262	.076	.223	-.209	.472	.153
AW2	**.996**	.170	-.298	.265	.164	.229	-.259	.461	.164
AW3	**.358**	.150	-.218	.146	.052	.153	-.112	.278	.078
PER1	.444	.199	-.363	.400	.215	.365	-.359	**.628**	.098
PER2	.343	.207	-.267	.172	.036	.330	-.212	**.493**	.229
PER3	.407	.344	-.323	.283	.199	.391	-.236	**.791**	.133
PER4	.494	.170	-.292	.398	.180	.299	-.180	**.743**	.116
R1	.288	.148	-.330	**.676**	.302	.328	-.255	.400	.235
R2	.365	.188	-.417	**.675**	.273	.350	-.253	.466	.205
R3	.450	.213	-.392	**.590**	.275	.412	-.375	.503	.137
R4	.278	.120	-.328	**.806**	.214	.308	-.204	.355	.043
R5	.230	.051	-.248	**.727**	.242	.231	-.223	.290	-.035
R6	-.012	-.074	-.071	**.283**	.077	.070	.031	.051	-.217
R7	.117	.042	-.150	**.177**	.075	.141	-.136	.105	.040
AS1	.306	.342	**-.887**	.324	.378	.297	-.409	.340	.227
AS2	.311	.337	**-.946**	.302	.278	.391	-.460	.352	.188
AS3	.303	.385	**-.900**	.308	.342	.435	-.447	.313	.238

Table 9(cont.)

	Factors								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
USE1	.280	**.770**	-.556	.178	.330	.536	-.504	.322	.286
USE2	.281	**.768**	-.504	.276	.420	.523	-.588	.495	.152
USE3	.253	**.832**	-.502	.202	.368	.450	-.485	.382	.298
USE4	.337	**.649**	-.508	.400	.519	.378	-.563	.560	.076

4.3 Assessment of initial model with SEM

The initially proposed model was evaluated through measurement and structural model analysis.

4.3.1 Measurement model

Confirmatory Factor Analysis (CFA) was conducted by SmartPLS to assess the convergent and discriminant validity of the instrument. In contrast to EFA, CFA is a must for the researches which the certain factors were specified in advance. Convergent validity means that each measurement item has high correlations with other items which measure the same hypothetical construct. Fornell and Larcker (1981; as cited in Gorla, Somers, & Wong, 2010) suggests the three criteria for establishing convergent validity: (1) all factor loadings should be significant and exceed 0.707; (2) composite reliabilities should exceed 0.70; and (3) Average Variance Extracted (AVE) by each construct should exceed 0.50. Table 10 shows the results of factor loadings.

Table 10 Initial factor loadings

	AS	**AW**	**COM**	**EOU**	**U**	**PER**	**R**	**USE**	**WEB**
AS1	0.928								
AS2	0.951								
AS3	0.940								
AW1		0.904							
AW2		0.930							
AW3		0.614							
COM1			0.891						
COM2			0.914						
COM3			0.896						

Table 10 (Cont.)

	AS	AW	COM	EOU	U	PER	R	USE	WEB
EOU1				0.833					
EOU2				0.680					
EOU3				0.773					
EOU5				0.816					
U1					0.748				
U2					0.788				
U3					0.770				
U4					0.646				
U5					0.614				
U6					0.812				
PER1						0.768			
PER2						0.646			
PER3						0.854			
PER4						0.798			
R1							0.8		
R2							0.808		
R3							0.784		
R4							0.801		
R5							0.688		
R6							**0.201**		
R7							**0.260**		
USE1								0.860	
USE2								0.916	
USE3								0.889	
USE4								0.851	
WEB1									0.687
WEB2									0.762
WEB3									0.746
WEB4									0.742
WEB5									0.720
WEB7									**0.527**

Hair et al (1998; as cited in Gorla, Somers, & Wong, 2010) mentioned that the factor loading above 0.6 is also acceptable. All factor loadings were well above 0.6 except R6, R7 and WEB7. The same items discovered to be problematic in EFA (in section 4.2.6). Those items were extracted from dataset and PLS algorithm was performed again. The results of new factor loadings are given in Table 11.

Table 11 Final factor loadings

	AS	AW	COM	EOU	U	PER	R	USE	WEB
AS1	0.928								
AS2	0.951								
AS3	0.940								
AW1		0.904							
AW2		0.930							
AW3		0.614							
COM1			0.891						
COM2			0.914						
COM3			0.896						
EOU1				0.833					
EOU2				0.680					
EOU3				0.773					
EOU5				0.816					
U1					0.748				
U2					0.788				
U3					0.770				
U4					0.646				
U5					0.614				
U6					0.812				
PER1						0.768			
PER2						0.646			
PER3						0.854			
PER4						0.798			
R1							0.801		
R2							0.819		
R3							0.784		
R4							0.803		
R5							0.690		
USE1								0.860	
USE2								0.916	
USE3								0.889	
USE4								0.851	
WEB1									0.693
WEB2									0.770
WEB3									0.755
WEB4									0.749
WEB5									0.723

The composite reliability and AVE values for the convergent validity analysis are given in Table 12.

