



**STUDYING ACCEPTANCE OF ONLINE BANKING INFORMATION  
SYSTEM: A STRUCTURAL EQUATION MODEL**

**A thesis submitted for the degree of Doctor of Philosophy**

**by**

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**In the name of Allah, Most Gracious, Most Merciful.**

“Praise be to Allah, the Cherisher and Sustainer of the worlds; Most Gracious, Most Merciful; Master of the Day of Judgment; Thee (alone) we worship; Thee (alone) we ask for help; Keep us on the right path; The path of those whom Thou hast favoured; Not the (path) of those who earn Thine anger nor of those who go astray”.

**(Holy Quran 1:1-7)**

## **DEDICATIONS**

I would like to dedicate this thesis to my family, especially to my lovely mother and father, who always believed in their children, and to my brothers, with love and deepest appreciations.

## **DECLARATION**

I declare that the ideas, results, analysis, findings and conclusions reported in this thesis are entirely my own efforts, except where otherwise acknowledged. I also declare that this work is original and has not been previously submitted for any degree award.

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## **ABSTRACT**

Acceptance of information technology (IT) has remained a topic of interest for a last few decades. Several theories, specifically over the conceptualisation of the technology acceptance model (TAM) have emerged and they have been applied in different contexts to investigate new insights into the acceptance behaviour at individual and organisational levels.

However, despite TAM's maturity and validity in different contexts, very little published literature strives to extend its capability to predict individuals' acceptance behaviour about an online banking information system (OBIS). A possible rationale for this gap may be conceptualisation of the TAM under which individuals' acceptance behaviour can only be predicted with two beliefs: perceived ease of use (PEOU) and perceived usefulness (PU). The evidence in literature shows that PU and PEOU beliefs are not sufficient; hence, they may not explain individuals' acceptance behaviour in emerging contexts, such as online banking information systems, especially in developing economies such as Pakistan. There is therefore a need for inclusion of any additional factor that can enhance prediction of acceptance of online banking information system by potential users.

Extending research on the TAM, this study developed and tested a model of OBIS acceptance. The proposed model integrated key constructs from the information systems acceptance research stream into the theoretical frame of the TAM and other theories from social psychology, such as the theory of reasoned action (TRA), theory of planned behaviour (TPB) and the TAM2.

According to the proposed conceptual model, OBIS acceptance was determined by eight main factors, which included perceived usefulness, perceived ease of use, trust, technological self-efficacy, response time, output quality, accessibility, and terminology clarity. In this model, PU was hypothesised to be affected by PEOU, trust, technological self-efficacy (TSE), output quality (OQ) and response time (RT). In addition, PEOU was hypothesised to be determined by three external factors: TSE, accessibility and terminology clarity (TC).

The model was tested on a sample of 353 Internet banking users in Pakistan. Using structural equation modelling with Analysis of Moment Structures (AMOS) software, data analysis showed considerable support for the extended hypothesised model. The result indicated that, in order of importance, PU, PEOU and trust explained 45.7 % of the variance in the acceptance behaviour. The trust and the TSE predicted 28.1 % of the variance in the PU. However, the hypothesised relationships between the PU and the PEOU, OQ and RT were found to be not significant. While in the PEOU, 21.8 % of the variance was predicted by the TSE, accessibility and TC. TSE was found to be a more influential determinant of the PEOU than the PU.

The consideration of factors that have a significant influence on the acceptance of OBIS, as identified in this research, is important for the managers in the banking sector, especially in developing countries, in order to increase wider acceptance and use of these systems, which provide benefits to both the customers and the service providers.

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# **CHAPTER ONE**

## **Introduction**

This chapter introduces the PhD thesis entitled “Online Banking Information Systems Acceptance: A Structural Equation Model” and the research study reported herein. Section 1.1 provides the background for theoretical issues and the research problem. Section 1.2 introduces the research aims and objectives. Section 1.3 and section 1.4, respectively presents the significance and boundaries of the study. Section 1.5 describes the research methodology. Section 1.6 gives the necessary context of the country in which this study was undertaken. Finally, the structure of this thesis is presented in the section 1.7.

### **1.1 Theoretical Background and Research Problem**

Information technology (IT) is considered as one of the most fundamental forces for change in the financial services sector. Consequently, it has rapidly transcended barriers permeating different sectors by creating new products, services, market opportunities, and developing more information- and systems-oriented businesses and management processes (Liao and Cheung, 2002). Moreover, together with innovative business thinking, technology has been transforming the way in which personal financial services are designed and delivered (Crane and Bodie, 1996; Wang et al., 2003). After the development of faster and secure internet services, the financial services sector including retail banks started introducing online banking information systems to facilitate and complement their traditional service channels namely- counter teller, automated teller machines (ATM), telephone banking, and so on. This technological development and an increase in innovation diffusion serve as defensive measures to satisfy increasingly sophisticated and highly demanding consumers, as well as making the market more competitive in terms of reducing rising costs (Wang et al., 2003; Lin, 2006; Shah et al., 2007).

Online banking has transformed and revolutionised traditional financial institutions (Daniel, 1999; Mols, 1999). This transformation in banking has been achieved by digitising activities and making them automatic for operational purposes (Bradley and Stewart, 2003). The potential competitive advantages of the internet and the web

for banks lie in the areas of cost reduction and satisfying consumer needs. However, electronic transactions through internet banking remain a fraction of what is performed through bank branches or other traditional methods such as counter-tellers, automated teller machines (ATMs) or telephone banking (Bradley and Stewart, 2002). However, these methods of carrying out financial transactions are costly compared to online banking. According to Hall et al., (1999), Chang (2002), and Xue et al., (2011), the average cost per transaction charge for different service channels is 1.07 US\$ for counter-tellers, 0.54 US\$ for telephone banking, 0.27 US\$ for the ATM service and 0.01 US\$ for internet banking. In addition, setting up a single new branch of a bank costs approximately 3.5 to 5 million US\$, whereas the cost of setting up an online banking service is from 1.5 to 2 million US\$ (Lin, 2006). Therefore, online banking facilities are much cheaper for the banks; as a result, bankers are very willing to open and provide online banking facilities to their customers. However, the acceptance and the success of online banking facilities rest with the potential users – the bank account holders.

Online banking (or internet banking) is a relatively new type of information system that “uses the innovative resources of the internet and world wide web to enable customers to effect financial activities in virtual space” (Shih and Fang, 2004; pp.213). This newly developed online banking system , if used properly, has the potential to increase customer satisfaction as well as the performance of the banks (Alsajjan and Dennis, 2010; Al-Somali et al., 2009; Pikkarainen, 2004; Hiltunen et al., 2004; Karjaluoto et al., 2002; Wang et al., 2003). Pikkarainen et al. (2004) asserted that electronic banking provides many benefits to the customers all over the world. It has been observed that the benefits and usefulness of OBIS play a significant role in determining customer choice, since many are attracted to those banks that offer more online banking benefits (Pikkarainen, 2004; Wang et al., 2003). There are varieties of benefits that an OBIS can offer which are however not limited only to the banks but customers can also benefit from them by utilising the services in order to carry out their banking transactions (Karjaluoto et al., 2002; Hiltunen et al., 2004; Yiu, et al., 2007; Alsajjan and Dennis, 2010). These benefits can be summarised as: Firstly, online banking service is available 24 hours and seven days a week compared to the brick and mortar banks that are opened only for few

hours during the working days. Secondly, online banking systems attend the queries regarding financial irregularities faster than traditional banking system by logging on instantly and accessing the online bank. In this way, online banking services do not only save the time and money but also provide the convenience and instant accessibility. Thirdly, online banking information systems ensure privacy better than human-teller processing speed by executing and confirming transactions at a quicker speed. Finally, consumers are updated not only about new services, but also about special events, promotions and reports, and updates on regular basis.

However, despite the benefits that online banking information systems can offer, it is worth noting that the technological developments alone cannot guarantee the acceptance and the use of systems by the potential customers. Despite the fact that the potential benefits of electronic services in banking have been described in detail in the research conducted (Alsajjan and Dennis, 2010; Al-Somali et al., 2009; Yiu, et al., 2007; Yousafzai, 2005; Pikkarainen et. al., 2004; Wang et al., 2003; Daniel, 1999; Mols, 1999), countries which have played leading role in introducing internet banking have yet to achieve their targets in comparison to the resources invested in technology-based services. For example, according to (Sarel and Marmorstein, 2003) many US online customers are inactive, use online banking very rarely or use it to carry out very basic transactions. It has been reported that all the top 50 largest banks in the US offered online banking by 2002 and approximately 91% of US households had a bank account (Kolodinsky, 2004), but only 17% of them had utilised online banking. Analysts at that time predicted that this online banking penetration would reach 37% by 2007 (Yousafzai, 2005). However, this prediction was proved an over-estimation as new survey conducted by American Bankers Association in 2007 showed that only 23% of the USA consumers use online banking as primary method for banking transactions (Fisher, 2007). Moreover, according to (Flavian et al., 2005) when users really want to make a financial transaction which should generate revenue for the bank they choose to do it at a bricks-and-mortar branch and complex transactions are still performed manually. Therefore, if customers do not accept or fully utilise the capabilities of these information systems based banking facilities than there is a reduced return on such investments (Burton-Jones and Hubona, 2006; Venkatesh and Davis, 1996). Thus, it

is important for both researchers and practitioners to understand why customers accept or reject new information systems (Davis et al., 1989) and identify those factors that influence acceptance of online banking systems.

In understanding the importance of customer acceptance, a number of information systems (IS) researchers have investigated and developed models to predict user acceptance and usage behaviour. Among the various models that IS researchers have applied to predict and explain users' acceptance behaviour, the technology acceptance model (TAM) developed by Davis, 1989; Davis et al., 1989 is perhaps the most widely used model. The main reasons for its widespread use are simplicity, parsimony and robustness (Mathieson et al., 2001; Cheng et al., 2005; Venkatesh and Bala, 2008; Abbasi et al., 2011). The TAM explains that individuals' perceptions are based on perceived usefulness (PU) and perceived ease of use (PEOU) which, in turn, influence users' intention and usage behaviour towards a particular information system (Davis, 1989; Davis et al., 1989). Prior research applying the TAM and its core constructs: PU and PEOU, proved its validity in predicting user acceptance behaviour across technologies and contextual settings (Davis et al., 1989; Venkatesh and Davis, 2000; Gefen et al., 2003; Abbasi et al., 2011). However, there is considerable debate among researchers (e.g. Moon and Kim, 2001; Wang et al., 2003; Abbasi et al., 2011) who argue that the TAM's core constructs (i.e. PU and PEOU) may not be sufficient to explain user acceptance of new IT systems, as the factors influencing the acceptance of a new IS (such as an OBIS, which is focus of this study) are likely to vary with the technology, target users, and context. Therefore, to better understand the acceptance behaviour of potential users, this study intends to extend the TAM in the context of OBIS acceptance, specifically in the context of a developing economy context (i.e. Pakistan).

## **1.2 Research Aims and Objectives**

This research study intends to address a research problem, i.e., what factors affect user acceptance of online banking information systems, by developing and testing an amalgamated model of the antecedents and consequents of individual's belief towards OBIS acceptance and use. The proposed model integrates key constructs

from the information systems and e-commerce acceptance research streams into the theoretical frame of the technology acceptance model (TAM). The results of the present study are expected to contribute literature on online banking information systems and technology acceptance. By addressing the above stated research problem, this study aims to achieve the following two objectives.

1. To develop a model of the determinants of online banking information system acceptance based on technology acceptance model as a foundation.
2. To test the empirical validity of the proposed research model in a developing economy context i.e., Pakistan's perspective.

### **1.3 Significance of the Study**

Online banking information system (OBIS) is a web-based information system that has the potential to increase customer satisfaction as well as the performance of the banks (Alsajjan and Dennis, 2010; Al-Somali et al., 2009; Pikkarainen, 2004; Hiltunen et al., 2004; Karjaluoto et al., 2002; Wang et al., 2003) and is thus worthy of further research efforts.

Academically speaking, the present study is significant from two points of view. Firstly, this study makes contribution to the research on technology acceptance model as it extends theoretical and empirical research on OBIS acceptance. Secondly, the previous research has contributed to the development of literature both theoretical and empirical related to IT usage. The present study makes a comparison between the results of this study with results of other studies which assist in advancing MIS field to achieve awaited goals. For bank management, who are actually using or planning to use OBIS in their banks, better understanding of critical factors could assist them in achieving the most effective deployment of such system. For IS designer and developers, understanding the crucial factors related to OBIS use will enable them to design more effective systems to enhance the acceptance and use of OBIS among current and potential users. Finally, this study is also useful for OBIS software consultant and vendors as this study provides them a synopsis of very crucial factors which can add or undermine efforts of their provision of successful products and services to the clients and customers. The model validated through

study can also serve as a diagnostic tool to assist OBIS practitioners in understanding some reasons regarding why some systems are preferred to the others for extensive use. The results of this study can suggest some crucially key factors. These key factors then could be manipulated in a way they influence behaviour of potential users of OBIS. In this way, they can achieve an efficient and effective use of IT resources.

#### **1.4 Research Boundaries**

The boundaries of the present study can be described from different angles. First, the area of application under investigation in this study is the acceptance of online banking information systems. The rationale for selecting this area is explained in section 1.1. Second, the investigation for the acceptance behaviour is limited in developing economy context, i.e. from Pakistan's perspective. The choice of the location is justified in section 1.6. Although, in general sense, the notion of technology acceptance is not restricted to any specific parts of the world, however, there is a reservation in terms of the practicality and applicability of those technology acceptance models that are established in the developed countries and are applied to developing countries context. Moreover, most of the technology acceptance research published in the top journals is based on the data from western world (i.e. North America, UK, Australia, and so on). Therefore, investigating the applicability of technology acceptance models by obtaining data from a developing economy is worth investigating. Finally, as mentioned earlier data for present study is obtained from a single study that focused on the online banking information system, and specific user group (i.e. online banking users). Thus, diligence is required when generalising findings of this study to other IT/IS systems applications and user groups.

#### **1.5 Research Methodology Used in this Thesis**

The data for present study was collected using a cross sectional questionnaire survey. The survey approach is considered most appropriate technique, especially in technology acceptance and MIS research, because this technique is faster, inexpensive, efficient, and can be administered to a relatively large sample (Churchill, 1995, Sekaran, 2000; Zikmund, 2003). The questionnaire was developed

using seven-point Likert type scale, ranging from (1) strongly disagree to (7) strongly agree.

A pre-testing of questionnaire was conducted in order to ensure that there was no ambiguity in the questions and that the respondents felt no difficulty in understanding them. Then the instrument was pilot tested for the assessment of the psychometric properties of the measurement items. In the field survey, 375 questionnaires were returned out of 900 distributed, which represented a response rate of 41.7% of the original sample. However, among those returned questionnaire, 22 responses were discarded because four of them were returned completely blank, five respondents had put the same answers on all the Likert scale items, seven respondents mentioned that they had never used internet before (i.e. not satisfying inclusion criteria) and six questionnaires were partially answered (i.e. some questions and/or some parts of the questionnaire such as demographic questions were left blank). Therefore, remaining 353 questionnaires were used for further data analysis. As a result, the final response rate in this study was 39.2%.

All of these valid responses were coded into Statistical Package for the Social Sciences (SPSS) version 16.0 for statistical analysis. Two types of data analysis were performed on the data: descriptive analysis and inferential analysis. The latter included exploratory factor analysis and structural equation modelling analysis including confirmatory factor analysis and hypotheses testing. Descriptive analysis and exploratory factor analysis were performed using SPSS while structural equation modelling (SEM) analysis was performed using Analysis of Moment Structures (AMOS) software version 16.0. A two-stage approach was adapted to conduct SEM analysis as recommended by Anderson and Gerbing (1988). In the first stage measurement model using confirmatory factor analysis (CFA) was conducted to assess the reliability and validity of latent constructs. In the second stage, hypotheses related to influential factors were tested. The SEM model fit was determined using goodness-of-fit indices and coefficient parameter estimates, as suggested by (Byrne, 2001; Kline, 2005; Hair et al., 2006).

## **1.6 Context of Study: Pakistan**

Pakistan has been chosen as the context for data collection for this study. This South Asian country with a total population of 166 million (World Bank, 2008) is the sixth most populous country in the globe and third among Muslim countries (Abbasi et al., 2011). The country has a GDP of 168.28 billion US dollars (as of year 2008) with a growth rate 5.95% per annum (World Bank, 2009). In addition, according to the Information Economy Report published in 2009 by the United Nations Conference on Trade and Development ([www.unctad.org](http://www.unctad.org)), Pakistan is among the five countries of Asia in terms of increased rate of internet and broadband penetration, and mobile phone usage. Given below are the main reasons for selecting Pakistan as the context for this study.

(1) Although enormous funds have been invested in IT in organisations in Pakistan, especially in banking sector, the new technology acceptance rate is observed to be lower than expected.

(2) The culture of Pakistan is different from the countries where the TAM originated (e.g. North American countries). Therefore, selecting Pakistan will help to examine the applicability (validity and robustness) of extending the TAM, which may vary across different cultural settings (Mao and Palvia, 2006).

Pakistan is among the late adopters of IT; nevertheless, the IT sector has grown tremendously since 2000 following the announcement of IT policies and action plans by the Pakistan government in order to boost IT usage (Kundi and Shah, 2009). As a result, there has been a continuing increase in internet users and usage in Pakistan. For example, according to the Internet World Stats, there are now about 6,767,805,208 internet users worldwide, of which 3,808,070,503 are in Asia, making 42.6%. Of total users, Pakistan is ranked 8th among the top 10 Asian countries, covering about 18.5% of the total internet user population in Asia. This tremendous growth among the internet users in Pakistan is evident from the fact that there were approximately 133,900 internet users in the year 2000, which rose to 18,500,000 by 2009. The internet penetration rate has been recorded to be 10.6% (Internet World Stats, 2010). According to the International Telecommunication Union (ITU), the number of internet users per 100 persons in Pakistan was recorded as 11.4 in 2008



(ITU, 2009). In addition, the government of Pakistan has reduced the cost of bandwidth, in order to increase the internet penetration rate (Kundi and Shah, 2009). However, despite these efforts on the part of the government, some neighbouring countries have a higher internet penetration rate. In comparison to Pakistan's internet penetration rate of 10.6 per cent, neighbouring countries like Iran has 32% internet penetration rate, Saudi Arabia has 29.21%, and the UAE has 86% (as cited in Abbasi et al., 2011).

In Pakistan, the banking sector is among the leading players in applying IT for their retail banking activities. Citing Shamsad (2006), Kundi and Shah (2009) have reported that out of a total of 7,406 bank branches in Pakistan by the end of 2005 (Table 1.1), 3,424 (47.3%) branches provided a real-time online banking facility to account holders. Shakaib (2006) reported that the online banking systems in Pakistan increased by 45% during the second quarter of 2006. So, while there has been a considerable growth in online banking in Pakistan, the underutilisation of online banking systems is still a major problem in the country.

Table 1.1 Total number of banks branches in Pakistan

Categories	June-2001	June-2002	June-2003	June-2004	June-2005	Dec-2005
Domestic Banks	7,272	7,280	6,829	6,872	7,089	7,301
Foreign Banks	80	78	70	67	82	105
Total	7,352	7,358	6,889	6,939	7,171	7,406

Source: Kundi and Shah (2009), p.3.

The recent literature shows that most of the users do not utilise and make good use of the electronic services, especially those offered by banking sectors. It has been reported, in a survey conducted in a major city, that only 8% of customers had knowledge of online bank account facilities in Pakistan (Kundi and Shah, 2009). Thus, in order to fully utilise electronic services offered by the banks, it is vital to understand the factors that can facilitate or hinder the use of newly developed banking systems; especially in the context of developing economies. In the above stated background, this researcher has undertaken a research study that is reported in the thesis, which is outlined in the next section.

## **1.7 Structure of the Thesis**

This section briefly explains the structure of this thesis. Chapter one introduces the issues related to the topic under investigation i.e. acceptance of online banking information system, particularly in developing economies context.

Chapter two discusses in detail various theories such as the theory of reasoned action (TRA), theory of planned behaviour (TPB) and the technology acceptance model (TAM), which have been used in explaining user acceptance of technology in general. Also, it critically reviews the relevant literature related to the important factors that are likely to influence the online banking information system, in order to develop the online banking information system acceptance model. The influential factors identified in the literature along with technology acceptance model include trust, technological self-efficacy, output quality, response time, accessibility, and terminology clarity.

Drawing on the literature review presented in Chapter two, Chapter three presents the conceptual model of acceptance of online banking information system proposed in this research. The conceptual model explains eleven hypotheses to be tested and analysed.

Chapter four presents the methodology applied to empirically test the proposed conceptual model of online banking information system acceptance, established in Chapter three. This chapter discusses research paradigms, and research strategy. It also provides the justification of the methodology, discusses the steps taken to collect the data, discusses the sampling issues, explains scale items selected to measure the underlying latent factors, describes development and operationalisation of the instrument used to collect the data, reports the pre-testing of survey instrument, presents pilot study results, discusses the data analysis techniques, presents reliability and validity of the latent factors, and finally presents the ethical considerations in this research.

Chapter five reports the results of data analysis undertaken in this study using different data analysis tools, which are explained and justified in Chapter four.

Results reported include descriptive analysis and inferential statistics including structural equation modelling analysis. This chapter also reports the reliability and the validity of constructs along with hypotheses testing.

The chapters six and seven presents discussion and conclusions of the present study. The chapter six provides an overview of the research and discusses finding related to the results drawn from testing of eleven hypotheses in this study. The chapter presents theoretical and managerial implications drawn from the results reported in Chapter five. Finally, it presents limitations and directions for future research followed by the conclusions.

This chapter provided the background of theoretical issues and the research problem, research objectives, the purpose of the study, the research methodology, the context in which this study was undertaken as well as the outline of the structure of this thesis. The next chapter provides a review of literature relevant to the study topic.

## **CHAPTER TWO**

### **Literature review**

#### **2.1 Introduction**

Since the inception of information systems, there has been an ongoing quest among the research community to find those factors that influence people to accept and to make use of the systems. This issue is of particular importance for organisations because by understanding influencing factors, management will be able to understand users' perceptions and intentions towards a given IS. Besides, this will also enable system designers and developers to enhance the use and acceptance of newly developed systems through focusing on user-centred design choices. Over the decades, researchers have been investigating the factors predicting user acceptance of information systems (IS) / information technology (IT). In this regard, researchers have developed and used various models to understand user acceptance of IS.

Among the various user acceptance theories, Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB) and Technology Acceptance Model (TAM) appear to be the most widely accepted and used by the IT researchers. The TRA and its derivatives, TPB and TAM follow the Attitude-Behaviour paradigm that suggests that behaviour in question is determined through the intention toward the behaviour. Thus, the intention is influenced by attitude and finally salient beliefs influence the attitude. However, the TAM has more clear focus on the IT/IS usage. The TAM has been extensively used solely for the purpose of predicting, explaining and increasing the understanding regarding individual's acceptance of technology in variety of fields. It is important to note here, that the present study applies TAM-based findings as the basis for the theoretical model development.

In this chapter, researcher discusses the research that has been conducted in the field of individual's acceptance of information systems and online banking. Section 2.2 discusses theoretical models used in technology acceptance and usage. Section 2.3 presents extensions and integration of models with TAM. Section 2.4 presents review of technology acceptance studies in different contextual settings. Section 2.5

provides relative importance of external variables in technology acceptance of IT/IS. Section 2.6 discusses online banking information system acceptance and use. Section 2.7 discusses relative importance of trust in technology acceptance. Section 2.8 presents critical assessment of technology acceptance studies. Section 2.9 presents conclusions.

## **2.2 Theoretical Models Used in Technology Acceptance and Usage**

Recently, the adoption of technology in organisations has grown immensely. In 1999, it was estimated that annual worldwide expenditures on IT may exceed one trillion US dollars per year and it was predicted to be growing at about 10 per cent compounded annually (Seddon et al, 1999). Further, studies have shown that investment in IT has consumed about half of total capital investment of organisations since 1980's (Venkatesh et al, 2003). However, the consequential benefits of such investments on the development of IT systems are not guaranteed, until these systems are not accepted and utilised by the intended users (Venkatesh and Davis, 1996). Hence, there is a need to know why people are keen or reluctant in using new information systems in order to figure out practical methods of evaluating and assessing new IT systems, to forecast the user response and acceptance of IT systems along with the implementation of these systems (Davis, 1989).

Literature has confirmed an individual's 'intention' as a significant predictor of the acceptance and usage of new IT systems (Venkatesh and Morris, 2000; Fishbein and Ajzen, 1975; Davis, 1989; Ajzen and Fishbein, 1980; Davis et al., 1989) and suggested models that have theoretical base in social psychology. These intention-based models use behavioural intention to predict information system acceptance and usage (Taylor and Todd, 1995). These theoretical models (TRA, TPB, and TAM), from which the theoretical framework for this research is developed, are discussed in detail in following sections.

The TRA developed by Fishbein and Ajzen (1975) has established as a successful theory in explaining and predicting IT usage behaviour across a broad range of domains. However, due to its limitations on volitional control, Ajzen (1991) extended TRA by including an additional construct i.e. perceived behavioural control

(PBC). This construct predicts both behavioural intentions to use as well as the actual use behaviour. The extended model is called the Theory of Planned Behaviour (TPB). Empirical studies (Mathieson, 1991; Taylor and Todd, 1995) showed the appropriateness of using the TRA and the TPB theories for studying the determinants of IT usage behaviour. The TAM developed by Davis in 1986 is an information system theory adapted from the TRA specifically designed for modelling user acceptance of an IS. The TAM is one of the most widely used models to explain user acceptance of new IS/IT systems (Venkatesh and Davis, 2000).

### 2.2.1 Theory of Reasoned Action

The Theory of Reasoned Action (TRA: Fishbein and Ajzen, 1975) is an intention model developed from social psychology that explains the determinants of users' behaviour in question (Ajzen and Fishbein, 1980). The main goal of this theory is "to predict and understand an individual's behaviour" (Ajzen and Fishbein, 1980, p.5). The foundations of the TRA lie in the assumption that behaviour of the users is rational and that the users evaluate the existing data systematically. In other words, the TRA suggests that individuals take into consideration the implications of their activities before performing any specific behaviour (Ajzen and Fishbein, 1980). A model of TRA is illustrated in Figure 2.1.

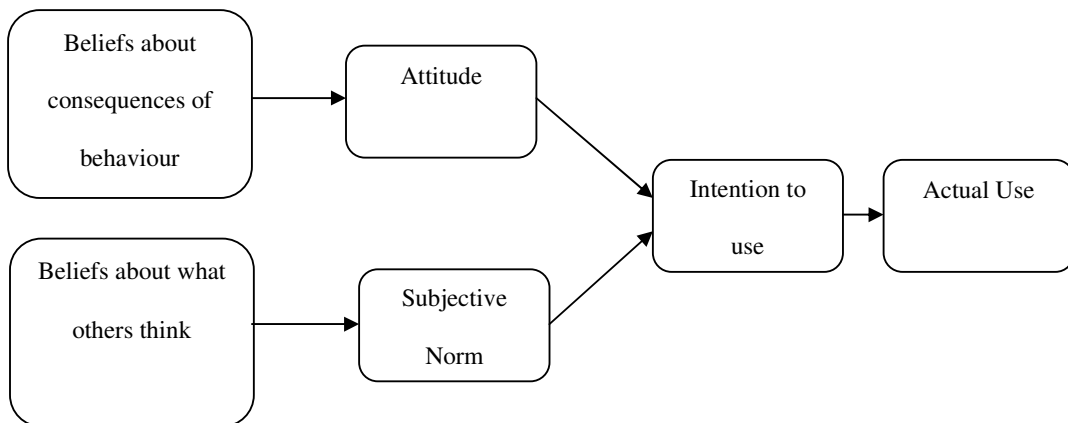


Figure 2.1 TRA (Fishbein and Ajzen, 1975)

According to Ajzen and Fishbein (1980), the theory of reasoned action posits that "most behaviours of social relevance are under volitional control and are thus

predictable from intention" (p. 41). The model of TRA, as shown in the Figure 2.1, defines relationships among beliefs, norms, attitudes, intended behaviour, and actual behaviour. In the TRA, attitudes and subjective norms affect individual's intention, which predicts the behaviour of the person. Attitude refers to individual's negative or positive assessment of the behaviour in question (Fishbein and Ajzen 1975), while subjective norm, a social influence factor, refers to individual's perception of social pressure to perform or not to perform the specific behaviour (Fishbein and Ajzen 1975). Therefore, the TRA comprises two core constructs i.e. attitude and subjective norms, which are defined in Table 2.1.

Table 2.1 Core constructs in TRA

<b>Core Constructs</b>	<b>Definition</b>	<b>Author</b>
Attitude	refers to individual's negative or positive evaluation of the behaviour.	Fishbein and Ajzen (1975)
Subjective Norm	refers to individual's perception of social pressure to perform or not to perform the behaviour.	Fishbein and Ajzen, (1975)

Source: Developed for this study.

The TRA has been broadly applied and tested in various studies to predict and explain the performance of behaviour both the intended and the actual (Davis et al., 1989). However, by the time this theory was applied in various academic disciplines, researchers realised that this theory was not sufficient and there were several limitations when it was applied in particular contextual settings (Davis et al., 1989; Ajzen, 1991). Davis et al. (1989) suggested that TRA is general behavioural theory and it does not point out what particular beliefs would be appropriate in particular situations. Furthermore, the TRA theory was criticised for being unsuitable to predict situations where individuals have low levels of volitional control (Ajzen, 1985). To address these limitations, Ajzen in 1991 extended the TRA and proposed a new theory called theory of planned behaviour (TPB), which is discussed in the next section.

### 2.2.2 Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB) is an extension of the TRA (Ajzen, 1991) and the later (TRA) was proposed to study individuals' behaviour in situation in which they had no control over the performed behaviour (Mathieson, 1991; Ajzen, 1991). Ajzen (1991) added the perceived behavioural control (PBC) construct in the TRA model to accommodate situation in which individuals' lacked full volitional control. The PBC was therefore seen as an ease or difficulty in performing a particular behaviour (Ajzen, 1991). Therefore, the TPB that is another intention model established from social psychology (see Figure 2.2) suggests that (PBC) factor, subjective norms (SN), and attitudes are direct determinants of intentions to use and the actual usage behaviour. Thus, the TPB suggests that attitude, social influence factor SN, and PBC jointly determine the intended and actual behaviour. Additionally, the construct PBC was postulated to have casual relationship with both the intention to use and the actual usage.

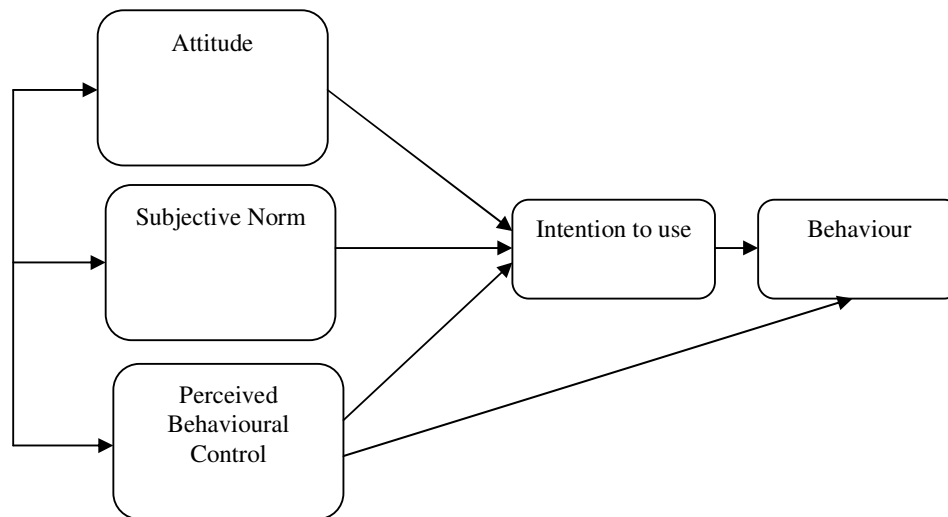


Figure 2.2 Theory of Planned Behaviour (TPB: Ajzen, 1991)

Researchers have applied the TPB in a variety of situations in order to predict the performance of intentions and actual behaviour, such as, predicting user intentions to use new IS systems (Mathieson, 1991) and to perform unethical behaviour (Man, 1998). While comparing predictive power of TPB and TRA, Madden et al. (1992) and Man (1998) suggested that the TPB has an upper hand over the TRA in terms of predictive power of actual behaviour. The major difference between the TPB and the



TRA is that the TPB added an exogenous variable i.e. perceived behavioural control, which has direct and indirect effect on actual behaviour through intention.

Although previous information system research studies suggested that perceived behavioural control may be an important predictor of intentions to use and actual usage (Mathieson, 1991; Taylor and Todd 1995); there is however empirical evidence that suggests that with the behavioural control construct the role of self-efficacy is not only an important incorporation to the theory but it commonly emerges as the most significant factor influencing both behavioural intention to use and actual behaviour (Armitage and Conner, 2001). Table 2.2 provides the definitions of the core constructs included in the TPB.

Table 2.2 Core constructs in TPB

<b>Core Constructs</b>	<b>Definition</b>	<b>Author</b>
Behavioural Intention	refers to individual's intention to perform behaviour and is a function of Attitude, Subjective Norm and Perceived Behavioural Control.	Fishbein and Ajzen (1975); Ajzen (1991); Mathieson (1991)
Attitude	refers to individual's negative or positive evaluation of the behaviour.	Fishbein and Ajzen (1975); Ajzen (1991); Mathieson (1991)
Subjective Norm	refers to individual's perception of social pressure to perform or not to perform the behaviour.	Ajzen (1991); Mathieson (1991)
Perceived Behavioural Control	refers to the perceived ease or difficulty of performing the behaviour and reflects.	Ajzen (1991); Mathieson (1991)

Source: Developed for this research

### 2.2.3 Technology Acceptance Model

The technology acceptance model (TAM), developed by Davis (1989) (Figure 2.3), is one of the most widely applied models used to explain the individual's acceptance

of information systems. The TAM is an information systems (IS) theory adapted from the theory of reasoned action (TRA), which was specifically designed for modelling acceptance of information systems by potential users. The primary purpose of the TAM is to predict IS/IT acceptance and diagnose design problems before users actually use new systems. Therefore, the TAM has been widely used for the purpose of predicting, explaining and increasing the understanding of user acceptance of information systems in various fields.

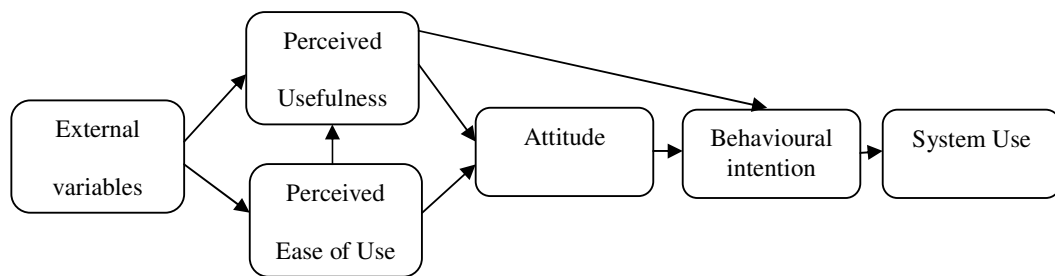


Figure 2.3 Technology Acceptance Model (TAM: Davis, 1989)

The TAM model suggests that when individuals encounter new IS technologies, two main variables influence how and when individuals will use the system. These variables of the TAM are perceived usefulness (PU) and perceived ease of use (PEOU). PU is referred as “the degree to which person believes that using a particular system would enhance his or her job performance” (Davis, 1989, p.320). PEOU is defined as “the degree to which a person believes that using a particular system would be free from efforts” (Davis, 1989, p.320). The TAM proposes that PU and PEOU beliefs affect users’ attitude towards using information systems. Their attitude directly relates to behavioural intention (BI) to use, which, in turn, will determine usage of the system. PU and PEOU both have an effect on BI. PEOU also affects PU. BI is also indirectly influenced by external variables through PU and PEOU.

However, the original TAM (Davis, 1989) was revised by omitting attitude from the model. Davis et al. (1989) conducted an empirical study among MBA students using

word processing application. The results of their study partially supported the model. They found that attitude did not fully mediated perceived ease of use and perceived usefulness. Therefore, they recommended a revision of the original TAM model which they claimed was a more "powerful for predicting and explaining user behaviour, based on only three theoretical constructs: Behavioural intention (BI), perceived usefulness (PU), and perceived ease of use (PEOU)" (Davis, 1989: p. 997). In addition, Davis and Venkatesh (1996) empirically proved that BI to use is only partly mediated by the attitude. The revised TAM is illustrated in Figure 2.4.

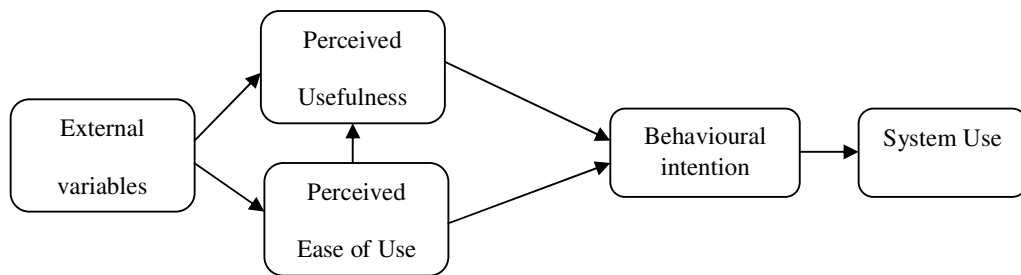


Figure 2.4 Revised Technology Acceptance Model (Davis, 1989)

The revised model of technology acceptance, proposes that BI is determined by PU and POEU. PU is determined by PEOU and external factors. PEOU is also hypothesised to have a direct effect on PU. In addition, external variables are postulated to have effect on core beliefs of TAM i.e. PU and PEOU. According to Davis et al. (1989) these external variables, as suggested in the TAM, could be system design features, personal characterises, training, and the like. Table 2.3 shows definitions of the core constructs in the TAM.

Table 2.3: Core constructs of the TAM

Core Constructs	Definition	Authors
Perceived Usefulness	refers to the degree to which a person believes that using a particular system would enhance his or her job	Davis (1989); Davis et al. (1989); Venkatesh et al. (2003)

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	performance.
Perceived Ease of Use	refers to the degree to which a person believes that using a particular system would be free of effort.

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Source: Developed for this research

Davis (1989) conducted various experiments to validate the TAM by using PEOU and PU as two independent variables to understand information system usage. He found that both constructs were significantly correlated with intended use and actual system usage. Although, the TAM was originally developed to test simple word processing software with students, Davis et al. (1989) described the core constructs (i.e. PU and PEOU) of the TAM as universal to varying types of information systems and user populations.