Table 12 Convergent validity scores

	AVE	Composite reliability
AS	0.883792	0.958007
AW	0.687449	0.864891
COM	0.811686	0.928209
EOU	0.605712	0.859333
PER	0.594160	0.852917
R	0.610071	0.886308
USE	0.774779	0.932198
U	0.538554	0.873927
WEB	0.545879	0.852453

All AVE values of the constructs exceeded the required value (0.5) and all constructs have the composite reliability values above 0.7. Subsequently, the convergent validity of the instrument was approved.

Discriminant validity is another component of construct validity. Discriminant validity means that the items forming up a construct should be distinguished from items of another construct. According to Gefen and Straub (2005) the square root of AVE should be much larger than the correlations of the construct to all the other constructs for confirming the discriminant validity of the instrument. Table 13 shows the correlations among constructs and square root of AVE value for each construct on the diagonal. The square root of AVE value for each construct is much greater than the correlation between a selected construct and all others. Accordingly, the discriminant validity of the instrument was confirmed.

Table 13 Discriminant validity

	AS	AW	COM	EOU	U	PER	R	USE	WEB
AS	**0.939**								
AW	0.315	**0.828**							
COM	0.547	0.292	**0.900**						
EOU	0.435	0.309	0.568	**0.777**					
U	0.4	0.533	0.410	0.473	**0.770**				
PER	0.437	0.408	0.377	0.464	0.550	**0.781**			
R	0.597	0.322	0.737	0.584	0.506	0.459	**0.879**		
USE	0.502	0.247	0.615	0.583	0.376	0.428	0.620	**0.733**	
WEB	0.594	0.343	0.629	0.582	0.451	0.513	0.585	0.642	**0.738**

4.3.2 Structure model

The statistical significant of the each hypothesis was tested by bootstrapping procedure (300 cases, 300 samples). The path coefficients, t-value, significant and non-significant relations are shown in Table 14.

The control and social influence constructs were extracted from the research model as a result of the reliability test for pilot study (section 3.3). Therefore H3 and H4 could not be measured. The strong positive relations were found between U-USE, PER-U and AS-USE at the $p<0.01$ level, so H1, H9 and H10 were supported. Additionally, the strong positive relationship was found between EOU-USE at the $p<0.05$ level, so H2 was supported. The strong positive relation was also found between COM-USE at the 0.001 level, so H8 supported as well. The relations between AW-USE, R-USE and WEB-USE were not significant, so H5, H6 and H7 were rejected.

Compatibility had the strongest effect on the use of internet banking which is followed by alliance service. Usefulness had the third largest effect on the use of internet banking. Customization/Personalization and ease of use had influence on the use of internet banking as well. The results of the analysis reveal that the proposed model accounted for 65.5% of variances in internet banking usage.

Table 14 Initial model analysis results

	T-value	**B value**	**Results**
H1: U→ USE	3.036	0.155	Supported ($p<0.01$)
H2: EOU→ USE	2.014	0.106	Supported ($p<0.05$)
H3: C→USE	Control and social influence constructs were excluded from the research model in pilot study.		
H4: SI→USE			
H5: AW→USE	0.421	-0.018	Rejected ($p<0.05$)
H6: WEB→USE	0.486	0.048	Rejected ($p<0.05$)
H7: R→USE	0.917	0.047	Rejected ($p<0.05$)
H8: COM→USE	7.281	0.435	Supported ($p<0.001$)
H9: PER→USE	2.897	0.150	Supported ($p<0.01$)
H10: AS→USE	3.668	0.184	Supported ($p<0.01$)
R^2(USE) =0.655			

4.4 Model modification

Model modification is the final step of SEM for improving the initial proposed model. Model modification should be done in an iterative manner. Therefore, one change was made at a time and the effect of change in the results of PLS algorithm, bootstrap and R^2 were explored. After 14 iterations the final model was appeared.

4.4.1 Measurement model

The removal of WEB7, R6 and R7 items as a result of confirmatory factor analysis in section 4.3.1 insured the validity of measurement instrument. Therefore, measurement model was not change in this step.

4.4.2 Structural model

Table 15 summarizes the relationships which were added to the model in each iteration. Most of relationships were based on the current literature. Three relationships (shown in bold) which were seemed to be reasonable based on our knowledge were applied to the model as well. Each relationship was tested after adding to the model.

Table 15 Added relationships

Added Relationships	**Significant**
AS→U	No
WEB→U	Yes
R→U	No
COM→U	Yes
PER→U	No
EOU→U	Yes
AW→U	No
COM→ EOU	Yes
WEB→ EOU	Yes
R→ EOU	Yes
PER→EOU	**Yes**
WEB→COM	**Yes**
WEB→PER	**Yes**

Subsequently, the non-significant relationships were eliminated from the initial model and the extra significant relationships were added to it. Ultimately, the final model of internet banking usage was presented (Figure 13).