Reliable and valid measurement scales are most important for empirical studies; thus, Davis (1989) developed six item measurement scales for the core constructs: PU and PEOU, of TAM. Both PU and PEOU measurement item scales achieved high reliability and were proven to demonstrate convergent and discriminant validity. Since then many studies have used and replicated these measures and supported their reliability and validity in predicting and explaining user acceptance of various information technology applications (e.g. Segars and Grover 1993; Adams et al. 1992; Mathieson 1991; Hendrickson et al. 1993, 1996). Adams et al. (1992) in their study examined the psychometric properties of PU and PEOU instrument developed by Davis (1989). Results of their study confirmed the reliability and validity of measurement instrument for both perceived usefulness and perceived ease of use. They found that PU and PEOU were robust across different information systems and user groups. Hendrickson et al. (1996) assessed the test-retest reliability of the TAM core constructs PU and PEOU measurements instruments. They confirmed the PU and PEOU measurement scales to be reliable and valid in terms of test-retest analysis. Szajna (1994) examined the validity of PU and PEOU measurements to predict future behaviour with DBMS application using MBA students as sample. The discriminant analysis results of study found good predictive

validity for PU and PEOU instrument. Davis and Venkatesh (1996) suggested that original items of TAM could be used for predicting various information systems acceptance. In a research study, Subramanian (1994) concluded that information system researchers can use PU and PEOU scales in different technological and organizational contexts.

Although many research studies found TAM to be suitable as a base model for explaining user acceptance of various internet based technologies, such as online-tax (Wu and Chen, 2005 ), e-commerce (Palvia, 2009) and world wide web (Lederer et al., 2000). However, Segars and Grover (1993) recommended assessment of measurement instrument each time used in different settings, noting that “no absolute measures for those constructs exist across varying technological and organisational context.... Measurement models must be rigorously assessed and, if necessary, respecified” (p. 525).

### **2.3 Extensions and Integration of Models with TAM**

The technology acceptance model has very well explained the user’s acceptance of different applications of IT/IS; therefore, a number of extensions to the TAM model have been developed. The original TAM identified that PU and PEOU as significant determinants of intention to use. Thereafter, several additional determinants have been incorporated into the TAM model, which have been postulated as having influence on the usage behaviour. There have been at least three approaches to extend the TAM. These approaches include introduction of new factors such as SN, PBC and perceived resources (PR), addition of extra or alternate constructs of the belief, and examination of mediators and antecedents of PU and PEOU (Wixom and Todd, 2005).

Venkatesh and Davis (2000) and Chau and Hu (2002) examined the influence of subjective norm (SN) on behavioural intention (BI) to use. Empirical results of the research studies revealed mixed findings for the SN construct. For example, subjective norm was significant determinant of BI in study conducted by Venkatesh and Davis (2000). However, the results of Chau and Hu (2002) found that subjective norm was insignificant determinant of BI to use. In another study, Mathieson et al.

(2004) added perceived resources construct in the model. The result of the study found that perceived resources construct was a major determinant of behavioural intention. In addition, perceived behavioural control (Chau and Hu, 2002) and perceived enjoyment (Heijden, 2004) were also found to have significant influence on intended behavioural use.

However, surprising results were of the research conducted by Taylor and Todd (1995). They pointed out that, “perhaps one of the most interesting results from this study was that by adding subjective norm and perceived behavioural control constructs to the relatively simple TAM model, the ability of the model to predict IT usage behaviour did not increase substantially” (Taylor and Todd, 1995, p. 171). They stressed a need for broader exploration of factors beyond those suggested by traditional intention or innovation models. In addition, they concluded that TAM could be used when the research goal is to predict behavioural intention to use.

Another attempt taken to extend TAM was to examine the influence of external variables on core beliefs of TAM i.e. PU and PEOU. For example, Davis (1991) extended the TAM in a research about the influence of system design features on user acceptance and found that TAM’s basic constructs PEOU and PU fully mediated the effect of systems design features on the usage. Igbaria et al. (1995) examined the influence of external factors i.e. user training, computing support and managerial support on PU and PEOU beliefs. Their results confirmed that these external factors significantly affected both the PU and the PEOU of microcomputer usage. However, some empirical studies have shown no significant effect of user training on TAM beliefs towards system acceptance. For example, a study by Karahanna and Straub (1999) found no significant effect of training on both PEOU and PU constructs.

In 2000, Venkatesh and Davis extended the original TAM model to explain perceived usefulness and behavioural intention towards usage in terms of social influence process and cognitive instrumental processes. They called extended model as TAM2 (Venkatesh and Davis, 2000). In TAM2, the social influence process highlights the impact of three inter-related factors that affect users when they

experience the opportunity to accept or reject a newly developed information system. The factors are subjective norms, voluntariness and image. In cognitive instrumental process, the TAM2 highlights the individual's job relevance and output quality in relation to PU and PEOU. Furthermore, results demonstrability and ease of use are other fundamental determinants of user acceptance. Venkatesh and Davis (2000) conducted a longitudinal study including two voluntary settings and two involuntary settings. The results of their study revealed that results demonstrability, image, subjective norms, job relevance and results were significant determinants of usefulness construct. In addition, in a study conducted by Venkatesh (2000) revealed that factors like computer anxiety, computer self-efficacy, perceptions of external control, and objective usability were significant determinants of ease of use construct.

#### **2.4 Review of Technology Acceptance Studies in Different Contextual Settings**

The technology acceptance model (TAM) has been one of the most widely applied models in research studies on technology acceptance. The model of TAM has been used in a wide range of application settings across various user populations, and its reliability and validity has been established in predicting user acceptance of technologies.

In a study, Davis et al. (1989) compared model of technology acceptance and the TRA model, to examine the effectiveness of these two models in explaining behavioural intention to use in a word processing application. The empirical results indicated that the TAM explained 47 per cent of the variance in behavioural intention to use whereas the TRA explained 32 per cent of the variance in users' intention to adopt. Taylor and Todd (1995) compared three models: TAM, TPB, and decomposed TPB to understand information technology usage. The results of the study, in terms of overall fit, indicated that all three models had a good fit and almost equivalent explanatory power. The research concluded that while TAM could be preferably used when the research goal was to predict usage behaviour, the decomposed TPB model provided a more complete understanding of the determinants of usage behaviour. Mathieson (1991) compared TAM and TPB to predict user intentions towards information systems. The results indicated both TAM

and TPB predicted intention to use IS quite well. The study concluded that TAM was more parsimonious than TPB, and easier to apply in practice, giving TAM an empirical advantage over TPB. Chau and Hu (2001) compared TAM, TPB, and a decomposed TPB to examine the degree to which these models explain user acceptance in health care environment. The models were investigated using a survey on telemedicine technology involving 400 physicians in Hong Kong. The results suggested that TAM was better than TPB in explaining physicians' intentions towards telemedicine technology acceptance (R-square = 0.40, 0.32, respectively). However, relatively low R-square compared to previous studies of TAM suggested a need for inclusion of additional factors in the model.

In an empirical study based on extended version of TAM, Chau (2001) investigated the influence of computer self-efficacy and computer attitude on individuals' information technology usage behaviour. The model was empirically tested using data obtained from 360 business students by applying structural equation modelling software LISREL and their results supported the hypothesised model. They found that PU was a strong predictor of behavioural intentions. In addition, their results revealed that inclusion of computer related self efficacy and attitude towards computer into the model significantly improved the explanatory power of the research model on the variance of PU.

In 2004a, Shih conducted an empirical study to predict consumer's acceptance of e-shopping on the web. He developed a model based on the TRA and TAM. The model was tested using data collected from 212 employees of eight small and medium size organisations in Taiwan. The results of study confirmed the theoretical postulation of the TAM. The results further suggested that both perceived ease of use of trading online and perceived usefulness were significant predictors of attitude towards acceptance of electronic shopping using the Internet. Findings also revealed that Internet and web perception of information, system and service significantly influenced user acceptance. In another empirical study, Shih (2004b) combined technology acceptance model (TAM) and the model of information behaviour for Internet utilisation. The extended TAM was tested using questionnaire survey of 203 office workers from ten small and medium sized organizations in Taiwan. The



results strongly supported the extended TAM. The empirical results suggested that TAM beliefs (usefulness and ease of use), and relevance significantly influenced the attitude towards information use (Beta = 0.16, 0.48 and 0.31 respectively). PEOU was found strongest predictors of the Internet use through attitude. Furthermore, there was a significant effect of relevance on TAM's core beliefs i.e. PEOU and PU with Beta values 0.50, and 0.41 respectively. Overall, the extended TAM in the context of Internet utilisation explained 47 per cent of the variance in information use.

Ong et al. (2004) applied and extended technology acceptance model to understand acceptance of electronic learning system by engineers. They modified TAM by incorporating new construct perceived credibility into the model. The data was collected from 140 engineers working in six different international companies. The model was tested using CALIS procedure of SAS version 8.1. The results of the study strongly supported modified TAM in predicting engineers' intention towards electronic learning system. They found that computer self-efficacy had a significant positive effect on both perceived usefulness and perceived ease of use whereas computer self-efficacy negatively affected perceived credibility construct. The results revealed that perceived usefulness, perceived ease of use, and perceived credibility had significant positive effect on behavioural intention to use (Beta = 0.34, 0.26 and 0.20, respectively). Overall, the extended model accounted 44% of the variance in behavioural intention to use of e-learning system.

Moon and Kim (2001) extended TAM in the context of World Wide Web. They added perceived playfulness, as an intrinsic motivation factor, into the model. Overall, their results supported the extended model in which perceived usefulness and perceived playfulness were found to have a significant effect on intention to use the World Wide Web. In addition, Vijayasathy (2004) extended TAM, by incorporating other factors from previous research studies, to predict consumers' behavioural intentions in the context of on-line shopping. The additional constructs included in the TAM were: compatibility, privacy, security, normative beliefs, and self-efficacy. The model was tested with data collected from 281 residents of a city in the USA. Overall, results of this study revealed that compatibility, usefulness,

ease of use, and security have a significant effect on attitude towards on-line shopping usage. In addition, normative beliefs and self efficacy were found to have a significant influence on intention to use an on-line shopping system. Furthermore, results of this study encouraged consideration of other factors besides the core constructs of TAM (i.e. PU and PEOU) when applying the TAM in online settings.

Gefen et al. (2003) developed an integrated model based on trust and TAM's core constructs i.e. PU and PEOU, in the context of online commerce. They conducted a field study to investigate the effects of trust and TAM on behavioural intention to shop. The integrated model was tested with business students in the USA, who had previous experience with online sites. The results of the study suggested that trust, perceived usefulness, and perceived ease of use were significant determinants of online shopping intention. The beta values were 0.26 for Trust, 0.40 for PU, and 0.25 for PEOU and all the beta values were significant at  $p = .01$  level (Gefen et al. 2003). The results implied that PU was strongest predictor of online shopping behaviour. Furthermore, results also indicated that trust and PEOU had a significant effect on PU (beta = 0.26 and 0.55 respectively,  $p = .01$ ). They concluded that experienced consumers' intention to perform online transactions depend both on trust and TAM's core beliefs (i.e. PU and PEOU).

Wang et al. (2003) applied the extended version of technology acceptance model (TAM) in the context of Internet banking and they added two factors in the model to increase the explanatory power of the TAM. The constructs added to the model were perceived credibility (PC) and individual difference (computer self-efficacy). The model was tested on a sample of 123 users through telephone interview from Taiwan. Results of data analysis, using structural equation modelling software LISREL version 8.3, showed a strong support for the proposed model in determining user's intention to adopt Internet banking. The empirical results suggested that perceived usefulness, perceived ease of use and perceived credibility had a direct significant positive effect on behavioural intention to use the internet banking (beta values were 0.18, 0.48 and 0.24, respectively). Unlike previous studies (e.g. Davis et al., 1989 and Gefen et al., 2003), in this study PEOU was found as a strongest predictor of intention to use. In addition, there was a significant and positive effect of

computer self-efficacy (CSE) on both PU and PEOU but the self-efficacy had a significantly negative impact on the credibility (beta values = 0.16, 0.63 and - 0.21, respectively). This indicated that the CSE was a more influential in predicting the PEOU than the PU in the Internet banking context. Finally, Wang et al. (2003) pointed out that people with higher CSE are more likely to have positive PEOU and PU towards their behavioural intention in using internet banking.

Furthermore, in the context of online banking, Pikkarainen et al. (2004) conducted research in Finland to investigate consumers' perceptions towards online banking acceptance. They added four variables into the TAM model derived from previous literature and from focus group interviews with banking professionals. Besides core variables of TAM (i.e. PU and PEOU), other constructs included in the model were security and privacy, perceived enjoyment, information on online banking, and the quality of the Internet connection. The extended model was empirically tested with 268 Finnish consumers who had previous experience of internet banking. The findings of the study suggested that PU and information on online banking were significant determinants of online banking acceptance behaviour.

In summary, almost all of the empirical studies presented here suggested that the basic constructs of TAM i.e. PU and PEOU are significant determinants of behavioural intention to use and that the TAM demonstrates significant prediction power in explaining user acceptance of new information systems in different contextual settings, as described above. Table 2.4 presents TAM studies review.

Table 2.4 Review of TAM studies

<b>Year</b>	<b>Author (s)</b>	<b>Technology Examined</b>	<b>Sample</b>	<b>Findings</b>
2011	Abbasi et al.	Internet	504 academics	Perceived usefulness was most significant construct in Internet acceptance.
2010	Autry et al.	Supply Chain Technologies	195 users	The study found in technologically turbulent environments, the relationships between the firms' perceived usefulness and ease of use and the firm's intention to use a supply chain technology are stronger.
2008	Venkatesh and Bala	Various office IT systems	38 Employees 39 Employees 43 Employees 36 Employees	Overall results supported the extended model. TAM3
2007	Chen et al.	Electronic toll collection	255 individual motorists	Perceived usefulness was found to have insignificant influence on the intention

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2006	Yi et al.	PDA	222 physicians	of electronic toll collection adoption Perceived usefulness was found to be the most significant determinant of physician's intention to accept a technology
2005	Wixom and Todd	Data warehouse predefined reporting software.	456 employees from seven organizations from different organisation	Results supported the application of information and system satisfaction as external variables to traditional TAM
2004	Ong et al.	Electronic learning system	140 engineers working in six different international companies	computer self-efficacy had a significant positive effect on both perceived usefulness and perceived ease of use
2004	Vijayasathy	On-line shopping	281 residents of a city in the USA	compatibility, usefulness, ease of use, and security have a significant effect on attitude towards on-line shopping usage
2004a	Shih	E-shopping on the web	212 employees of eight small and medium size organisations	The results of study confirmed the theoretical postulation of the TAM

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2004b	Shih	Internet utilisation	203 office workers from ten small and medium sized organizations	Perceived usefulness, perceived ease of use, and relevance significantly influenced the attitude towards information use
2003	Gefen et al.	Online commerce	business students	Trust, perceived usefulness, and perceived ease of use were significant determinants of online shopping intention
2001	Moon and Kim	World Wide Web	152 graduate students	Perceived usefulness and perceived playfulness were found to have a significant effect on intention to use
2001	Chau and Hu	Telemedicine technology	400 physicians	TAM was better than TPB in explaining physicians' intentions towards telemedicine technology acceptance
2000	Venkatesh	Online help system Multimedia system Windows 95	70 employees 160 employee 52 employees	Anchor elements were used to form perceived ease of use about a new system and with increased experience adjustments play an

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1999	Agrawal and Prasad	Software applications in personal computer.	230 Technology Literate employees	important role in determining system specific PEOU Validated the relationship between individual differences and technology acceptances mediated by the TAM core beliefs.
1995	Igbaria et al.	Microcomputer usage	236 part-time MBA students	Confirmed the effect of external variables on usage in addition to confirming previous relations among TAM constructs
1992	Adams et al.	Voice and email Software applications	118 employees in 10 different organizations plus 73 users.	Demonstrated validity and reliability of perceived usefulness and perceived ease of use measurement. Also, perceived usefulness found a major determinant of system usage
1992	Davis et al.	Word processing Program plus Graphic system	200 plus 40 MBA Students	Usefulness and enjoyment found significant determinant of usage

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				intentions and were found to mediate the effects on usage intention of PEOU and output quality.
1989	Davis	Email and file editor, Plus, graphic systems	112 employee 40 evening MBA students	Two 6 item scales with high reliability for the perceived usefulness and perceived ease of use.
1989	Davis et al.	Word processor	107 MBA Students	Behavioural intentions found the major determinant of usage behaviour. Attitude has no mediating effect between perceived usefulness or perceived ease of use and behavioural intention.

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## **2.5 Relative Importance of External Variables in Technology Acceptance**

Previous research studies have recognised the need to introduce external variables into the TAM for improvement of its specificity and explanatory power (Davis et al., 1989; Karahanna and Limayem, 2000; Venkatesh et al., 2003; Chin and Gopal, 1995). For instance, Davis et al. (1989) suggested considering judicious system design features so as to increase user acceptance. In addition, Venkatesh et al. (2003) underscored the need for considering explicitly the information and system characteristics that might increase the system usage. Moreover, a study conducted by Karahanna and Limayem (2000) with two technologies (i.e. e-mail and voice-mail) found that the determinants of usefulness and ease of use of target system acceptance were different among the technologies. Furthermore, Chin and Gopal (1995) noted that “greater understanding may be garnered in explicating the causal relationships among beliefs and their antecedent factors” (p. 46).

It is imperative to mention here that Davis (1989) in his well-known technology acceptance model (TAM) did not include external variables explicitly into the model that are expected to influence intentions and usage through PU and PEOU. These external variables could be system characteristics, organisational structure, individual difference, and the like (Davis et al., 1989). In emphasising the importance of external factors, Fishbein and Ajzen (1975) noted that “external stimuli influence a person’s attitude toward behaviour indirectly by influencing his/her salient beliefs about the consequences of performing the behaviour” (p. 396).

Consequently, many researchers have attempted to extend the TAM by adding external factors into the model, specifically those related to information system characteristics. For example, Davis (1993) extended the TAM in a research study about the influence of system design features on user acceptance. This field study was conducted with 112 users of two end-user system applications. The results of the research suggested that TAM’s basic constructs perceived usefulness (PU) and perceived ease of usage (PEOU) fully mediated the effect of external variables (i.e. system design features) on usage behaviour. The proposed model accounted 36% of the variance in the usage behaviour. PU was found twice strong determinant than PEOU. Moreover, the study concluded by suggesting consideration of other

additional factors that might explain user acceptance in a better way. Wixom and Todd (2005) developed an integrated model based on technology acceptance and user satisfaction literature. The augmented model was tested using a data collected from 465 users working seven different organisations regarding their use of data warehousing software. Findings showed that information and system characteristics explained 75% of the variance for system and information quality. In addition, a significant effect of information and system quality on PU and PEOU was found. Moreover, Wixom and Todd (2005) underscored the importance of investigating the influence of the IT artefact on PU and PEOU of TAM to explain and increase user acceptance.

Some studies incorporated external factors, such as individual, organisational, system attributes, and computer self-efficacy into the TAM, hypothesising that salient beliefs i.e. PU and PEOU of TAM mediate the effect of external factors and user acceptance. For example, Igbaria et al. (1995) extended TAM by introducing external variables namely: individual, organisational, and system characteristics. This field study was conducted using a survey questionnaire with 214 part-time M.B.A students. Data was analysed using a structural equation modelling technique called the partial least square (PLS). The results of the study confirmed the effect of external factors i.e. individual, organizational, and system characteristics on both perceived usefulness and perceived ease of use. In another empirical study, Igbaria and Iivari (1995) extended the TAM by including computer self-efficacy as an external variable and its antecedents (i.e. organisation support and experience), hypothesising to have an effect on salient beliefs of the TAM i.e. PU and PEOU, computer anxiety and usage. Findings of this research study conducted with a sample of 450 micro computer users in Finland indicated a strong support for the proposed model. The results suggested that PU had a strong direct effect on usage behaviour whereas PEOU had an indirect effect on usage through PU. Self-efficacy was found to have a direct effect on PEOU and usage as well as an indirect effect on PU through PEOU.

In addition, a significant effect of computer self-efficacy on IT usage behaviour was found in an empirical study conducted by Chau (2001), who investigated the effect

of computer self-efficacy and computer attitude on IT usage behaviour. Computer self-efficacy and attitude were explicitly incorporated in the model as external factors affecting core beliefs of TAM i.e. PU and PEOU. The conceptual model was tested using data collected from 360 business students by applying structural equation modelling software package known as linear structural relations (LISREL). Findings of the study provided a support for the model. The empirical results of the study found perceived usefulness (PU) as a strong predictor of behavioural intention to use. In addition, results also suggested that addition of computer self-efficacy and computer attitude in the conceptual model significantly improved explanatory power of the model on the variance of PU.

## **2.6 Online Banking Information Systems Acceptance and Use**

In recent years, the extraordinary advances in information technology (IT) are considered to be the most powerful force for change in the financial services sector. This includes the availability of online banking services in the retail banking sector. Together with innovative business thinking, IT has transformed the ways in which personal financial services are designed and delivered (Crane and Bodie, 1996; Wang et al., 2003). This technological development and an increase in innovation diffusion serve as defensive measures to satisfy increasingly sophisticated and highly demanding consumers, as well as making the market more competitive in terms of reducing rising costs (Wang et al., 2003; Lin, 2006; Shah et al., 2007). The use of the internet in retail banking has provided financial institutions with a remote distribution channel. Now, by virtue of the internet, consumers are able to conduct their financial transactions virtually without ever going themselves to the banks (Daniel, 1999; Pikkarainen et al., 2004).

Internet is one of the most important advances in IT sector. Internet offers a variety of services particularly in carrying out transactions and facilitating communication in business field. E-commerce is a miracle of internet which has potential to transcend the geographical limitation and boundaries. Considering the potential use of internet in business, Chou and Chou (2000) believes that internet serves for four different purposes (1) facilitates in establishing direct relationship between organisations and customers so that business transactions could be carried out smoothly and easily (2)

helps organizations to win over their rivals by providing services to the customers (3) assists companies in providing services and delivering products to new customers, and (4) it facilitates organisations to increase their dominancy and retain it through utilizing potential benefits of internet.

Due to advent of internet, new models of business, and modern methods and channels of distribution are introduced in banking as well in other sectors. Internet has increased competition among banks. Now it has become quite difficult for banks to survive without introducing internet reforms. The traditional system of banking having just physical presence could no longer compete with those which provide virtual facilities to their customers. Internet could be utilized in banking sector through two ways. A bank which already exists physically can develop a Web Site to provide services of internet banking along with employing orthodox channels and traditional methods as described by (Furst et al., 2002 and Hernandez-Murillo et al., 2010). This type of strategy is known as a 'click-and mortar' (Xue et al., 2011). DeYoung (2005) maintains that click-and-mortar (C&M) model of business assists in the routine value-added transactions via internet at the time when customized, high value-added transactions are run by more costly network in a branch. Another way of utilizing internet services could be to develop a virtual or internet only model without establishing any physical branch. In this model, a single main computer server could play a complete function of the bank which could be placed at any location. This model is non-physical so banks can provide all facilities of depositing and withdrawing funds and money via ATM's or other delivery channels (Furst et al., 2002). It is important to mention that the present study focuses on the former strategy, i.e. C&M model. C&M model's significance lies in its dual nature, in that the banks could offer customers the option to carry out their transactions online without taking risk of losing those clients who prefer traditional method of banking and performing transactions in brick-and-mortar branch (DeYoung, 2005).

Prior to the development of the internet, banks were already utilizing IT for the purposes of digitizing back-office functions and operations in 1960s. This specific use of IT was later changed by a move of technology into the front office and thus the beginning of management information systems (MIS) emerged (Liao et al.,

1999). Consequently, IT made it possible for banking industry to extend the back-office (core process and support process) to the front office and beyond the branch (Legg, 1994; Llwellyn, 1995; Liao et al., 1999). This extension in banking marked the beginning of new era, where a sudden increase in IT applications has been seen throughout banking industry, and in this way distance and communication gap between different departments of banks was lessened as integrated software systems increasingly blur the line. After the development of faster internet services, financial institutions such as the banks have started introducing online banking information systems to facilitate and complement their traditional services channels such as counter teller, automated teller machines (ATM) and telephone banking (TB). The advent of this new era of internet/online banking systems was the result of integration of intelligent systems which did not differentiate between back-office and front-office (Liao et al., 1999).

Online banking information system (OBIS) in this research is referred as web-based system through which user / customer is expected to perform at least one of the following transactions, via the Internet, namely: viewing account balance and transaction histories, paying bills, transferring funds between accounts, ordering cheques, managing investments and stock trading (Pikkarainen et al., 2004; Alsajjan and Dennis, 2010). Generally, bank's website provides the interface or doorway to the OBIS. Customers normally enter a bank's main web site and then click on a link to enter the OBIS, which is also known as 'Internet Branch' (Sayar and Wolfe, 2007). OBIS are secure sites that require authentication for customers to enter and make transactions. In order to make transaction the customer/user enters username (ID) and password, which she/he has created before, once their ID and password are verified then they would be able to make a transaction (Al-Abdullah et al., 2010). Thus, bank web sites that offer only static information on their pages or use their web sites as an online brochure and do not offer opportunity to the customers/users for conducting any financial transaction are not qualified as OBIS.

It is believed that online banking has transformed and revolutionised traditional financial institutions (Daniel, 1999; Mols, 1999). This transformation in banking has been achieved by digitising activities and making them automatic for operational

purposes (Bradley and Stewart, 2003). In view of rapid transformation of the bank into internet banking, it is forecasted that there will be a significant and sharp rise in them in the next three years which will affect badly the progress of the traditional banks (Yousafzai, 2005). The expansion from traditional to online banking is more assisted and facilitated due to the easy availability of the internet, the comfort with technology, plus low cost PC and internet banking solutions. So it is not surprising that the number of customers banking online has risen considerably over the past few years. According to report, cited by the Yousafzai (2005), 30% of US households who were having access to the internet banking services in 2005 were predicted to reach 36% by 2007. It is also suggested that traditional banks will lose about 10% of their customers over the next five years if they did not respond to the need for internet banking (ibid).

The potential competitive advantages of the internet and the web for banks lie in the area of cost reduction and satisfying needs of the consumers. However, electronic transactions through the internet banking are a fraction of what is performed through bank branches or other traditional electronic channels such as the ATMs or telephone banking (Bradley and Stewart, 2002). However, these methods (counter teller, ATM, and TB) of financial transactions have been found costly compared to the online banking. According to Hall et al., (1999), Chang (2002), and Xue et al., (2011), the average payment per transaction charges for different service channels are 1.07 US\$ for counter tellers, 0.54 US\$ for telephone banking, 0.27 US\$ for auto teller machine service and 0.01 US\$ for the internet banking. In addition, setting up a single new branch of a bank requires a huge amount, approximately 3.5 to 5 million US\$, whereas the cost of setting up an online banking service is from 1.5 to 2 million US\$ (Lin, 2006). Therefore, the online banking facilities are much cheaper for the banks; as a result, the bankers would be more willing to open and provide online banking facilities to their customers. However, the acceptance and the success of online banking facilities rest with the potential users – the bank account holders.

Apart from cost saving, there is another potential benefit of online banking which is to develop a strong reliable relationship between the bank and the customer due to comfort in using it and being available all times at the door step (Yiu, et al., 2007).

All this helps in getting more loyal customers than that of traditional banking, which is very important. Winning loyalty of customers is an important goal to be achieved given the nature of the competition in the market (Mols, 2000). The loyalty of customers can be won over by online banking system, which enables banks to provide customers personalised and customised interactions for keeping them totally engaged with banks. The customers feel comfortable as they can manage their finances for 24 hours a day, and seven days a week through the convenient and effective approach offered through Internet. In addition, the customers remain updated by virtue of current information available, which is updated regularly. For corporate customers, sophisticated cash management packages provided through internet banking offers them with up to the minute information, allowing for timely funds management decisions (Kalakota and Whinston, 1996).

Pikkarainen et al. (2004) maintain that electronic banking accompanies with many benefits to customers all over the world. It is observed that the benefits and usefulness of online banking system play a significant role in determining the choice of the customers, who are attracted more to those banks that offer more online banking benefits than the others (Pikkarainen et al., 2004; Wang et al., 2003). There are varieties of benefits that an online banking can offer, which are however not limited only to the service provider but customers can also benefit from them by utilising the services in order to carry out their banking transactions (Karjaluoto et al., 2002; Pikkarainen et al., 2004). These benefits can be summarised as follows: Firstly, online banking service is available 24 hours compared to unlike the brick and mortar banks. Secondly, online banking systems attend the queries regarding financial irregularities faster than traditional banking system by logging on instantly and having access to his/her online banking account. In this way, online banking services not only save time but also money, and provide convenience and instant accessibility. Thirdly, online banks information system ensures privacy better than human-teller processing speed by executing and confirming transactions at a quicker speed. Finally, consumers are updated not only about new services but also about special events, promotions and reports, if there is any, on regular basis.

Despite of benefits that online banking information systems can offer, it must be

noticed that the technological developments alone cannot guarantee the use of online banking system by the potential customers. It is therefore essential to consider the likings and disliking of the customers. In other words, while making technological improvement to make the online banking more efficient, the banks should also care for the likings of the customers to make sure the technological innovations are utilised to the maximum by the customers. Because, if customers do not accept or fully utilise capabilities of these newly launched information system then there is very less return and benefit of such investments (Venkatesh and Davis, 1996; Burton-Jones and Hubona, 2006). The acceptance of technology by customers is necessary for the success of online banking system, which is a very complex phenomenon involving the changing of behavioural patterns and developing a familiarity with both the technology and the financial services. The complex nature of financial services often makes the task of information-search easier than information-evaluation (Black et al., 2001). It is therefore very difficult to foresee the combined effect of customers' understanding of both the internet channel and the financial services; therefore, the more research is needed to understand customers' use of complex services on the Internet (Suh and Han, 2002).

Although online banking is still a relatively new phenomenon in some countries, there is agreement that the delivery of this service will have a considerable effect on the banking sector in these countries (Daniel, 1999; Jayawardhena and Foley, 2000). However, this new technology sometimes requires complex understanding and mental capability to fully exploit its capabilities. Exploitation of this new technology may be difficult to achieve due to potential users' limited exposure and access to it (Cullen, 2001; Gorbacheva et al., 2011). Thus, in order to utilise it, it merits a systematic understanding of the factors that can hinder or facilitate the acceptance and usage of OBIS by potential users.

Previous research has identified factors that affect new information system usage and one of these factors is accessibility to the online services and the internet (Mols, 1999). According to Ody (2000), the customers use the internet largely for two main reasons i.e. to find information or buy products or service conveniently and in quicker pace. Apart from this factor, account security related issues would also affect



the choice and preferences of the customer's towards accepting and using an online banking system (Sathye, 1999; Wang et al., 2003). Furthermore, Suh and Han (2002) think that trust is another factor, which determines online banking system use. Moreover, Doll et al. (1995) have reported that the information about product on the web and its layout and design are the main factors affecting satisfaction of customers and hence influence its usage.

Quicker transaction in a short period of time may also facilitate online banking information system use. Individuals do not like to spend more time on performing transactions; they are therefore highly sensitive to the speed of the service delivery (Ody, 2000). In view of sophisticated supplies of the internet and availability of web-based systems, customers expect more efficient and faster service delivery. Previous research shows that efficient and speedy response from a web-based service was a main factor for increasing satisfaction level of customers. In this regard, Doll and Torkzadeh (1988) agree that consumers' satisfaction largely relies on the efficiency and the quality of web site features. Ody (2000) becomes more emphatic in highlighting the relation between convenient and speedy web service and customers' satisfaction. Previous research provides support for a significant association between transaction time and willingness to use. For example, Liao and Cheung (2002) found that a perception of higher transaction speed was a significant predictor of willingness to use. Similarly, Jun and Cai (2001) posit that when a consumer interacts with an internet based system (i.e. performs any transaction), a slow response time from the system causes him/her concern as to whether the transaction was completed. In the view of Ody (2000), convenience and speed are the main reasons why consumers use web-based systems to perform any transaction.

User perceptions of accessibility have been found to be related to technology and information use in both organisational communications and information systems research (Culnan, 1984; Culnan, 1985; Straub and Karahanna, 1996; Karahanna and Straub, 1999). According to Culnan (1985), accessibility has a number of dimensions such as the access to and interface with the source, and the capability of physically retrieving important information. However, previous research has suggested that physical access to data (information) is not dependent on the access to

an information system (Culnan, 1984). In discussing the results of his study, Culnan (1984) noted that, while providing unobstructed physical access to information is essential for use of information systems; however, physical access only does not guarantee the use of information systems. There exists theoretical and empirical evidence to suggest a relationship between perceived accessibility and ease of use beliefs. In an empirical study, Karahanna and Straub (1999) examined the effect of perceived accessibility on the PEOU belief. Their research findings indicated that perceived accessibility significantly and positively influenced the PEOU. Therefore, it can be assumed that the more accessible OBIS is, so less effort will be needed to use it. In addition, the research by O'Reilly in 1982 got similar findings by suggesting that there was a strong effect of accessibility on reported frequent use. Moreover, Poon (2008) found that accessibility, convenience, design and content are sources of satisfaction, and these factors have significant influence on adoption of e-banking.

Previous studies have also emphasised the importance of quality characteristics on IS acceptance. For example, Seddon and Kiew (1996) believed that usefulness of information system depends largely on perceptions regarding quality characteristics (i.e., information and system). This is based on the premise that information system that offers a higher quality will be regarded as useful and may be used more (Davis, 1993). In other words, if the customers feel at ease and convenient at using information system (such as an online banking information system), it is more likely that they will use it repeatedly. Sabherwal et al. (2004) conducted a study for examining the effect of information and system quality on perceived usefulness. The results noticed a close relation between system quality and usefulness perceptions factor and user satisfaction and system usage. In addition, Venkatesh and Davis (2000) in their extended model TAM2 found that output quality served as a significant predictor of perceived usefulness. The research conducted in the past also found the significant effect of output quality on usefulness perceptions of IS (Davis et al., 1992). Prior research has demonstrated theoretical and empirical evidence of a significant correlation between output quality and perceived usefulness. For example, Davis et al. (1992) found that output quality has a significant positive influence on PU. Whereas, Chismar and Wiley-Patton (2002) found that individuals'

perception of output quality is related to the usefulness of systems. Venkatesh and Davis (2000) suggested that when a set of multiple relevant IS are available, then systems delivering the highest output quality are chosen by people.

In addition, it is observed that the terminology used in any system facilitates productive navigation through an information system as well as effective usage of resources (Hong et al., 2002; Kim, 2006). According to Hong et al. (2002), one major problem with the terminology used in information systems is inappropriate jargon. Talja et al. (1998) argue that the vocabulary that users often use to express their information needs often mismatch with the terminology of the information provider. This mismatch of vocabulary not only makes it difficult for users to interact with the system, but also minimises the potential benefits that a system can provide to the users of that system (Hong et al., 2002). Thus, clear and understandable terminology can help users to interact with a system efficiently. Thus, it is expected that clear and correct descriptions, instructions, and terms and conditions used in an OBIS will make it easier for users to use the system.

The security of the customers' account and avoidance of any fraudulent transactions play a significant role in increasing confidence of customers for using online banking information systems. Stewart (1999) claimed that one of the reasons customers avoid conducting online retail transaction is the absence of customers' trust in electronic channels. The customers feel scared that there may be fraudulent transaction. In order to win the confidence of customers, it is very crucial to take necessary measures so that customers feel secure while making online transactions. In other words, customers' protection is important for building online customer confidence and trust because there is no face-to-face contact while using online banking information system; thus, it will be hard for the customer to observe the behaviour of other party (such as the bank in this case) via the Internet.

In addition to the above factors, the role of TAM constructs i.e. perceived usefulness (PU) and perceived ease of use (PEOU) is vital in predicting online banking system use (Suh and Hun, 2002; Wang et al., 2003; Cheng et al., 2006; Pikkarainen et al., 2004). In this regard, the research by Suh and Han (2002) conducted in South Korea

recommended for adding trust to the TAM model. Results showed that that PU, PEOU and trust played a significant role in determining acceptance of internet banking by the customers. A study by Wang et al. (2003) in Taiwan identified some factors that determined internet-banking acceptance by users. In their research, they expanded TAM by including a new factor: perceived credibility in association with the PU, PEOU and self-efficacy. The testing of the model was made through phone interviews with Taiwanese customers. The results of the research strongly backed the extended model by showing that perceived credibility and PEOU determined the intended behavioural usage of internet banking more compared to PU. While Khalil and Pearson (2007) came up with similar results and found that the trust was a significant factor that affects customers' attitudes about the internet-banking. Cheng et al. (2006) found that PU, PEOU and Web security were significant factors in determining the customers' intentions to use internet banking. In Thailand, the research by Rotchanakitumnuai and Speece (2003) exhibited trust and security as major factors impacting wider adoption of internet banking. In contrast to the factors having a positive influence, the research by Sathye (1999) identified factors that have negative effect on the acceptance of online banking. This study identified that the major barriers in the adoption of internet-banking were security concerns, dearth of awareness and lack of perceived benefits. The study survey showed that more than 70% of customers felt concerned about the security issues in online banking. Table 2.5 summarises online banking studies.

Table 2.5 Internet banking studies

<b>Year</b>	<b>Author (s)</b>	<b>Research Context</b>	<b>Respondents</b>	<b>Method/Approach</b>	<b>Analysis techniques</b>	<b>Findings</b>
2002	Suh and Han	Korea	845 Internet banking users	Web Survey	Structural equation modelling using LISREL software	Trust, usefulness and ease of use perceptions has a significant impact on the acceptance of Internet banking
2003	Wang et al.	Thailand	123 users	Phone interview	Confirmatory factor analysis using LISREL	Perceived usefulness, PEOU, and perceived credibility showed a significant positive influence on attitude towards internet banking acceptance
2004	Pikkarainen et al.	Finland	268 experienced consumers	Questionnaire	Confirmatory factor analysis plus regression	Factors PU and information on online banking were significant determinants of online banking acceptance behaviour
2005	Lasser et al.	Eastern USA	349 business students	Internet survey	Logistic regression	Study found positive relationship between internet users' related innovativeness and online banking.
2006	Guriting and Ndubisi	Malaysia	133 bank customers	Questionnaire	Multiple regression	Usefulness and ease of use factors were found significant determinants of internet banking adoption. In addition, computer self-efficacy and experience had an indirect effect on behavioural intention though PU and PEOU.
2010	Alsajjan and Dennis	Saudi Arab and UK	618 university students	Questionnaire	Structural equation modelling (SEM)	Perceived usefulness and trust had direct significant influence on attitudinal intentions. In addition, trust had significant impact on perceived usefulness.

## **2.7 Relative Importance of Trust in Technology Acceptance**

According to Gefen (2000), wider dissemination of commercial activities on the web is limited due to a lack of trust by potential users of online transactions and the providers of online services. As the medium of transactions in a virtual environment is a web-site, users are unwilling to provide sensitive information such as financial details on the internet due to the element of uncertainty and risk associated with online environments (Gefen et al., 2003). Trust is crucial in shaping individuals' perceptions towards online vendors, particularly with "individuals' uncertainty regarding the motives, intentions, and prospective actions of others on whom they depend" (Kramer, 1999, p. 571). As perceived risk and uncertainty negatively impact on behavioural intention to use, it is natural that consumers prefer to utilise online vendors with sound security and privacy mechanisms (Wang et al., 2003). Trust can be seen as a common mechanism for minimising the perception of uncertainty and risk associated with online transactions by enhancing the expectation of a positive outcome regarding the expected behaviour of the trustee (Gefen, 2000; Gefen and Straub, 2004).