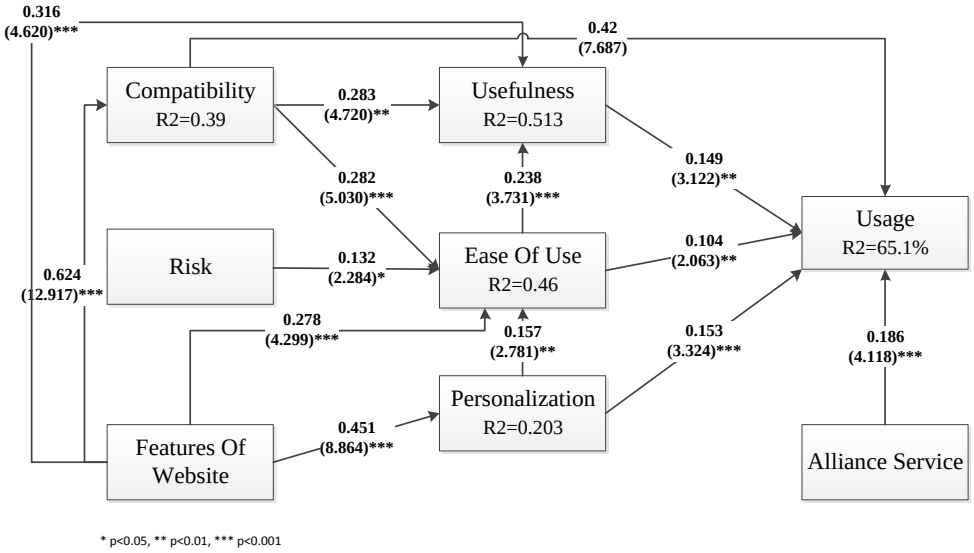

Figure 13 Path diagram of the final model

Table 16 demonstrates the bootstrap validation of path coefficients in the structural model. According to the results of the bootstrapping, all relationships are significant.

The results reveals that the proposed model accounted for 65.1%, 51.3%, 46%, 39% and 20.3% of variances in Usage, Usefulness, Ease of use, Compatibility and Customization/Personalization respectively. In general, the factors in the final model are able to explain 0.651 of variance in actual internet banking usage. The explanatory power of the modified model did not improve when it compares to the initial model, but is preferable than initial model, because it can predict actual use of internet banking by contribution of less constructs.

Table 16 Results of structural modeling analysis for modified model

	T-value	**B value**	**Results**
U→ USE	2.988	0.149	Supported
EOU→USE	2.173	0.104	Supported
COM→USE	7.163	0.420	Supported
PER→USE	3.749	0.153	Supported
AS→USE	3.62	0.186	Supported
WEB→U	4.712	0.316	Supported
COM→U	4.715	0.283	Supported
EOU→U	4.001	0.238	Supported
COM→EOU	5.226	0.282	Supported
WEB→EOU	3.86	0.278	Supported
R→ EOU	2.356	0.132	Supported
PER→EOU	2.833	0.157	Supported
WEB→COM	13.52	0.624	Supported
WEB→PER	8.939	0.451	Supported
R^2(USE) =0.651, R^2(U)=0.513, R^2(EOU)=0.46, R^2(COM)= 0.39, R^2(PER)= 0.203			

CHAPTER 5

DISCUSSION & CONCLUSION

This chapter includes five sections. In section 5.1, the results of the study are discussed. Section 5.2 summarizes the findings of the study. Section 5.3 encompasses the contribution of the study. Section 5.4 expresses the limitations of this study. Finally, section 5.5 makes some suggestions for future researches.

5.1 Discussion

The results of the SEM analysis were discussed with respect to the current literature. In addition, we provided some possible underlying explanations for the findings of this study.

5.1.1 Compatibility

The empirical results reveal that compatibility positively and significantly affect ease of use, usefulness and internet banking usage. The significant effect of compatibility on ease of use is a similar result to findings of Lai, Chau, & Cui (2010). The significant relationship between compatibility and ease of use implies that customers regard internet banking as an easy way to handle their banking activities when internet banking system is compatible with customers' needs, current values and past experiences. This can be supported by following arguments. When an internet banking system well matches to current banking services, customers do not need to spend much time and effort to understand and learn how to use internet banking system. Therefore, they find internet banking easy to use. Additionally, customers might be more eager to test a compatible internet banking system and spend more time on it which leads them to easily use the system. The significant effect of compatibility on usefulness is a contradictory result with finding of Lai , Chau, & Cui (2010). The significant relationship between compatibility and usefulness indicates that customers perceive a compatible internet banking system more useful than a non-compatible one. It is thought that if an internet banking system is compatible with customers' banking needs, customers will be more ambitious to use the system because of its potential usage benefits such as time and cost saving. Furthermore, when a system is compatible with customers' past experiences, customers are more

familiar with the system. As a result, customers are able to do their banking activities more quickly while having greater control over their financial activities which in turn affects customers' perception of system usefulness. The significant influence of compatibility on internet banking usage is an analogues result to findings of Ndubisi & Sinti (2006). The significant relationship between compatibility and internet banking usage expresses that customers' use of internet banking relies greatly on the compatibility of new internet banking system to banking norms, banking needs, life and working style of customers. The underlying reasoning might be that the banking customers prefer internet banking, because it is compatible with abilities of today's banking customers who are computer and internet savvy. Additionally, having more control over banking activities and spending less time to manage finances are known as value for many of banks' customers. Therefore, customers might prefer to use internet banking because it supports their values.

5.1.2 Usefulness

Similar to findings of Pikkarainen et al. (2004), usefulness demonstrates the significant effect on internet banking usage in this study as well. This significant relationship suggests that customers who perceive internet banking as a useful channel for doing internet banking activities more likely prefer to use it. We thought that customers use internet banking which enables them to utilize banking services in more effective and efficient manner by reducing costs and saving time. Customers might prefer internet banking because they are charged less for performing banking transaction compared to in branch services. Additionally, customers might use internet banking to have greater control over their financial activities from anywhere at any time without going to bank branches and waiting in line.

5.1.3 Ease of use

This study also discloses the significant influence of ease of use on internet banking usage in agreement with the finding which reported by Pikkarainen et al. (2004). According to our research, customers prefer to use internet banking services because they perceive it as an easy way to handle their banking activities. This can be explained by the notion that customers prefer to use internet banking system which is comfortable to operate and learn how to use. The user-friendly features of the system, familiarity of tasks, clear and easy to follow instructions might be important aspects which encourage customers to use internet banking. On the other hand, customers might find internet banking easy to use because it has passed its infancy stage and people are ready to use it.

Moreover, we found that the effect of ease of use on internet banking usage also mediated through usefulness. This result supports the earlier findings. (Lee, 2008; Yaghoubi & Bahmani, 2010; Yiu, Grant, & Edgar, 2007; Lai, Chau, & Cui, 2010; Al-Somali, Gholami, & Clegg, 2009; Chau & Lai, 2003; Suh & Han, 2002; Ramayah et al., 2003, Cheng, Lam, & Yeung, 2006). We thought that a simple and user-friendly system

might attract the attention of customers from all levels which lead them to try the system and understand its advantages and usefulness.

As expected from previous studies, usefulness was more influential than ease of use in explaining internet banking usage in our research. We suggested at least three possible explanations for this. First usefulness also mediated the impact of ease of use on internet banking usage. Second, the difficulty in using internet banking might be reduced since customers get familiar to it. Third, customers might not prefer to use easy to handle system if it is not useful.

5.1.4 Customization/Personalization

Customization/Personalization is an important determent factor in internet banking usage in our study. The significant effect of personalization on internet banking usage reveals that customers are more eager to use internet banking which is customized based on their preferences and characteristics. To best of our knowledge, there is not any study which has investigated the direct impact of personalization on internet banking usage. Of course, Chau and Lai (2003) reported the indirect effect of personalization on attitude to use internet banking via perceived usefulness.

Furthermore, we found the significant relationship between personalization and ease of use. Possible interpretations behind this significant relationship might be that the personalized appearance of internet banking system leads people to feel comfortable when dealing with internet banking. For instance, customers can customize the order of menus based on their frequency of use. Therefore, they can perform their banking activities more easily. On the other hand, personalized messages which inform customers about their upcoming payables can provide easy tracking of payments and bills for customers. Afterwards, providing personalized services for special customers based on their banking habits can reduce their difficulty to search for new services and facilities which are profitable for them.

5.1.5 Alliance services

Our study indicates that alliance service has a significant effect on internet banking usage as well. This significant relationship emphasizes that customers prefer internet banking because it makes many links to other institutions' services. Chau and Lai (2003) examined the relationship among alliance service and usefulness, but the direct relationships between alliance service and internet banking usage was not reported in any previous study. The significant effect of alliance service on internet banking usage might be a sign that customers do not prefer to use internet banking only for performing simple financial transactions. In other words, customers want to perform all of their financial related activities through internet banking systems and in one stop. For instance, an internet banking system which provides options for payment of bills, school fee, insurance premium, tax and so on might be more preferable for internet banking customers.

5.1.6 Risk

Risk does not have significant effect on internet banking usage in this study. The result corroborates the findings by Ndubisi and sinti (2006). A plausible explanation for this result might be the assurance of the banks over the privacy and security aspects of their internet banking. Therefore, customers are not worried about risk of fraud and losing money when using internet banking.

On the other hand, the results display a positive relationship among risk and ease of use which should be elaborated precisely. In our questionnaire, we stated all items in the positive manner. For example, I believe that internet banking protects my privacy or I am not worried about risk of fraud when using IB. Therefore, this positive relationship indicates that if customers are not anxious about risks of internet banking they will perceive it as an easy tool to use and vice versa. For instance, security and privacy risks of internet banking force customers to spend extra effort and time to protect against frauds and hackers which lead them to observe internet banking as difficult way to do banking activities.

5.1.7 Website features

In this research, website features do not have direct effect on internet banking usage, although it affects usefulness and ease of use. These outcomes might be supported by the following arguments. If customers do not have difficulties for connecting and accessing to the internet banking websites they will regard it as easy way to do banking activities as reported by (Al-Somali, Gholami, & Clegg, 2009; Chau & Lai, 2003). In addition, user-friendly design of internet banking websites makes them confortable to use. Moreover, the high transaction speed of internet banking websites can reduce delivery time which in turn affects people's perceptions about usefulness of internet banking as mentioned by Liao & Cheung (2002).

In this study, website features also has a positive influence on customization/personalization. One possible reason in support of this relationship might be that customers see internet banking as a personalized service when the website designs of internet banking systems are based on their preferences.

Finally, the significant relationship between website features and compatibility might be justified by following statement. Customers more likely regard an internet banking system as compatible if the terms, comments, instructions and procedures which are used in the internet banking website are similar to branch-based banking.