Previous research studies have applied the trust construct in various disciplines, such as management (Lewis and Weigert, 1985), marketing (Schurr and Ozanne, 1985), and information systems (Jarvenpaa et al., 1998). Recently, trust has been applied in e-commerce (Gefen, 2000; McKnight et al., 2002; Jarvenpaa and Tractinsky, 1999) to explain the seller-buyer relationship in online environments. While the literature on trust research is quite extensive across disciplines, each of these disciplines has provided its own conceptualisation of trust and there is some lack of agreement among researchers (Lewicki and Bunker, 1995). Nevertheless, McKnight and Chervany (2002) classified these diverse conceptualisations of the trust construct into four different types: disposition to trust; institution-based trust; trusting belief, and trusting intention. They described disposition to trust, a type of trust originally derived from psychology, as "the extent to which one displays a consistent tendency to be willing to depend on others in general across a broad spectrum of situations and persons" (p.55). On the other hand, institution-based trust comes from sociology, which reflects the idea that action is not determined by the factors within the individual but by the situation or environment (McKnight and Chervany, 2002). The

third type of trust construct, trusting beliefs, refers to one's beliefs that "the other party has one or more characteristics beneficial to oneself" (McKnight and Chervany 2002, p.46). Finally, the trust intention describes a willingness to depend on, or intention to depend on, another party even though one cannot control the situation (McKnight and Chervany, 2002).

Some researchers have suggested that trusting beliefs and trusting intentions reflect the idea that "interactions between individuals and cognitive-emotional reactions to such interactions determine actual behaviour" (McKnight and Chervany, 2002, p.46). Jarvenpaa et al. (1999) argued that trust is a precursor to willingness to purchase from an online web-based system. McKnight et al. (2002) and Pavlou (2003) suggested that specific trusting beliefs in electronic vendors are associated with an intention to transact with those same online vendors. Researchers have suggested that specific characteristics of trust beliefs such as integrity, ability, benevolence, and predictability (McKnight and Chervany, 2002) increase the intention to use by reducing perceived risk among potential customers (Jarvenpaa and Tractinsky, 1998). According to McKnight and Chervany (2002), integrity is related to the trustee's honesty and intention to fulfil of a promise, while ability refers to the competence and power of the trustee to do what the trustor needs. In addition, benevolence means that the trustee is genuinely interested in doing well for trustor, and has motives that are beneficial to the interest of the trustor, and finally, they refer to predictability as the extent to which a trustee's behaviour is consistent.

In terms of applicability, some research studies have applied trust as an overall construct in the sense that the trustor is willing to be vulnerable to the action of the trustee (van der Heijden, et al., 2003; Gefen, 2000) or a general belief that the other party can be trusted (Hosmer, 1995; Gefen, 2000). Some research studies have combined these trust conceptualisations into one construct to establish another trust construct (McKnight et al., 2002). Other studies, apart from the overall trust construct, have examined the impact of specific trust beliefs on the BI to shop online (Gefen and Straubs, 2004; van der Heijden and Verhagen, 2004). Nevertheless, regardless of the complex and diverse nature of trust, researchers acknowledge the importance of trust in online environments. According to Mayer et al. (1995), trust

helps individuals to survive in undefined and risky circumstances. In the virtual world of e-business and e-commerce, trust is ultimately the driving force behind successful financial transactions and long-term relationships (Gefen, 2000). Trust is a crucial element of e-commerce because of the uncertain and open nature of internet and web-based systems as a financial transaction medium in the global environment (Hoffman et al., 1999).

Other trust related factors widely studied in online context are privacy and security. Many researchers have noted the importance of security and privacy related to online financial services such as electronic commerce, online shopping and internet banking ( Wang et al., 2003; Rotchanakitumnuai and Speece, 2003; Shih, 2003; Molla and Licker, 2001; Pikkarainen et al., 2004; Cheng et al. 2006). Molla and Licker (2001) describe privacy as “the ability of an individual to keep his / her identity confidential during the course of a transaction and the protection of various types of data that are collected” (p. 138). They pointed out that privacy is the most important issue for consumers when using internet based system because they might not be fully aware about the use of their online information. According to Wang et al. (2003) internet threatens information privacy, which in turn pushes consumers away from providing personal and sensitive information to the web sites for performing online financial transactions. In addition, Caudill and Murphy (2000) and Branscum and Tanaka (2000) found that privacy protection is a primary factor influencing customers’ online purchase decisions and their satisfaction and loyalty to an online business.

Another important characteristic related to trust is security. Information technology can lead to security threat, crime, loss of sensitive business information and harm to corporate or brand-name reputation. According to a survey by Nielsen (2005), five security concerns of American online shoppers were: not receiving the items, or receiving items that are different from their descriptions on the website, email addresses sold to other parties, fears about personal or financial information being stolen, and emails from disreputable sources, which were disguised as messages from trusted retailers or financial institutions. Lee et al. (2005) found that customers would like to conduct more online shopping activities through a secured website and that organisations would have a better brand image if they offered a safe online



environment.

### **2.7.1 Definition of Trust**

Trust has been a topic of almost universal interest in research and practice but everyone has a different understanding of what it actually means. The situation, in online commerce, is unfortunately not very different. There is however, a plethora of trust definitions available in the different disciplines that researchers can choose from (Corritore et al., 2001).

For example, Mayer et al. (1995) defined trust as “the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party” (p.712). According to Rousseau et al. (1998), trust is “a psychological state comprising the intention to accept vulnerability based upon positive expectation of the intentions or behaviour of another” (p. 395). In the context of the e-vendor, Gefen (2000) described trust as the willingness to make oneself vulnerable to actions taken by the trusted party based on feelings of confidence and assurance. In addition, Ba and Pavlou (2002) defined trust as the subjective assessment of one party that another party will perform a particular transaction according to his or her confidant expectation, in an environment characterised by uncertainty.

While all these definitions of trust are useful, the concepts of ‘willingness to be vulnerable’ and ‘positive expectations about the actions of the other party’ are especially important in the context of online commerce and banking. First, performing banking transactions on the internet puts users in a vulnerable situation because online transactions contain very sensitive information (Morgan and Hunt, 1994). That is, when users perform an online transaction, they have to reveal sensitive information such as personal and financial details, to the bank via the internet. Second, online banking is highly uncertain because the parties (users and banks in this case) engaged in online transactions are in different places, thus customers cannot observe the behaviour of other party directly (Suh & Han, 2002). Therefore, users can only engage in transactions if they believe that other party will

not behave opportunistically. To quote Mishra's words "trust by its very nature provides opportunities for malfeasance on the part of those being trusted" (1996, p. 265). Therefore, in order to perform transactions via the internet, users need to trust the other party enough to put themselves in a potentially vulnerable situation. Gefen et al. (2003) argued that the existence of trust increases individuals' belief that online vendors will not engage in opportunistic behaviour; hence, making the role of trust even more important in an online banking environment than in offline banking.

### **2.7.2 Trust and TAM in the Online Context**

Many studies have applied trust and trust related factors with TAM in the context of online commerce (Pavlou, 2003; Khalil and Pearson, 2007; Gefen et al., 2003; Lee et al., 2000) and internet banking (Suh and Han, 2002). Lee et al. (2000) included risk with TAM in a study explaining the factors affecting consumers' online purchase behaviour. In the proposed e-commerce adoption model, they divided perceived risk into transaction risk and product performance risk. Their findings showed that transaction risk had a negative effect on PU and purchase behaviour while performance risk negatively influenced the purchase behaviour but it had no effect on the PU and their conceptual model explained approximately 34% of the overall variance in electronic-commerce adoption model (Lee et al. (2000). Pavlou (2003) also expanded TAM by adding trust and perceived risk factor in a study on customers' online purchase intentions. The conceptual model included trust, risk, and TAM core constructs (i.e. PU and PEOU). The results of the study supported the hypothesised model. Finding of the study suggested that apart from PU and PEOU, trust and risk had major impact on behavioural intentions to purchase online. In addition, Gefen et al. (2003) incorporated trust into TAM in an empirical study that examined factors affecting customers' decisions to return to an electronic vendor and their findings indicated that trust, PEOU and PU had strong influence on behavioural intentions to transact online. Trust was also included in the TAM model by Suh and Han (2002) and their results confirmed that trust was very significant determining factor in the acceptance of internet banking in South Korea. While studying the influence of trust on internet banking acceptance, Khalil and Pearson (2007) revealed that trust significantly influenced attitude towards internet banking acceptance.

Some others have conducted empirical studies to examine the role of trust related factors i.e. security and privacy in an online transactional environment. For instance, Pikkarainen et al. (2004) conducted research in Finland to investigate the consumers' acceptance of online banking by expanding model of technology acceptance - TAM. They included factors perceived enjoyment, security and privacy, information on online banking, and quality of internet connection into the TAM. In Hong Kong, Cheng et al. (2006) conducted research study to investigate customers' perceptions towards adoption of internet banking. They added perceived web security construct to the TAM model. The model was empirically tested by using questionnaire survey with internet bank customers. They found that PU, PEOU and Web security were significant determinants of customer's intentions to use internet banking. Overall, results of the study supported extended TAM model. In addition, Rotchanakitumnuai and Speece (2003) also identified trust and security as major factors inhibiting wider adoption of internet banking in Thailand. The other main barriers in the adoption of internet banking include the lack of benefits and awareness as well as security concerns (Sathye, 1999). The survey revealed that more than 70% of customers expressed their concerns about security of internet banking (Sathye, 1999). Finally, Rotchanakitumnuai and Speece (2003) argued that customers frequently do not trust internet technology for three reasons: security of the system, distrust of service providers, and worries about the reliability of the service.

## **2.8 Critical Assessment of Technology Acceptance Studies**

This research adopts technology acceptance model (TAM) for three main reasons as identified in the literature, First, the TAM is a parsimonious model, simple, information systems-specific, and was developed to provide an adequate acceptance prediction power across user groups with different information systems and technologies within diverse contextual settings. Second, the TAM is a well researched model with a strong theoretical base and has been validated by a set of psychometric measurement scales. Third, the TAM offers strong empirical support for its core constructs i.e. PU and PEOU in predicting users' acceptance of technology (Davis, 1989, Davis et al., 1989, Mathieson, 1991, Gefen et al., 2003).

The thorough assessment of literature reveals that technology acceptance model (TAM) has upper hand when compared to other relevant well-known theories, such as the TRA and the TPB, specifically in IS context, in technology usage research. Literature suggests that when applied in the online settings, TAM is capable of explaining adequate variance in predicting actual usage. In the TAM, individual's beliefs about the PU and PEOU have been suggested as the most influential factors that predict behavioural intentions of information system use.

However, regardless of TAM's capability of predicting acceptance of various internet and e-commerce applications, researchers argue that TAM provides little explanation about how to influence usage through design and implementation (Taylor and Todd 1995; Venkatesh et al., 2003; Wixom and Todd, 2005) and existing findings on TAM reveal mixed results that are not conclusive (Moore and Benbasat, 1991). For example, some studies revealed that perceived ease of use has an insignificant influence on technology acceptance (e.g., Subramanian, 1994); while others found that it has a significant influence on technology acceptance (e.g., Davis, 1989; Venkatesh and Davis, 1996). In addition, although a few research studies investigated determinants of TAM's core constructs in online settings (Chau, 2001; Pavlou, 2003; Gefen et al., 2003); it is, however, argued that relatively little is known about what constitutes beliefs of ease of use and usefulness (Wixom and Todd, 2005). Wixom and Todd's (2005) argument is echoed by Chen and Tan (2004) who note that "while TAM has been very successful in predicting potential user acceptance, it provides little assistance in the design and development of systems with a high level of acceptance" (pp.75). This suggests that TAM's strength specifically lies in its predictive power rather than in its explanatory power. Thus, it is important for online banking systems to deal with the obstacles that affect users' beliefs and prevent them from transacting online.

According to Chen and Tan (2004), it is essential to identify the determinants of PEOU and PU, to make the model more robust and meaningful for system designers and developers. Moreover, the important role of trust, technology self-efficacy and a number of external variables (e.g. output quality, accessibility, terminology clarity, response and time) in different studies recognised the need for inclusion of additional

factors to develop a robust and integrated model that explains more variance than an ordinary standalone model (Davis, 1991; Igarria and Iivari, 1995; Gefen et al., 2003).

## **2.9 Conclusions**

This chapter aimed to provide an overview of various theories and models that have been used to understand and investigate knowledge regarding user acceptance of IS/IT. Among them, the Technology Acceptance Model has been used extensively by the IS researcher. This was mainly because of its specific focus on IS/IT usage, parsimony, and validity and reliability of measuring instruments.

While compared to the related theories such as the TPB and TRA, the TAM has been believed to be the parsimonious, predictive and robust. The model has been however criticised for being too simple and easy to be generalised to various IS/IT domains. Also, it is argued that TAM does not provide detailed understanding of the system usage behaviour. However, this simplicity can also be the strength of the TAM, as it is fairly easy to extend the model by adding factors from related research studies. This is shown by the numerous direct determinants and external variables that have been added to the model and the various technologies to which it has been applied.

Also, it was pointed out in the literature that despite of adding factors (like subjective norms and behavioural control to the TAM model the ability of the model to predict IS/IT usage behaviour did not increase substantially. This suggests a need for broader exploration of factors beyond those suggested by traditional intention or innovation models. Moreover, literature review shows that there is a pressing need for identifying and investigating closely the antecedents of salient beliefs i.e. PU and PEOU of TAM. Recently, System characteristics i.e. Information and system quality, have been found significant determinants of PU, PEOU and system usage by IS researchers in user satisfaction literature. However, this researcher could not find any research study that has used these factors in IS acceptance literature.

Besides, most of these empirical studies using TAM were conducted in developed countries and in the industrialised world. Very few studies were carried out to test

the applicability of the model outside these countries. Therefore, it would be erroneous to assume that IT acceptance theories and models predict equally well in other cultural settings. The robustness of the models may vary across different cultures; thus, there is a need for closely investigating the applicability of the TAM model in different cultural settings.

The model of technology acceptance – TAM has been chosen as the basis of this research. The reason for choosing the TAM is that it has tremendous flexibility to be extended and applied to many different information systems. Besides, similar determinants can be acknowledged from literature on IS to extend knowledge regarding user acceptance of online banking. Indeed, this can facilitate user acceptance of an online banking information system (OBIS).

As there is growing use of new information system in organisational and personnel contexts; it appears that the issue of user acceptance should continue to be of great importance. The reviewed literature works as the basis for developing a model to extend the knowledge regarding affecting factors and to measure the factors that influence user acceptance of OBIS in the context of a developing economy. Using the findings of literature reviewed and presented in this chapter, the next chapter provides a theoretical framework, which this researcher has developed for an empirical study conducted by this researcher.

## **CHAPTER THREE**

### **Conceptual Framework**

#### **3.1 Introduction**

Drawing on the findings of literature review presented in the previous chapter, a theoretical framework was developed for this research study and it is presented in this chapter, which is divided in six sections. The first section describes model development and research hypotheses. The second section is about the dependent variable. The third section explains independent variables / factors affecting online banking information system acceptance, which include perceived ease of use, perceived usefulness, trust and technological self-efficacy. The fourth section describes antecedents of perceived usefulness, which include the output quality and response time. The fifth section is about the antecedents of perceived ease of use that include accessibility and terminology clarity, and finally, the sixth section concludes this chapter.

#### **3.2 Model Development and Research Hypotheses**

So far, this researcher has presented the literature relevant to acceptance of IT / IS. In addition, this researcher has also provided discussion on the need for identification of additional factors that might be important in determining acceptance of online banking information systems. Moreover, the context of the current study with reference to earlier studies on the acceptance of technology in general and IT/IS in particular has also been discussed. In this chapter, the constructs identified in previous chapter are discussed in a greater detail. In particular, from the theories discussed in the previous chapter, the researcher develops and presents a model that identifies a number of factors, which can possibly influence behavioural intention towards acceptance of online banking information system.

The literature review identified that in comparison to the TRA and the TPB, the technology acceptance model (TAM) has been proved parsimonious, robust, and it has a clear focus on IS usage. According to Mathieson (1991), TAM is parsimonious, and easier to apply in practice, giving TAM an empirical advantage

over other theoretical models. Given these findings, this researcher considers a TAM-based model to be more appropriate than the TPB or the TRA for examining the acceptance of online banking information system. In addition, the reviewed literature showed that the focus of empirical studies has been on the acceptance of commercial technologies, which are simple and individually oriented technologies. The literature review has revealed that the TRA, TPB and TAM are applicable to a range of technologies such as online shopping and online business.

The research model proposed by this researcher, as presented in Figure 3.1, extends TAM in the context of online banking information system based on prior research on technology acceptance. The model posits that user acceptance of online banking information systems is jointly determined by perceived ease of use (PEOU), perceived usefulness (PU), and trust. Drawing upon other researchers' (Davis et al., 1989, Wixom and Todd, 1995; Venkatesh and Davis, 2000) recommendations to include external factors in the model to examine their effects on core beliefs of TAM, the proposed model incorporates the antecedents of PU and PEOU based on previous studies that have extended the TAM. External variables incorporated in the model include technological self-efficacy, output quality, accessibility, and terminology clarity and response time, which are described latter in this chapter. Among these five external factors, technological self-efficacy (TSE) is proposed to have a direct influence on both PU and PEOU while other external factors such as output quality (OQ) and response time (RT) are proposed to have direct effect on PU and accessibility (AC) and terminology clarity (TC) are proposed to have direct effect on PEOU. The model also proposes that the two beliefs constructs i.e. PU, and PEOU mediate the effects of the antecedents of beliefs on usage of Online banking information system. Table 3.1 presents constructs and their proposed hypothesised relationships

The attitude construct, which is included in the original model of technology acceptance as a mediating factor between core beliefs and intended behaviour (see Figure 2.3 of Chapter 2), was later removed from the TAM. The reason for excluding attitude was based on the observation of Davis et al. (1989), which suggested that attitude does not generally intervene between core beliefs (e.g. PEOU



and PU) and behavioural intentions. Exclusion of attitude is in agreement with previous studies that also excluded attitude from the TAM on the basis of their empirical evidence which showed that the attitude did not mediate the influence of the core beliefs (i.e. PEOU and PU) on the behavioural intentions in the TAM (Igbaria et al., 1995; 1997; Szajna, 1996; Venkatesh and Davis, 1996; Agarwal and Karahanna, 2000; Venkatesh and Morris, 2000; Hong et al., 2002; Gefen et al., 2003). Therefore, the attitude variable is excluded from the model proposed in this research study.

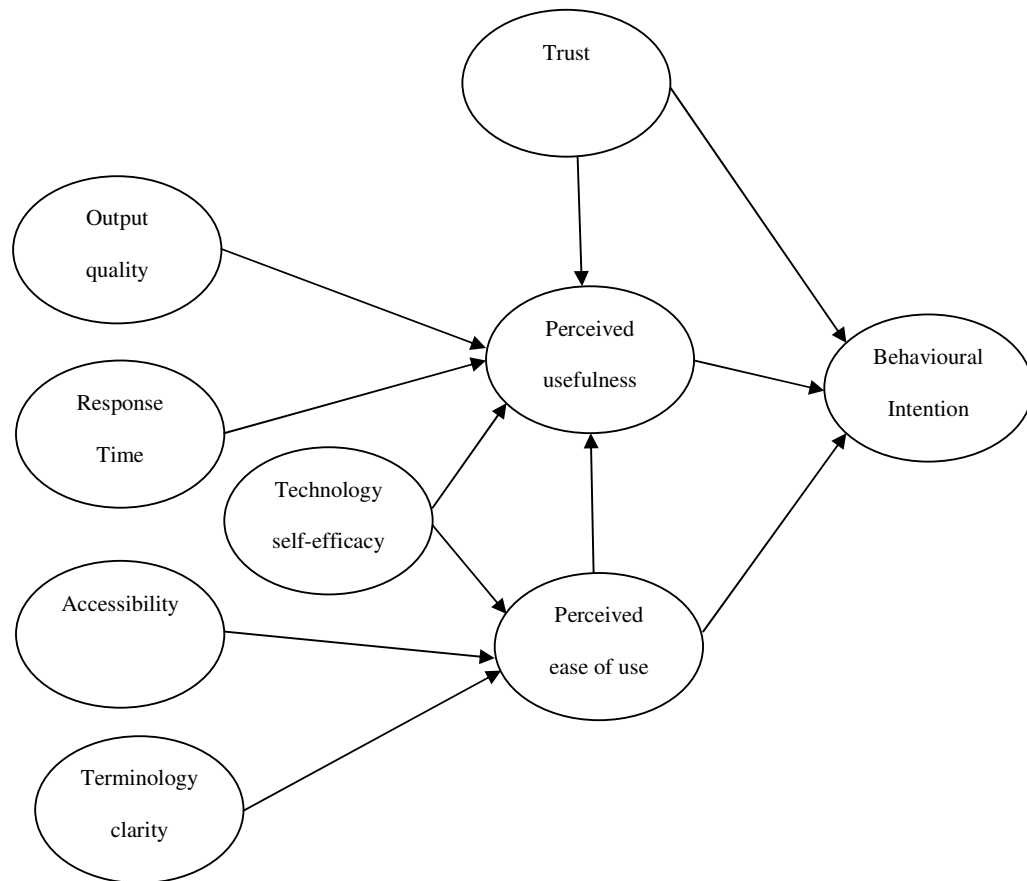


Figure 3.1 Proposed research model.

### **3.3 Dependent Variable – Behavioural Intention**

System acceptance, defined by Swanson (1988) as potential user's predisposition towards personally using a specific system, is considered as the predictor of system usage within the model of technology acceptance – TAM (Davis et al., 1989). System usage is a key variable in most of the theoretical frameworks in IS research literature focusing on technology acceptance by individual users. Self-reported usage measures have often been used in IS research to operationalise system usage, particularly when objective usage metrics are not available. With regard to the TAM research predicting new IT/IS acceptance, usage is often measured by Behavioural Intention (BI) (Mathieson, 2001). Thus, this research considered 'intention to use' as the dependent variable, rather than actual use, for the reason that in the original TAM, PU and PEOU were postulated to have a direct relationship with BI but not with actual use. This is also consistent with the findings of a number of previous research studies (Davis, 1991; Gefen and Straub, 2000; Jarvenpaa et al., 2000; Shih, 2004).

### **3.4 Factors Affecting Online Banking Information System Acceptance**

#### **3.4.1 Perceived Usefulness**

Perceived usefulness (PU) is defined as “the degree to which a person believes that using a particular system would enhance his/her job performance” (Davis, 1989, p. 320). In the TAM, PU is a significant factor having a strong influence in determining user acceptance of IS (Davis, 1989; Davis et al., 1989). Several researchers have provided evidence of the significant effect of PU on IS acceptance and usage (Davis, 1989; Pikkarainen et al., 2003; Wang et al., 2003; Chan and Lu, 2004). PU is often found to have a stronger relationship with intended system use compared to the ease of use. This significance of PU suggests that users are generally inclined or more likely to accept a system primarily because of the functions it performs, implying that the ease of use cannot compensate for a system that does not provide the required functionality (Davis, 1989). Similarly, in the online banking systems context, if users think that system is useful then they are more likely to accept it. Therefore, in accordance with the TAM, it is hypothesised that PU would have a significant positive influence on user acceptance of OBIS. Consequently, the first hypothesis developed for this research is as follows:

*H1. Perceived usefulness will have a significant positive effect on the behavioural intention to use an OBIS.*

### **3.3.2 Perceived Ease of Use**

Prior research has empirically shown that perceived ease of use (PEOU) is another major determinant of user acceptance which has a positive effect on intended system use (Davis, 1889; Igarria et al., 1997; Davis, 1989; Pikkarainen et al., 2003; Wang et al., 2003; Chan and Lu, 2004; Gefen et al., 2003; Venkatesh and Davis, 2000). According to Davis (1989), perceived ease of use is “the degree to which a person believes that using a particular system would be free of efforts” (p.320). The TAM posits that PEOU is an important factor that affects IS acceptance, either directly or indirectly through perceived usefulness (Davis et al., 1989; Mathieson, 1991). Venkatesh and Davis (2000) found that PEOU has a positive direct effect on user acceptance of IS. Other studies have found that PEOU has a significant effect on the PU (Adams et al., 1992; Davis et al., 1989; Gefen and Straub, 2000; Igarria et al., 1997). Davis (1989) on the relationship between PEOU and PU suggests that “from a causal perspective, the regression results suggest that ease of use may be an antecedent of usefulness, rather than a parallel, direct determinant of usage” (p. 334). According to the TAM, the direct effect of PEOU on PU is explained by increased PEOU, which results in improved performance by saving effort needed to do the same work. Similarly, if online banking systems are easy to use; they are more likely to be accepted by the intended users. Therefore, consistent with TAM, it is hypothesised that PEOU has an influence on user acceptance of an OBIS both directly and indirectly through its effect on the PU. This hypothesis is summarised as follows:

*H2a. Perceived ease of use will have a significant positive effect on users’ perceived usefulness of an OBIS.*

*H2b. Perceived ease of use will have a significant positive effect on the behavioural intention to use an OBIS.*

### **3.4.3 Trust**

According to Suh and Han (2002), due to a high of uncertainty in some online environments, individuals are apprehensive about providing sensitive information, i.e., financial details on the internet. Given that online banking is an exchange situation that lacks the physical presence of a 'bricks and mortar' branch and face-to-face interaction, people experience greater uncertainty. However, according to Grewal et al. (2003, p.18) online customers are expected "to trust internet firms than their bricks and mortar counterparts". Trust is, therefore, essential in online transactions otherwise "e-commerce is doomed to stagnation at best and extinction at worst" (Fusaro et al., 2002, p. 148). Trust is an important precursor of willingness to participate in commerce, in general, and in an online environment, in particular, because of the ease with which vendors can behave in an opportunistic manner (Reichheld and Scheffer, 2000). In other words, trust helps to reduce the social complexity that a customer faces in e-commerce by allowing the customer to subjectively rule out undesirable yet possible behaviours of the electronic service provider, including improper use of information (Alsajjan and Dennis, 2010).

There is both theoretical and empirical evidence of a significant association between trust and behavioural intention to use. For example, Doney and Canon (1997) found that consumer trust is related to intention to use the vendor in the future. Whereas, Gefen (2000) found a significant effect of trust on purchase intentions and suggested that trust in the e-commerce vendor increases the individual's intention to use the vendor's website. Moreover, prior research has also recognised a significant association between trust and perceived usefulness (Stewart, 2003; Chircu et al., 2000; Gefen et al., 2003). For example, Stewart (2003) argues that the higher the level of trust, so customers perceive a website as more useful. Similarly, Chircu et al. (2000), contend that trust positively affects perceived usefulness in that it allows consumers to become vulnerable to online vendors to ensure that they receive the expected useful interaction. According to Gefen et al. (2003, p. 61), trust should increase consumers' "perceived usefulness of the interaction through the website by increasing the ultimate benefits, in this case getting the products or services from an honest, caring, and able vendor, as expected". In addition, Alsajjan and Dennis (2010) have reported the significant influence of trust on perceived usefulness.

In the light of reported evidence from prior research, the following hypotheses about the impact of trust on the intention towards acceptance of OBIS are suggested:

*H3a. Trust will have a significant positive effect on the behavioural intention to use an OBIS.*

*H3b. Trust will have a significant positive effect on users' perceived usefulness of an OBIS.*

Table 3.1 Constructs, definitions, code name, and their hypothesised relationships

<b>Construct</b>	<b>Code Name</b>	<b>Definitions</b>	<b>Hypothesised relationships</b>
Perceived Usefulness	PU	refers the degree to which a person believes that using a particular system would enhance his/her job performance.	PU → BI
Perceived ease of use	PEOU	refers to the degree to which a person believes that using a particular system would be free of efforts.	PEOU → PU PEOU → BI
Trust	TR	the willingness of a party to be vulnerable to the actions of another party.	TR → PU TR → BI
Technological self-efficacy	TSE	is an individual's judgment of efficacy across multiple computer application domains.	TSE → PU TSE → PEOU
Accessibility	AC	refers as the ease with which individual can locate specific computer systems	AC → PEOU
Terminology clarity	TC	refers to the clarity of the words, sentences, and abbreviations used by a system.	TC → PEOU
Output quality	OQ	is an individual's perception of how well a system performs tasks necessary to the user's job.	OQ → PU
Response time	RT	the degree to which an individual perceives that the response from the OBIS is fast, consistent, and reasonable.	RT → PU
Behavioural intention	BI	refers to individual's intention to perform behaviour.	Dependent variable

### **3.5 Technological Self-efficacy**

Self-efficacy (SE) has been defined as the belief “in one’s capabilities to organize and execute the courses of action required to produce given attainments” (Bandura, 1997, p. 3). It has been used for understanding human behaviour, performance and motivation in various domains. In social cognitive theory (SCT), self-efficacy is a type of self-assessment that influences decisions about undertaking certain behaviours, and the effort put into something during difficult times (Bandura, 1997). Thus, people who have low self-efficacy will be less likely to perform a related behaviour in the future, in this case, accept and use an online banking system, than those with a high degree of self-efficacy.

In the context of IT usage, studies on the effect of self-efficacy have collectively pointed out its importance in explaining the individual’s behaviour towards IT and his/her performance in using IT (Compeau and Higgins, 1995a; 1995b; Gist et al., 1989). However, Marakas et al., (1998) pointed out the differences between self-efficacy related to computers in general and self-efficacy related to a specific task on a computer. The former known as ‘general computer self-efficacy’ is referred as “an individual’s judgment of efficacy across multiple computer application domains” (p. 129). While the latter is known as ‘task-specific computer self-efficacy’ and is referred to as perceptions of ability to perform specific computer-related tasks in the domain of general computing (*ibid*). General computer self-efficacy in this article is referred as technological self-efficacy.

Prior studies have shown support for a causal relationship between technological self-efficacy (TSE) and computer usage (Igarria and Iivari, 1995), e-learning acceptance (Ong et al., 2004; Roca et al., 2006), acceptance of electronic services (Hsu and Chiu, 2004), and web based IS (Yi and Hwang, 2003). These research studies therefore indicate the important role that technological self-efficacy can play in understanding the individual’s perception of new IT applications, such as an OBIS.

In addition, there is empirical evidence that supports a causal association between computer self-efficacy (CSE) and beliefs of usefulness (Chau, 2001). The causal relationship was justified on the basis the significance of CSE on outcome

expectations (Compeau and Higgins, 1995; Compeau, Higgins, and Huff, 1999), which are similar to the PU construct in the TAM (Igarria and Iivari, 1995). In an online context, it can therefore be said that PU reflects an individual's belief about the expectation of an outcome (Chau, 2001); which suggests that technological self-efficacy may be an important factor that affects the individual's usefulness beliefs towards OBIS acceptance.

Moreover, the relationship between computer-related self-efficacy and the construct of PEOU has also been examined in previous research (Venkatesh and Davis, 1996; Venkatesh, 2000; Hong et al., 2001; Chau, 2001). The proposed causal relationship between technological self-efficacy (TSE) and PEOU was based on a theoretical argument from prior research (Venkatesh and Davis, 1996). Venkatesh (2000) notes that "in the absence of direct system experience, the confidence in one's computer related abilities and knowledge can be expected to serve as the basis for an individual's judgment about how easy or difficult a new system will be to use "(p. 347). In other words, individuals having high self-efficacy will perceive the system to be easy and useful due to the effect of self-efficacy on the degree of effort required to use the system (Igarria and Iivari, 1995).

Hence, it is expected that technological self-efficacy influences individuals' usefulness and ease of use perception towards acceptance intentions of an OBIS. Thus, consistent with prior research, it is hypothesised as follows:

*H4a. Technological self-efficacy will have a significant positive effect on users' perceived usefulness of an OBIS.*

*H4b. Technological self-efficacy will have a significant positive effect on user's perceived ease of use of an OBIS.*

### **3.6 Antecedents of perceived usefulness**

Output quality and response time are identified as antecedents of perceived usefulness. The model depicted in Figure 3.1 proposes that both output quality and response time will have a significant impact on perceived usefulness of an online

banking information system. These antecedents of perceived usefulness are described in the following sub-sections.

### **3.6.1 Output Quality**

Output quality is defined as an individual's perception of how well a system performs tasks necessary to the user's job (Venkatesh and Davis, 2000). Venkatesh and Davis (2000), in their extended model, TAM2, theorised output quality as a cognitive predictor of perceived usefulness. Prior research has demonstrated theoretical and empirical evidence of a significant correlation between output quality (OQ) and perceived usefulness (PU). For example, Davis et al. (1992) found that output quality has a significant positive influence on PU. Whereas, Chismar and Wiley-Patton (2002) found that individuals' perception of output quality is related to the usefulness of systems. Venkatesh and Davis (2000) suggested that when a set of multiple relevant IS are available, then systems delivering the highest output quality are chosen by people. Venkatesh and Davis's (2000) argument was echoed by Kim (2006) who posits that "increased output quality is likely to improve an individual's job performance; thus, influencing his perception of usefulness" (p.1718). Therefore, consistent with findings obtained from previous published literature, this research hypothesises that output quality would have an influence on the perception of usefulness of an OBIS. Thus it is suggested as follows:

*H5. Output quality will have a significant positive effect on users' perceived usefulness of an OBIS.*

### **3.6.2 Response Time**

Previous research provides support for a significant association between transaction time and willingness to use. For example, Liao and Cheung (2002) found that a perception of higher transaction speed was a significant predictor of willingness to use. Similarly, Jun and Cai (2001) posit that when a consumer interacts with an internet based system (i.e. performs any transaction), a slow response time from the system causes him/her concern as to whether the transaction was completed. In the view of Ody (2000), convenience and speed are the main reasons why consumers use web-based systems to perform any transaction. Accordingly, similar to the definition



of Bailey and Pearson (1983) and Pituch and Lee (2006), response time in this research is defined as the degree to which an individual perceives that the response from the OBIS is fast, consistent, and reasonable.

There exists theoretical and empirical evidence to suggest a relationship between response time (RT) and usefulness beliefs. For example, Pituch and Lee (2006) argue that a system with poor response time will not be perceived as easy to use or useful. According to Shih (2004), consumers prefer to evaluate their online transaction performance in terms of the associated benefits (i.e. usefulness) and costs, such as maximising convenience and minimising transaction time. Empirically, the relationship between response time and perceived usefulness has also been shown in prior research (Pituch and Lee, 2006). While studying the effects of system characteristics on e-learning, Pituch and Lee (2006) found response time to be an important factor that significantly affects PU. Hence, consistent with the theoretical and empirical findings obtained from previous research, it is hypothesised that response time will have a significant effect on perceived usefulness of OBIS. This hypothesis is summarised as follows:

*H6. Response time will have a significant positive effect on users' perceived usefulness of an OBIS.*

### **3.7 Antecedents of perceived ease of use**

Accessibility and terminology clarity are identified as the antecedents of perceived ease of use. The model shown in Figure 3.1 proposes that both accessibility and terminology clarity will have a significant effect on the perception of perceived ease of use towards online banking information. These antecedents of perceived ease of use are described in the following sub-sections.

#### **3.7.1 Accessibility**

According to Kling and Elliott (1994), accessibility is defined as the ease with which individual can locate specific computer systems (such as an OBIS). User perceptions of accessibility have been found to be related to technology and information use in both organisational communications and information systems research (Culnan,

1984; Culnan, 1985; Straub and Karahanna, 1996; Karahanna and Straub, 1999). According to Culnan (1985), accessibility has a number of dimensions such as the access to and interface with the source, and the capability of physically retrieving important information. However, previous research has suggested that physical access to data (information) is not dependent on the access to an information system (Culnan, 1984). In discussing the results of his study, Culnan (1984) noted that, while providing unobstructed physical access to information is essential for use of information systems; however, physical access only does not guarantee the use of information systems.

In addition, there is empirical evidence that supports a causal relationship between perceived accessibility and perceived ease of use. In an empirical study, Karahanna and Straub (1999) examined the effect of perceived accessibility on the PEOU belief. Their research findings indicated that perceived accessibility significantly and positively influenced the PEOU. Therefore, it can be assumed that the more accessible OBIS is, so less effort will be needed to use it. In accordance with the results of the study by Karahanna and Straub (1999), it is hypothesised that accessibility will have a positive significant effect on PEOU belief. Thus it is hypothesised:

*H7. Perceived accessibility will have a significant positive effect on users' perceived ease of use of an OBIS.*

### **3.7.2 Terminology clarity**

Terminology refers to the words, sentences, and abbreviations used by a system (Lindgaard, 1994); therefore, the terminology used in any system facilitates productive navigation through an information system as well as effective usage of resources (Hong et al., 2002; Kim, 2006). According to Hong et al. (2002), one major problem with the terminology used in information systems is inappropriate jargon. Talja et al. (1998) argue that the vocabulary that users often use to express their information needs often mismatch with the terminology of the information provider. This mismatch of vocabulary not only makes it difficult for users to interact with the system, but also minimises the potential benefits that a system can

provide to the users of that system (Hong et al., 2002). Thus, clear and understandable terminology can help users to interact with a system efficiently. Clear and correct descriptions, instructions, and terms and conditions used in an OBIS will make it easier for users to use the system.

There is theoretical and empirical evidence of a significant relationship between terminology clarity and PEOU in prior studies (Thong et al., 2002; Hong et al., 2002). For example, in a study investigating the acceptance of digital libraries, Thong et al. (2002) found that clarity of terminology had a significant impact on perceived ease of use of digital libraries. Similar results were also found by Hong et al. (2002). Thus, consistent with previous research studies, it is hypothesised that the terminology used in an OBIS will have a positive significant effect on perceived ease of use of the system. This hypothesis is expressed as follows:

*H8. Terminology clarity will have a positive significant effect on users' perceived ease of use of an OBIS.*

### **3.8 Conclusions**

The increasing demand and use of new information systems in organisational and individual contexts indicates that the issue of user acceptance should continue to be of great importance. In order to understand the factors that affect user acceptance of online banking information system, this research extends well known technology acceptance model by addition of six factors to the TAM. These factors include trust, technological self efficacy, output quality, response time, accessibility, and terminology clarity. These factors have been identified on the basis of their significant effect on user acceptance of technology in IS and technology acceptance literature.

The conceptual causal model of this study proposes eleven hypotheses from H1 to H8, which are shown in Table 3.1. Perceived usefulness, perceived ease of use and trust in the model are hypothesised (Hypotheses H1, H2 and H3) to have a direct significant effect on behavioural intention to use, which is a dependent variable in this research. Technological self-efficacy is proposed to influence both perceived

usefulness and perceived ease of use, as suggested by prior research.

In addition, perceived ease of use and trust along with output quality and response time are also proposed as antecedents of perceived usefulness while accessibility and terminology clarity are proposed as antecedents of perceived ease of use (Table 3.1). These determinants of both perceived usefulness and perceived ease of use are hypothesised based on the finding obtained from prior research. Finally, this research intends to test the proposed hypothesised model empirically. Next chapter discusses the methodology.

## **CHAPTER FOUR**

### **Research Methodology**

#### **4.1 Introduction**

This chapter aims to explain appropriate methodology for achieving the research study aims and objectives. The overall purpose of this research study was to examine as well as extend the body of knowledge and understanding regarding user acceptance of online banking information systems. Based on the published literature review, a conceptual model and hypotheses concerning the user acceptance of an online banking information system (OBIS) was developed. In order to examine the key determinants of an OBIS acceptance, users will be asked to respond to a number of survey questions measuring the different constructs included in the proposed theoretical model. This chapter outlines the data collection and statistical analyses methods that was used in this research study.

This researcher employed a quantitative data collection method using the survey approach to collect data concerning the usage of online banking information system by intended users. The survey questionnaire was created on the basis of previously validated scales and survey instruments. The wording of questionnaire items included in the survey measuring constructs of the proposed model, presented in the previous chapter, was adapted as necessary from the previous published literature to fit within the context of this study. Data analysis for the final conceptual model was performed by Structured Equation Modelling (SEM) using the Analysis of Moment Structures (AMOS) software. The primary intent of this statistical approach is that it allows a researcher to model and predict relationships between constructs in the hypothesised manner.