5.2 Summary

Worldwide expansion of internet banking highlights the need for deeper investigating and understanding of this phenomenon. Therefore, this study is developed and validated new

research model to predict factors which affect internet banking usage. Factors of this model was determined based on literature review and expert group analysis as usefulness, ease of use, control, social influence, risk, alliance service, customization/personalization, awareness of service, compatibility and website features. Afterwards, hypotheses were formulated and research model was developed then the paper based questionnaire was prepared based on current literature review and by making some adjustments to fit the field. The reliability of questionnaire was assessed through the pilot study. In this step two factors named social influence and control could not pass the reliability test and were eliminated from the model. Subsequently, the questionnaire was revised and distributed to people. The Partial Least Squares Path Modeling (PLS_PM), a variation of Structural Equation Modeling (SEM) was employed to validate both measurement and structural model. Finally, the initial model was modified in an iteration manner to increase the explanatory power of model and find the interdependent relationships among various research factors. The modified model was able to explain the 65.1% of the variance in internet banking usage. Compatibility of internet banking with customers' life and work styles has found to be the crucial driver of internet banking usage in this study. Furthermore, results displays that usefulness, ease of use, customization/personalization and alliance services influence and encourage internet banking usage among customers.

5.3 Contribution of the study

This study is one of the rare empirical studies in Turkey and even in the world which offers its own research model to investigate factors that encourage and accelerate internet banking usage.

Additionally, this study makes a contribution to the field by grouping the existing research factors in the current literature. We categorized factors which convey same meanings.

Expert group analysis is another point which differentiates this study from similar researches. We conducted expert group analysis not only for groping current research factors but also for determining research factors for this study.

Moreover, as far as we were concerned, this study examined the direct effect of alliance services and customization/personalization on internet banking usage for first time.

Therefore, this thesis can be used as a guideline for both researchers and practitioners. It presents state of the art and concern of the internet banking users. Therefore, researchers can benefit from it to become familiar with the field and conduct new researches. On the other hand, it can be utilized by practitioners to develop and implement successful internet banking systems which will be accepted and used by customers.

5.4 Limitation of the study

This study was conducted in the capital city of Turkey; study might end up with different results when it is applied in different economics and cultures. Therefore, we could not generalize the results of study to whole users in other geographical areas. Additionally, respondents might be affected by their negative experiences about internet banking usage which leaded them to be biased when answering to questions.

This study neglected the effect of moderating factors such as age, educational level and internet banking experiences on internet banking usage.

Another limitation is related to exclusion of social influence and control factors from the research model, because their corresponding items violated the instrument reliability. As a result we could not measure the effect of social influence and control factors on internet banking usage.

5.5 Suggestion for future works

Future studies can utilize our research model to examine internet banking usage in different cultures. Additionally, longitude studies can be conducted to investigate our research model in different time periods. This study only employed quantitative research methods for finding the relationships among research factors and internet banking usage. Complementary qualitative analyses such as Interpretative Phenomenological Analysis (IPA) can be applied in future studies in order to support the findings of quantitative analyses. Future researches can also consider the inclusion of additional variables from other fields of technology adoption into our research model for increasing its explanatory power. The significant influence of customization/personalization and alliance services might inspire many research questions. For instance, there is a room to explore the adoption of banking recommender systems which offer more personalized banking services. The types of alliance services which might encourage internet banking usage can be explored as well. Finally, the impact of new banking channels (e.g. mobile banking) on internet banking usage might be a new area for research.

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APPENDICES

APPENDIX A SURVEY INSTRUMENT OF MAIN STUDY

Sayın Katılımcılar,

Bu anket bir tez çalışması kapsamında, veri toplamak amacıyla hazırlanmıştır. Bilgiler saklı kalacak ve başka bir amaç için kullanılmayacaktır. Katılımlarınız için çok teşekkür ederiz.

1. Kişisel bilgiler:

Cinsiyet: K ☐ E ☐
Yaşınız: 18-24☐ 25-34☐ 35-44☐ 45-54☐ 55 -+☐
Eğitim durumunuz: İlköğretim ☐ Ortaokul ☐ Lise ☐ Yüksekokul ☐ Üniversite☐ Y.Lisans/Doktora ☐
Kaç senedir internet kullanıyorsunuz? 1-3☐ 4-6☐ 7-9☐ 10-12☐ Daha fazla☐
İnternet bankacılığını kullanıyor musunuz? Evet☐ Hayır☐
Kaç senedir internet bankacılığını kullanıyorsunuz? 1-2☐ 3-4☐ 5-6☐ 7-8☐ 9-10☐ Daha fazla☐
Cep bankacılığını kullanıyor musunuz? Evet☐ Hayır☐
Cep bankacılığını, internet bankacılığına tercih eder misiniz?
Evet☐ Hayır☐

2. Aşağıdaki ifadelere ne derecede katıldığınızı lütfen belirtiniz. (5=Kesinlikle Katılıyorum, 4=Katılıyorum, 3=Kararsızım, 2=Katılmıyorum, 1=Kesinlikle Katılmıyorum). Doğru ya da yanlış cevap yoktur. Sizin durumunuzu yansıttığını düşündüğünüz rakam bizim için en doğru yanıttır.