Details of the methodology used in this research study are described in the following sections: Section 4.2 provides a philosophical Perspective about this study. Section 4.3 describes the design of this Study. Section 4.5 explains the sampling strategy used in this study. Section 4.5 gives an account of the data collection procedure. Section 4.6 describes the development of the survey questionnaire and adaption of questionnaire items. Section 4.7 explains the measurement scales. Section 4.8

describes the data analysis procedures and techniques. Section 4.9 reports the ethical consideration relevant to this study, and finally, section 4.10 concludes this chapter.

## **4.2 Philosophical Perspectives**

The research paradigm offers a framework within which a researcher works. Therefore, the research framework is considered as a basic belief system, which guides researcher(s) or investigator(s) (Guba and Lincoln, 1994). Although a researcher may be conscious, or unconscious, about using any research paradigm, however, s/he will have to commit to the established rules and standards (Kuhn, 1996). Thus, every research methodology is a part of a paradigm (Guba and Lincoln, 1994).

Generally, a research paradigm provides a set of boundaries within which a researcher is expected to conduct his/her research work and it is a worldwide view that guides the researchers (Guba and Lincoln, 1994). According to Easterby-Smith et al. (1991), research design is an overall configuration of piece of research (p.16). There are however several factors which can influence the selection of the research methodology (Bryman, 2001). These factors include the type of research questions, the nature of the phenomenon under study, the degree of control required in a particular research context over behavioural events, and the researcher's philosophical stance (Yin, 1994; Hussey and Hussey, 1997).

Guba and Lincoln (1994) pointed out that the basis for research paradigms are ontology, epistemology and methodology. Ontology is related with what exists and the nature of the world whereas epistemology is a theory that deals with how the knowledge of the external reality is acquired (Sekaran, 2003). According to Crotty (1998), epistemology is related to knowledge theories (Kvale, 1996) whereas ontology focuses on sought realities (Scott, 2000). Burrell and Morgan (1979) clarify the epistemological assumptions by saying that:

“It is possible to identify and communicate the nature of knowledge as being hard, real and capable of being transmitted in tangible form, or whether knowledge is of a softer, more subjective, spiritual or even

transcendental kind, based on experience and insight of a unique and essentially personal nature. The epistemological assumptions in these instances determine extreme positions on the issues of whether knowledge is something which can be acquired on the one hand, or is something which has to be personally experienced on the other” (Quoted by Cohen et al., 2000, p.6 ).

Assumptions relating to ontology refer to the nature of truth that is untainted. Cohen et al. (2000) have inquired whether there “is social reality external to individuals-imposing itself on their consciousness from without- or is it the product of individual consciousness? Is reality of an objective nature, or the result of individual cognition? Is it a given ‘out there’ in the world, or is it created by one’s own mind?” (p.5-6). Setting off from these basics, the researcher chose the objective approach in which knowledge is deemed as an external reality. In this study, the researcher has attempted to be objective by keeping himself detached by maintaining distance from the subjects (research participants) under observation to make the inquiry objective so that time- and context-free generalisations could be made possible (Nagel, 1986). In addition, the researchers tried to remain disinterested throughout the inquiry for eliminating his biases, keeping himself emotionally detached, and being not involved with the objects of the study.

In the domain of methodology, there are two main research approaches, namely positivist (Hussey and Hussey, 1997), and interpretivist (Mingers 2001). Positivist approach is widely known as a scientific approach and it is quantitative in nature while the interpretivist approach is commonly known as a qualitative approach. However, both philosophical approaches have positive and negative impacts on different context of research in one way or another but the main concern is the same (Bryman, 2001). Both of these approaches are discussed in the next section along with the rationale for the selection of a particular research philosophy adopted for this survey research.

#### **4.2.1 Positivist approach**

A scientific paradigm contributes to the application of the methods of the natural sciences to the study of certain phenomena. This approach tends to view reality as objective and something that can be measured and uncovered by a neutral researcher (Gall et al., 2007; Lichtman, 2006). This stance has also been named positivism; a term associated with the French philosopher Auguste Comte in the first half of the nineteenth century and has been used through to the current day, and historically it has been the dominant paradigm in research inquiry (Cohen et al., 2007). The positivist paradigms rely on a host of scientific methods that produce numeric and alphanumeric data (Orlikowski and Baroudi, 1991). Hussey and Hussey (1997) pointed out that the positivistic paradigm is related with the facts or causes of social phenomena. In this research paradigm, investigators apply the language of theories, variables, and hypotheses. Being a scientific approach, it deals with the numbers in an objective fashion and applies statistical tools for data analysis. In other words, this approach includes data collection and organisation into quantifiable variables, the use of statistics as proxies for population parameters, and deliberate control for outside influences.

According to quantitative purist researchers (Ayer, 1959; Maxwell and Delaney, 2004; Popper, 1959; Schrag, 1992; as cited in Johnson and Onwuegbuzie, 2004), social observations should be conducted in the way similar to that in which physical phenomena is treated by physical scientists. They further believe that the observer must keep himself detached by maintaining distance from subjects (research participants) under the observation. In this way, they suggest that to make generalisations, it's essential that social science inquiry should be objective, by which we would be able to determine the validity and the reliability of the real causes of social scientific outcomes (Nagel, 1986). According to positivistic school of thought, researchers need to remain disinterested by keeping their biases aside, and being emotionally uninvolved with the objects and participants of study. Therefore, researchers who use positivist approach traditionally remain neutral, and involve a formal writing style and use the impersonal passive voice and technical terminology (Tashakkori and Teddlie, 1998).



The research methods used in positivistic approach were originally developed in the natural sciences meant for studying natural phenomena. The most common quantitative methods used in management information systems are survey methods, laboratory experiments, formal methods and numerical methods (Orlikowski and Baroudi 1991). The quantitative research approach is based on deductive reasoning. A postulate is set a priori, and data is gathered to test the validity of the hypothesis.

#### **4.2.2 Interpretivist approach**

The interpretive paradigm has emerged since the 1960s in response to the problems associated with using a positivist approach to researching social phenomena and from the belief by a large body of researchers that the world cannot be viewed as an objective reality but must be understood in relation to the subjective interpretations of human behaviour and experiences (Bryman, 2001). Therefore, qualitative purists, who are also called constructivists and interpretivist, argue for “the superiority of constructivism, idealism, relativism, humanism, hermeneutics, and, sometimes, postmodernism” (Guba and Lincoln, 1989; Lincoln and Guba, 2000; Schwandt, 2000; Smith, 1983, 1984 cited in Johnson and Onwuegbuzie, 2004, p.14). According to these qualitative purists, since there are multiple-constructed realities; therefore, time- and context-free generalisations are neither desirable nor acceptable. They further contend that it is not possible to differentiate fully the causes and the effects on which specific generalisations are based. In this regard, (Guba, 1990) remarks that as knower and known cannot be separated so the best approach to know the reality is subjective rather objective. The styles of writing by qualitative purists include a detailed description with rich information compared to a detached and formal style of writing preferred by the quantitative purists.

Researchers of interpretivist school of thought assume that only the subjective interpretation and intervention in reality would enable investigator to fully understand the reality (Davison, 1998). The interpretivist claim that reality is not objectively determined but constructed socially (Hussey and Hussey, 1997). The fundamental belief underlying this assumption is that there is a greater opportunity to comprehend the perceptions of people regarding their own activities by the right placement in social contexts (Hussey and Hussey, 1997). In its very nature,

interpretivist approach promotes the importance of qualitative data in development of knowledge (Kaplan and Maxwell, 1994). Consequently, qualitative research methods were developed in the social sciences so that researchers could study social and cultural phenomena. Qualitative research is based on induction. Data is collected and examined, and theories are built on the evidence extrapolated from that data. Table 4.1 provides a summary of the main differences between these two approaches.

Table 4.1 Main features of positivistic and interpretivist research paradigms

<b>Positivist</b>	<b>Interpretivist</b>
Uses large sample size	Uses small sample size
Researcher does not get involved into problem domain	Researcher gets involved into the problem domain
The location is artificial	The location is natural
Data is precise and specific	Data is subjective
It is concerned with testing hypothesis	It is concerned with developing theories
Generalises from sample to population	Generalises from one setting to another setting

**Source:** Hussey and Hussey 1997, p. 312.

#### **4.2.3 Research approach adopted in this study**

This research study was conducted to identify the factors that influence the online banking information system acceptance and to explore the relationships among these factors. Based on various theories and models in the field of technology acceptance, a hypothesised model of online banking information system acceptance was developed. In order to empirically test and validate the hypotheses in the proposed model, this study used the positivist' (quantitative) approach, as it was consistent with the topic. In fact, Hussey and Hussey (1997) suggested the normal process under a positivistic approach is to study the literature to establish an appropriate theory and construct hypotheses.

Therefore, this research study was within the domain of positivist approach rather than interpretivist approach for many reasons. Firstly, after a thorough investigation

of literature in the field, the hypotheses are formulated. These hypotheses will then be tested by collecting data through self-administered questionnaires. Thus, researcher remains detached from the problem realm (Hussey and Hussey, 1997). Secondly, the researcher position remains neutral though out the research process. Finally, this approach is appropriate because it allows economical collection of data, clear theoretical focus of the research, and provides easily comparable data (Hussey and Hussey, 1997). Based on these reasons it can arguably be said that this research was conducted from a positivist's perspective to study the acceptance of online banking information systems.

### **4.3 Design of the Study**

The research design helps a researcher to draw boundaries for the research, which consists of defining study settings, type of investigations that needs to be carried out, the unit of analysis and other issues related to the research. A research design is a plan of the research project to investigate and obtain answers to research questions (Cooper and Schindler, 2001). There are three types of research designs identified from the literature: (1) exploratory, (2) descriptive, and (3) casual or explanatory design (Cooper and Schindler, 2001). The exploratory research was employed in this study in the first stage to obtain the background information about the research problem and to generate hypotheses by thorough investigation of the literature, as suggested (Churchill, 1995). As a result, the researcher identified constructs and formulated hypotheses based on the literature and previous empirical studies, as reported in Chapter 3. The research problem was crystallised and the purpose of the research have clearly been stated such that this research study focuses on testing of an integrated model, which identifies factors affecting user acceptance of online banking information systems. The next stage used a descriptive research design in order to describe the characteristics of the respondents and to determine the frequencies, percentages, mean and standard deviation of the constructs used. However, descriptive research could not explain the relationship among the variables (Zikmund, 2000); therefore, explanatory research was used in order to explain the relationship and association between variables of the model. Figure 4.1 depicts research design.

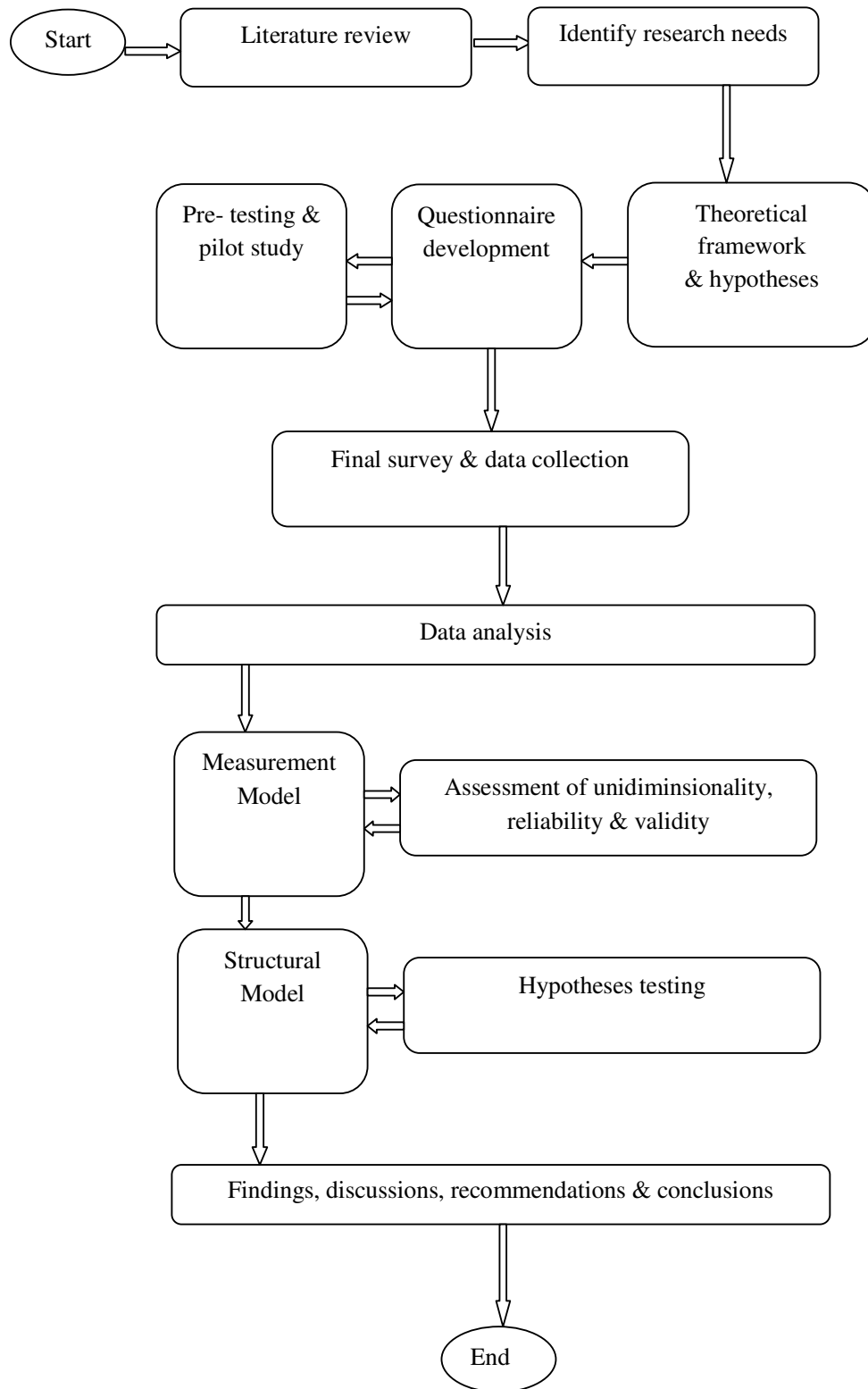


Figure 4.1 Research design

In this study, the researcher employed a quantitative data collection method and survey approach to obtain data concerning the usage of online banking information systems by intended users. A cross-sectional study employing a survey method was carried out for collecting the data. The survey method was used because it is designed to deal more directly with the respondents' thoughts, feeling and opinions, especially when collecting information regarding attitudes and beliefs is concerned (Yin, 1994; Zikmund, 2003). In addition, survey method offers more accurate means of evaluating information about the sample and enables the researcher to draw conclusions about generalising the findings from a sample to the population (Creswell, 1994). Moreover, survey method is considered to be quick, economical, efficient, and can easily be administered to a large sample (Churchill, 1995; Sekaran, 2000; Zikmund, 2003). In addition, this research study employed a two-step approach in the structural equation modelling (SEM) analysis. In the first step, measurement model evaluation was conducted, in order to examine the unidimensionality, validity, and reliability of latent constructs using confirmatory factor analysis (CFA). In the next step, the structural model procedure was employed in order to examine the hypothesised relationships between the latent constructs in the proposed research model. Table 4.2 presents the overall approach employed in this research.

Table 4.2 Research philosophy, approach and strategy of this study

Research Philosophy	Positivism
Research Approach	Deductive
Research Strategy	Quantitative
Time Horizon	Cross-Sectional
Data Collection Method	Survey questionnaire

Source: Developed by this researcher

#### **4.4 Sampling strategy**

##### **4.4.1 Population**

There is no reliable data available about the users of internet based online banking systems and the Internet in Pakistan. Therefore, the researcher contacted the subjects of the study through various means such as by hand to hand distribution of

questionnaires in banks, shopping malls, town centres, bus stops and train stations and so on. Literature suggests that the target population is the entire group of subjects of interest that is defined by the research objectives (Zikmund, 2000; Burns and Bush, 1995). However, there is a variation and difference among the population that a researcher is attempting to study and the population that is available for sampling (Zikmund, 2000). According the Internet World Statistics (2009), the total number of Internet users in Pakistan (the country where data was collected for this study) is estimated to be 18.5 million persons, which represented approx. 10.59 per cent of the total internet population in Pakistan at that time (Table 4.3). Therefore, it is hard, if not impossible, for the researcher to approach everyone who uses the Internet in the country.

Table 4.3 Internet users and Internet penetration rate in Pakistan

<b>Country</b>	<b>Internet Users</b>	<b>Internet population</b>	<b>Internet Penetration rate</b>
Pakistan	18,500,000	10.59%	10.6%

**Source:** Internet World Statistics (June 2009: <http://www.internetworldstats.com/asia/pk.htm>)

#### **4.4.2 Sampling frame**

The sampling is process in which researchers choose a sample (e.g., certain number of selected participants) from available members of the population. In this research, each individual, who used internet, became the member of the population. Thus, the individual customer or user who is currently a user of the Internet and/or an online banking information system was chosen. Unfortunately, there was no data available for those people who are users of both the online banking information systems and the Internet in Pakistan. Therefore, it was justified for this researcher to administer survey questionnaire personally at different places to identify the subjects for this study.

It is also imperative to note that it is usually not possible for a researcher to approach the entire population through questionnaire survey due to the constraints of time and money; therefore, a method of sampling is commonly used in quantitative survey research. In research, the sampling of the subjects is done either through non-random

or through random sampling (De Vaus, 1996; Miller, 1991; Miles and Huberman, 1984).

#### **4.5 Sampling**

On the basis of incomplete evidence, humans are likely to make judgments about people, places and about many other things surrounding their lives (Gall et al., 2003). Sampling is the process of selection in which a number of individuals are chosen for a study in such a way that they may represent larger population to which they belonged. According to Gay and Airasian (2000), the aim of sampling is to get information about the population by using the sample. The more the selected sample represents the population, the more the research results are to be found generalisable to the population.

There are many occasions in social science and management information systems (MIS) research where it is not possible to assess all members of the relevant population. The assessment of all members of the chosen population may not be possible due to an extensive amount of hard work, time and money involved (Gay and Airasian, 2000). In such situations, the researchers need to reduce the number of participants into manageable unit so that the results got from the proportion are representative of the whole population from where the sample is drawn. Reducing the number of members to a manageable group is termed as sampling (Teddlie and Yu, 2007). The sampling commonly is used in opinion polls and as well as in market research. It is also used in large and as well as in small scale research projects. Thus, the decision regarding sampling is a very critical step in the study of any research, because if the chosen population (Sample) is not truly representative or is biased, then researcher is more likely to obtain incorrect conclusions. The sampling procedure in the social and behavioural sciences usually falls into two groups: probability sampling and purposive sampling. Teddlie and Yu (2007, P.78) believe that there are actually four broad categories of sampling, which are illustrated in Table 4.4 as follows.

Table 4.4 Taxonomy of Sampling Techniques

<b>Probability Sampling</b>	<b>Purposive Sampling</b>	<b>Convenience Sampling</b>	<b>Mixed Methods Sampling</b>
<b>A.</b> Random Sampling <b>B.</b> Stratified Sampling <b>C.</b> Cluster Sampling <b>D.</b> Sampling Using Multiple Probability Techniques	<b>A.</b> Sampling to Achieve Representativeness or Comparability <b>B.</b> Sampling Special or Unique Cases <b>C.</b> Sequential Sampling <b>D.</b> Sampling Using Multiple Purposive Techniques	<b>A.</b> Captive Sample <b>B.</b> Volunteer Sample	<b>A.</b> Basic Mixed Methods Sampling <b>B.</b> Sequential Mixed Methods Sampling <b>C.</b> Concurrent Mixed Methods Sampling <b>D.</b> Multilevel Mixed Methods Sampling <b>E.</b> Combination of Mixed Methods Sampling Strategies

Source: Teddlie and Yu, 2007.

Instead of going into the details of each of the four categories, the researcher has dwelled upon the two: Probability and Purposive sampling. The former is used in quantitatively oriented studies, and the latter is used in qualitative studies. The probability sampling techniques involves “selecting a relatively large number of units from a population, or from specific subgroups (strata) of a population, in a random manner where the probability of inclusion for every member of the population is determinable” (Tashakkori and Teddlie, 2003, p. 713). The main purpose of the probability samples in quantitative studies is to achieve representativeness to the extent in which the sample accurately represents the entire population.

Purposive sampling technique may be defined as selecting units (e.g., individuals, groups of individuals, institutions) on the basis of specific purposes associated with answering a research study’s questions. Maxwell (1997) further defined purposive sampling as a type of sampling in which, “particular settings, persons, or events are deliberately selected for the important information they can provide that cannot be gotten as well from other choices” (p. 87). Since the present study is quantitative in nature; therefore, this research has mainly focused on the various techniques used in the probability sampling.



#### **4.5.1 Probability Sampling Techniques**

According to Teddlie and Yu (2007, p. 79), there are three basic types of probability sampling, plus a category that involves multiple probability techniques:

Random sampling: This type of sampling occurs when each sampling unit in a clearly defined population gets an equal chance of being part of the sample.

Stratified sampling: This type of sampling occurs when the researcher divides the population into subgroups (or strata) such that each unit belongs to a single stratum (e.g., high income, medium income, low income) and then selects units from those strata.

Cluster sampling: This type of sampling occurs when the sampling unit is not an individual but a group (cluster) that occurs naturally in the population such as neighbourhoods, hospitals, schools, or classrooms.

Sampling using multiple probability techniques involves the use of multiple quantitative (QUAN) techniques in the same study.

A detailed description of above mentioned sampling techniques is given in the following sections.

##### **Random sampling**

In random sample, everyone has chance of being part of the sample. The sample is chosen, randomly without taking into account factors non-random factors i.e. availability, willingness, age or ethnic origin of the participants etc. There are two methods used in random sampling: truly random sampling or systematic sampling (Tashakkori and Teddlie, 2003; Teddlie and Yu, 2007). In the former sampling method, a researcher selects the subjects without considering any factors i.e. age or gender, and picks the sample randomly whereas in the systematic random sampling, a sample is picked through some simple rules, for example, if we are to conduct a survey in a town of 20,000 houses, a sample of 10% (i.e., 2,000 houses) of total houses can be achieved by selecting every tenth house. The uniform distribution can be obtained through the systematic random sampling and there is advantage of using this type method because this sampling technique ensures that the chosen sample represents the target population when the population is large in size. Systematic

random sampling method was therefore used in this study.

### **Stratified sampling**

While being interested in drawing a random sample, a researcher wants the sample that should match the parent population by controlling a makeup of the sample. For this, the sample is chosen from the different sections so that it could match and represent the parent population. However, it should also be noted that the individuals from each stratum (e.g. female/male) may be selected randomly, but the overall sample cannot be considered random because of its makeup (Teddlie and Yu, 2007), which has been manoeuvred by the investigator. Following two examples explain this issue further.

Example1: If a researcher wishes a stratified random sample of males and females in a class of computer science. Then the researcher, first of all, needs to separate the whole population of the class into two groups (or strata): one for all males and one for all females. After that, the researcher independently selects a random sample from each stratum (one random sample of males and one random sample of females).

Example 2: If the researcher has already knowledge of the target population i.e. first year students at a University comprising 60% female students and 40% male students; then the researcher can chose twenty males and thirty females at random to make sure that the sample represents the ratio of males to females present in the parent population. In addition, if it is known that three out of every five male students study science subjects while only two out of every five female students study science, and then the ratio of each stratum of population can also be controlled. In this way, out of twenty male students, researcher could make sure that eight were arts students and twelve were sciences students; while out of the thirty female students, the researcher could make sure that eighteen were arts students and twelve were science students.

### **Cluster sampling**

The cluster sampling takes place when the researcher wishes to develop a more efficient probability sample with regard to monetary / time resources. If the sample is

geographically spread over a great distance then the researcher, instead of sampling individual units, samples groups (clusters) that occur naturally in the population such as neighbourhoods or schools or hospitals. In this way, cluster sampling, which involves sampling clusters of items, is not only quicker but also easier to sample items.

### **Sampling using multiple probability techniques**

Researchers often use the above three basic probability sampling techniques in addition with one another to develop samples that are more complex. For example, multiple cluster sampling is a technique, which includes: (i) the clusters are randomly chosen in the first stage, and (ii) the units of interest are sampled within the clusters in the second stage. The common example of this sampling technique could be educational research in which schools (the clusters) are randomly chosen and then teachers (the units of interest) in those schools are randomly sampled.

### **4.5.2 Non-probability sampling methods**

In addition to the above mentioned probability sampling methods, Charles and Yu (2007), De Vaus (1996), Miles and Huberman (1984), and Miller (1991) have identified some other methods of sampling, which are described below.

#### **Quota sampling**

In contrast to the stratified sampling, quota sampling aims to find a representative sample without making a random selection of cases. In other words, quotas of particular types of people are searched in this type of sampling method. However, in searching quotas of participants, there is likelihood of causing some bias as researcher can choose such cases which are easy to identify and ready to participate in research.

#### **Snowball sampling**

Snowball sampling, starts first with searching for a few individuals who come up to the criteria; and then these people are asked to work as informants to help find others who have the same characteristics. This is a non-random technique, but it facilitates to find the most difficult populations sector, which may not be possible otherwise

such as drug users and HIV-AIDS patients.

### **Availability sampling**

In this type of sampling, anyone willing can participate or respond. The key advantages of this sampling are that it is cheap and easy, nevertheless, it result in quite large samples. The main disadvantage of the technique is that may be the samples are not being representative of the whole population. However, the cautious measures used can help make availability become representative of the parent population.

### **4.6 Sample Size**

The role of sample size is crucial in all statistical analysis. According to Luck and Rubin (1987), the more sophisticated the statistical analysis the larger the sample size needed. Therefore, the sample size requirement in this study was based on the selected statistical analysis technique used that is, structural equation modelling (SEM). SEM, like other statistical technique, requires an appropriate sample size in order to obtain reliable estimates (Hair et al., 2006). Gorsuch (1983) suggested at least 5 participants per construct and not less than 100 individuals per data analysis. Harris and Schaubroeck (1990) proposed a sample size of 200 at least to guarantee robust structural equation modelling. Kline (2005) suggested that a very complicated path model needs a sample size of 200 or larger. In addition, Hair et al. (1998) recommended that a sample size of at least 200 and not exceeding 400 is considered appropriate. They further pointed out that when the sample size exceeds 400 to 500 participants the SEM analysis becomes too sensitive and almost any difference is detected, making goodness-of-fit measure show poor fit. Thus, as a general rule, a sample of minimum 200 is needed to give parameter estimates with any degree of confidence (Gerbing and Anderson, 1993). In line with the above recommendations and assumptions, the main concerns of this researcher were to achieve a minimum of 200 usable responses. Assuming a very conservative response rate, 900 questionnaires were distributed to the participants in order to get the required sample size.

#### **4.7 Data Collection Procedure**

The process of data collection involves collecting opinions and useful information from target participant about the research questions or topic (Churchill, 1987). Different methods have been identified in the literature to collect data such as using postal services, meeting face-to-face with participants, or making telephonic calls, sending electronic mail, and a combination of these methods (Cooper and Schindler, 2001; Sekaran, 2000; Zikmund, 2000). The data for the present study was gathered using a combination of these methods (i.e., self-administered, e-mail, postal mail), which is in line with many researchers (Davis, 1989; Wang et al., 2003; Pikkarainen et al.; 2004), who used questionnaire survey to collect the data, and face-to-face self-administered method (Alsajjan and Dennis 2010; Abbasi et al., 2011). The use of different data collection techniques together provided the advantages such as versatility, speed and cost effectiveness.

The researcher employed three different ways for administering questionnaires; face to face contacts were made with the participants by visiting banks in selected cities, shopping malls, town centres, bus stops and train stations. After identifying potential users who were capable of using internet, the researcher distributed questionnaires among them. Since participants were chosen from different locations therefore various methods were applied to collect data. In shopping malls, town centres, and bus and train stations, the researcher met participants face to face, and distributed questionnaires to them. Some of the participants filled in questionnaires at the time of distribution; the others dropped their emails, and postal addresses to be contacted later. Moreover, researchers also sent questionnaires to some participants through emails. Yet others were contacted by post, i.e., the questionnaire together with pre-paid envelopes were sent to them so that they can conveniently return the filled questionnaires. As far as banks are concerned, the researcher first got the consent of the managers of four main banks in capital cities of four provinces: Karachi, Lahore, Peshawar and Quetta, and then dropped bundles of questionnaires at various branches. The participants picked the questionnaire from their respective branches, filled in at their convenience, and returned questionnaires back to the banks.

The researcher identifies his sampling close to cluster sampling in which four main

cities: Karachi, Peshawar, Lahore, and Quetta of Pakistan were chosen. Since the use of internet at the time of data collection was still a relatively new phenomenon and was available only in a few bigger cities in Pakistan, the researchers focused on the four main cities in order to have a sample representative of the population. Apart from this, the other motive was to save time and money as the population of the prospective participants spread over great distance across different cities of the country. Therefore, researcher instead of sampling individual units, used sample groups (clusters) that occurred naturally in the population. In this particular case, the cluster sampling is area sampling or geographical sampling in which main four cities of Pakistan are identified as clusters (Teddlie and Yu, 2007). The internet banking users were then selected randomly from these clusters by approaching them in public places i.e. town centres, shopping malls, bus and train stations, and as well as main banks.

Consistent with the previous studies in technology and IS acceptance (e.g. Venkatesh et al., 2003; Lewis et al., 2003; Venkatesh and Bala 2008; Abbasi et al 2011) and internet banking (Al-Somali et al. 2009; Alsajjan and Dennis, 2010), a quantitative cross-sectional questionnaire survey approach was adopted to test the proposed hypothetical model as shown in Figure 3.1 in chapter 3. The data was collected using survey instrument with internet banking users from major cities in Pakistan. Inclusion criteria for the sample were that respondents must be internet banking users at the time of survey or have used the internet banking in the past. Participation in the survey was completely voluntary. Respondents were asked to complete a survey questionnaire based on their perception of and/or acceptance of online banking information systems.

The questionnaires were distributed uniformly in four main cities of Pakistan. Forty questionnaires were dropped at four main banks of each four cities and sixty five questionnaires were distributed in shopping malls and bus/train stations of each city. The total number of questionnaires distributed was 640 for banks and 260 for town centres and bus/train stops. Although, there was a uniform distribution of questionnaire in each city, the response rate varied from one another (see Table 4.5).

Table 4.5 Questionnaire Distribution and Response rate

Name of city	Questionnaires distributed	Questionnaire returned	Response rate in %
Karachi	225	130	34.6
Lahore	225	105	28.0
Peshawar	225	86	22.9
Quetta	225	54	14.4

The large variation in response rate may have occurred due to various reasons. The highest response rate was achieved in Karachi which was already expected. The reasons lie in the fact that Karachi is the biggest metropolitan city and the hub of business activities with largest population, higher rate of literacy and is equipped with advanced technology. The lowest response rate in Quetta happened due to fact that it is relatively backward city and at the time of data collection the law and order situation was not better. The response rate from Peshawar was bit more than the expected. The city of Peshawar has recently advanced in terms of business centres, education institutions, and availability of internet across the city.

In total, 375 questionnaires were returned out of 900 distributed, which represented a response rate of 41.7% of the original sample. However, among those returned questionnaire, 22 responses were discarded because four of them were returned completely blank, five respondents had put the same answers on all the Likert scale items, seven respondents mentioned that they had never used internet before (i.e. not satisfying the inclusion criteria) and six questionnaires were partially answered (i.e. some questions and/or some parts such as demographic questions were left blank). Therefore, remaining 353 questionnaires were used for further data analysis. Consequently, the final usable response rate in this study was 39.2%.

#### **4.8 Survey Questionnaire**

Survey questionnaire is efficient and economical tool to collect the required data. In this study, the survey questionnaire was accompanied with a covering letter, which explained the purpose of the research study and ensured confidentiality of the data gathered. The participants were explained that the research was being conducted to explore their perception of and/or acceptance of online banking information systems, and that the participation in the survey was voluntary. They were further informed

that they have the right to withdraw from the survey study at any time and that they must be at least 18 years old to participate in the survey. In addition, the respondents were provided with the contact information of the researcher (i.e., telephone number and an e-mail address) so that they can do relevant inquiries or can obtain the results of the study, if they wished.

The survey questionnaire consisted of three main parts. In the first part of the questionnaire, the participants were asked to provide back ground information related to internet usage. In the second part, the participants had to provide demographic data, such as income, age, gender, education, and occupation. In the third part, question items for different constructs mentioned in the research model were mixed together to minimise potential biases due to response consistency (Venkatesh and Davis, 1996).

The questionnaire was administered to the users personally as well as it was sent to the potential participants by post and electronic mail, as mentioned earlier. The questionnaire was accompanied by a covering letter from the researcher stating the goals and significance of research. The participants who received questionnaire by the post were asked to return the questionnaire by post in the prepaid envelopes with the return address. To encourage users to participate in the survey, users were offered the incentive of a gift. The respondents were asked to submit their names and addresses at the end of the survey if they were willing to enter in the draw for the gift. The winner of the gift incentive was informed through email and was rewarded with a gift.

The following section provides a detailed account of the development process of the survey questionnaire used in this study.

#### **4.8.1 Development of survey questionnaire**

##### **Questionnaire design**

Designing a questionnaire requires both artistic as well as scientific skills and experience (Malhotra, 1999). The questionnaire should be designed in a way to try to obtain accurate and complete information about the research problem (Malhotra,



1999). In the present study, the question items and response categories were designed such so as to motivate the respondents to participate in the research study. The researcher made utmost effort to keep the questions simple, easy to read, and unambiguous. Thereby enabling the respondent to comprehend the questions easily, reducing their chances of misunderstand the questions, and keeping their interest alive in the survey.

According to Sekaran (2000) questionnaires are well-organised and efficient method for obtaining data, especially in a situation where the researcher knows exactly what should be asked and how to measure the factors of interest in order to achieve relevance and accuracy (Zikmund, 2000). For this quantitative research study, the author developed a questionnaire in order to collect the data to meet the aims and objectives of the study. The questionnaire development process in this study was divided into a number of steps on the basis of the objectives of the study. Aaker et al. (1998), Zikmund (2003), Sekaran (2003) have suggested certain steps that are described below.

1. **Set up clear objectives:** The study objectives were described with as much clarity as possible. Further they contained necessary information required for answering research question, testing the hypotheses, and so on. This has already been reported in the previous chapter.
2. **Incorporate results from previous studies:** Findings from published literature were incorporated with the relevant variables, which helped in ascertaining the correct vocabulary, and point of view of online banking information system users / customers.
3. **Compare questionnaire design:** The design of the questionnaire was compared with similar studies through thorough reviewing of published literature.
4. **Use multiple, high-level items:** Multi item measures were used to capture the meaning of each construct because any single item cannot provide a perfect representation of the concept, according to Churchill (1987).

5. **Experts' comments:** Comments from experts i.e. those people who often use online banking and/or work in IT department of the banks, were solicited on the questionnaire.
6. **Pretesting:** The preliminary versions of the questionnaire were pretested before actual fieldwork.
7. **Piloting:** A pilot study was conducted to assess the psychometric properties of the measures.

### **Questionnaire content development**

The data collection for this study was based on the opinions and beliefs of respondents towards the research topic (i.e. acceptance of online banking system information in this study). Therefore, question development process employed the good question design principles, such as designing brief questions that can be used for all respondents, use of positive questions, and avoidance of leading questions as recommended (Cooper and Schindler, 2001; Frazer and Lawley, 2000; Zikmund, 2003). In addition questionnaire contents were kept quite simple and easy to read and comprehend, so that the respondents should not have difficulty to complete the questionnaire.

### **Question wording**

Question wording principles, as suggested (Cooper and Schindler, 2001; Frazer and Lawley, 2000; Zikmund, 2003), were used in drafting the questionnaire. The question wording for all questions was kept brief and simple, as much possible. The researcher also attempted to avoid any ambiguity and leading questions. In addition, the standard wording principles were strictly followed during the whole process of questionnaire design. Due to the practical approach of the research topic, the researcher also involved practitioners/experts in the development of the questionnaire. Both, the reviewed literature and the discussions with the practitioners /experts helped in improving the questionnaire in terms of wording as well as technical expressions that may be easily understood by the common user of online banking information system in developing economy context, such as Pakistan. This helped to ensure that respondent's biases and measurement errors were minimised and adequate responses were provided.

#### **4.8.2 Response formatting**

The questions in this survey are related to the individuals perceptions of and/or acceptance of online banking information system. Therefore, the researcher incorporated some closed ended and scaled-response formats, depending on the nature of the questions, to encourage participation in the study and to avoid response bias, which is associated with the way respondents respond to questions due to their mentality or predisposition (Alreck and Settle, 1995). This study however mostly used the closed-ended or structured questions in the survey questionnaire to keep the context of the question same for all the respondents (Frazer and Lawley, 2000). This also helps in eliminating researcher's bias. In addition, this format of questions reduces the amount of thinking and effort required by respondents in answering the questions (Hair et al, 2006).

In addition, scaled-response questions were used because this format of questions uses a scale measurement for respondents to indicate their degree of agreement with the constructs (Alreck and Settle, 1995). The Likert scale with seven categories was used for questions in this study. Questions were grouped by topic and placed in a logical sequence by using a funnel approach, starting with broad questions and narrowing down in scope, as suggested (Frazer and Lawley, 2000; Churchill, 1987). In brief, questionnaire items were designed with proper wording and response formatting in order to encourage participants' response, make it easy for them to provide accurate answers, and facilitate accuracy in data analysis.

#### **4.8.3 Scale development**

Scales used in this study are nominal and ordinal (i.e. Likert scale). Nominal scales are limited in use only for questions that determined the survey participants' demographic characteristics, such as gender, places of use of the Internet, and so on. Likert scales were used in questions that were used to investigate respondents' beliefs and opinions towards the acceptance of online banking information systems. Table 4.6 presents the relationships between research questions, hypotheses, variables, scale development and hypothesised relationships techniques used in this study.

The seven-point attitude rating scale was used in this study with adaptation of the summated ratings method developed by Rensis Likert in 1932. The Likert scale requires participants to make a decision on their level of agreement with the given statement. The seven-point rating scale was selected because it is the most popular scale and has been applied in many studies conducted in the past in technology acceptance and IS literature (Davis, 1989; Moon and Kim, 2001; Venkatesh and Davis, 2000). Cox (1980), while reviewing 80 years of research, recommended that the scale points between five and nine should be used, depending on the particular circumstances. Miller (1956), in his influential article, pointed out that the human brain has a span of apprehension capable of distinguishing about seven (plus minus two) different items. Therefore, a seven-point Likert scale was selected for this study based on its popularity, high reliability, and appropriateness to the nature of this study.

In short, the survey questionnaire was developed based on the research questions and the hypotheses of this study as well as the guidelines recommended for better response outcomes.

Table 4.6 Objectives, hypotheses, variables, hypothesised relationships, scales, and questions

No	Objectives	Construct	Hypotheses	Variables	Hypothesised relationship	Scale	Relevant Question
1	Identify respondents' demographic profile and internet usage experience	-----	-----	-----	-----	Nominal	Have you used the internet before? You use internet mainly at what location. For how many years you have been using internet.  Income. Age. Gender. Education. Occupation. 10-14.
2	Determine respondents' behavioural intention to use online banking information system.	Behavioural Intention (BI)	-----	BI	-----	Likert 7 points	
3	Investigate opinions and beliefs towards online banking system acceptance.	Perceived usefulness (PU)	<i>H1</i> . Perceived usefulness will have a significant positive effect on the behavioural intention to use an OBIS.	PU, BI	PU → BI	Likert 7 points	15-20.