Table 17 Questionnaire

Soru	Derece
İnternet bankacılığını kullanarak, bankacılık işlemlerini daha hızlı bir şekilde gerçekleştirme imkanım olacağını düşünüyorum.	
İnternet bankacılığını kullanarak, bankacılık işlemleri üzerinde daha fazla kontrol sahibi olacağımı düşünüyorum.	
İnternet bankacılığını kullanarak, bankacılık hizmetlerinden daha etkin bir şekilde faydalanabileceğimi düşünüyorum.	
İnternet bankacılığın kullanmanın, bana daha kapsamlı bankacılık ürünleri, hizmetleri ve yatırım fırsatları sunacağını düşünüyorum.	
İnternet bankacılığını kullanarak, bankacılık işlemlerinden alınan ücretlerden (EFT,havale, vs.) tasarruf edebileceğimi düşünüyorum.	
Genel olarak, internet bankacılığının benim için avantajlı olduğunu düşünüyorum.	
İnternet bankacılığını kullanmanın, anlaşılır ve kolay olduğunu düşünüyorum.	
İnternet bankacılığını kulanmak için çok fazla zihinsel çaba sarfetmem gerekmediğini düşünüyorum.	
İnternet bankacılığını kullanırken, sıklıkla yaptığım bankacılık işlemlerini gerçekleştirmek için açıkca tanımlanmış yöntemler var. (Mesela, internet bankacılığında fatura ödeme işlemleri adım adım ve açıkça tanımlanmıştır)	
Genel olarak, internet bankacılığının bankacılık işlemlerini yapmak için kolay bir yol olduğunu düşünüyorum.	
İnternet, dünyanın her yerinden bankanın web sitesine 7/24 erişim olanağı sağlıyor.	
Bankanın web sitesine erişim süresinin kısa olmasının önemli olduğunu düşünüyorum.	
İnternetin, bankacılık işlemlerimi tam ve doğru biçimde yapmam için bana olanak sağladığını düşünüyorum.	
Bankanın web tasarım ve menüler arası navigasyon (gezinti) kolaylığının, internet bankacılığı işlemlerinin kolay yapılmasını sağladığını düşünüyorum.	
İnternet bankacılığı sitelerindeki talimatlar ve açıklamaların kapsamlı, anlaşılır ve kolay okunabilir olmasının önemli olduğunu düşünüyorum.	

Table 17 (Cont.)

Soru	Derece
Bir bankanın web sitesinde kullandığı simgelerin (logo ve kurumsal renkler gibi) o bankanın gerçek hayattaki imajını yansıtmasının önemli olduğunu düşünüyorum.	
İnternet bankacılığının benim yaşam tarzım ile uyumlu olduğuna inanıyorum.	
İnternet bankacılığının benim çalışma tarzım ile uyumlu olduğuna inanıyorum.	
İnternet bankacılığının mali işlerimi yönetme tarzım ile uyumlu olduğuna inanıyorum .	
Bankam beni internet bankacılığı hakkında bilgilendiriyor.	
İnternet bankacılığı hizmetleri hakkında yeterli bilgi alıyorum.	
İnternet bankacılığının bana sunduğu finansal avantajlar hakkında yeterli bilgi alıyorum. (Örneğin, düşük EFT veya havale ücretleri)	
İnternet bankacılığını tercih ediyorum, çünkü bankanın internet sitesindeki bilgilerin sunum tarzını (menü sıralaması, kısayollar, vs.) benim kişisel ihtiyaçlarıma göre düzenleme olanağı sağlıyor.	
İnternet bankacılığını tercih ediyorum, çünkü bana bankanın internet sitesindeki bilgileri kişisel ihtiyaçlarıma göre düzenleme olanağı sağlıyor. (Örneğin , sık yapılan islemler, hatırlatmalar, vs.)	
İnternet bankacılığını tercih ediyorum, çünkü bankanın bana kişisel mesajlar göndermesini sağlıyor.(Örneğin, kredi kartı borcunuzun elektronik posta veya kısa mesaj olarak gönderilmesi)	
İnternet bankacılığını tercih ediyorum, çünkü benim kişisel ihtiyaçlarımı ve tercihlerimi öğrendikten sonra bana özel hizmetler ve ürünler sunuyor. (Örneğin, kişiye özel kredi veya yatırım imkanları sunmak gibi)	
İnternet bankacılığının, benim isteklerimi tam olarak yerine getirdiğinden eminim.	
İnternet bankacılığının, kişisel bilgilerimi (adres, e-mail, cep telefonu numarası, vs) koruduğuna inanıyorum. (İnternet bankacılığı kişisel bilgilerimi başka kurumlarla paylaşmıyor)	
İnternet bankacılığına güveniyorum; çünkü bankanın web sitesinde güvenliği garanti, bağımsız bir firmanın logosu bulunuyor. (3D secure logosu gibi)	

Table 17 (Cont.)

Soru	Derece
İnternet bankacılığını kullanırken, dolandırılma ihtimali olabilir diye endişe etmiyorum.	
İnternet üzerinden para aktarırken, dikkatsizlikten kaynaklanan hatalarım para kaybetmeme neden olabilir diye endişelenmiyorum. (Mesela, hesap numarasının veya para miktarının yanlış girilmesi gibi)	
Sistem kaynaklı bir hata oluştuğunda bankaların zararımı karşılamayacağından endişelenmiyorum. (Örneğin, otomatik ödemelerde bir sorun oluşup faturaların zamanında ödenmemesi)	
İnternet bankacılığı üzerinden verilen para aktarma ve ödeme talimatlarının yerine getirilmeme ihtimali yoktur diye inanıyorum.	
Bankalar, internet bankacılığı sayesinde farklı kurumlar tarafından sağlanan birtakım hizmetleri tek çatı altında birleştirip entegre hizmetler şeklinde sunabilirler diye düşünüyorum .	
İnternet vasıtasıyla, farklı kurumlar arasında sistem entegrasyonu sağlanması sayesinde, bankalar bana tek noktadan hizmet sunabilir diye düşünüyorum.	
İnternet vasıtasıyla, farklı kurumlar arasında sistem entegrasyonu sağlanması sayesinde, bankalar bana daha geniş hizmetler sunabilir diye düşünüyorum.	
Bankacılık işlemlerimi yapmak için internet bankacılığını çok kullanıyorum.	
Bankacılık işlemlerimi yapabilmek için internet bankacılığından tam anlamıyla yararlanıyorum.	
Bankacılık işlemlerimi yapmak için sıklıkla internet bankacılığını kullanıyorum.	
Bankacılık işlemlerimi gerçekleştirmek için internet bankacılığının sağladığı tüm imkanları en faydalı şekilde kullanıyorum.	

APPENDIX B RESULTS OF THE RELIABILITY TESTS

Table 18 Results of reliability test for usefulness

Item	**Correlated Item-Total Correlation**	**Coronbach's Alpha if Item Deleted**
U1	0.534	0.792
U2	0.491	0.790
U3	0.635	0.756
U4	0.661	0.753
U5	0.608	0.762
U6	0.582	0.773
Overall Coronbach's Alpha for usefulness = 0.803.		

Table 19 Results of reliability test for ease of use

Item	**Correlated Item-Total Correlation**	**Coronbach's Alpha if Item Deleted**
EOU1	.031	.037
EOU2	.166	-.015
EOU3	.152	.004
EOU4	-023	.670
EOU5	-.004	.046
Overall Coronbach's Alpha for ease of use = 0.046 If Item EOU4 is deleted the value of Coronbach's Alpha will increase to 0.67.		

Table 20 Results of reliability test for control

Item	Correlated Item-Total Correlation	Coronbach's Alpha if Item Deleted
C1	-.035	.320
C2	-.033	.331
C3	-.355	.477
C4	.462	-.066
C5	.582	-.171
C6	.337	.052
C7	-.154	.410
Overall Coronbach's Alpha for control = 0.288.		

Table 21 Results of reliability test for social influence

Item	Correlated Item-Total Correlation	Coronbach's Alpha if Item Deleted
SI1	-.104	.424
SI2	.514	.195
SI3	.083	.435
SI4	-.126	.591
SI5	.447	.208
SI6	.342	.270
Overall Coronbach's Alpha for social influence = 0.420.		

Table 22 Results of reliability test for compatibility

Item	Correlated Item-Total Correlation	Coronbach's Alpha if Item Deleted
COM1	.881	.801
COM2	.843	.846
COM3	.727	.937
Overall Coronbach's Alpha for compatibility = 0.903.		

Table 23 Results of reliability test for website features

Item	Correlated Item-Total Correlation	Coronbach's Alpha if Item Deleted
WEB1	.261	.688
WEB2	.334	.677
WEB3	.582	.610
WEB4	.648	.589
WEB5	.561	.635
WEB6	.129	.742
WEB7	.478	.635
Overall Coronbach's Alpha for website features =0. 691 If Item WEB6 is deleted the value of Coronbach's Alpha will increase to 0.742.		

Table 24 Results of reliability test for awareness of service

Item	Correlated Item-Total Correlation	Coronbach's Alpha if Item Deleted
AW1	.900	.771
AW2	.872	.797
AW3	.655	.975
Overall Coronbach's Alpha for awareness of service = 0.901.		

Table 25 Results of reliability test for customization/personalization

Item	Correlated Item-Total Correlation	Coronbach's Alpha if Item Deleted
PER1	.790	.858
PER2	.775	.865
PER3	.692	.895
PER4	.832	.841
Overall Coronbach's Alpha for customization/personalization = 0.895.		

Table 26 Results of reliability test for risk

Item	Correlated Item-Total Correlation	Coronbach's Alpha if Item Deleted
R1	.666	.802
R2	.632	.808
R3	.623	.812
R4	.641	.804
R5	.734	.787
R6	.345	.857
R7	.550	.819
Overall Coronbach's Alpha for risk = 0.836.		

Table 27 Results of reliability test for alliance services

Item	Correlated Item-Total Correlation	Coronbach's Alpha if Item Deleted
AS1	.891	.941
AS2	.950	.894
AS3	.871	.956
Overall Coronbach's Alpha for alliance services = 0.953.		

Table 28 Results of reliability test for usage

Item	Correlated Item-Total Correlation	Coronbach's Alpha if Item Deleted
USE1	.661	.830
USE2	.724	.794
USE3	.673	.819
USE4	.778	.774
Overall Coronbach's Alpha for usage = 0.849.		