		Perceived ease of use (PEOU)	<i>H2a.</i> Perceived ease of use will have a significant positive effect on users' perceived usefulness of an OBIS.	PEOU, PU	PEOU → PU	Likert 7 points	21-26.
			<i>H2b.</i> Perceived ease of use will have a significant positive effect on the behavioural intention to use an OBIS.	PEOU, BI	PEOU → BI	Likert 7 points	-----
		Trust (TR)	<i>H3a.</i> Trust will have a significant positive effect on the behavioural intention to use an OBIS.	TR, BI	TR → BI	Likert 7 points	27-34
			<i>H3b.</i> Trust will have a significant positive effect on users' perceived usefulness of an OBIS.	TR, PU	TR → PU	Likert 7 points	--
4	Investigate the influence of	Technological self-efficacy	<i>H4a.</i> Technological self-efficacy will	TSE, PU	TSE → PU	Likert 7 points	35-39.

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external variable on TAM's core beliefs.	(TSE)	have a significant positive effect on users' perceived usefulness of an OBIS.				
		<i>H4b.</i> Technological self-efficacy will have a significant positive effect on user's perceived ease of use of an OBIS.	TSE, PEOU	TSE→PEOU	Likert 7 points	---
	Output quality (OQ)	<i>H5:</i> Output quality will have a significant positive effect on users' perceived usefulness of an OBIS.	OQ, PU	OQ→PU	Likert 7 points	40-41.
	Response time (RT)	<i>H6:</i> Response time will have a significant positive effect on users' perceived usefulness of an OBIS.	RT, PU	RT→PU	Likert 7 points	42-43.
	Accessibility	<i>H7:</i> Perceived	AC,	AC→PEOU	Likert 7	44-45.

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(AC)	accessibility will have a significant positive effect on users' perceived ease of use of an OBIS.	PEOU		points	
Terminology clarity (TC)	<i>H8</i> : Terminology clarity will have a positive significant effect on users' perceived ease of use of an OBIS.	TC, PEOU	TC→PEOU	Likert 7 points	46-47.

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#### **4.8.4 Operationalisation of Variables**

The theoretical constructs were operationalised using validated items from prior relevant research. The adapted items were validated, and wording changes were made to tailor the instrument for the purposes of this study. The operationalisation of questionnaire items for each construct is described as follows.

##### **Operationalisation of behavioural intention**

The operationalisation of Behavioural Intension (BI), measured on a seven point scale with 1 = strongly disagree and 7 = strongly agree, was based on five items adapted from Davis (1989), Davis et al.(1989), Davis (1993), Venkatesh and Davis (2000), and Moon and Kim (2001) as follows.

- B1. I intend to use the online banking information system as often as needed.
- B2. I intend to continue using the online banking information system in the future.
- BI3. Assuming I have access to the online banking information system, I intend to use it.
- BI4. Given that I may have access to the online banking information system in the future, I predict that I will use it.
- BI5. I will strongly recommend others to use the online banking information system.

##### **Operationalisation of perceived usefulness**

The operationalisation of perceived usefulness (PU) on a seven point scale (with strongly disagree = 1 and strongly agree = 7) was based on six items, which were adapted from Davis (1989), Davis et al. (1989), Venkatesh et al. (2003). The items were as follows:

- PU1. Using the online banking information system enhances the productivity of my banking activities.
- PU2. Using the online banking information system makes it easier to do my banking activities.
- PU3. Using the online banking information system enables me to accomplish banking activities more quickly.

PU4. Using the online banking information system improves my performance of banking activities.

PU5. Using the online banking information system enhances my effectiveness of banking activities.

PU6. Overall, I find the online banking information system useful for my banking activities.

### **Operationalisation of perceived ease of use**

The operationalisation of perceived ease of use (PEOU) was also on a seven point scale ( i.e. 1 = strongly disagree and 7 = strongly agree) and it was based on six items that were adapted from Davis (1989), Davis et al. (1989), Venkatesh et al. (2003). The adapted items were:

PEOU1. Learning to operate the online banking information system is easy for me

PEOU2. I find it easy to get the online banking information system to do what I want it do.

PEOU3. My interaction with the online banking information system is clear and understandable.

PEOU4. I find the online banking information system to be flexible to interact.

PEOU5. It is easy for me to become skilful at using the online banking information system.

PEOU6. Overall, I find online banking information system easy to use.

### **Operationalisation of trust**

The operationalisation of trust (TR), on a seven point scale with 1 = strongly disagree and 7 = strongly agree was based on ten items adapted from Morgan and Hunt (1994), Doney and Cannon (1997), Gefen (2000), McKnight et al. (2002), and Gefen et al. (2003). The items were:

TR1. The online banking information system is trustworthy.

TR2. I am quite certain what to expect from the online banking information system.

TR3. I trust the online banking information system.

TR4. The online banking information system would do the job right even if not monitored.

TR5. The online banking information system offers secure personal privacy.

TR6. I trust in the ability of the online banking information system to secure my privacy.

TR7. I believe that the online banking information system would act in my best interest.

TR8. The online banking information system keeps its promises and commitments

### **Operationalisation of technological self-efficacy**

The operationalisation of technological self efficacy (TSE), measured on a seven point Likert scale with strongly disagree =1 and strongly agree = 7, was based on five items that were adapted from the prior studies (Compeau and Higgins, 1995a; 1995b; Venkatesh, 2003; Ong and Lai, 2006). The adapted items were as follows:

TSE1. I could complete my banking tasks using the online banking information system, if I had never used a system like it before.

TSE2. I could complete my banking tasks using the online banking information system, if I had only the system manuals for reference.

TSE3. I could complete my banking tasks using the online banking information system, if I had seen someone else using it before trying it myself.

TSE4. I could complete my banking tasks using the online banking information system, if I had just the built-in-help facility for assistance.

TSE5. I could complete my banking tasks using the online banking information system, if there was no one around to tell me what to do as I go.

### **Operationalisation of accessibility**

The operationalisation of accessibility (AC) - measured on a seven point Likert scale with 1 = strongly disagree and 7 = strongly agree was based on two items that were adapted from Culnan (1984; 1985), Karahanna and Straub (1999) and Kim (2006). The adapted items were as follows:

AC1. The online banking information system is accessible.

AC2. My access to the online banking information system is unrestricted.

AC3. I find it easy to get access to the online banking information system.

### **Operationalisation of terminology clarity**

The operationalisation of terminology clarity (TC), measured on a seven point Likert scale with 1 = strongly disagree and 7 = strongly agree, was based on two items adapted from Venkatesh et al (2000), and Kim (2006). The items were as follows:

TC1. I find it easy to understand the terms used throughout the online banking information system.

TC2. I understand most of the terms used throughout the online banking information system

### **Operationalisation of response time**

The operationalisation of response time (RT), measured on a seven point Likert scale with 1 = strongly disagree and 7 = strongly agree) was based on two items adapted from Bailey and Pearson (1983), Wixom and Todd (2005), and Pituch and Lee (2006). The items were:

RT1. The online banking information system returns answers to my requests quickly.

RT2. In general, the response time of the online banking information system is consistent.

RT3. In general, the response time of the online banking information system is reasonable.

### **Operationalisation of output quality**

The operationalisation of output quality (OQ), measured on a seven point Likert scale 1 = strongly disagree and 7 = strongly agree, was based on two items adapted from Kim (2006). The adapted items were as follows:

OQ1. The quality of the output I get from the online banking information system is high.

OQ2. I have no problem with the quality of the online banking information system's output.

#### **4.9 Pre-testing and Pilot Study**

Pre-test and pilot study are both essential parts of questionnaire survey design and according to Sekaran (2003), they must be conducted prior to the initial data collection phase or main survey in order to validate instrument and to ensure that the survey questionnaire is free of errors and ambiguities. Therefore, one pre-test and a pilot study were conducted prior to using the survey questionnaire in the main study. The purpose of pre-testing and pilot study was to avoid participants' confusions and misinterpretations as well as to identify and detect any errors and ambiguities

##### **4.9.1 Pre-testing the Questionnaire**

Pre-testing is preliminary assessment of questionnaire with a group of respondents for the purpose of detecting problems in the questionnaire contents, wording, or layout, whether the respondents have any difficulty in understanding questions or whether there are any ambiguous or biased questions (Sekaran, 2003). According to Baines and Chansarkar (2002), pre-testing is important since it affects all aspects of the questionnaire design.

In this research study, the pre-test was conducted by distributing questionnaires to 30 PhD scholars from Pakistan who were studying at different universities in the UK. Twenty five questionnaires returns meant a very good response rate of (about 83%). The rationale for using these subjects was that all of them were from Pakistan and some of them were technology professionals while others had experience of technology in general and online banking information systems in particular. In addition, respondents were asked to suggest potential problems with the questionnaire design in order to obtain feedback for improving the survey questionnaire. Questionnaire pre-testing was successful in obtaining some interesting comments from the respondents. For example, one PhD student suggested that she herself would not like to answer her age in years in the space provided and she would prefer to leave it blank. Another respondent had similar thoughts and suggested that the researcher should provide different options to select, rather than just providing a space for writing the age.

The participants' other suggestions highlighted some potential problems with wording and inappropriate sequencing of the questionnaire design and identified some ambiguities. During this process, the wording was changed as needed and ambiguous questions were either clarified or deleted. Consequently, the questionnaire was significantly revised according to suggestions of the respondents in the pre-test.

#### **4.9.2 Pilot Study**

A pilot study was conducted to detect weakness in the design and survey instrument and to provide proxy data for selection. Also, the instrument was pilot tested in order to assess the psychometric properties of the measures.

In the pilot study, the researcher conducted survey by personally visiting two banks in Karachi - the capital city of Sindh province in Pakistan. The city of Karachi was selected because it is the largest metropolitan city as well as the commercial and business capital of Pakistan. The staffs at the banks were requested to distribute the questionnaires to the respondents (customers) with some explanation about the survey, and to provide the contact information in case of need or for following up the survey. In total, 60 questionnaires were sent to the offices of the two banks with 30 questionnaires for distribution at each of the two banks. After many phone calls and follow ups visits to check out the progression of the survey, 45 questionnaires were returned with response rate of 75%. Twenty three (76.7%) questionnaires were returned from bank A and twenty two questionnaires (73.3%) were returned from bank B. The duration of pilot survey was four weeks i.e. from 6 March 2009 to 6 April 2009. Basic statistical analysis was made of this pilot study using SPSS 16.0. Next section presents the descriptive analysis of the usable data collected in the pilot survey (45 responses) by using the SPSS statistical software version 16.

#### **Demographic profile of respondents of pilot study**

This section presents the demographic information of the respondents of pilot study. Table 4.7 presents participants' gender, age, education, occupation and average monthly income in Pakistani currency (Rupee).

Table 4.7 Demographic details of pilot study respondents ((N=45)

<b>Variable</b>	<b>Category</b>	<b>Frequency</b>	<b>%</b>
<b>Gender</b>	Male	29	64.4
	Female	16	35.6
<b>Age (years)</b>	< 20	3	6.9
	20-30	21	46.7
	31-40	14	31.1
	41-50	4	8.9
	51-60	1	2.2
	>60	2	4.4
	<b>Education (level)</b>	Less than high school	1
High school		7	15.6
Diploma		4	8.9
Bachelor		19	42.2
Post-graduate		14	31.1
<b>Occupation</b>	Student	8	17.8
	Government employee	12	26.7
	Private sector employee	17	37.8
	Businessperson	8	17.8
<b>Income (in Pakistani rupees = Rs)</b>	< 10,000	4	8.9
	10,000-20,000	10	22.2
	21,000-30,000	18	40
	31,000-40,000	8	17.8
	41, 000-50,000	3	6.7
	> 50,000	2	4.4

Results of pilot study (Table 5.1) show that among 45 respondents, the majority of participants was male (n=29, 64.4%) while the remaining were female (n= 16, 35.6%). Majority of the respondent were young adults of 20-30 years age (n=21, 46.7%) while those between 30-40 years of age were second highest in numbers (n=14, 31%).

Findings of pilot study showed that the most of participants had a Bachelor degree (n=19, 42.2%) followed by those who had post graduate qualifications (n=14, 31.1%). These findings indicate that the internet users in Pakistan generally have higher education, compared to the average Pakistani citizens (Demographic census, 1998). Moreover, it was possible to explain that educated respondents have benefited from more awareness and greater exposure to information technology as part of their education. Therefore, they are better able to use computers and the Internet. It was also interesting to find out that 26.7% respondents had lower level of educational qualifications.

In addition, the pilot study revealed that most of the respondents (n = 29, 64.5%) were either employed in government (public) sector or working in private sector. It was more interesting to find out that the percentage of participating businesspersons and students was the same (n=8, 17.8%) in the pilot study.

Finally, the response rate of 75% per cent achieved in this pilot study was very good, which was very encouraging. In addition, the sample size was big enough for the further analysis as follows.

### **Reliability of the instrument**

In this pilot study, the reliability of the measures items used in the questionnaire was assessed using the internal consistency test Cronbach's alpha. This is a test of the consistency of the respondent's answers to all the items in the measure. Cronbach's alpha estimate value above 0.70 is considered as acceptable (Nunally, 1978). According to Sekaran (2000), if the value of Cronbach's alpha reliabilities is less than 0.6, they are considered as poor, if the value is in 0.7 they are acceptable, and



the reliabilities value above 0.8 are considered good. Therefore, the closer the Cronbach's alpha gets to 1.0 the better is the reliability. Table 4.8 presents the Cronbach's alpha coefficients for all constructs obtained in the pilot study.

Table 4.8 Cronbach's Alpha Coefficients for all Constructs in Pilot Study

<b>Construct</b>	<b>Cronbach's Alpha</b>
Perceived Usefulness (PU)	.937
Perceived Ease of Use (PEOU)	.873
Trust (TR)	.954
Technological Self-efficacy (TSE)	.871
Accessibility (AC)	.873
Terminology Clarity (AC)	.952
Output Quality (OQ)	.905
Response Time (RT)	.958
Behavioral Intentions (BI)	.938

All of the measures used in the pilot study showed an adequate reliability with Cronbach's alpha values, which ranged between 0.749 and 0.958 that are considered to be good and acceptable except a two items (i.e., one item from response time (RT3), and one from accessibility (AC3) constructs), which were dropped in the final survey instrument.

#### **4.10 Data Analysis**

According to Coorley (1978), the main goal of "the statistical techniques are to assist in establishing the plausibility of the theoretical model and to estimate the extent to which the various explanatory factors seem to be influencing the dependent variable" (p.13). The primary purpose of this research study was to identify and investigate the

factors that affect user acceptance of online banking information systems. In order to achieve these objectives, this thesis used two different statistical software tools. Statistical Package for Social Sciences (SPSS) was used for analysing the preliminary data, explained in the following sub-section. The Analysis Moment of Structures Software (AMOS) for Structural Equation Modelling (SEM) was used for measurement model analysis and structural model to test the proposed hypothesised model explained in Chapter Three. Following sub-sections describe and provide justification for using these statistical software and the techniques mentioned above.

#### **4.10.1 Preliminary Data Analysis**

Statistical Package for Social Sciences (SPSS), version 16.0, was used to analyse the quantitative data obtained from the survey questionnaire. This software package is widely accepted and used by researchers in different disciplines including social sciences, business studies, and information systems research (Zikmund 2003). Therefore, this tool has been used to screen the data of this research study in terms of data coding, treatment of missing data (i.e., using ANOVA), identification of outliers (i.e., Mahalanobis Distance ( $D^2$ )) test and find out the data normality (i.e. using kurtosis and skewness statistics). Each one of these techniques are explained and discussed in the following sections. In addition, SPSS was also applied to perform descriptive statistics such as frequencies, percentages, mean values, and standard deviations. These analyses were performed for each variable separately and to summarise the demographic profile of the respondents in order to get preliminary information and the feel of the data (Sekaran, 2000). Furthermore, before applying SEM, SPSS was used to conduct exploratory factor analysis (EFA) for the first stage of data analysis to summarise information from many variables in the proposed research model into a smaller number of factors, which is known as factor / dimension reduction (Hair et al., 2006). EFA is however discussed in more detail in chapter 5. Data collection in this quantitative survey mainly used nominal and ordinal scales, which would return data in a form appropriate for this technique (Kline, 2005).

### **Missing data**

Missing data is a very common problem in all type of survey research because it usually involves a large number of samples (Bryman and Cramer, 2005). Hair et al. (2006) note that missing data causes two main problems: (a) it minimises the ability of statistical test to imply a relationship in the data set, and (b) it creates biased parameter estimates. The potential effects of missing data depends on the frequency of occurrence, the pattern of missing observations, and the reasons for the missing value ( Tabachnick and Fidell, 2001). Hair et al. (2006) point out that if the pattern of missing data is systematic (i.e. non-ignorable or is not missing at random), any technique used to treat this missing data could possibly generate biased results whereas, if the missing data is scattered in a random fashion with no distinct pattern (i.e. missing completely at random = MCAR), any remedy to treat this problem is assumed to yield acceptable results.

Although there are no clear set guidelines regarding what constitutes a large amount of missing data; Kline (1998, p. 75) suggested that missing values should probably constitute less than 10% of the total data. According to Cohen and Cohen (1983), 5% or even 10% of missing data on a particular variable is not large. Olinsky et al. (2003) point out that if the percentage of cases with missing observations is less than approximately 5%, and the pattern is ignorable, most simple analyses should yield reliable results.

This study followed steps suggested by Byrne (2001) for dealing with incomplete (missing) data, which were: (1) Investigation of the total amount of missing data, (2) Investigation of the pattern of missing data, (3) and finding out appropriate techniques to deal with missing data. These three steps are discussed in chapter five in more detail.

### **Outliers**

Kline (2005) and Hair et al. (2006) described outliers as cases with scores that are distinctively different from rest of the observations in a dataset. Researchers have warned that problematic outliers can have dramatic effects on the statistical analysis

such as model fit estimates and parameter estimates (West et al., 1995) and they can create a negative variance (Dillon et al., 1987). There are two main types of outliers i.e. univariate and multivariate outliers. A univariate outlier is the case that has an extreme value on one variable whereas a multivariate outlier is a case with an unusual combination of values on two or more variables (Tabachnick and Fidell, 2001; Kline 2005). Although, there is no absolute judgement of an extreme value, a commonly accepted rule of thumb is that scores more than three standard deviation away from the mean may be considered as outliers (Kline, 2005). The univariate outlier can be detected easily by diagnosing frequency distributions of Z-scores (Kline, 2005).

In this study, univariate outliers were not identified because the study utilized a Likert scale with 7 categories ranging from 1 - strongly disagree to 7 - strongly agree. However, if respondents answered strongly disagree or strongly agree, these response options might become outliers, as they are the extreme points of the scale.

Presence of multivariate outliers in data can be checked by Mahalanobis distance ( $D^2$ ) test, which is a measure of distance in standard deviation units between each observation compared with the mean of all observations (Byrne, 2001; Kline, 2005; Hair et al., 2006). A large  $D^2$  identifies the case as an extreme value on one or more variables. A very conservative statistical significance test such as  $p < 0.001$  is recommended to be used with  $D^2$  measure (Kline, 2005; Hair et al., 2006). In this research study, researcher measured Mahalanobis distance using SPSS version 16.0 and then compared the critical  $\chi^2$  value with the degrees of freedom (df) equal to number of independent variables and the probability of  $p < 0.001$ .

### **Normality**

Normality is defined as the "shape of the data distribution or an individual metric variable and its correspondence to the normal distribution, which is the benchmark for statistical methods" (Hair et al., 2006; p. 79). Violation of normality might affect the estimation process or the interpretation of results especially in SEM analysis. For instance, it may increase the chi-square value and may possibly cause

underestimation of fit indices and standard errors of parameter estimates (Hair et al., 2006). One approach to diagnose normality is through visual check or by graphical analyses such as the histogram and normal probability plot that compare the observed data values with a distribution approximating the normal distribution. If the observed data distribution largely follows the diagonal lines then the distribution is considered as normal (Hair et al., 2006). Beside the shape of distribution, normality can also be inspected by two multivariate indexes i.e. skewness and kurtosis. The skewness portrays the symmetry of distribution whereas the kurtosis refers to the measure of the heaviness of the tails in a distribution (also known as peakedness or flatness of the distribution) compared with the normal distribution. In normal distribution, the scores of skewness and kurtosis are zero. Hair et al (2006) point out that skewness scores outside the -1 to +1 range demonstrate substantially skewed distribution. However, West et al. (1995) and Kline (2005) suggest that values of the skew index greater than three (3.0) are indicated as extremely skewed and score of the kurtosis index from about 8.0 to over 20.0 describe extreme kurtosis. In this study, the researcher set the maximum acceptable limit of observation values up to  $\pm 1$  for the skewness and up to  $\pm 3$  for the kurtosis. Thereafter, the researcher used factor analyses and structural equation modelling for inferential statistical analyses.

#### **4.11 Factor Analysis**

Factor analysis (FA) techniques are used to address the problem of analysing the structure of the correlations among a large number of measurement items (also known as variables) by defining a large set of common underlying dimensions, known as factors. FA takes a large set of variables and summarises or reduces them using a smaller set of variables or components (factors) (Hair et al., 2006). The main purposes of the FA therefore include: (a) understanding the structure of a set of variables, (b) constructing a questionnaire to measure any underlying variables, and (c) reducing a data set to a more manageable level (Field, 2006, p.619). Therefore, at first, the researcher identifies latent dimensions of the structure of the data and then determines the degree to which a test item (variable) is explained by each factor. This is then followed by the primary uses of FA: summarisation and data reduction (Hair et al., 1995). This purpose can be achieved by either exploratory factor

analysis or confirmatory factor analysis techniques. However, the exploratory factor analysis technique is used for “take what the data give you”; whereas the confirmatory factor analysis technique involves combining variables together on a factor or the precise set of factors for testing hypotheses (Hair et al., 2006, p.105).

In this research study, the researcher first conducted exploratory factor analysis (EFA) to examine the dimensions of each construct (herein called as a factor) and then confirmatory factor analysis (CFA) was performed for testing and confirming relationships between the observed variables under each hypothesised construct (Zikmund, 2003; Hair et al., 2006). The Next section explains exploratory factor analysis performed by using SPSS version 16.0.

#### **4.11.1 Exploratory factor Analysis**

Parasuraman (1991) defined exploratory factor analysis (EFA) as “ a multivariate statistical technique that analyses data on a relatively large set of variables and produces a smaller set of factor, which are liner combinations of the original variables, so that the set of factors captures much information as possible from the data set” (p.757). The EFA has been widely used to select items from a large pool and group them in a more manageable form as well as to examine the relationships among the variables without priori hypotheses (Hair et al, 2006).

There are two main steps in the EFA: Extraction and Rotation. The process of extraction aims to determine the factors underlying a number of variables (Miller et al., 2002). There are various extraction methods available however the principal component analysis is most commonly used method. The reason for its popularity lies in its reliable assessment of variables without any errors (Luck and Rubin, 1987). The second step of EFA is the rotation, which is applied to present the pattern of loadings in a manner that is easier to interpret. Tabachnick and Fidell (2001) noted two main approaches to rotation, which include orthogonal and oblique rotation methods. The orthogonal rotations assume that extracted factors are independent (uncorrelated) while the oblique rotations assume that the extracted factors are correlated (Tabachnick and Fidell, 2001; Miller et al., 2002, and Bryman

and Cramer, 2005).

In this research study, the researcher employed the principal components analysis (PCA) and orthogonal model with varimax rotation to perform factor analysis using SPSS (version 16.0). The reason for using the orthogonal rotation was that the results generated from it have a higher generalisability and replicability power compared with oblique rotation, as well as interpretation of orthogonal rotation factors is less complicated because factors are uncorrelated with each other (Tabachnick and Fidell, 2001). After conducting the EFA, the identified dimensions were checked by confirmatory factor analysis using structural equation modelling, as described in next section. Table 4.9 presents summary of statistics used in this research study.

Table 4.9 Summary of Statistics

Statistics	Software package	Purpose of use	Remarks	Reference (s)
Analysis of variance (ANOVA)	SPSS 16.0	to estimate the non response bias	the questionnaires received at different point of time of the data collection (i.e. early respondents and late respondents) were used in analysis to assess the non-response bias	Babbie (1990)
Little's chi-square statistics ( $\chi^2$ )	SPSS 16.0	to diagnose the randomness of missing data	insignificant value of the test suggests that the data may be assumed to be missing completely at random (MCAR)	Little (1988)
Mahalanobis Distance ( $D^2$ )	SPSS 16.0	to investigate the multivariate outliers	a very conservative statistical significance test such as $p < 0.001$ was employed to be used with $D^2$ measure	Kline (2005); Hair et al. (2006)
Kurtosis and Skewness	SPSS 16.0	to find out data normality	the maximum acceptable limits of observation values up to $\pm 1$ for the skewness and up to $\pm 3$ for the kurtosis were used.	Hair et al (2006); West et al. (1995); Kline (2005)
Descriptive statistics(i.e. frequencies, means, standard deviations, and so on)	SPSS 16.0	to summarize demographic information and items analysis	these analyses were performed for each variable separately and to summarise the demographic profile of the respondents in order to get preliminary information and the feel of the data	Sekaran (2000)
Cronbach's Alpha	SPSS 16.0	to examine the internal consistency of each measure	a minimum cut off of 0.7 for Cronbach's alpha reliability coefficients was employed	Nunnally (1978); Hair et al. (2006)
Pearson's Correlations	SPSS 16.0	to obtain preliminary information about relationships between latent factors	correlation vary from no to excellent relationship depending on the r value	Fink (1995)



Levene's test	SPSS 16.0	to test the homogeneity of variance in the data	the p-value of Levene's test greater than some critical value (typically 0.05), suggests homogeneity of the variance in the data	Levene (1960)
Exploratory factor analysis (EFA)	SPSS 16.0	to summarise information from many variables in the proposed research model into a smaller number of factors	principal components analysis (PCA) and orthogonal model with varimax rotation was employed to perform EFA	Tabachnick and Fidell (2007); Miller et al. (2002); Bryman and Cramer (2005)
Confirmatory factor analysis (CFA)	SEM using AMOS 16.0	to assess unidimensionality, reliability and validity of constructs used in the model	the minimum cut off criteria for factors loadings >0.7, AVE >0.5, and reliability >0.7 were used for assessing the convergent validity. nomological validity was assessed using correlations (estimates). Positive and significant estimates indicated nomological validity. for discriminant validity, the average variance extracted (AVE) for each construct was compared with the corresponding squared inter construct correlations (SIC); the AVE larger than the SIC indicates discriminant validity	(Hair et al., 2006)
Path analysis	SEM using AMOS 16.0	to examine the hypothesised relationships between the latent constructs in the proposed model	critical ratio (CR) estimates value $\geq 1.96$ suggests significance of the causal path between latent constructs	Kline (2005); Hair et al. (2006)

## **4.12 Structure Equation Modelling**

Structural equation modelling (SEM) is collection of statistical models that seeks to clarify and explain relationships among multiple latent variables (constructs). In SEM, researchers can examine interrelated relationships among multiple dependent and independent constructs simultaneously (Hair et al., 2006). Consequently, SEM analytical techniques have been used in many disciplines and have become an important method for analysis in academic research (Byrne, 2001; Kline, 2005; Hair et al., 2006). In addition, SEM is a multivariate statistical approach that allows researchers to examine both the measurement and structural components of a model by testing the relationships among multiple independent and dependent constructs simultaneously (Gefen et al., 2000; Tabachnick and Fidell, 2001). Thus, structural equation modelling techniques were most suitable for this research study involving multiple independent-dependent relationships that were hypothesised in the proposed research model, which was described in Chapter 3.

SEM software package called Analysis of Moment Structures (AMOS), version 16, was used in this research study to explore statistical relationships between the test items of each factor and among the factors of independent variables (i.e. PU, PEOU, and others) and the dependent variable (i.e., Behavioural intention). The reasons for selecting the SEM for data analysis were: Firstly, it offered a systematic mechanism to validate relationships among constructs and indicators and to test relationships between constructs in single model (Hoyle, 1995, Hair et al., 2006). Secondly, it offered powerful and rigorous statistical techniques to deal with complex models (Bryne, 2001; Tabachnick and Fidell, 2001; Hair et al, 2006). In SEM, relationships among constructs and indicators are validated by using confirmatory factor analysis (CFA), also known as measurement model, and relationships between constructs are tested using the structural model (Bentler, 1995; Hoyle, 1995, Hair et al., 2006), which are described below.

### **4.12.1 Measurement model**

CFA is very important technique of SEM (Kline, 2005) and is generally applied when there is some background knowledge of the underlying constructs and

measurement items (Byrne 2001). However, it is highly recommended that confirmatory factor analysis (CFA) should be performed after exploratory factor analysis (EFA) in order to verify and confirm the scales derived from EFA (Hair et al., 1998; Byrne, 2001). In practice, unlike EFA, CFA is technique used to confirm a priori hypothesis about the relationship between set of indicator variables (measurement items) and their respective latent variables (Byrne, 2001). There are two broad approaches used in CFA to evaluate the measurement model: (1) deciding the goodness of fit (GOF) criteria indices, (2) and evaluating the validity and reliability of measurement model (Hair et al., 2006). Therefore, the researcher used the measurement model in this research for assessing the unidimensionality, validity, and reliability of the measures, which are explained as follows.

### **Goodness of fit indices**

Structural equation modelling (SEM) has three main types of fit measure indices: absolute fit indices, incremental fit indices, and parsimonious fit indices (Hair et al., 1998). The absolute fit indices are used to assess the ability of the overall model fit and these indices include the likelihood ratio statistic chi-square ( $\chi^2$ ), in association with root mean square error of approximation (RMSEA), and the goodness of fit index (GFI) (Hair et al., 1998). The incremental fit indexes are used to compare the proposed model to some baseline model and the incremental fit indices consist of normed fit index (NFI), and comparative fit index (CFI) (Hair et al., 1998; Hair et al., 2006). The parsimonious fit indices are used to investigate whether the estimated model is simpler or can be improved by specifying fewer estimated parameter paths (Hair et al., 1998). The parsimonious fit index includes the adjusted goodness-of-fit index (AGFI). Details of these fit measures and their recommended level are presented in Table 4.10.

Table 4.10 Goodness of Fit Statistics in SEM

Index	Abbreviation	Type of fit measure	Recommended criteria	References
chi square	$\chi^2$	Model fit	$\chi^2$ , df, p >0.05	Joreskog and Sorbom (1988);
Normed chi square	$\chi^2/df$	Absolute fit and parsimony of model	$1.0 < \chi^2/df < 3.0$	Hair et al. (1998);
Goodness-of-fit index	GFI	Absolute fit	>0.90	Bryne (2001); Hair et al. (2006)
Root mean square error of approximation	RMSEA	Absolute fit	<0.05 good fit <0.08 acceptable fit	
Normed fit index	NFI	Incremental fit	>0.90	
Comparative fit index	CFI	Incremental fit	>0.90	
Adjusted goodness-of-fit index	AGFI	Parsimonious fit	>0.90	

### Model estimates

In addition to the goodness of fit criteria, other standardised estimates are also used to evaluate the measurement model. For example, standardised regression weight (factor loadings), and critical ratio (cr) estimates criteria. This research study used the cut-off point suggested by researchers for these estimates as follows. According to Holmes-Smith (2002), the factor loadings value should be greater than 0.7; however, a value greater than 0.5 is also acceptable (Churchill, 1979). The critical

ratio values should be above 1.96 (Hair et. al., 1998; Byrne, 2001). Table 4.11 summarise these criteria.

Table 4.11 Measurement Model Estimates

<b>Estimates</b>	<b>Recommended values</b>	<b>References</b>
Factor loading	>0.5 acceptable >0.7 good	Churchill, (1979); Holmes-Smith (2002)
Critical ratio (t-value)	>1.96	Hair et., al. (2006); Byrne (2001)
Standard residuals	±2.8	Byrne (2001); Hair et., al. (2006)

As described in the previous section, measurement model explains the interrelationships between observed (indicator) variables and unobserved (latent) variables. In other words, it specifies and aims to confirm which measurement items (indicator variables) relate to the each of its corresponding underlying construct (latent variable). Therefore, CFA (measurement model) was performed in order to identify and confirm the pattern by which measurement items were loaded onto a particular construct (Kline, 2005; Hair et al., 1998). The measurement model was evaluated by using the maximum likelihood (ML) estimation technique provided in the AMOS software (Hair et al., 1998; Tabachnick and Fidell, 2001). The reason of choosing this estimation procedure were: Firstly, this technique is reasonably suitable for medium sized samples and when the model does not meet the criteria of having at least 5 measurement items for each construct (Anderson and Gerbing ,1984; Hair et. al., 1998) because some constructs in this study used less than 5 items. Secondly, the ML estimation technique is fairly unbiased compared to other estimation methods under moderate violations of normality in case of medium size sample, normal data, and when the number of categories in Likert scale are 4 or greater (Bollen, 1989, Kline, 2005; Bryne, 2001). It is reminded that this study used the seven point Likert scale. Finally, ML method is also the most widely used estimator in SEM analysis (Kline, 1998; Tabachnick and Fidell, 2001) because this method minimises the difference between covariance and observed matrices; as a

result, it improves the parameter estimates (Hair et al., 2006). Therefore, in this study, the measurement model was run using the maximum likelihood estimation method as recommended by researchers (Anderson and Gerbing, 1988; Hair et al., 1998; Kline, 2005).

#### **4.12.2 Reliability**

Reliability is concerned with the consistency, stability and reproducibility of measurement results (Sekaran, 2000). It is the most important determinant of measurement instrument's quality, such that, it helps to identify the inconsistencies and their effect on the measurement results. According to Bryman and Cramer (2005), internal reliability is particularly important when there are multiple measurement items for each construct.

In this research, some measurements consisted of multiple items. For example, five items were used to measure behavioural intentions, six items for measuring PEOU, six for PU, and so on, as explained earlier. In the present study, the reliability of the measurement items was evaluated by examining the consistency of the respondent's answers to all the question items in the measure, as recommended (Nunnally, 1978). Cronbach's alpha reliability coefficients were used to measure the internal consistency of each measure. Reliability coefficients less than 0.6 were considered poor, 0.7 were acceptable, and those greater than 0.8 were considered good, as suggested (Sekaran, 2000). Nunnally (1978) suggested that Cronbach's alpha reliability coefficients equal to 0.7 or greater show adequate reliability. While, Hair et al. (2006) suggested the Cronbach's alpha reliability coefficients of 0.7 or higher indicate adequate internal consistency. Therefore, a minimum cut off value of 0.7 for Cronbach's alpha reliability coefficients was employed in the present research to determine the reliability of each measure in order to find out the overall reliability of the each of the latent constructs used in the model.

#### **4.12.3 Validity**

Validity is related with the accuracy of measures (Sekaran, 2000). Zikmund (2003) defined validity as "the ability of a scale to measure what it intended to be

measured” (p.331). In other words, validity determines the extent to which a construct and its corresponding measurement indicators are related, and the extent to which these set of items actually reflect the construct they were designed to measure (Hair et al., 2006). According to Neuman (2003), the better the fit between theoretical latent construct and measured items, the greater establishment of validity. Construct’s validity can be examined by assessing convergent validity, discriminant validity and nomological validity, which are explained as follows.

### **Convergent Validity**

Convergent validity is the extent to which observed variables of a particular construct share a high portion of the variance in common (Hair et al., 2006). Factor loadings of construct, average variance extracted (AVE), and construct reliability (CR) estimation are used to assess the convergent validity of each of the constructs (Hair et al., 2006). In addition, Hair et al. (2006) suggested that ideal standardised loading estimates should be 0.7 or higher, AVE estimation should be greater than 0.5, and reliability estimates should be above 0.7 to show adequate convergent validity. Therefore, in this study, the minimum cut off criteria for loadings  $>0.7$ , AVE  $>0.5$ , and reliability  $>0.7$  were used for assessing the convergent validity.

### **Discriminant validity**

Discriminant validity refers to the extent to which a latent construct is truly distinct from other latent constructs (Hair et al., 2006). Discriminant validity was assessed by a method, suggested by Hair et al. (2006), in which the average variance extracted for each construct is compared with the corresponding squared inter-construct correlations (SIC), and the AVE estimate consistently larger than the SIC estimates indicates support for discriminant validity of the construct. This procedure was used in this research to assess the discriminant validity of each of the constructs.

### **Nomological validity**

Nomological validity refers the degree to which a construct behaves as it should within a system of related constructs (Bagozzi, 1980). Nomological validity is tested by examining whether or not the correlations between the constructs in the

measurement model make sense (Hair et al., 2006). This type of the validity can be supported by demonstrating that the CFA latent constructs are related to other latent constructs in the model in a way that supports the theoretical framework. For nine construct model proposed in this research study (as described in chapter 3), all constructs were defined as positive and significant. Therefore, to demonstrate nomological validity the latent constructs must be positively related as suggested in the theoretical model (Hair et. al. 2006). The construct correlations (estimates) were used to assess the nomological validity of the model.

#### **4.12.4 Structural model evaluation and hypothesis testing**

As discussed in earlier in this chapter, this research applied a two-step approach in the structural equation modelling analysis. In the first step, measurement model evaluation was achieved by examining unidimensionality, reliability, and validity of latent constructs using CFA. Hence, the structural model can be tested as a next main stage to examine the hypothesised relationships between the latent constructs in the proposed model (Kline, 2005; Hair et al., 2006). The structural model (hypothesised model) depicts the relationship among the latent constructs, as presented in chapter 3. In other words, it aims to specify which constructs directly / indirectly influence the values of other constructs in the model (Byrne, 2001). Results of structural model testing are presented in chapter five.

#### **4.13 Ethical considerations**

It is very important to address ethical issues in any kind of research despite the fact that it is a very difficult and strenuous process (Busher and Clarke, 1990). “The application of moral knowledge and wisdom then turns out to be governed as much by reflective judgment as by rule-following and the practicing of skills” (Lovlie, 1993, p. 76). Since researchers are human beings, so they are open to making mistakes, and sometimes do not become successful in addressing all ethical issues (Cohen et al., 2000). In order to avoid making mistakes in addressing ethical issues, it has been suggested that the researchers “need two attributes: the sensitivity to identify an ethical issue and the responsibility to feel committed to acting appropriately in regard to such issues” (Eisner and Peshkin, 1990, p. 244).



In addition, Busher (2002) believes that ethical codes vary from person to person, culture to culture, and from one context to the other. Something acceptable in one setting may be considered unethical or even unacceptable in another. “The application of ethics to research is situated in and depends on how each situation is deconstructed to understand the needs of all the participants in it, including the researchers and research sponsors” (p. 87). Moreover, ethical decisions involve trade-off where a researcher should have a compromising attitude. Cohen et al. (2000) argue that researchers need “to strike a balance between the demands placed on them as professional scientists in the pursuit of truth, and their subjects’ rights and values potentially threatened by the research” (p. 49). Therefore, a give and take attitude should be adopted in which the researchers’ interests and the peoples’ (audience's) right to know should be evaluated against the informants’ (participants’) right for privacy and confidentiality (Frankfort-Nachmias and Nachmias, 1992). In other words, “the value of the best research is not likely to outweigh injury to a person exposed. Qualitative researchers are guests in the private spaces of the world. Their manners “should be good and their code of ethics strict” (Stake 2005, p. 459).