APPENDIX C OUTLIERS

Table 29 Trimmed mean

Case	Mean	%5 Trimmed Mean	Case	Mean	%5 Trimmed Mean
U1	4.71	4.78	AW2	3.4	3.44
U2	4.33	4.4	AW3	3.53	3.49
U3	4.34	4.39	PER1	3.71	3.77
U4	3.94	3.99	PER2	3.87	3.88
U5	4.17	4.27	PER3	3.82	3.89
U6	4.49	4.56	PER4	3.4	3.44
EOU1	4.21	4.27	R1	3.58	3.64
EOU2	4.0	4.12	R2	3.71	3.74
EOU3	4.19	4.29	R3	3.67	3.71
EOU5	4.41	4.5	R4	3.29	3.32
WEB1	4.56	4.63	R5	3.3	3.42
WEB2	4.52	4.6	R6	3.25	3.09
WEB3	4.2	4.26	R7	3.72	3.66
WEB4	4.21	4.27	AS1	4.13	4.21
WEB5	4.51	4.6	AS2	4.13	4.22
WEB7	4.03	4.11	AS3	4.15	4.23
COM1	4.19	4.29	USE1	4.37	4.48
COM2	4.25	4.33	USE2	4.06	4.13
COM3	4.12	4.2	USE3	4.32	4.41
AW1	3.41	3.46	USE4	3.81	3.86

APPENDIX D TEST OF NORMALITY

Table 30 Normality test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
U1	.451	300	.000	.553	300	.000
U2	.289	300	.000	.762	300	.000
U3	.301	300	.000	.772	300	.000
U4	.240	300	.000	.855	300	.000
U5	.274	300	.000	.775	300	.000
U6	.358	300	.000	.711	300	.000
EOU1	.249	300	.000	.796	300	.000
EOU2	.287	300	.000	.805	300	.000
EOU3	.258	300	.000	.795	300	.000
EOU5	.308	300	.000	.713	300	.000
WEB1	.378	300	.000	.668	300	.000
WEB2	.371	300	.000	.673	300	.000
WEB3	.256	300	.000	.794	300	.000
WEB4	.242	300	.000	.798	300	.000
WEB5	.350	300	.000	.653	300	.000
WEB7	.257	300	.000	.823	300	.000
COM1	.244	300	.000	.800	300	.000
COM2	.260	300	.000	.782	300	.000
COM3	.258	300	.000	.813	300	.000
AW1	.224	300	.000	.900	300	.000
AW2	.220	300	.000	.902	300	.000
AW3	.235	300	.000	.454	300	.000
PER1	.241	300	.000	.875	300	.000
PER2	.244	300	.000	.542	300	.000
PER3	.262	300	.000	.859	300	.000
PER4	.224	300	.000	.902	300	.000
R1	.201	300	.000	.893	300	.000
R2	.255	300	.000	.877	300	.000
R3	.259	300	.000	.868	300	.000

Table 30 (Cont.)

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
R4	.184	300	.000	.911	300	.000
R5	.202	300	.000	.909	300	.000
R6	.291	300	.000	.267	300	.000
R7	.306	300	.000	.299	300	.000
AS1	.299	300	.000	.779	300	.000
AS2	.310	300	.000	.763	300	.000
AS3	.304	300	.000	.755	300	.000
USE1	.329	300	.000	.715	300	.000
USE2	.250	300	.000	.828	300	.000
USE3	.290	300	.000	.749	300	.000
USE4	.248	300	.000	.871	300	.000
a. Lilliefors Significance Correction						

APPENDIX E SKEWNESS AND KURTOSIS SCORES

Table 31 Skewness and kurtosis

Item	Skewness	Kurtosis	Item	Skewness	Kurtosis
U1	-2.160	5.475	AW2	-0.383	-0.443
U2	-1.166	1.414	AW3	9.722	139.665
U3	-0.837	0.003	PER1	-0.58	0.194
U4	-0.628	-0.227	PER2	7.030	93.905
U5	-1.224	0.912	PER3	-0.768	0.079
U6	-1.174	0.952	PER4	-0.361	-0.522
EOU1	-0.886	1.002	R1	-0.458	-0.445
EOU2	-1.156	0.994	R2	-0.437	-0.187
EOU3	-0.866	0.597	R3	-0.541	0.429
EOU5	-1.541	3.497	R4	-0.214	-0.571
WEB1	-1.611	3.678	R5	-0.286	-0.647
WEB2	-1.732	3.765	R6	13.825	222.0277
WEB3	-0.972	1.498	R7	12.947	204.323
WEB4	-0.938	1.154	AS1	-0.981	2.169
WEB5	-2.050	6.441	AS2	-1.177	2.834
WEB7	-1.032	1.020	AS3	-1.356	3.394
COM1	-1.018	0.960	USE1	-1.582	2.471
COM2	-1.130	1.422	USE2	-0.890	0.479
COM3	-0.952	0.752	USE3	-1.358	1.893
AW1	-0.409	-0.622	USE4	-0.561	-0.060

TEZ FOTOKOPİSİ İZİN FORMU

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YAZARIN

Soyadı : DANESHGADEH

Adı : Salva

Bölümü : Information Systems

TEZİN ADI (İngilizce) : EMPIRICAL INVESTIGATION OF INTERNET BANKING USAGE IN TURKEY

TEZİN TÜRÜ : Yüksek Lisans ☐ Doktora ☐

1. Tezimin tamamından kaynak gösterilmek şartıyla fotokopi alınabilir. ☐
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TEZİN KÜTÜPHANEYE TESLİM TARİHİ : …….