In the research, privacy involves issues regarding the usage of the information received from the participants (Denier and Crandall, 1978) while confidentiality involves the issue of safeguarding the identity of the participants (Cohen et al., 2000). For addressing the issue of confidentiality, Kvale (1996) suggested that data that identify participants should be excluded. In case, a researcher wants to include the name and identity of the participants for some publishing purpose, it is very essential to receive consent of subjects for the release of identifiable information. Such kind of information should also be shared with participants when receiving their consents at the beginning of the research. Therefore, “The protection of subjects’ privacy by changing their names and identifying features is an important issue in the reporting...” (Kvale, 1996, p.14). Cohen et al. (2000) insisted by saying that the participants should not be betrayed by revealing their personal information in public without getting their consent. Cohen et al. (ibid) also remarked that participants should have the right to participate, withdraw or even refrain from taking part in the study.

Hence, it is essential that the researcher seek approval for access to the potential participants before starting the research study. Getting approval for access may not be difficult for those researchers who conduct the study in the context where they are employed and work as a member of staff; however, getting access approval in other contexts is not so simple.

In addition, Eisner (1991) contends that “we all like the idea of informed consent, but we are less sure just who is to provide that consent, just how much consent is needed, and how we inform others so as to obtain consent when we have such a hard time predicting what we need to get consent about” (p. 215). Even after getting access, it is suggested that a researcher should have on-going interaction with participants soon after getting their consent so that both (researcher and participants) together can have a common say in the research (Lincoln, 1990).

In this research study, ethical issues were seriously considered during the research process to ensure the integrity of research. In accordance with this, Brunel University requires all projects involving human subjects must have approval from the University’s Research Ethics Committee before conducting the fieldwork. According to the University’s Ethics Policy Guidelines, the researcher is required to fill the Ethics Form, which must be signed by researcher and approved by the research student’s supervisor. Accordingly, Brunel University Research Ethics application form was filled and signed by the researcher and supervisors and then it was submitted to the academic programme office for ethics approval to conduct this research study.

In conformity with the ethics requirements, a covering letter was also attached with the questionnaire stating the purpose of the study. The names and the address of the researcher, and his university were included in the covering letter to increase respondent’s confidence and to ensure respondents to know with whom they were dealing (Cooper and Schindler, 2001). The respondent’s information was kept confidential and they were not described in any way that allows them to be identified. To maintain the confidentiality and privacy of the respondents, only

aggregate results were used in reporting results of this study. Participant's personal information was not been identified in any of the study findings. In addition, the data collected were not been used for any purpose other than as stated in the study objectives, which were only aimed for academic research for fulfilment of the requirements of a PhD thesis

#### **4.14 Conclusions**

The aim of this chapter was to discuss and choose the appropriate methodology and to discuss statistical techniques used in this study. It was identified that in the domain of methodology, two main research approaches were highly appreciated, namely positivist, and interpretivist. Positivist approach is widely known as a scientific approach and it is quantitative in nature while the interpretivist approach is commonly known as a qualitative approach. However, both philosophical approaches have positive and negative impacts on different context of research in one way or another but the main concern is the same. Both of these approaches were discussed in detail with the proper justifications for the selection of a particular research methodology.

This study adopted the quantitative (positivist) approach, as it was consistent with the topic. In fact, prior research suggested that the normal process under a positivistic approach is to study the literature to establish an appropriate theory and construct hypotheses. Therefore, this study was within the domain of positivist approach rather than interpretivist approach, as the model was developed after thorough investigation of literature, hypothesized model was proposed (see chapter 3), in order to determine acceptance of online banking information system. In addition, a cross-sectional quantitative approach using a survey tool was employed to collect the data. The survey method was used because it was designed to deal more directly with the respondents' thoughts, feeling and opinions, especially when collecting information regarding attitudes and beliefs is concerned. Moreover, survey approach offers more accurate means of evaluating information about the sample and enables the researcher to draw conclusions about generalising the findings from a sample to the population. Additionally, surveys methods are quick, economical,

efficient, and can easily be administered to a large sample.

In order to collect the data for this study, a questionnaire was developed. The question items were adopted from prior relevant research. The adapted items were validated, and wording changes were made to tailor the instrument for the purposes of this study. The question items and response categories were better developed to motivate the respondents to participate in the research study. The researcher made utmost effort to keep the questions quite simple and easy to read and comprehend so that the respondents should not misunderstand them or they become disinterested in taking part in the study. The questionnaire was then administered to the users personally as well as it was sent to the potential participants by post and electronic mail.

Previous research suggests that a pre-test and pilot study are both essential parts of questionnaire survey design and they must be conducted prior to the initial data collection phase or main survey in order to validate instrument and to ensure that the survey questionnaire is free of errors and ambiguities. Thus, one pre-test and a pilot study were conducted prior to using the final survey questionnaire in the main study. The main purpose of pre-testing and pilot study was to avoid participants' confusions and misinterpretations as well as to identify and detect any errors and ambiguities. In addition, a pilot study was also used to test the reliability of measurement items used in the questionnaire, most of the items showed adequate reliability.

SPSS 16.0 was used to analyse the quantitative data collected from the questionnaires. This software package is widely accepted and used by researchers in different disciplines, thus, this tool has been used to screen the data of this research study in terms of data coding, treatment of missing data (i.e., using ANOVA), identification of outliers (i.e., Mahalanobis Distance ( $D^2$ )) test and find out the data normality (i.e. using kurtosis and skewness statistics. In addition, SPSS was also applied to perform descriptive statistics such as frequencies, percentages, mean values, and standard deviations.

Structural equation modelling (SEM) software package AMOS 16.0, was used in this research study to explore statistical relationships between the test items of each factor and among the factors of independent variables (i.e. PEOU, PU, trust, and others) and the dependent variable (i.e., Behavioural intentions).

This research study applied a two-step approach in the SEM analysis as suggested by prior research. In the first step, measurement model evaluation was achieved by examining unidimensionality, validity, and reliability of latent constructs using CFA. In the next step, the structural model was tested to examine the hypothesised relationships between the latent constructs in the proposed research model. Finally, the ethical issues were also addressed. Results of the main study are presented next.

## **CHAPTER FIVE**

### **Results**

Results of this study are presented in this chapter, which is divided into seven sections. The first section provides the response rate achieved and non-response bias. The second section reports demographic characteristics of respondents. The third section presents missing values. The fourth section gives descriptive statistics of items of measured constructs. The fifth section reports results of exploratory factor analysis. The sixth section presents findings of confirmatory factor analysis. The seventh (final) section describes results of hypotheses tested in this study.

#### **5.1 Response Rate and Non-response Bias**

##### **5.1.1 Response rate**

In this study, 375 questionnaires were returned out of 900 distributed, which represented a response rate of 41.7% of the original sample. However, among those returned questionnaire, 22 responses were discarded because four of them were returned completely blank, five respondents had put the same answers on all the Likert scale items. Seven respondents mentioned that they had never used internet before (i.e. not satisfying inclusion criteria) and six questionnaires were partially answered (i.e. some questions and/or some parts such as demographic questions were left blank). Therefore, remaining 353 questionnaires were used for further data analysis. Consequently, the final response rate in this study was 39.2%.

##### **5.1.2 Non-response bias**

It was not possible for the researcher to obtain the demographic information of all non-respondents in order to compare them with the respondents for direct bias test. Thus, to check any potential non-response bias, the researcher assumed that people who failed to fill the questionnaire were more like those who delayed in responding rather than those who answered right away, as suggested (Babbie, 1990, p 180). Therefore, questionnaires received at different point of time of the data collection (i.e. early respondents and late respondents) were used in analysis to assess the non-response bias. Four demographic variables i.e. age, education, monthly income, and

occupation were compared between the first 40 respondents and the last 40 respondents. The responses in between these two sub-samples were deleted to ensure a significant separation between the early and the late responders. Analysis of variance (ANOVA) statistical test was used to estimate the response bias. For each variable, the mean value for the first 40 respondents was compared with that for the last 40 respondents and the results are shown in Table 5.1.

Table 5.1 Response Bias Analysis: Demographic Data

<b>Respondents' Characteristics</b>	<b>ANOVA (First 40-Last 40)</b>	
	F	Sig.
Age	.795	.505
Education	.831	.486
Income	1.022	.409
Occupation	.477	.700

The results (Table 5.1) revealed that there were no statistically significant differences between the early and late respondents. Thus, it may be implied that respondents were not different from the non-respondents. Consequently, non-response bias was not considered as a serious limitation in this research survey. Besides, it also served the true purpose of the survey, which was to achieve a satisfactory but unbiased sample of the population.

## **5.2 Demographic Characteristics of Participants**

This section presents the demographic characteristics of the respondents of the survey questionnaire. Results of participants' gender, age, education, occupation and average monthly income (given in Pakistani currency i.e. rupees (Rs) are shown in Table 5.2a.

### **Gender**

Table 5.2a shows that the majority of the respondents were male (71.4%) and the ratio of the male participants to the female participants were 7 to 3.

**Age**

Results (Table 5.2a) revealed that the majority i.e. 73.4% (40.9+32.9) of respondents was aged between 20-40 years. The second highest number (15.9%) of respondents was of those aged between 40-50 years old.

**Education**

Most of the participants in this survey reported highest level of education as a Bachelor degree (49.3%) followed by postgraduate qualifications (30.4%).



Table 5.2a Demographic Characteristics of Survey Respondents (n=353)

<b>Variable</b>	<b>Category</b>	<b>Frequency</b>	<b>%</b>
<b>Gender</b>	Male	252	71.4
	Female	99	28
	Missing	2	0.6
<b>Age</b>	< 20	20	5.7
	20-30	143	40.5
	31-40	116	32.9
	41-50	56	15.9
	51-60	14	4.0
	>60	1	0.3
	Missing	3	0.8
	<b>Education</b>	Less than high school	12
High school		49	13.9
Diploma		9	2.5
Bachelor degree		174	49.3
Post-graduate degree		109	30.9
<b>Occupation</b>	Student	44	12.5
	Government employee	105	29.7
	Private sector	136	38.5
	Businessperson	63	17.8
	Other	5	1.4
<b>Income (rupees)</b>	< 10,000 Rs	63	17.8
	10,000-20,000 Rs.	122	34.6
	21,000-30,000 Rs.	87	24.6
	31,000-40,000 Rs.	41	11.6
	41, 000-50,000 Rs.	15	4.2
	>50,000 Rs.	23	6.5
	Missing	2	0.6

### **Occupation**

Five categories of occupation (profession) were presented to respondents to choose the one which best reflects their occupational status. The largest percentage of the participants was private sector employees (38.5%), while the government employees were second highest number of respondents (29.7%) followed by businessperson (17.8%).

### **Income**

The largest group of respondents (34.6%) had monthly income between Rs. 10,000 and Rs. 20,000 whereas the highest monthly income i.e. from Rs.40, 000 to Rs. 50,000 was reported by 4.2% of the respondents.

### **Participants' Internet usage**

Results of participants' exposure to internet use by location and duration as well as use of online banking system are presented in Table. 5.2b. Results revealed that the highest percentage (36.5%) of participants used the Internet at home followed by internet use at workplace (30.3%) while the lowest percentage (4.5%) of participants used the internet at a library. The highest percentage (28.3%) of participants had experience of using the Internet for 3-4 years while about 28% of participants had used the internet for more than six years in this sample.

Table 5.2b Participants' Experience of Internet Use (n=353)

	Frequency	Percent
<b>Location of Internet Usage</b>		
At home	129	36.5
At work	122	34.7
At school / university	67	19
In a library	16	4.5
Internet café	19	5.4
<b>Internet Experience</b>		
<1 years	24	6.8
1-2 years	56	15.9
3-4 years	100	28.3
5-6 years	75	21.2
>6 years	98	27.8

### 5.3 Descriptive Statistics of Construct Items

This section presents descriptive statistics of survey constructs as follows.

#### 5.3.1 Behavioural intention

The respondents were first asked to indicate their intentions of using online banking system in the future. Five –items on a seven point Likert scale ranging from strongly disagree (scale 1) to strongly agree (scale 7) were used to measure this construct. The results of the respondents' ratings for each item of this construct are reported in Table 5.3. The mean scores ranged between 4.78 ( $\pm 1.916$ ) and 5.01 ( $\pm 1.846$ ).

Table 5.3 Descriptive statistics of measured items of behavioural intention (BI) construct

	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness Statistic	Kurtosis Statistic
BI1	5.01	1.846	3.406	-.825	-.470
BI2	4.95	1.776	3.154	-.768	-.446

BI3	4.97	1.838	3.377	-.783	-.523
BI4	4.78	1.916	3.673	-.727	-.628
BI5	4.97	1.781	3.172	-.769	-.504

### 5.3.2 Perceived usefulness

The respondents' perceptions of usefulness were measured by six items using a seven point Likert scale ranging from 'Strongly disagree' (scale 1) and 'Strongly agree' (scale 7). Table 5.4 reports the descriptive statistics of measured items of PU construct. The mean rating of PU construct items was between 4.64( $\pm 1.788$ ) and 4.74( $\pm 1.885$ ). Results show that all items relating to PU were highly rated by the respondents and the entire items' mean score was greater than the neutral point (4).

Table 5.4 Descriptive statistics of measured items of perceived usefulness (PU) construct

	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness Statistic	Kurtosis Statistic
PU1	4.75	1.882	3.543	-.710	-.662
PU2	4.72	1.855	3.442	-.533	-.910
PU3	4.67	1.889	3.570	-.634	-.787
PU4	4.65	1.790	3.205	-.500	-.838
PU5	4.70	1.868	3.490	-.602	-.832
PU6	4.69	1.951	3.807	-.565	-.951

### 5.3.3 Perceived ease of use

Perceived ease of use construct was measured by six-items. Table 5.5 presents descriptive results of measured items of this construct. The highest and lowest mean ratings of the items were 3.42( $\pm 1.940$ ) and 4.88( $\pm 1.842$ ) respectively. In summary, the average mean scores of all items is 4.786 ( $\pm 1.86$ ) indicating that the sample moderately agrees that online banking system is easy to learn, to understand, and to use.

Table 5.5 Descriptive statistics of measured items of the perceived ease of use (PEOU) construct

	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness Statistic	Kurtosis Statistic
PEOU1	4.88	1.842	3.391	-.687	-.698
PEOU2	4.86	1.786	3.190	-.646	-.749
PEOU3	4.81	1.907	3.637	-.707	-.753
PEOU4	4.58	1.940	3.762	-.470	-1.095
PEOU5	4.78	1.826	3.336	-.690	-.628
PEOU6	4.75	1.859	3.455	-.644	-.759

### 5.3.4 Trust

Ten-items were used to measure this construct on a Likert scale ranging from one to seven points. Table 5.6 presents the means and standard deviations of the items measuring the trust construct. The low mean rating observed was 4.53 ( $\pm 1.776$ ) for item TR6 (i.e.) and the highest mean rating of 4.77 ( $\pm 1.774$ ) was reported for TR7 (i.e. rely the ability of online bank protects privacy).

Table 5.6 Descriptive statistics of measured items of trust (TR) construct

	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness Statistic	Kurtosis Statistic
TR1	4.70	1.851	3.425	-.761	-.564
TR2	4.77	1.774	3.147	-.694	-.590
TR3	4.73	1.847	3.413	-.718	-.598
TR4	4.72	1.860	3.458	-.644	-.754
TR5	4.57	1.894	3.586	-.547	-.926
TR6	4.53	1.776	3.153	-.509	-.804
TR7	4.65	1.865	3.479	-.595	-.777
TR8	4.63	1.924	3.701	-.545	-.907
TR9	4.68	1.885	3.552	-.610	-.897
TR10	4.69	1.812	3.282	-.594	-.765

### 5.3.5 Technological Self-efficacy

Table 5.7 reports the summary of the descriptive statistics of the respondents reported levels of technological self-efficacy (TSE) concerning their usage of OBIS on a 7-point scale ranging from 1 referring to “strongly disagree” to 7 referring to “strongly agree”. There were five items to measure this construct. The highest mean rating of 4.87 ( $\pm 1.795$ ) was found for TSE1 item while the lowest mean rating was 4.72 ( $\pm 1.757$ ) for TSE5 item. The average mean score of TSE construct items was 4.78 reflecting that respondents were agreeable to the variables. The average standard deviation of 1.78 showed that the respondents were not too much dispersed around their mean score.

Table 5.7 Descriptive statistics of measured items of technological self-efficacy (TSE) construct

	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness Statistic	Kurtosis Statistic
TSE1	4.87	1.795	3.224	-.785	-.458
TSE2	4.84	1.836	3.371	-.756	-.526
TSE3	4.73	1.802	3.248	-.620	-.670
TSE4	4.76	1.716	2.946	-.604	-.655
TSE5	4.73	1.757	3.086	-.660	-.565

### 5.3.6 Accessibility

A two-item scale was used to measure the accessibility construct and Table 5.8 shows the means and standard deviation of items measuring this construct. The findings show that both items i.e. AC1 (online banking system is accessible) and AC2 (access to online banking system is unrestricted) had mean over 4 (i.e. neutral point). The average mean ratings for both items of this construct were 4.59 ( $\pm 1.98$ ). This indicated that respondents were agreeable to the measurement variables.

Table 5.8 Descriptive statistics of measured items of accessibility (AC) construct

	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness Statistic	Kurtosis Statistic
AC1	4.62	1.991	3.963	-.507	-1.063
AC2	4.55	1.961	3.845	-.442	-1.083

### 5.3.7 Terminology clarity

This construct was measured by two items on a Likert scale reflecting the respondent's assessment of the terminology used in online banking information systems. Table 5.9 presents descriptive results of this construct, which shows that the mean of individual item was over the neutral point (4) indicating that respondents were agreeable to the variables. The average mean rating for this construct was 4.65(±1.93).

Table 5.9 Descriptive statistics of measured items of terminology clarity (TC) construct

	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness Statistic	Kurtosis Statistic
TC1	4.69	1.944	3.779	-.566	-.898
TC2	4.62	1.918	3.680	-.572	-.904

### 5.3.8 Output Quality

Two-items were used to measure this construct on a seven point Likert scale ranging from 1 “strongly disagree” to 7 “strongly agree”. Table 5.10 shows the descriptive statistics (means and standard deviations) of the items measuring this construct. The mean score of both items was 4.45(±1.93), which indicated that participants’ agreement with the measured variables.

Table 5.10 Descriptive statistics of measured items of output quality (OQ) construct

	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness Statistic	Kurtosis Statistic
OQ1	4.42	1.956	3.825	-.412	-1.116
OQ2	4.47	1.904	3.625	-.384	-1.106

### 5.3.9 Response Time

This construct was also measured by two items, which were measured on a seven point Likert scale ranging from 1 “strongly disagree” to 7 “strongly agree”. Table 5.11 presents the descriptive statistics (mean and standard deviations) of the construct items. The mean score of both items for this construct was 4.73 ( $\pm 1.87$ ), which was higher than scale point 4.00 (the neutral scale) indicating participants’ agreement on these variables.

Table 5.11 Descriptive statistics of measured items of response time (RT) construct

	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness Statistic	Kurtosis Statistic
RT1	4.76	1.818	3.307	-.663	-.651
RT2	4.70	1.917	3.675	-.629	-.828

### 5.4 Missing Data

Found in this research study. In doing so, first the amount of missing values is presented. Then, randomness of missing data is investigated and finally handling of missing data is described.

#### 5.4.1 The amount of missing data

Table 5.12 presents both the frequency and the percentage of missing data. None of the items had more than 1 percent of missing observations. The maximum percentage of missing data was 0.8 percent. This amount is very low and can be considered acceptable.



Table 5.12 Missing data statistics

Variables Construct	Item	Valid N	Missing values	
			Count	%
Perceived usefulness	PU1	352	1	0.3
	PU2	351	2	0.6
	PU3	352	1	0.3
	PU4	353	0	0.0
	PU5	351	2	0.6
Perceived Ease of Use	PEOU1	352	1	0.3
	PEOU2	352	1	0.3
	PEOU3	350	3	0.8
	PEOU4	351	2	0.6
	PEOU5	352	1	0.3
	PEOU6	353	0	0.0
Trust	TR1	353	0	0.0
	TR2	352	1	0.3
	TR3	352	1	0.3
	TR4	353	0	0.0
	TR5	351	2	0.6
	TR6	352	1	0.3
	TR7	352	1	0.3
	TR8	353	0	0.0
Technological Self-efficacy	TSE1	351	2	0.6
	TSE2	353	0	0.0
	TSE3	353	0	0.0
	TSE4	352	1	0.3
	TSE5	352	1	0.3
Accessibility	AC1	350	3	0.8
	AC2	352	1	0.3
Terminology Clarity	TC1	352	1	0.3
	TC2	351	2	0.6
Output Quality	OQ1	351	2	0.6
	OQ2	350	3	0.8
Response Time	RT1	352	1	0.3
	RT2	352	1	0.3
Behavioural Intentions	BI1	351	2	0.6
	BI2	353	0	0.0
	BI3	352	1	0.3
	BI4	353	0	0.3

### 5.4.2 Randomness of missing Data

Although the amount of missing data was very low, it was worth pausing to investigate the randomness of missing data before moving for inferential analysis. This researcher used Roderick J.A. Little's (1988) chi-square statistics for diagnosing the randomness of missing data (In SPSS select Analyse, Missing Value Analysis, and check EM estimation). Little (1988) suggested that if the p value for the MCAR test is not significant then the data might be assumed to be missing completely at random (MCAR). The statistical results of the Little's MCAR test are shown in Table 5.13, which indicates that the test is NOT significant ( $p = .750$ ). Thus, it was safely concluded that the missing data in this study was Missing Completely at Random

Table 5.13 Little's MCAR test results

Chi Square ( $\chi^2$ )	Df	Sig.
849.338	878	.750

### 5.4.3 Handling with missing data

As described earlier, the amount of missing data was acceptably low and the pattern of missing values was not specific that is it was missing in completely randomly. Therefore, the researcher applied 'regression imputation' technique to replace missing data, as recommended by Byrne (2001) and Arbuckle (2003). Moreover, as suggested by Frane (1976), regression imputation was undertaken in two steps. In the beginning, the relationships among variables were estimated and then the missing values were estimated by using the regression coefficients. The procedure is provided by SPSS version 16.0.

### 5.5 Outliers

The univariate outliers were identified by determining frequency distributions of Z-scores of the observed data, as suggested (Kline. 2005). However, no univariate outlier was identified for this study, because it utilized a 7 point Likert scale ranging from (1) strongly disagrees to (7) strongly agree. If respondents answered strongly

disagree or strongly agree, these response options could become outliers, as they are the extreme points of the scale.

The multivariate outlier were checked by determining the Mahalanobis distance ( $D^2$ ), which is a measure of distance in standard deviation units between each observation compared with the mean of all observations (Byrne 2001; Kline, 2005; Hair et al., 2006). A large  $D^2$  identifies the case as an extreme value on one or more variables. A very conservative statistical significance test such as  $p < 0.001$  is recommended to be used with  $D^2$  measure (Kline 2005; Hair et al., 2006). In this research study, Mahalanobis distance was measured using SPSS version 16.00 and then it was compared with the critical  $\chi^2$  value of 73.402 with corresponding degrees of freedom ( $df = 40$ ), which was equal to number of independent variables at the probability of  $p < 0.001$  (Tabachnick and Fidel 2001). Results of multivariate outliers are shown in Table 5.14, which shows that there were eleven cases with  $D^2$  greater than the critical value mentioned above.

Table 5.14 Mahalanobis Distance for Multivariate outliers

<b>Observation Number</b>	<b>Mahalanobis D<sup>2</sup></b>
130	96.21806
118	86.13513
116	85.48574
109	82.27371
108	82.04677
94	77.76161
110	77.28054
84	76.5852
83	76.22281
81	76.07202
70	75.79791
135	74.88728

Although results from Table 5.14 revealed that there were a few outliers. However, Hair et al. (2006) suggested that the deletion of outliers might improve the multivariate analysis but at the risk of limiting generalisability. Therefore, this researcher decided to retain all the multivariate outlier cases.

### **5.6 Data Normality for Individual Item**

Data normality for individual measured items was checked by determining the skewness and kurtosis statistics, which are shown in tables 5.3 to 5.11. The skewness and kurtosis statistics were found less than  $\pm 1$ , which indicated no deviation from data normality.

### **5.7 Exploratory Factor Analysis**

Employing the Principal components analysis (PCA) and orthogonal method with varimax rotation, exploratory factor analysis was performed using SPSS (version 16.0).

### 5.7.1 KMO and Bartlett's Test of Sphericity.

The result of KMO and Bartlett's Test of Sphericity are presented in Table 5.15, which shows that the value of Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy value was .937 and the Bartlett's test of sphericity was ( $p < .001$ ), which revealed the appropriateness of sample data for conducting factor analysis.

Table 5.15 KMO statistics and Bartlett's test of sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		
		.937
Bartlett's Test of Sphericity	Approx. Chi-Square	11146.480
	Df	666
	Sig.	.000

### 5.7.2 Communalities

Communalities between measured items loaded on the EFA model varied from .630 for PEOU4 item to .904 for OQ2 and RT1 items (Table 5.16). The lowest communality of the PEOU4 item showed that this item was the weakest measured item, which might be dropped.

Table 5.16 Communalities

	Initial	Extraction
BI1	1.000	.843
BI2	1.000	.804
BI3	1.000	.828
BI4	1.000	.830
BI5	1.000	.840
PU1	1.000	.806
PU2	1.000	.804
PU3	1.000	.816
PU4	1.000	.807
PU5	1.000	.831
PEOU1	1.000	.801
PEOU2	1.000	.814
PEOU3	1.000	.789
PEOU4	1.000	.630
PEOU5	1.000	.798
PEOU6	1.000	.827
TR1	1.000	.747
TR2	1.000	.733
TR3	1.000	.793
TR4	1.000	.739
TR5	1.000	.770
TR6	1.000	.771
TR7	1.000	.781
TR8	1.000	.806
AC1	1.000	.883
AC2	1.000	.875
TC1	1.000	.886
TC2	1.000	.888
OQ1	1.000	.895
OQ2	1.000	.904
RT1	1.000	.904
RT2	1.000	.889
TSE1	1.000	.701
TSE2	1.000	.770
TSE3	1.000	.761
TSE4	1.000	.777
TSE5	1.000	.790

Note: Extraction Method: Principal Component Analysis.

### 5.7.3. Exploratory factors extraction model

Kaiser's criterion of Eigen values greater than one and the scree plot were applied for factors' extraction. Table 5.17 presents results of factors' extraction on the basis of the eigenvalues greater than 1 criterion, which resulted in identification of nine factors. The first factor explained 38.308% of the total variance and other eight factors explained the remaining variance in the model.

Table 5.17 Total number of factors extracted and total variance explained in EFA model.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	14.174	38.308	38.308	14.174	38.308	38.308	6.298	17.022	17.022
2	3.645	9.852	48.160	3.645	9.852	48.160	4.836	13.071	30.094
3	2.396	6.475	54.634	2.396	6.475	54.634	4.048	10.940	41.034
4	2.363	6.386	61.020	2.363	6.386	61.020	3.841	10.382	51.416
5	1.911	5.165	66.185	1.911	5.165	66.185	3.832	10.357	61.773
6	1.584	4.280	70.466	1.584	4.280	70.466	1.784	4.822	66.595
7	1.415	3.824	74.290	1.415	3.824	74.290	1.778	4.804	71.399
8	1.406	3.799	78.089	1.406	3.799	78.089	1.767	4.776	76.176
9	1.040	2.810	80.899	1.040	2.810	80.899	1.748	4.724	80.899
10	.510	1.379	82.278						

Note: Extraction Method: Principal Component Analysis

Figure 5.1 shows the Scree plot test used to confirm the maximum number of factors extracted in this model under eigenvalues greater than one criterion. The slope of the Scree plot revealed extraction of nine factors, which confirmed extraction of the same number of factors through the eigenvalues criterion

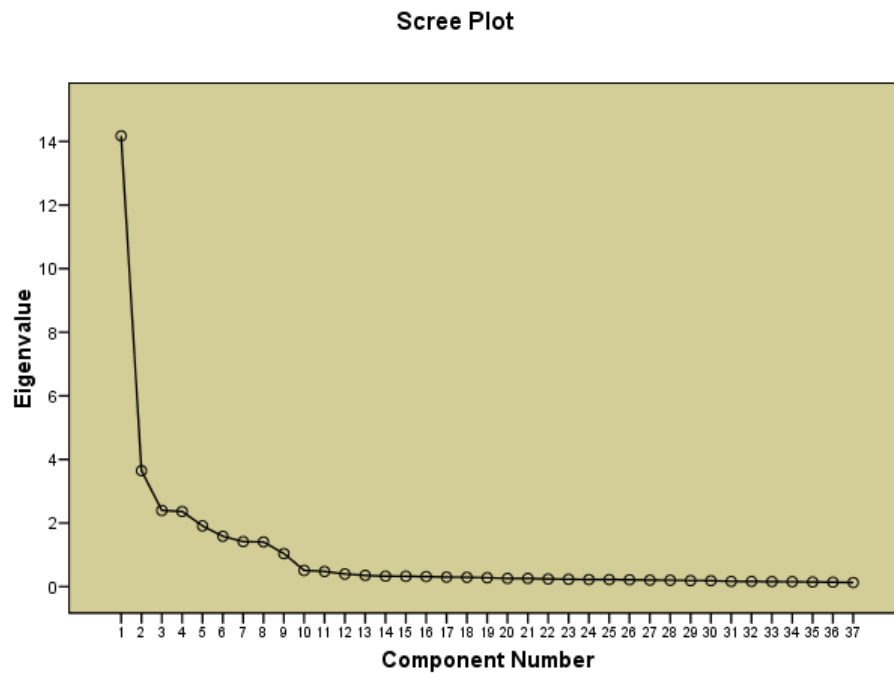


Figure 5.1 Scree plot

#### 5.7.4 Loadings of measured items on latent factors

The rotated component matrix (Table 5.18) presents loadings of each measured item on each of the nine latent factors identified in the EFA model. The loading matrix shows that the measured items have high loadings on their hypothesised constructs and the cross loadings between them and other factors are lower than the minimum criteria of .30. This confirms the convergent and divergent reliabilities of the constructs and their measured items.



Table 5.18 Rotated Component Matrix

	Component								
	1	2	3	4	5	6	7	8	9
TR3	<b>.832</b>	.105	.127	.107	.194	.121	.035	.069	.050
TR7	<b>.829</b>	.088	.149	.151	.157	.089	.027	.041	.073
TR8	<b>.824</b>	.120	.146	.195	.160	.120	.085	.008	.081
TR6	<b>.812</b>	.081	.184	.203	.140	.066	.069	.040	.027
TR5	<b>.799</b>	.113	.193	.207	.172	.035	.021	.074	.045
TR4	<b>.795</b>	.078	.178	.164	.169	.035	.073	.024	.080
TR1	<b>.781</b>	.158	.218	.133	.149	-.030	.069	.114	.077
TR2	<b>.777</b>	.104	.238	.114	.078	-.003	-.016	.170	.120
PEOU3	.088	<b>.864</b>	.067	.104	.079	.080	.061	.001	.051
PEOU2	.111	<b>.850</b>	.112	.137	.123	.104	.117	.061	.066
PEOU6	.143	<b>.841</b>	.110	.136	.159	.044	.097	.122	.127
PEOU5	.152	<b>.841</b>	.078	.145	.146	.105	.028	.062	.062
PEOU1	.087	<b>.830</b>	.169	.160	.143	.062	.058	.118	.089
PEOU4	.087	<b>.773</b>	-.024	.131	.070	.036	-.016	-.007	.027
PU5	.269	.119	<b>.826</b>	.190	.132	.060	.045	.050	.035
PU1	.230	.092	<b>.811</b>	.220	.128	.073	.069	.035	.107
PU4	.250	.147	<b>.801</b>	.196	.140	.057	.053	.065	.109
PU3	.288	.100	<b>.794</b>	.213	.176	.044	.089	.081	-.008
PU2	.257	.041	<b>.784</b>	.277	.134	.061	.046	.113	.089

BI5	.243	.220	.237	<b>.803</b>	.121	.085	.048	.089	.010
BI4	.245	.169	.252	<b>.797</b>	.156	.063	.092	.042	.063
BI1	.275	.225	.215	<b>.779</b>	.204	.105	.010	.070	.078
BI3	.261	.201	.287	<b>.772</b>	.134	.091	.073	.086	.049
BI2	.238	.200	.236	<b>.756</b>	.205	.139	.116	.072	.021
TSE4	.222	.057	.100	.046	<b>.830</b>	.109	.078	.070	.020
TSE3	.194	.084	.111	.157	<b>.816</b>	.026	.057	.089	.036
TSE5	.168	.199	.160	.113	<b>.815</b>	.028	.099	.094	.015
TSE2	.215	.193	.095	.220	<b>.778</b>	.050	.125	.075	.021
TSE1	.187	.203	.186	.154	<b>.740</b>	.043	.036	.089	.084
OQ2	.124	.165	.103	.156	.070	<b>.892</b>	-.009	.147	.069
OQ1	.135	.185	.101	.152	.125	<b>.881</b>	-.016	.128	.022
TC2	.113	.085	.066	.120	.135	-.022	<b>.907</b>	.061	.064
TC1	.082	.158	.131	.079	.159	.000	<b>.895</b>	.018	.061
RT1	.158	.109	.108	.096	.163	.118	.043	<b>.896</b>	-.028
RT2	.174	.151	.133	.133	.179	.166	.045	<b>.859</b>	-.017
AC1	.169	.162	.108	.035	.055	.030	.064	-.040	<b>.898</b>
AC2	.165	.153	.113	.089	.063	.054	.061	.000	<b>.891</b>

Note: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 6 iterations.

### 5.8. Creation of Latent Factors

On the basis of the findings of the exploratory factor analysis, nine latent factors were created by adding (summing) the rating scores of all items loaded on each latent factor; henceforth called as the latent constructs. Following sub-sections provide the item mean values along with standard deviation and Cronbach's alpha reliability of the scales.

#### Trust construct

The reliability statistics of the trust construct (Table 5.19a) revealed .954 Cronbach's alpha reliability for this construct, which comprised eight items obtained through EFA. The summary item statistics (Table 5.19b) for this construct showed the mean value of the items means was 4.675 that confirmed that the sample trusted the online banking. The item total statistics (Table 5.19c) revealed that if item deleted the Cronbach's Alpha could not be increased more than the observed Cronbach's Alpha for this construct in this study.

Table 5.19a Reliability Statistics Trust

Cronbach's Alpha	Cronbach's Alpha Based on	
	Standardized Items	N of Items
.954	.954	8

Table 5.19b Summary Item Statistics Trust

	Mean	Minimum	Maximum	Range	Maximum /	
					Minimum	Variance
Item Means	4.675	4.533	4.773	.241	1.053	.006
Item Variances	3.398	3.147	3.701	.553	1.176	.037
Inter-Item Covariances	2.451	2.118	2.690	.572	1.270	.024
Inter-Item Correlations	.721	.658	.773	.115	1.175	.001

Table 5.19c Item-Total Statistics Trust

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
TR1	32.63	128.581	.812	.678	.949
TR2	32.67	128.028	.789	.649	.950
TR3	32.68	125.842	.842	.719	.947
TR4	32.87	128.597	.811	.676	.949
TR5	32.76	125.975	.835	.712	.947
TR6	32.78	124.896	.833	.704	.947
TR7	32.72	125.413	.840	.713	.947
TR8	32.71	126.359	.854	.740	.946

**Perceived ease of use construct**

Table 5.20a presents the reliability statistics of the perceived ease of use construct, which that comprised six items and shows .938 Cronbach's alpha reliability for this construct. The summary item statistics (Table 5.20b) for this construct revealed the mean value of the items means was 4.776 that confirmed that the sample perceived ease in using the online banking. The item total statistics (Table 5.20c) revealed that, if item deleted, the Cronbach's Alpha for this construct can be increased to .942 by deleting PEOU4 item.

Table 5.20a Reliability Statistics PEOU

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.938	.938	6

Table 5.20b Item Statistics PEOU

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance
Item Means	4.776	4.575	4.878	.303	1.066	.012
Item Variances	3.462	3.190	3.762	.572	1.179	.043
Inter-Item Covariances	2.475	2.130	2.754	.624	1.293	.044
Inter-Item Correlations	.717	.596	.804	.208	1.349	.006

Table 5.20c Item-Total Statistics PEOU

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PEOU1	23.78	66.526	.836	.728	.923
PEOU2	23.80	66.953	.851	.738	.922
PEOU3	23.84	65.859	.825	.687	.925
PEOU4	24.08	69.045	.689	.498	.942
PEOU5	23.87	66.702	.838	.715	.923
PEOU6	23.90	65.798	.855	.754	.921

### Perceived usefulness construct

The perceived usefulness construct was created with five measured items derived after EFA and the reliability statistics of this construct (Table 5.21a) revealed .940 Cronbach's alpha reliability. Table 5.21b presents the summary item statistics for this construct and it revealed 4.695 mean value of the items means, which suggested that the sample perceived usefulness of the online banking. Table 5.21c presents the item total statistics of this construct and it shows that the Cronbach's Alpha for this construct cannot be increased if any item of this construct is deleted.

Table 5.21a Reliability Statistics PU

Cronbach's Alpha	Cronbach's Alpha Based on	
	Standardized Items	N of Items
.940	.941	5

Table 5.21b Summary Item Statistics PU

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance
Item Means	4.695	4.652	4.745	.093	1.020	.001
Item Variances	3.450	3.205	3.570	.365	1.114	.021
Inter-Item Covariances	2.620	2.454	2.724	.270	1.110	.008
Inter-Item Correlations	.760	.728	.785	.057	1.078	.000

Table 5.21c Item-Total Statistics PU

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
PU1	18.73	45.084	.832	.698	.928
PU2	18.76	45.394	.832	.695	.928
PU3	18.81	44.768	.843	.715	.926
PU4	18.82	46.105	.837	.709	.927
PU5	18.78	44.843	.852	.727	.924

### Behavioural intention to use construct

The reliability statistics of the behavioural intention to use construct (Table 5.22a) revealed .947 Cronbach's alpha reliability for this construct, which comprised five items. The summary item statistics for this construct (Table 5.22b) showed the mean value of the items means was 4.935 that showed study participants' positive behavioural intention to use the online banking. The item total statistics (Table 5.22c) revealed that the Cronbach's Alpha for this construct could not be increased more than the observed Cronbach's Alpha if any item is deleted.

Table 5.22a Reliability Statistics BI

Cronbach's Alpha	Cronbach's Alpha Based on	
	Standardized Items	N of Items
.947	.947	5

Table 5.22b Summary Item Statistics BI

	Mean	Minimum	Maximum	Range	Maximum	
					Minimum	Variance
Item Means	4.935	4.779	5.008	.229	1.048	.008
Item Variances	3.356	3.154	3.673	.519	1.164	.044
Inter-Item Covariances	2.619	2.422	2.825	.404	1.167	.014
Inter-Item Correlations	.781	.759	.811	.052	1.069	.000

Table 5.22c Item-Total Statistics BI

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
BI1	19.67	44.529	.862	.749	.933
BI2	19.73	45.887	.837	.701	.937
BI3	19.71	44.696	.859	.740	.933
BI4	19.90	43.808	.855	.735	.934
BI5	19.71	45.366	.860	.743	.933

**Technological self-efficacy construct**

Technological self-efficacy construct was created with five measured items and the reliability statistics of this construct revealed .915 Cronbach's alpha reliability (Table 5.23a). The summary item statistics for this construct revealed 4.783 mean value of the items means (Table 5.23b), which confirms participants' technological self-efficacy regarding the online banking. Table 5.23c provides the item total statistics of this construct and it revealed that the Cronbach's Alpha for this construct cannot be increased more than the observed Cronbach's Alpha if any item of this construct is deleted.

Table 5.23a Reliability Statistics TSE

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.915	.916	5



Table 5.23b Summary Item Statistics TSE

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance
Item Means	4.783	4.725	4.867	.142	1.030	.004
Item Variances	3.175	2.946	3.371	.424	1.144	.027
Inter-Item Covariances	2.172	1.913	2.339	.425	1.222	.016
Inter-Item Correlations	.685	.621	.732	.111	1.180	.001

Table 5.23c Item-Total Statistics TSE

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
TSE1	19.05	39.290	.747	.573	.904
TSE2	19.08	37.926	.797	.643	.894
TSE3	19.18	38.531	.784	.623	.896
TSE4	19.16	39.537	.780	.628	.897
TSE5	19.19	38.558	.810	.662	.891

### Output quality construct

The reliability statistics of output quality construct (Table 5.24a) showed .892 Cronbach's alpha reliability for this construct, which comprised two items. The summary item statistics for this construct (Table 5.24b) revealed the mean value of the items means as 4.448, which showed study sample were positive about the output quality of the online banking. The item total statistics (Table 5.24c) revealed that the Cronbach's Alpha for this construct could not be altered, as there were only two items in this construct.

Table 5.24a Reliability Statistics OQ

Cronbach's Alpha	Cronbach's Alpha Based on	
	Standardized Items	N of Items
.892	.892	2

Table 5.24b Summary Item Statistics OQ

	Mean	Minimum	Maximum	Range	Maximum /	
					Minimum	Variance
Item Means	4.448	4.425	4.470	.045	1.010	.001
Item Variances	3.725	3.625	3.825	.200	1.055	.020
Inter-Item Covariances	2.996	2.996	2.996	.000	1.000	.000
Inter-Item Correlations	.805	.805	.805	.000	1.000	.000

Table 5.24c Item-Total Statistics OQ

	Scale	Corrected	Squared	Cronbach's
	Scale Mean if Item Deleted	Variance if Item Deleted	Item-Total Correlation	Alpha if Item Deleted
OQ1	4.47	3.625	.805	.647
OQ2	4.42	3.825	.805	.647

a. The value is negative due to two items used.

### Terminology clarity construct

The reliability statistics of terminology clarity construct (Table 5.25a) showed .871 Cronbach's alpha reliability for this construct, which comprised two items. The summary item statistics for this construct (Table 5.25b) revealed the mean value of

the items means as 4.448 that showed study sample were positive about the output quality of the online banking. The item total statistics (Table 5.25c) revealed that the Cronbach's Alpha for this construct could not be altered because there were only two items in this construct.

Table 5.25a Reliability Statistics TC

Cronbach's Alpha	Cronbach's Alpha Based on	
	Standardized Items	N of Items
.871	.871	2

Table 5.25b Summary Item Statistics TC

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance
Item Means	4.652	4.618	4.686	.068	1.015	.002
Item Variances	3.729	3.680	3.779	.099	1.027	.005
Inter-Item Covariances	2.879	2.879	2.879	.000	1.000	.000
Inter-Item Correlations	.772	.772	.772	.000	1.000	.000

Table 5.25c Item-Total Statistics TC

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
TC1	4.62	3.680	.772	.596	.(a)
TC2	4.69	3.779	.772	.596	.(a)

a. The value is negative due to two items used

**Response time construct**

Table 5.26a presents the reliability statistics of the response time construct revealing .888 Cronbach’s alpha reliability for this construct, which consisted of two items. Table 5.26b provides the summary item statistics for this construct showing the mean value of the construct items means as 4.73 that revealed that the participants agreed positively with the response time of the online banking. The item total statistics (Table 5.246) for this construct showed that the Cronbach's Alpha for this construct could not be changed due to only two items in this construct.

Table 5.26a Reliability Statistics RT

Cronbach’s Alpha	Cronbach's Alpha Based on	
	Standardized Items	N of Items
.888	.889	2

Table 5.26b Summary Item Statistics RT

	Mean	Minimum	Maximum	Range	Maximum	
					Minimum	Variance
Item Means	4.732	4.703	4.762	.059	1.013	.002
Item Variances	3.491	3.307	3.675	.369	1.111	.068
Inter-Item Covariances	2.790	2.790	2.790	.000	1.000	.000
Inter-Item Correlations	.800	.800	.800	.000	1.000	.000

Table 5.26c Item-Total Statistics RT

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
RT1	4.70	3.675	.800	.640	.(a)
RT2	4.76	3.307	.800	.640	.(a)

a. The value is negative due to two items used

### Accessibility construct

The reliability statistics (Table 5.27a) for the accessibility construct reveal .864 Cronbach's alpha reliability for this construct that consisted two items. The summary item statistics for this construct (Table 5.27b) revealed the mean value of the items means as 4.586, which showed that the participants confirmed the accessibility of the online banking. The item total statistics of this construct (Table 5.27c) revealed that the Cronbach's Alpha for this construct could not be improved because this construct consisted only two items.

Table 5.27a Reliability Statistics AC

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.864	.864	2

Table 5.27b Summary Item Statistics AC

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance
Item Means	4.586	4.552	4.620	.068	1.015	.002
Item Variances	3.904	3.845	3.963	.119	1.031	.007
Inter-Item Covariances	2.972	2.972	2.972	.000	1.000	.000
Inter-Item Correlations	.761	.761	.761	.000	1.000	.000

Table 5.27c Item-Total Statistics AC

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
AC1	4.55	3.845	.761	.580	.(a)
AC2	4.62	3.963	.761	.580	.(a)

a. The value is negative due to two items used

### 5.9 Pearson's Correlations between Latent Factors / Constructs

Bivariate Pearson's correlations were used to test the linearity in data. It is essential part of the preliminary analysis to know the level of correlation in data and to figure out if there is any departure from the linearity that might affect the correlations (Field, 2006). Result of the Bivariate Pearson's correlations between all latent factors /constructs are presented in Table 5.28. All latent factors were positively and significantly correlated with each other ( $p < .01$ ) except the output quality (OQ) construct, which was not significantly correlated with the terminology clarity (TC) construct and the accessibility (AC) construct was not significantly correlated with the response time (RT) construct.

Table 5.28 Pearsons' Bivariate Correlations between latent factors / constructs

	TR	PEOU	PU	BI	TSE	OQ	TC	RT	AC
TR	1								
PEOU	.326(**)	1							
PU	.556(**)	.309(**)	1						
BI	.550(**)	.455(**)	.605(**)	1					
TSE	.473(**)	.377(**)	.424(**)	.469(**)	1				
OQ	.292(**)	.331(**)	.285(**)	.377(**)	.271(**)	1			
TC	.238(**)	.254(**)	.260(**)	.282(**)	.317(**)	.070	1		
RT	.340(**)	.285(**)	.322(**)	.341(**)	.369(**)	.370(**)	.170(**)	1	
AC	.312(**)	.296(**)	.278(**)	.241(**)	.201(**)	.167(**)	.194(**)	.059	1

\*\* Correlation is significant at the 0.01 level (2-tailed).

### 5.10 Outliers for Latent Factors

After creation, the latent factors (n=9) were checked for the presence of univariate and multivariate outliers by creating boxplots and calculating Mahalanobis distance respectively. In the case of multivariate outliers, all cases with  $D^2$  greater than the Chi Square ( $\chi^2$ ) critical values of 27.877 corresponding with degree of freedom (df) = 9 at  $p = .001$ .

Results of multivariate outliers are shown in Table 5.29, which shows that the maximum Mahalanobis distance ( $D^2$ ) was 23.150 than the  $\chi^2$  critical values of 27.877 for  $Df= 9$  ( $p =.001$ ). This confirmed that there were no multivariate outlier values in the data at this stage.

Table 5.29 Residuals Statistics showing Mahalanobis distance (a)

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	70.46	304.26	176.99	38.680	353
Std. Predicted Value	-2.754	3.290	.000	1.000	353
Standard Error of Predicted Value	6.260	25.058	15.400	4.713	353
Adjusted Predicted Value	67.55	308.26	176.19	38.864	353
Residual	-204.256	223.075	.000	94.441	353
Std. Residual	-2.135	2.332	.000	.987	353
Stud. Residual	-2.154	2.405	.004	1.002	353
Deleted Residual	-207.947	237.243	.805	97.341	353
Stud. Deleted Residual	-2.166	2.422	.004	1.004	353
Mahal. Distance	.510	23.150	8.975	5.806	353
Cook's Distance	.000	.037	.003	.005	353
Centered Leverage Value	.001	.066	.025	.016	353

a. Dependent Variable: ID



Univariate outliers in the latent factors were checked through creating boxplots (Figure 5.2), which revealed that there were no univariate outliers for the nine latent factors.

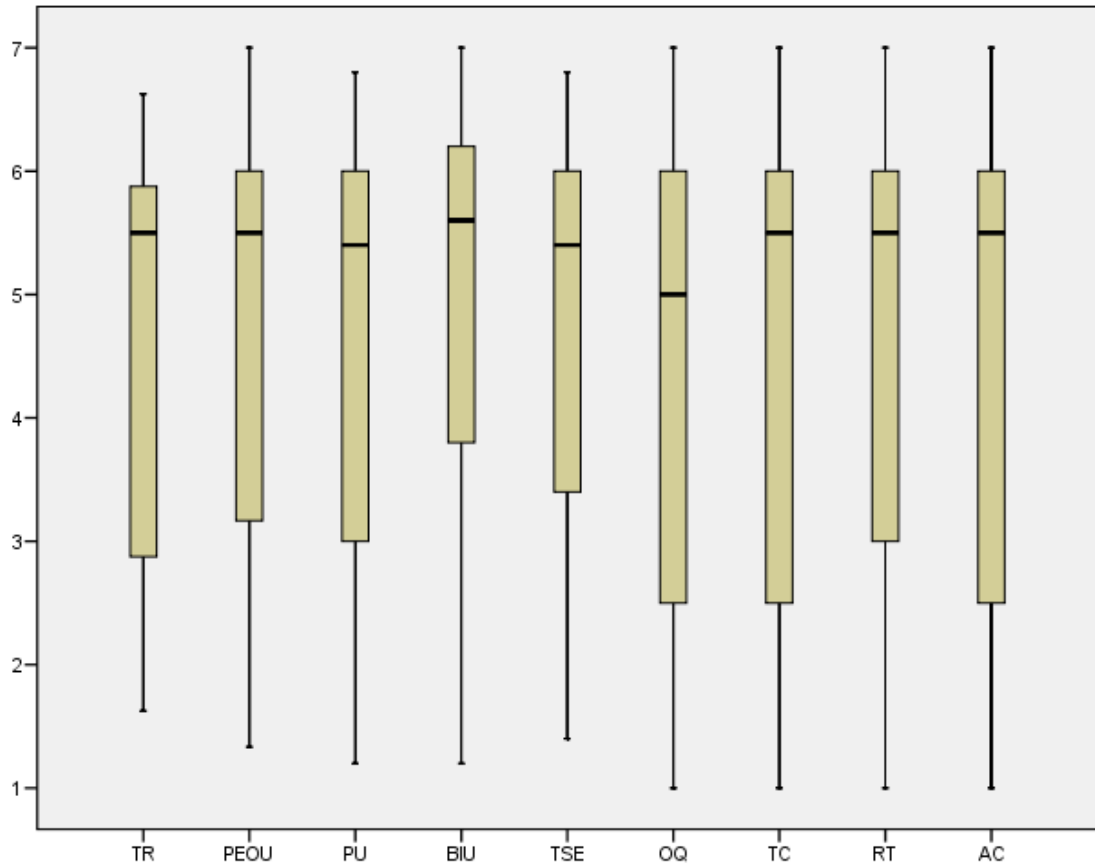


Figure 5.2 Boxplots for latent factors / Constructs

Moreover, the descriptive statistics for the latent factors revealed that the values for the Skewness and Kurtosis were lower than the  $\pm 2$  for both statistics, which confirmed that there was no major issue of non-normality of the data.

Table 5.30 Descriptive Statistics of latent factors / constructs

	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
TR	1.63	6.63	4.6753	1.60282	-.714	.130	-1.143	.259
PEOU	1.33	7.00	4.7757	1.62470	-.761	.130	-.909	.259
PU	1.20	6.80	4.6952	1.66911	-.678	.130	-1.107	.259
BI	1.20	7.00	4.9354	1.66335	-.924	.130	-.679	.259
TSE	1.40	6.80	4.7830	1.54042	-.831	.130	-.736	.259
OQ	1.00	7.00	4.4476	1.83308	-.428	.130	-1.289	.259
TC	1.00	7.00	4.6516	1.81780	-.644	.130	-1.087	.259
RT	1.00	7.00	4.7323	1.77214	-.723	.130	-.873	.259
AC	1.00	7.00	4.5864	1.85414	-.528	.130	-1.241	.259

### 5.11 Normality of Data for Latent Factors

Presence of normality of data was checked with the two normality tests i.e. Kolmogorov-Smirnov test and Shapiro-Wilk test (Table 5.31). All statistics for the both tests were found significant, which indicated departure from the normality of the data. However, these two tests are recognised to be sensitive to large sample size, such as the sample size of 353 in this study; therefore, they tend to become significant. Nevertheless, skewness and kurtosis statistics found less than  $\pm 1$  (see tables 5.3 to 5.11), which indicated no deviation from data normality. Consequently, it was assumed that there was no major problem of a lack of normality in the data in this study.

Table 5.31 Tests of Normality

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
TR	.226	353	.000	.821	353	.000
PEOU	.212	353	.000	.855	353	.000
PU	.219	353	.000	.848	353	.000
BI	.239	353	.000	.821	353	.000
TSE	.202	353	.000	.856	353	.000
OQ	.199	353	.000	.887	353	.000
TC	.255	353	.000	.858	353	.000
RT	.237	353	.000	.868	353	.000
AC	.221	353	.000	.869	353	.000

### 5.12 Homogeneity of Variance in the Data

Presence of the Homogeneity of Variance was determined by the Levene's Test and the results of this test (Table 5.32) revealed that all latent constructs were non-significant except the PEOU construct, which confirmed that there was homogeneity of variance in the data for eight out of nine latent constructs.

Table 5.32 Test of Homogeneity of Variance

		Levene			
		Statistic	df1	df2	Sig.
TR	Based on Mean	1.033	1	351	.310
	Based on Median	.538	1	351	.464
	Based on Median and with adjusted df	.538	1	350.973	.464
	Based on trimmed mean	1.101	1	351	.295
PEOU	Based on Mean	4.737	1	351	.030
	Based on Median	1.124	1	351	.290
	Based on Median and with adjusted df	1.124	1	344.173	.290
	Based on trimmed mean	4.157	1	351	.042
PU	Based on Mean	.004	1	351	.951
	Based on Median	.045	1	351	.832
	Based on Median and with adjusted df	.045	1	350.979	.832
	Based on trimmed mean	.031	1	351	.861
BIU	Based on Mean	.742	1	351	.390
	Based on Median	.296	1	351	.587
	Based on Median and with adjusted df	.296	1	350.961	.587
	Based on trimmed mean	.686	1	351	.408
TSE	Based on Mean	.000	1	351	.989
	Based on Median	.014	1	351	.907
	Based on Median and with adjusted df	.014	1	348.842	.907
	Based on trimmed mean	.000	1	351	.991
OQ	Based on Mean	.043	1	351	.836
	Based on Median	.236	1	351	.627
	Based on Median and with adjusted df	.236	1	346.025	.627
	Based on trimmed mean	.074	1	351	.786
TC	Based on Mean	1.063	1	351	.303
	Based on Median	.290	1	351	.591
	Based on Median and with adjusted df	.290	1	350.271	.591
	Based on trimmed mean	.867	1	351	.353

RT	Based on Mean	.194	1	351	.660
	Based on Median	.184	1	351	.669
	Based on Median and with adjusted df	.184	1	349.756	.669
	Based on trimmed mean	.245	1	351	.621
AC	Based on Mean	.084	1	351	.771
	Based on Median	.278	1	351	.599
	Based on Median and with adjusted df	.278	1	350.961	.599
	Based on trimmed mean	.132	1	351	.716

### 5.13 Structural Equation Modelling Analysis

Structural equation modelling (SEM) is a collection of statistical models that seeks to explain relationships among multiple variables. It enables researchers to examine interrelationships among multiple dependent and independent variables simultaneously (Hair et al., 2006). The reasons for selecting SEM for data analysis were, firstly; SEM has the ability to test causal relationships between constructs with multiple measurement items (Hair et al., 2006). Secondly, it offers powerful and rigorous statistical procedures to deal with complex models (Tabachnick and Fidell, 2001; Hair et al., 2006). The relationships among constructs and indicator (measurement items) are validated by using confirmatory factor analysis (CFA), also known as the measurement model, and relationships between constructs are tested using the structural model (Hair et al., 2006). A two-step approach was adopted to perform SEM analysis as recommended by Anderson and Gerbing (1988). In the first step, the measurement model was specified using the interrelationships between indicator (observed) and latent (unobserved) factors. For the measurement model, confirmatory factor analysis (CFA) was performed using the SEM software AMOS v.16.0. In the second step, the structural model related to dependent and independent variables was specified in order to test the hypotheses. Results of measurement and structural model are presented as follows. However, it is to be noted that for clarification and due to the limits of word length only final measurement model (CFA) results will be presented.

### **5.13.1 Measurement model specification and confirmatory factor analysis results**

In this research, confirmatory factor analysis (CFA) was performed on the measurement model to assess the unidimensionality, reliability, and validity of measures. Two broad approaches were used in the CFA to assess the measurement model. First, consideration of the goodness of fit (GOF) criteria indices and second, evaluating the validity and reliability of the measurement model.

### **5.13.2 Goodness of fit indices**

Structural equation modelling (SEM) has three main types of fit measure indices: absolute fit indices, incremental fit indices, and parsimonious fit indices. Results of these fit measures obtained in this study and their recommended levels are presented in Table 5.33.

CFA was performed on the measurement model comprising nine factors, which were: perceived usefulness (PU); perceived ease of use (PEOU); trust (TR); technological self-efficacy (TSE); output quality (OQ); response time (RT); accessibility (AC); terminology clarity (TC); and behavioural intention (BI). Figure 5.3 depicts the initial hypothesised measurement model. These factors were measured using number of items (indicators). In total, 37 items were used which were derived from the EFA. For instance, behavioural intention was measured by 5 items code named as BI1, BI2, BI3, BI4, and BI5; perceived usefulness was measured using 5 items code named as PU1, PU2, PU3, PU4, and PU5. Details of all constructs and their measurement items along with their code names are given in Table 4.5 in chapter Four.

The measurement model was evaluated by using the maximum likelihood (ML) estimation techniques provided by the AMOS 16. Table 5.33 provides summarised results of the initial CFA. The results revealed that chi square statistics ( $\chi^2=647.007$ ,  $df= 558$ ) was significant at  $p<0.05$  indicating that fit of data to the model was not good and should be rejected. However, it was unreasonable to rely on the chi-square statistics as a sole indicator for evaluating the specification of model, as this statics is

sensitive to the sample size and is very sensitive to the violations of the assumption of normality, especially the multivariate normality; therefore, it can be misleading. . Thus, other fit indices i.e. GFI, AGFI, CFI, NFI, and RMSEA were used to assess the specification of the model.

Results revealed that the value of GFI= 0.896, AGFI= 0.892, CFI =0.943, and RMSEA=0.048 (Table 5.33). These results indicated for further refinement of model as the results were not consistent with the recommended values of the fit indices of a priori specified measurement model.

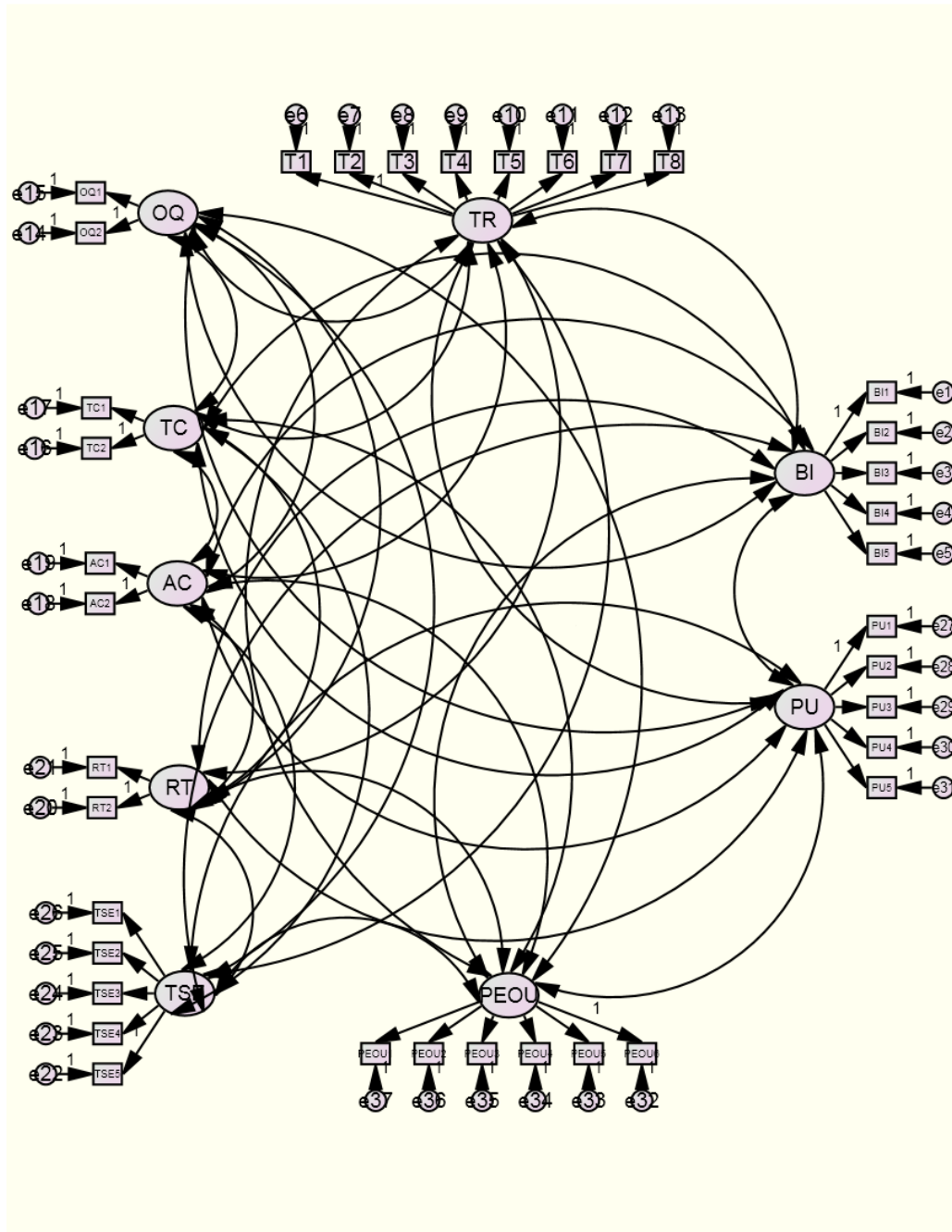


Figure 5.3 Hypothesised CFA model derived from EFA



Table 5.33 Goodness of fit statistics for the Initial CFA

	Absolute fit measures				Incremental fit measures		Parsimony fit measure	
	$\chi^2$	Df	$\chi^2/df$	GFI	RMSEA	NFI	CFI	AGFI
<b>Criteria</b>			1< $\chi^2/df < 3$	$\geq 0.90$	$< 0.05$	$\geq 0.90$	$\geq 0.90$	$\geq 0.90$
<b>Obtained</b>	945.325	413	2.288	0.896	0.048	0.932	0.943	0.892

**Note:**  $\chi^2$  = Chi-square; **df** = degree of freedom; **GFI** = Goodness of fit index; **RMSEA** = Root mean square error of approximation; **NFI** = Normated fit index; **CFI** = Comparative fit index; **AGFI** – Adjusted goodness of fit index

Given the fact that the goodness of fit indices of the initial run of CFA (e.g.  $\chi^2$ , GFI, AGFI) were not within the recommended level, further detailed evaluation was conducted to refine and re-specify the model, in order to improve the discriminant validity and achieve better fit of the model (Kline, 2005). The model refinement procedure applied following criteria recommended by researchers. According to Byrne (2001) factor loading (i.e. standard regression weight in AMOS 16.00) value should be greater than 0.7 and Squared multiple correlations (SMC) value should be greater than the cut-off point 0.5. The standard residual values should be within the threshold (above 2.58 or below – 2.58) as recommended by Hair et al. (2006). Finally, modification indices (MI) that show high covariance and demonstrate high regression weights are candidate for deletion (Byrne, 2001; Hair et al., 2006).

Following these recommended criteria, the output of the initial CFA run was examined to see whether any item is proving to be problematic. Assessment of results indicated that the standard regression weight of all measurement items was above the recommended level ( $>0.7$ ) (Hair et al., 2006). However, evaluation of standardised residuals indicated that the values of TR5, BI3, TSE3, and PEOU4 were not within the acceptable level (above 2.58 or below – 2.58) (Hair et al., 2006). The items which shared a high degree of residual variance were therefore dropped. It is, however, not unusual that items are dropped at this stage. This is because CFA (unlike EFA and Cronbach’s alpha) also examines the unidimensionality (Gefen, 2000; Gefen et al., 2003). Thus, after dropping these problematic items, the measurement model was re-run, as recommended (Byrne, 1998; Kline, 2005; Hair et al., 2006). Final CFA model is depicted in Figure 5.4.

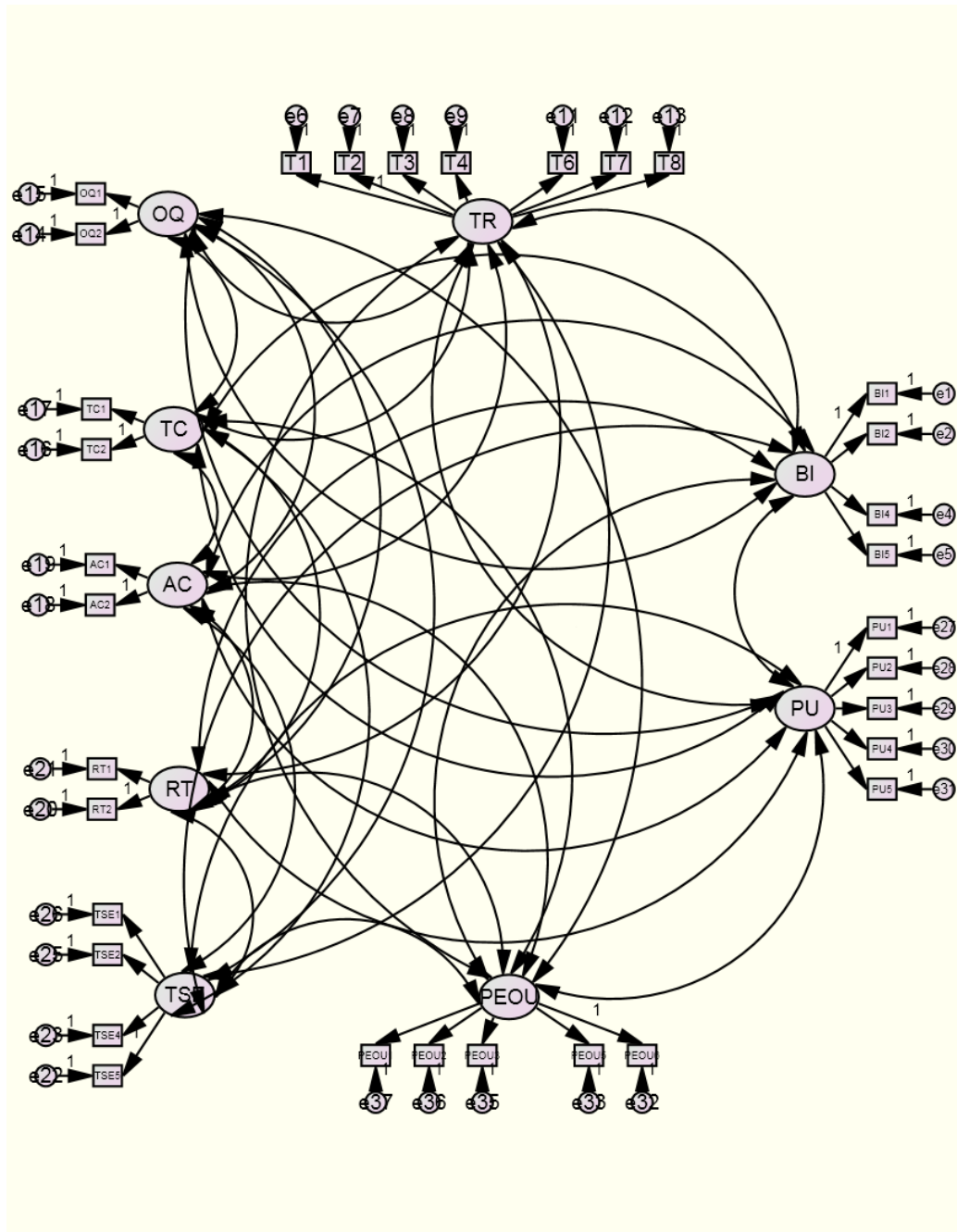


Figure 5.4 Final CFA model

After dropping these problematic items, which were TR5, BI3, TSE3, and PEOU4 CFA was re-run for assessing the measurement model fit. The results of the model revealed that goodness of fit indices were improved and the revised model demonstrated a better fit to the data. Results of the respective measurement model after removal of redundant items (see Table 5.34) indicated the absolute fit measures i.e. GFI and RMSEA were 0.945 and 0.017, respectively, the incremental fit measures i.e. NFI and CFI were 0.953 and 0.995, respectively and the parsimony fit measure i.e. AGFI was 0.937. All these measures surpassed the minimum recommended values. In addition to these indices, the ratio of  $\chi^2/df$  was 1.643, which was within the acceptable threshold level (i.e.,  $1.0 < X^2/df < 3.0$ ). These goodness of fit statistics therefore confirmed that the model adequately fitted the data.

Table 5.34 Goodness of fit statistics of revised CFA model

	Absolute fit measures				Incremental fit measures		Parsimony fit measure	
	$\chi^2$	Df	$\chi^2/df$	GFI	RMSEA	NFI	CFI	AGFI
<b>Criteria</b>			$1 < X^2/df < 3$	$\geq 0.90$	$< 0.05$	$\geq 0.90$	$\geq 0.90$	$\geq 0.90$
<b>Obtained</b>	823.231	501	1.643	0.945	0.017	0.953	0.995	0.937

**Note:**  $\chi^2$  = Chi-square; **df** = degree of freedom; **GFI** = Goodness of fit index; **RMSEA** = Root mean square error of approximation; **NFI** = Normated fit index; **CFI** = Comparative fit index; **AGFI** – Adjusted goodness of fit index

Besides, other estimation criteria show that model fit the data adequately well, such that, standard regression weight were all greater than 0.7, standard residual were all within the threshold level (+2.58 , - 2.58) , and critical ratios values were above 1.96. In summary, the results confirmed that model was fit to the data, indicating no further refinement in the model was required. Thus, the unidimensionality of the model / data was established (Byrne 2001; Hair et al. 2006).

#### 5.14 Assessment of Reliability and Validity of Constructs

This section presents results of the validity and reliability of the constructs used in this study.

### 5.14.1 Reliability of constructs

In this research study, reliability of the measures was assessed by examining the consistency of the respondents' answers to all items in the measure (Nunnally, 1978). Cronbach's alpha reliability coefficients were used to measure the internal consistency of each measure. In order to find out the overall reliability of the each of the latent constructs used in the model. Construct reliabilities were calculated by formula 1 suggested by (Fornell and Larcker 1981; Hair et al., 2006), as follows.

Formula 1 for Computing constructs reliability

$$CR = \frac{\left(\sum_{i=1}^n \lambda_i\right)^2}{\left(\sum_{i=1}^n \lambda_i\right)^2 + \left(\sum_{i=1}^n \delta_i\right)}$$

Note: in the formula mentioned above  $\lambda$  represents factor loadings (standardized regression weights) and  $i$  represents total number of items, and  $\delta$  represents the error variance term for each latent construct.

The results mentioned in the table 5.35 showed that the reliability coefficient for the construct behavioural intention (BI) was 0.935, which was above the criteria strictly recommended (>0.7), indicating the observed variables are reasonably good measurement of the construct BI. The results also revealed that construct's reliability estimate for BI indicated high internal consistency and adequate reliability of the construct. Besides, all other estimation values were above the recommended cut off point indicating strong reliability and high internal consistency in measuring relationship in the model. This also suggested strong construct validity (Hair et. al. 2006).

Results of construct reliability calculated are presented in Table 5.35. The construct reliabilities varied between .957 for the trust construct and .768 for the technological self-efficacy construct. Construct reliabilities for all nine constructs were found greater than the minimum acceptable level of construct reliability = .7 for each construct.

Table 5.35 Construct reliability statistics

<b>Constructs</b>	<b>Construct reliability</b>
<b>Criteria</b>	<b>≥0.7</b>
Behavioural intentions	0.934
Perceived usefulness	0.941
Perceived ease of use	0.943
Technological self-efficacy	0.768
Trust	0.946
Terminology clarity	0.874
Output quality	0.892
Accessibility	0.864
Response time	0.893

#### **Average variance extracted**

Average variance extracted was computed by this researcher using a formula suggested by (Fornell and Larcker, 1981; Hair et al., 2006), as follows.

Formula 2 for computing average variance extracted

$$AVE = \frac{\sum_{i=1}^n \lambda_i^2}{n}$$

Note: in the formula mentioned above  $\lambda$  represents factor loadings (standardized regression weights) and  $i$  represents the total number of items.

#### **5.14.2 Validity**

Construct's validity can be examined by assessing convergent validity, discriminant validity and nomological validity.

### Convergent validity

Factor loadings of construct, average variance extracted (AVE), and construct reliability (CR) estimation were used by this researcher to assess the convergent validity of each of the constructs. Formula 1 was used to compute CR and formula 2 was used to compute AVE as mentioned earlier. A minimum cut off criteria for standardised regression loadings (>0.7, AVE >0.5 and reliability >0.7) were used to assess the convergent validity. Results are presented in Table 5.36

Table 5.36 Convergent validity

Construct	Item	Standardized factor loadings	Critical ratio (t-value)	Average variance extracted (AVE)
<b>Behavioural intention</b>	BI1	0.903	----- *	<b>0.779</b>
	BI2	0.863	23.561	
	BI3	0.881	23.544	
	BI5	0.889	24.987	
<b>Perceived usefulness</b>	PU1	0.861	-----	<b>0.760</b>
	PU2	0.866	21.905	
	PU3	0.877	22.249	
	PU4	0.870	21.784	
	PU5	0.883	22.673	
<b>Perceived ease of use</b>	PEOU1	0.883	24.397	<b>0.767</b>
	PEOU2	0.886	21.699	
	PEOU3	0.827	25.203	
	PEOU5	0.878	25.673	
	PEOU6	0.905	-----	
<b>Technological self-efficacy</b>	TSE1	0.806	17.553	<b>0.685</b>
	TSE2	0.862	19.041	
	TSE4	0.807	17.553	
	TSE5	0.839	-----	
	<b>Trust</b>	TR1	0.795	

	TR2	0.860	21.146	
	TR3	0.839	20.237	
	TR4	0.858	20.855	
	TR6	0.797	19.747	
	TR7	0.866	20.982	
	TR8	0.885	20.572	
<b>Terminology clarity</b>	TC1	0.875	9.72	<b>0.777</b>
	TC2	0.868	-----	
<b>Output quality</b>	OQ1	0.892	13.682	<b>0.892</b>
	OQ2	0.902	-----	
<b>Accessibility</b>	AC1	0.861	10.158	<b>0.764</b>
	AC2	0.884	-----	
<b>Response time</b>	RT1	0.837	13.837	<b>0.893</b>
	RT2	0.956	-----	

\* Regression weight 1

Results revealed that all the standardised factor loadings (standard regression weights) were above the minimum cut off point ( $>0.7$ ), the critical ratios (t- values) were higher than 1.96 ( $p < 0.001$ ) and the average variance extracted was greater than 0.05. The results thus demonstrated a high level of convergent validity of the latent constructs used in the model.

### **Discriminant validity**

The discriminant validity was assessed by the average variance extracted for each construct compared with the corresponding squared inter-construct correlation (SIC), and the AVE estimate larger than SIC estimates Table 5.37 and 5.38 presents results of squared inter-construct correlations and the discriminant validity, respectively, for each construct used in this study.

Table 5.37 Inter-construct correlations

	<b>BI</b>	<b>PU</b>	<b>PEOU</b>	<b>TSE</b>	<b>RT</b>	<b>AC</b>	<b>TC</b>	<b>OQ</b>	<b>TR</b>
<b>BI</b>	1.000								
<b>PU</b>	0.631	1.000							
<b>PEOU</b>	0.493	0.354	1.000						
<b>TSE</b>	0.515	0.461	0.443	1.000					
<b>RT</b>	0.372	0.597	0.336	0.406	1.000				
<b>AC</b>	0.268	0.308	0.338	0.228	0.075	1.000			
<b>TC</b>	0.298	0.290	0.308	0.364	0.183	0.220	1.000		
<b>OQ</b>	0.412	0.311	0.369	0.307	0.416	0.190	0.083	1.000	
<b>TR</b>	0.571	0.597	0.359	0.304	0.372	0.340	0.259	0.304	1.000

Table 5.38 Discriminant validity

	<b>BI</b>	<b>PU</b>	<b>PEOU</b>	<b>TSE</b>	<b>RT</b>	<b>AC</b>	<b>TC</b>	<b>OQ</b>	<b>TR</b>
<b>BI</b>	<b>0.779</b>								
<b>PU</b>	0.398	<b>0.76</b>							
<b>PEOU</b>	0.243	0.125	<b>0.767</b>						
<b>TSE</b>	0.265	0.213	0.196	<b>0.685</b>					
<b>RT</b>	0.138	0.356	0.113	0.165	<b>0.893</b>				
<b>AC</b>	0.072	0.095	0.114	0.052	0.006	<b>0.761</b>			
<b>TC</b>	0.089	0.084	0.095	0.132	0.033	0.048	<b>0.777</b>		
<b>OQ</b>	0.170	0.097	0.136	0.094	0.173	0.036	0.007	<b>0.805</b>	
<b>TR</b>	0.326	0.356	0.129	0.092	0.138	0.116	0.067	0.092	<b>0.714</b>

**Note:** Diagonal values are AVE and off diagonal are inter-construct squared correlations.

Results shown in Table 5.36 reveal that, the AVE estimates of all the constructs were larger than their corresponding squared inter-construct correlations estimates, which demonstrated a high level of discriminant validity of the constructs. In addition, this indicated that the measured items have more in common with the latent construct



they were associated with than other latent constructs; thus, providing strong support for the discriminant validity.

### **Nomological validity**

Nomological validity was tested by examining whether or not the correlations between the constructs in the measurement model make any sense (Hair et. al. 2006). The construct correlations (estimates) were used to assess the nomological validity of the model and results are given in Table 5.39 and 5.40.

Table 5.39 AMOS output - Covariances: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P
BI	<-->	TR	1.495	0.178	8.395	***
BI	<-->	OQ	1.201	0.189	6.359	***
BI	<-->	TC	0.781	0.176	4.439	***
BI	<-->	AC	0.764	0.185	4.139	***
BI	<-->	RT	1.122	0.186	6.032	***
BI	<-->	TSE	1.274	0.166	7.656	***
BI	<-->	PEOU	1.366	0.179	7.617	***
BI	<-->	PU	1.691	0.188	8.994	***
TR	<-->	PU	1.531	0.179	8.574	***
OQ	<-->	PU	0.888	0.177	5.005	***
TC	<-->	PU	0.747	0.164	4.55	***
AC	<-->	PU	0.861	0.18	4.78	***
RT	<-->	PU	1.04	0.181	5.748	***
TSE	<-->	PU	1.12	0.16	6.999	***
PU	<-->	PEOU	0.962	0.166	5.8	***
TR	<-->	PEOU	0.951	0.162	5.865	***
OQ	<-->	PEOU	1.089	0.188	5.792	***
TC	<-->	PEOU	0.82	0.168	4.883	***
AC	<-->	PEOU	0.979	0.185	5.279	***
RT	<-->	PEOU	1.026	0.186	5.52	***
TSE	<-->	PEOU	1.111	0.163	6.828	***
TR	<-->	OQ	0.849	0.174	4.872	***
TR	<-->	TC	0.651	0.165	3.944	***
TR	<-->	AC	0.93	0.176	5.28	***
TR	<-->	RT	1.074	0.178	6.044	***
TR	<-->	TSE	1.213	0.16	7.596	***
OQ	<-->	TC	0.233	0.168	1.389	0.165
OQ	<-->	AC	0.58	0.193	3.008	0.003
OQ	<-->	RT	1.339	0.207	6.462	***
OQ	<-->	TSE	0.81	0.171	4.745	***
TC	<-->	AC	0.605	0.179	3.384	***
TC	<-->	RT	0.531	0.181	2.94	0.003
TC	<-->	TSE	0.867	0.166	5.225	***
AC	<-->	RT	0.237	0.19	1.248	0.212
AC	<-->	TSE	0.589	0.164	3.599	***
RT	<-->	TSE	1.11	0.174	6.385	***

Table 5.40 AMOS output - Construct Correlations: (Group number 1 - Default model)

			<b>Estimate</b>
BI	<-->	TR	0.571
BI	<-->	OQ	0.412
BI	<-->	TC	0.298
BI	<-->	AC	0.268
BI	<-->	RT	0.372
BI	<-->	TSE	0.515
BI	<-->	PEOU	0.493
BI	<-->	PU	0.631
TR	<-->	PU	0.597
OQ	<-->	PU	0.311
TC	<-->	PU	0.29
AC	<-->	PU	0.308
RT	<-->	PU	0.352
TSE	<-->	PU	0.461
PU	<-->	PEOU	0.354
TR	<-->	PEOU	0.359
OQ	<-->	PEOU	0.369
TC	<-->	PEOU	0.308
AC	<-->	PEOU	0.338
RT	<-->	PEOU	0.336
TSE	<-->	PEOU	0.443
TR	<-->	OQ	0.304
TR	<-->	TC	0.259
TR	<-->	AC	0.34
TR	<-->	RT	0.372
TR	<-->	TSE	0.512
OQ	<-->	TC	0.083
OQ	<-->	AC	0.19
OQ	<-->	RT	0.416
OQ	<-->	TSE	0.307
TC	<-->	AC	0.22
TC	<-->	RT	0.183
TC	<-->	TSE	0.364
AC	<-->	RT	0.075
AC	<-->	TSE	0.228
RT	<-->	TSE	0.406

Results shown in Tables 5.39 and 5.40 revealed that all of the correlations were positive and significant, with the exceptions of TC <-> OQ (t-value = 1.389; p = 0.165) and OC <-> RT (t-value = 1.264; p = 0.206), which were positive but not significant. Overall, the correlations were consistent with the theoretical model and thus supported the nomological validity (Hair et. al. 2006). In summary, the CFA results indicated that measures used in the measurement model possessed adequate reliability, convergent, discriminant, and nomological validity.

### **5.15 Structural Model Evaluation and Hypotheses Testing**

This section presents results of hypotheses testing. Table 5.41 shows eleven hypotheses represented by causal paths (H1, H2a, H2b, H3a, H3b, H4a, H4b, H5, H6, H7, and H8) that were used to test the relationships between the latent constructs. The latent constructs used in the proposed theoretical model (as described in chapter 3) were classified in two main categories: exogenous and endogenous constructs. Exogenous constructs were the trust, technological self-efficacy, accessibility, terminology clarity, output quality, and response time while endogenous constructs were the behavioural intention, perceived usefulness, and perceived ease of use). Goodness of fit indices and other parameters estimates were examined to evaluate the hypothesized structural model. Assessment of parameter estimates results suggested that eight out of eleven hypothesised paths were significant. Thus, indicating support for the eight hypotheses. These results are presented in detail as follows.

Table 5.41 Hypotheses testing / paths causal relationships

Construct	Code	Hypotheses	Hypothesised Relationships (positive)
Perceived Usefulness	PU	H1	PU→BI
Perceived Ease Of Use	PEOU	H2a	PEOU→PU
		H2b	PEOU→BI
Trust	TR	H3a	TR→PU
		H3b	TR→ BI
Technological Self-Efficacy	TSE	H4a	TSE→PU
		H4b	TSE→PEOU
Accessibility	AC	H5	AC→PEOU
Terminology Clarity	TC	H6	TC→PEOU
Output Quality	OQ	H7	OQ→PU
Response Time	RT	H8	RT→PU

The fit indices shown in Table 5.42 indicate that the hypothesized structural model provided the good fit to the data. Although the likelihood ratio chi-square ( $\chi^2 = 868.902$ ;  $df = 484$ ;  $p = .000$ ) was significant ( $p < .001$ ); however, other fit measures showed that model adequately fit the observed data. The absolute fit measures i.e. GFI and RMSEA were 0.911 and 0.048 respectively indicating good fit of model. The incremental fit measures i.e. NFI and CFI were 0.913 and 0.959 respectively, which were above the minimum requirement showing adequate fit and the parsimony fit measure i.e. AGFI was 0.901, which also was above the cut-off point of  $> 0.9$ ). In addition to these indices, the  $\chi^2/df = 1.795$  was within the threshold level i.e.  $1.0 < \chi^2/df < 3.0$ ) supporting these findings.

Table 5.42 Structural model fit measure assessment

	Absolute fit measures				Incremental fit measures		Parsimony fit measure	
	$\chi^2$	df	$\chi^2/df$	GFI	RMSEA	NFI	CFI	AGFI
Criteria			$1 < \chi^2/df < 3$	$\geq 0.90$	$< 0.05$	$\geq 0.90$	$\geq 0.90$	$\geq 0.90$
Obtained	868.902	484	1.795	.911	.048	.913	.959	0.901

**Note:**  $\chi^2$  = Chi-square; **df** = degree of freedom; **GFI** = Goodness of fit index; **RMSEA** = Root mean square error of approximation; **NFI** = Normated fit index; **CFI** = Comparative fit index; **AGFI** – Adjusted goodness of fit index

Another most important part of structural model assessment is coefficient parameter estimates. The parameter estimates were used to produce the estimated population covariance matrix for the structural model. The model was defined by 33 measurement items that identified the nine latent constructs. The covariance matrix among the constructs was applied to test the model. When the critical ratio (CR or t-value) is higher than 1.96 for an estimate (regression weight), then the parameter coefficient value is statistically significant at the .05 levels (Hair et. al. 2006). Critical ratio or t-value was obtained by dividing the regression weight estimate by the estimate of its standard error (S.E). Using the path estimates and CR values, eleven causal paths were examined in this research study. For eight causal paths estimates t-values were above the 1.96 critical values at the significant level  $p \leq .05$ . The t-values for remaining three constructs were found statically not significant (t-value = 1.641,  $p = .101$ ; t-value = 1.177,  $p = .239$ ; t-value = 1.483,  $p = .138$ ). These results implied the regression weight estimates are 1.641, 1.177, and 1.483 standard errors above zero respectively. The overall structural model is depicted in Figure 5.5, and parameter estimates are presented in Table 5.43. It is to be noted that the measurement items and error terms associated with latent constructs are not shown for clarity.

Table 5.43 Regression estimates of latent constructs

			Estimate	S.E.	C.R.	P
Perceived ease of use	<---	Technological self-efficacy	0.407	0.063	6.43	***
Perceived ease of use	<---	Accessibility	0.23	0.056	4.126	***
Perceived ease of use	<---	Terminology clarity	0.167	0.058	2.848	0.004
Perceived Usefulness	<---	Trust	0.457	0.063	7.306	***
Perceived Usefulness	<---	Perceived ease of use	0.085	0.052	1.641	0.101
Perceived Usefulness	<---	Technological self-efficacy	0.194	0.064	3.026	0.002
Perceived Usefulness	<---	Output quality	0.061	0.052	1.177	0.239
Perceived Usefulness	<---	Response time	0.077	0.052	1.483	0.138
Behavioural Intention	<---	Trust	0.292	0.06	4.874	***
Behavioural Intention	<---	Perceived Usefulness	0.411	0.056	7.367	***
Behavioural Intention	<---	Perceived ease of use	0.273	0.045	6.075	***

Note: Estimate = regression weight; S.E = standard error; C.R = critical ratio, P = significance value

Results presented in Table 5.44 indicate that the eight of eleven hypothesized paths between independent and dependent variables were significant. For instance, the hypothesised path between perceived ease of use and technological self-efficacy with CR value of 6.43 ( $>1.96$ ) was statistically significant ( $p = 0.001$ ). Similarly, paths between perceived ease of use and accessibility; perceived ease of use and terminology clarity; perceived usefulness and trust; perceived usefulness and technological self-efficacy; behavioural intention and trust, behavioural intention and perceived usefulness; behavioural intention and perceived ease of use were statistically significant at  $p \leq .05$ . The hypothesized paths between the perceived usefulness and perceived ease of use; perceived usefulness and output quality; perceived usefulness and response time indicated that their t-values did not exceed the cut-off point required for statistical significance. Thus, these paths were not statistically significant.



Table 5.44 Hypotheses testing

Construct	Code Name	Hypotheses	Relationship (positive)	Standardized regression weights ( $\beta$ )	Supported
Perceived Usefulness	PU	H1	PU $\rightarrow$ BI	0.397	<b>YES</b>
Perceived Ease of Use	PEOU	H2a	PEOU $\rightarrow$ PU	0.093	<b>NO</b>
		H2b	PEOU $\rightarrow$ BI	0.288	<b>YES</b>
Trust	TR	H3a	TR $\rightarrow$ PU	0.453	<b>YES</b>
		H3b	TR $\rightarrow$ BI	0.279	<b>YES</b>
Technological Self-Efficacy	TSE	H4a	TSE $\rightarrow$ PU	0.194	<b>YES</b>
		H4b	TSE $\rightarrow$ PEOU	0.373	<b>YES</b>
Accessibility	AC	H5	AC $\rightarrow$ PEOU	0.243	<b>YES</b>
Terminology Clarity	TC	H6	TC $\rightarrow$ PEOU	0.139	<b>YES</b>
Output Quality	OQ	H7	OQ $\rightarrow$ PU	0.077	<b>NO</b>
Response Time	RT	H8	RT $\rightarrow$ PU	0.098	<b>NO</b>

Furthermore, in testing the hypotheses, results shown in Table 5.44 revealed that eight hypotheses i.e. H1, H2b, H3a, H3b, H4a, H4b, H5, and H6 were positive and statistically significant. The results suggest that standardized estimates for these hypotheses ( $\beta = 0.397, 0.288, 0.453, 0.279, 0.194, 0.373, 0.243, 0.139$ , respectively) indicate statistical significance and thus showing support for these hypotheses. While, three hypotheses i.e. H2a, H7, and H8 having standardized estimates ( $\beta = 0.093, 0.077, 0.098$ , respectively) were found statistically not significant. Hence, these hypotheses were rejected.

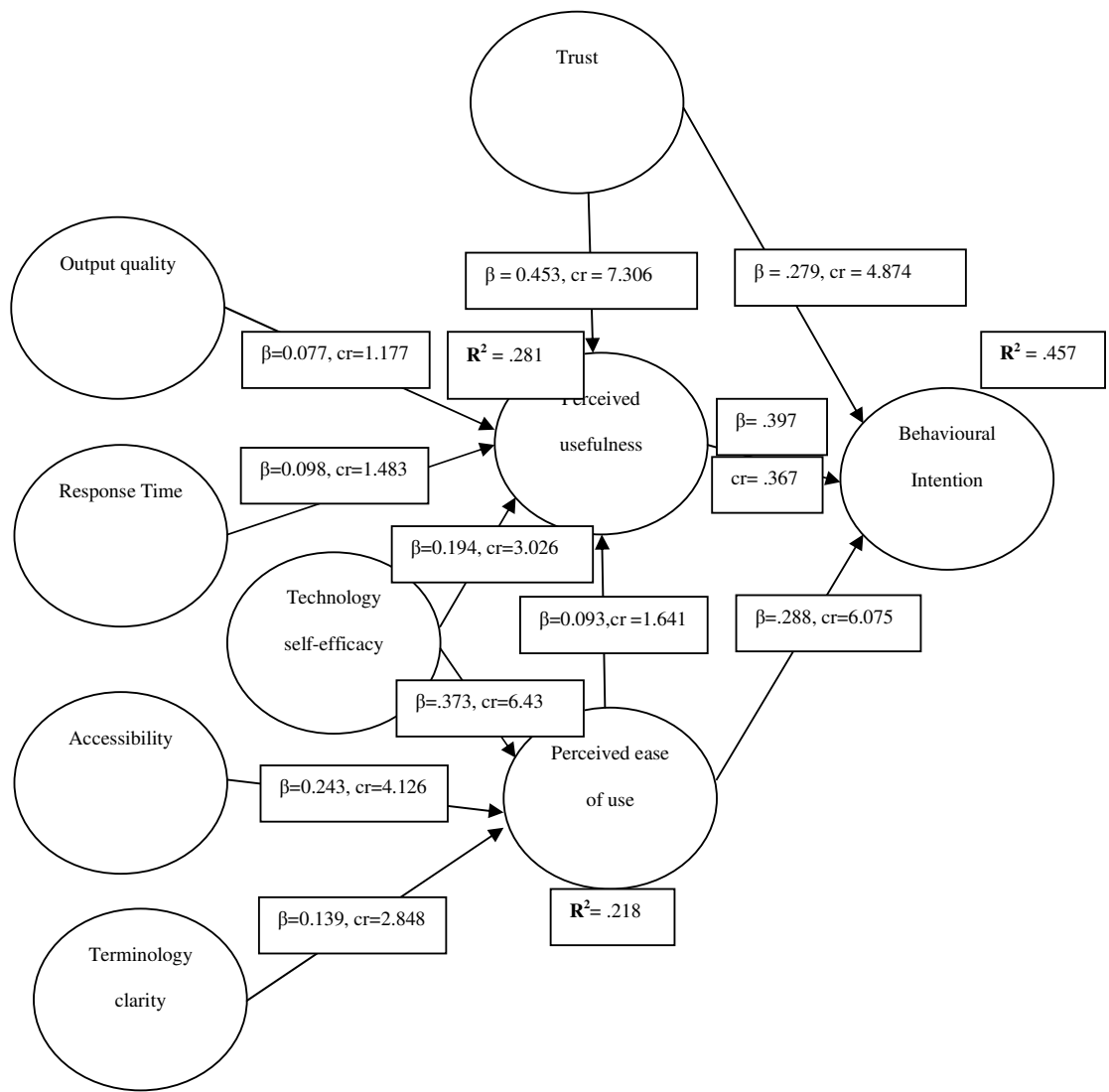


Figure 5.5 Structural model

As shown in Figure 5.5, the main model estimations revealed that 8 out of 11 hypotheses were significant while 3 were not significant. The following eight hypotheses were positively significant; hence, they were supported.

*H1. H1. Perceived usefulness will have a significant positive effect on the BI to use an OBIS.*

As shown in the Figure 5.5, the standardized regression weight and critical ratio for PU to BI is 0.397 and 7.367 respectively, suggesting that this path is statistically significant at the  $p = .001$ . The results demonstrated strong support for hypothesis H1, which was proposed in the model (presented in chapter three). This indicated that the perceived usefulness has strong significant effect on behavioural intention to use of online banking information system, implying that if there was increase in the PU then it would positively influence user's intention towards acceptance of the online banking systems. In summary, these results further suggest that PU was a major determinant of behavioural intentions.

*H2b. Perceived ease of use will have a significant positive effect on the BI to use an OBIS.*

As presented in Figure 5.5, the standardized regression weight and critical ratio for PEOU to BI was 0.288 and 6.075 respectively, indicating statistical significance for H2b at  $p = 0.001$ . The results suggested that the perceived ease of use has positive strong effect on the behavioural intention towards online banking information system acceptance and use. This implied that as the users perceived online banking system easy to use, they were more willing to use it. In summary, along with PU, PEOU was found to be an important determinant of user acceptance of the online banking system; however, it was found to be relatively less influential than the PU.

*H3a. Trust will have a significant positive effect on the BI to use an OBIS.*

Figure 5.5 revealed that the standardized regression weight for the TR to the BI was 0.279 and the critical ratio for the TR to the BI value was 4.874. This suggested that this path was statistically significant at  $p = .001$  level; hence, it, showed strong support for the acceptance of hypothesis H3a. These results indicated that trust has

strong significant effect on behavioural intention to use an online banking information system, implying that increase in the trust would positively influence user's intention towards acceptance of online banking systems. Lastly, these results further suggested that trust was as important determinant of behavioural intentions to use, as were the perceived usefulness and perceived ease of use.

*H3b. Trust will have a significant positive effect on users' perceived usefulness of an OBIS.*

The standardized regression weight for the TR to the PU was 0.453 and critical ratio for the TR to the BI value was 7.306 (shown in Figure 5.5). These results demonstrated strong support for the H3b, which suggested that trust has strong positive effect on perceived usefulness of using an online banking information system. It implied that users highly relate trust with usefulness of the online banking information system. In summary, trust was found to be an important factor, which positively influences users' intentions, both directly and indirectly through PU, towards online banking information systems' acceptance and use.

*H4a. H4a. Technological self-efficacy will have a significant positive effect on users' perceived usefulness of an OBIS.*

Figure 5.5 revealed that the standardized regression weight and critical ratio estimate for the TSE to the PU were 0.194 and 3.026, respectively, showing support for the acceptance of hypothesis H4a. These results showed that technological self-efficacy strongly influences perceived usefulness of online banking information system and it has positive direct effect on the PU. The results implied that greater the technological self-efficacy, the users were more likely to perceive an online banking system more useful. In brief, technological self-efficacy was found as a significant determinant of the perceived usefulness of online banking system.

*H4b. Technological self-efficacy will have a significant positive effect on user's perceived ease of use of an OBIS.*

As shown in Figure 5.5, the standardized regression weight and critical ratio estimate for the TSE to the PEOU were 0.373 and 6.43, respectively, showing support for

hypothesis H4b. These results indicated that technological self-efficacy strongly influences perceived ease of use of online banking information system and it has positive direct effect on the PEOU. The results also implied that the users were likely to perceive the online banking information systems easy to use as the technological self-efficacy increased. In short, technological self-efficacy was found as a significant determinant of perceived ease of use.

*H7. Perceived accessibility will have a significant positive effect on users' perceived ease of use of an OBIS.*

Figure 5.5 showed that the standardised regression weight and critical ratio estimate for the AC to the PEOU were 0.243 and 4.126, respectively, which indicated support for hypothesis H5. These results demonstrated that accessibility strongly influences perceived usefulness of online banking information system and it has positive direct effect on the PEOU. The results suggested that the as the accessibility increased the users were likely to perceive online banking information systems to be easy to use. In summary, accessibility was found to be the major determinant of the perceived ease of use, suggesting the users perceptions of ease of use were strongly influenced by the accessibility.

*H8. Terminology clarity will have a positive significant effect on users' perceived usefulness of an OBIS.*

Results of the standardised regression weight and critical ratio estimate for the TC to PEOU were 0.139 and 2.848, respectively. The results thus provided strong support for hypothesis 6. Results also suggested that the terminology clarity has a significant effect on the perceived ease of use of an online banking information system, implying that an increase in the terminology clarity would exert a positive influence on ease of use, which in turn, would influence users' perceptions towards using an online banking system positively. In summary, terminology clarity was found to be strong determinant of perceived ease of use. However, the TC appeared to be less influential than the AC on perceived ease of use of online banking information system.

Following three hypotheses were found statistically not significant, thus, they were rejected.

*H2a. Perceived ease of use will have a significant positive effect on perceived usefulness of an OBIS.*

Results shown in Figure 5.5 revealed that the standardized regression weight and critical ratio estimate for the PEOU to the PU were 0.093 and 1.641, respectively, showing statistically not significant path. These results did not provide support for hypothesis H2a. These results indicated that perceived the ease of use do not influence the perceived usefulness of online banking information system. It can be inferred from results that users do not relate ease of use with usefulness of online banking information system.

*H6. Output quality will have a significant positive effect on users' perceived usefulness of an OBIS.*

As shown in Figure 5.5, the standardised regression weight and critical ratio estimate for the OQ to the PU was 0.077 and 1.177, respectively. These results thus revealed that path estimates were not statistically significant. Thus, hypothesis 6 was not supported. This suggested that output quality do not have a significant effect on the perceived usefulness of online banking information system. It indicated that along with perceived ease of use, output quality do not influence perceived usefulness, which may imply that users do not relate output quality with the perceived usefulness of an online banking information system.

*H7. Response time will have a significant positive effect on users' perceived usefulness of an OBIS.*

As shown in Figure 5.5, the standardized regression weight and critical ratio for the RT to the PU were 0.098 and 1.483 respectively, suggesting that the path was not statistically significant. The results demonstrated that hypothesis H7 was not supported, which revealed that response time does not have significant effect on the perceived usefulness, implying that users do not relate response time with usefulness of online banking information system.

### 5.16 Modifying Structural Model by Removing Non-significant Paths

As discussed in the previous section, three hypotheses (i.e. H2a, H6, and H7) out of eleven hypotheses were statistically not significant and thereby they were rejected. Consequently, the structural model was re-specified by removing three not significant paths. This process would possibly provide a better fit to the data. The model was revised in order to achieve parsimonious model that fits the data well. Not significant hypothetical paths i.e. PEOU → PU, OQ → PU, and RT → PU were deleted to get the parsimonious model that adequately fits the data. Revised structural model is shown in Figure 5.6 and results are presented in Table 5.45 and 5.46.

Table 5.45 Results of revised structural model

Construct	Code / Name	Hypotheses	Relationship (positive)	Standardized regression weights ( $\beta$ )	CR	Supported
Perceived Usefulness	PU	H1	PU → BI	0.399	7.291	<b>YES***</b>
Perceived Ease Of Use	PEOU	H2b	PEOU → BI	0.285	6.082	<b>YES***</b>
Trust	TR	H3a	TR → PU	0.473	7.846	<b>YES***</b>
		H3b	TR → BI	0.279	4.911	<b>YES***</b>
Technological Self-Efficacy	TSE	H4a	TSE → PU	0.214	3.461	<b>YES***</b>
		H4b	TSE → PEOU	0.373	6.429	<b>YES***</b>
Accessibility	AC	H5	AC → PEOU	0.244	4.128	<b>YES***</b>
Terminology Clarity	TC	H6	TC → PEOU	0.139	2.851	<b>YES**</b>

\*\*\* Significant at 0.001 level (two tailed), \*\*Significant at 0.01 level (two tailed)

Table 5.46 Goodness of fit indices revised structural model

Criteria	Absolute fit measures					Incremental fit measures		Parsimony fit measure
	$\chi^2$	Df	$\chi^2/df$ 1 < $\chi^2/df$ < 3	GFI ≥ 0.90	RMSEA < 0.05	NFI ≥ 0.90	CFI ≥ 0.90	AGFI ≥ 0.90
Obtained	578.251	368	1.571	0.942	.039	0.935	0.975	0.933

**Note:**  $\chi^2$  = Chi-square; **df** = degree of freedom; **GFI** = Goodness of fit index; **RMSEA** = Root mean square error of approximation; **NFI** = Normated fit index; **CFI** = Comparative fit index; **AGFI** – Adjusted goodness of fit index; **CR** = critical ratio

In testing the revised structural model, results shown in Table 5.45 indicated that all of the hypotheses i.e. H1, H2b, H3a, H3b, H4a, H4b, H5, and H6 were statistically significant. The results suggested that standardized estimates and critical ratio values for these hypotheses ( $\beta = 0.399$ , CR = 7.291;  $\beta = 0.285$ , CR = 6.082;  $\beta = 0.473$ , CR = 7.846;  $\beta = 0.279$ , CR = 4.911;  $\beta = 0.214$ , CR = 3.461;  $\beta = 0.373$ , CR = 6.429;  $\beta = 0.244$ , CR = 4.128;  $\beta = 0.139$ , CR = 2.851; respectively) indicated statistical significance and thereby showing support for these hypotheses.

Furthermore, the fit indices presented in Table 5.46 indicated that the hypothesised structural model provided the better fit to the data after deletion of not significant paths n=3). Although the likelihood ratio chi-square ( $\chi^2 = 578.251$ ; df = 368; p = .000) was still significant; however, other fit measures showed that the model was adequately fit to the observed data. The absolute fit measures i.e. GFI and RMSEA were 0.942 and 0.039 respectively indicating good fit of model, incremental fit measures i.e. NFI and CFI were 0.935 and 0.975 respectively, which were above the minimum requirement hence showed adequate fit and the parsimony fit measure of AGFI was 0.933, which also was above the cut-off point (i.e., > 0.9). In addition to these indices, the  $\chi^2 / df = 1.571$  was within the threshold level (i.e.,  $1.0 < \chi^2 / df < 3.0$ ), which supported these findings. In summary, the results suggested that after removing three not significant paths i.e. H2a, H6 and H7, a best parsimonious model was achieved. Besides, the revised model adequately fit the observed data. The final revised model is shown in figure 5.6.



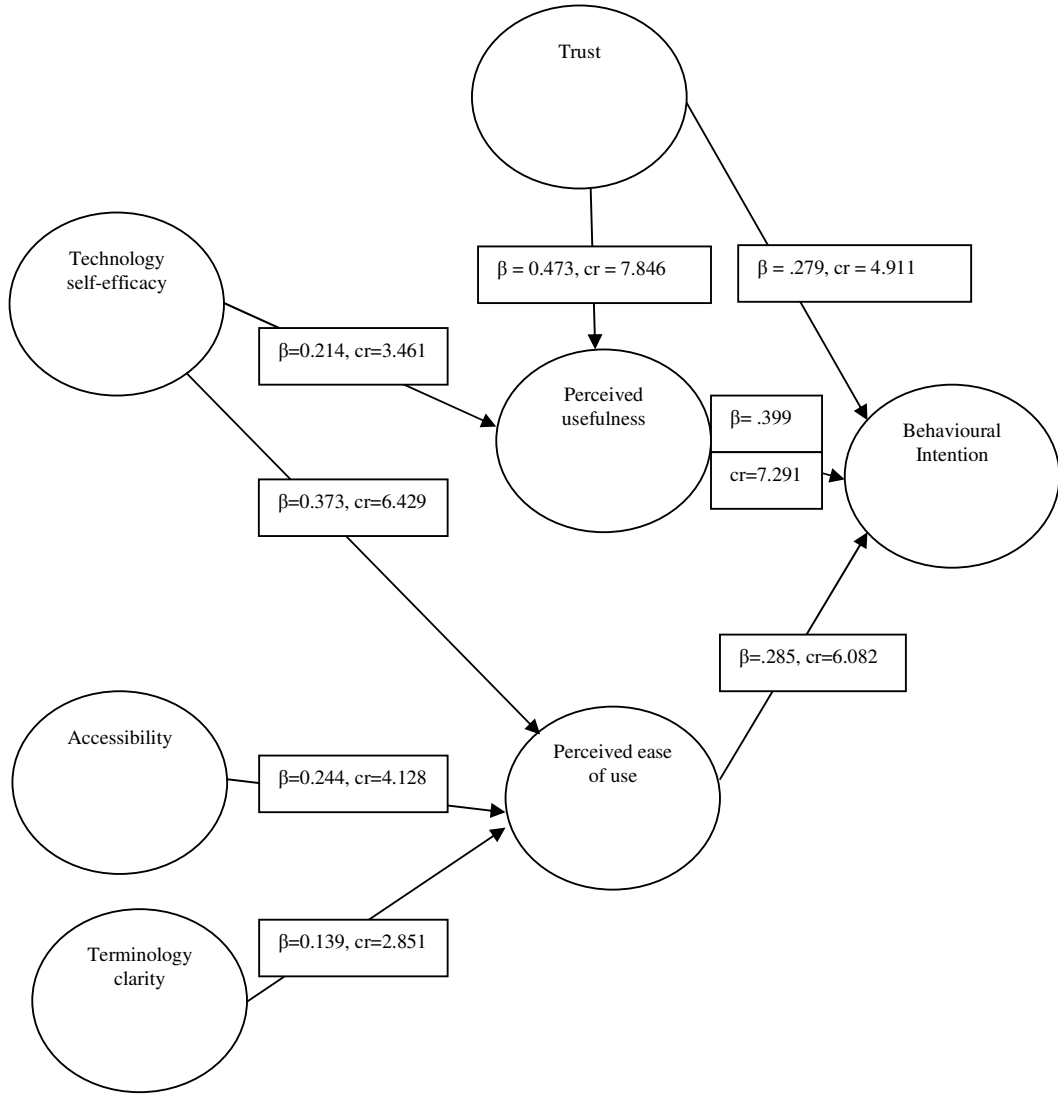


Figure 5.6 Final revised model

### 5.17 Conclusions

This chapter presented the results of this research study. Several statistical procedures were applied to screen the data to deal with missing values, outliers, and normality issues. This screening was important before performing structural equation modelling (SEM) because SEM is very sensitive to such issues. The three-step procedure suggested by Byrne (2001) was applied to deal with missing data. After investigation it was found that the percentage of missing data was very low (0.8%, and the data were missing completely at random (MCAR). Accordingly, following other researchers' (Kline, 2005, Hair et al., 2006) recommendations this researcher employed regression imputation mechanism to deal with the missing data. Mahalanobis distance ( $D^2$ ) using AMOS version 16.0 was measured to identify outliers. Results revealed that there were very few outliers; it was, however, decided to retain all the cases, as there was insufficient evidence that these outliers were not part of the entire population (Hair et al., 2006). Skewness and kurtosis were used to investigate normality of the data. Results suggested that data were normally distributed.

Principal components analysis and orthogonal model with varimax rotation method were applied to perform the EFA using SPSS version 16.0. The results suggested that an item to be deleted, as it was highly cross loaded on another latent factor. The item deleted was PU6 from the perceived usefulness construct.

Structural equation modelling (SEM) using AMOS version 16.0 was chosen to test the measurement and structural model in this study. The SEM analysis was performed in two stages. In the first stage, confirmatory factor analysis (CFA) was employed to assess the fit of measurement model. Assessment of results indicated the measurement model needed to be rectified. In addition to significant chi square, the other fit indices such as GFI= 0.893 and AGFI= 0.868 were little lower than the cut of point ( $\geq 0.90$ ). The standardised regression weights for all measurement items were above the recommend level ( $>0.7$ ). Evaluation of standard residuals indicated that the values of TR5, BI3, TSE3, and PEOU4 were not within the acceptable level (above 2.58 or below  $-2.58$ ). The items, which shared a high degree of residual

variance, were therefore dropped. After dropping these problematic items, CFA was performed again for the measurement model. The results of the model revealed that goodness of fit indices were improved and the revised model demonstrated a better fit to the data. Each latent construct was then assessed for the reliability and validity. The assessment of these constructs indicated that all constructs were reliable. Furthermore, the convergent, discriminant and nomological validity for each construct were also confirmed.

Thereafter, structural model was assessed to test the hypothesised relationships between latent constructs. Eleven hypotheses (i.e. H1, H2a, H2b, H3a, H3b, H4a, H4b, H5, H6, H7 and H8) represented as causal paths were used to test the relationships between these latent constructs. Both the goodness of fit indices and parameter estimates coefficients were examined to check whether the hypothesised structural model fitted the data and to test the hypotheses. The fit indices indicated that the hypothesised structural model provided the good fit to the data. However, three hypotheses i.e. H2a, H6, and H7 out of eleven were statistically not significant and thereby they were rejected. Consequently, the structural model was re-specified by removing not significant paths. The model was revised in order to achieve parsimonious model that fits the data well.

The next chapter presents detailed discussion of the findings of this study.

## **CHAPTER SIX**

### **Discussion**

The chapter starts with overview of the main objectives of this research. It then presents discussion on the key findings of this study: the descriptive statistical findings and the hypothesised relationships. The last section of the chapter presents the conclusions.

#### **6.1 Overview of This Research**

The purpose of this research study was to determine factors affecting user acceptance of online banking information system. This thesis developed and empirically tested a hypothesised model for understanding the factors that influence users' intention to use an online banking information system in a better way. By extending the model of technology acceptance - TAM in the context of online banking information system, this study incorporated factors from other well-known theories and models applied in IS research stream. In this background, the main objectives of the research included identifying factors that influence users' intention to accept an online banking information system, developing a model of factors influencing users' beliefs towards the online banking acceptance, and testing the hypothesised model for validating it by exploring relationships between studied factors.

As described in chapter 3, the research model in the present study proposed that user acceptance of an online banking information system is affected by user beliefs, which included perceived ease of use (PEOU), perceived usefulness (PU) from TAM, and trust. PEOU and PU were proposed to mediate the effects of external factors i.e. technological self-efficacy, output quality, terminology clarity, accessibility, and response time on the behavioural intention (BI) online banking information system. The relative importance of each of these factors in the prediction of the BI to use an online banking system was also evaluated.

In order to achieve the above mentioned research objectives, a detailed and organized literature review was conducted, which is already reported in chapter 2.

Different theories were compared and empirical research studies were reviewed. The literature suggested that the technology acceptance model was the most appropriate for the present research due to its simplicity, parsimony and specific focus on IS. Hence, the TAM was selected as a base model. However, it was identified that the TAM's core constructs i.e. perceived ease of use and perceived usefulness were not sufficient to explain an online banking information system's acceptance and usage behaviour; therefore, a need for additional variables was also identified. In addition, suitable factors which included an internal factor i.e. trust and some external factors i.e. technological self-efficacy, output quality, terminology clarity, accessibility, and response time were identified in literature and they were incorporated in the model.

This study employed a quantitative approach using a cross-sectional field survey for collecting primary data. A questionnaire was developed from the published literature by adapting existing measurement scales reported by previous research studies. Prior to using questionnaire in the main survey, one pre-test and a pilot study were conducted. The purpose of pre-test and pilot study was to detect any errors and ambiguities in the measurement instrument in order to avoid confusions and misinterpretations (already mentioned in detail in see section 4.9 of Chapter 4). The scales were revised and modified where necessary.

A final sample of 353 responses was used for data analysis. The data collected was then analysed using two statistical software tools i.e. SPSS and AMOS. The SPSS version 16.0 was used for the descriptive analysis, missing value analysis and exploratory factor analysis while the AMOS version 16.0 was used for structural equation modelling (SEM) analysis i.e. confirmatory factor analysis (CFA), testing model fit to the data and hypotheses testing. The descriptive analysis of the survey presented demographic profile of the sample and item analysis. The exploratory factor analysis was performed to extract latent factors (constructs), which were then confirmed by confirmatory factor analysis. Finally, the hypothesised relationships between the constructs were examined by structural equation modelling. A two step-stage approach was adopted in SEM. In the first stage, the measurement model, using CFA method, was tested to examine and assess the reliability and validity of the constructs used in the model. In the second stage, a hypothesised structural

model was assessed using the path analysis technique for testing the hypothesized causal relationships among the constructs proposed in the research model. The proposed research model was found to be valuable in explaining the acceptance of the online banking information system (OBIS) by potential users and adequately fit the data.

The results of this study largely support the hypothesised relationships proposed in the model. In particular, the results suggested that beliefs of usefulness, ease of use and trust jointly influence the behavioural intentions towards OBIS acceptance. The structural model was evaluated and a discussion of the findings is presented in more detail in the next section. It is to be noted that the discussion in this chapter is organised around hypotheses testing results and findings in respect to the proposed hypothesised research model. This is followed by the conclusions of this chapter.

## **6.2 Discussion**

Following sections provide discussion on the response rate, participants' demographic characteristics, constructs and items, and hypotheses tested in this study.

### **6.2.1. Response rate**

This field study employed a quantitative approach using a cross-sectional survey for collecting data. Out of 900 surveys distributed, 375 surveys were returned; however, only 353 responses were included in the data analysis while the remaining 22 surveys were incomplete; hence, they were discarded. Thus, the final response rate in this study was 39.2%. The overall useable response rate in this study seems relatively low but it was higher than the researcher's initial anticipation drawn from the response rate reported in previous studies in the same domain. The response rate achieved in this study is reasonably higher than that of in earlier studies on online banking and information systems. For instance, the response rate reported in the study by Cheng et al. (2006) was 20.3 per cent, Wu (2003) received 10.5 per cent, Laitinen (2002) reported 10.8 per cent, and Podder (2005) had 15.7 per cent of usable responses. Yousafzai (2005) in her research survey of Internet banking acceptance in the United Kingdom received 21.8 per cent usable responses.

Therefore, the final response rate in this study can be considered relatively better than the previous studies mentioned above.

### **6.2.2. Participants' demographic characteristics**

The results of participants' demographic characteristics revealed that the majority of the respondents were male (71.4 per cent). This was not surprising because looking at the latest gender statistics of Pakistan prepared by the Statistics Division of Government of Pakistan for the year 2009, it can be seen the total number of male population exceeds the number of females ([www.statpak.gov.pk](http://www.statpak.gov.pk)). This difference in the ratio between the male and female categories therefore may explain the high percentage of male responses obtained in this survey. In addition, this finding suggests that there are more male online banking users than female in Pakistan. This is also consistent with previous studies that revealed that the typical users of internet banking are generally male, especially in developing countries (Jayawardhenaa and Foley 2000; Singh 2004).

In addition, the age of about 74 per cent of respondents in this survey was between 20 years and 40 years. This finding suggests that the majority (about 74 per cent) of the online banking users in Pakistan are adults of working age, who might be using the Internet mostly at their workplace. This is evident from the results of the respondents' profession, which showed 86 per cent of the respondents were working as private sector employees (38.5 per cent), public (government) sector employees (29.7 per cent) and businessperson (17.8 per cent).

The findings also revealed that the level of education of the most (about 80 per cent) of the participants was minimum a bachelor's degree, which was higher compared to an average citizen in Pakistan where the literacy rate is low i.e. 54 per cent, (World Bank, 2008). These findings suggest that the online banking users in Pakistan generally have higher education level. It can possibly be explained that educated respondents have benefited from more awareness and greater exposure to information technology as a part of their education. Therefore, they are better able to use computers and the Internet.

This is evident from the respondents' level of education, which was higher as mentioned above. Consequently, they had better chances of being in the employment mainly in the private and public sectors. In addition, income distribution of the respondents (see table 5.2, chapter 5) revealed that about 46 per cent participants had monthly income  $\geq 20,000$  Rs, which is considered higher income in Pakistan where the average monthly salary of the population is low (World Bank, 2008). This finding suggests that the internet access and usage in Pakistan is skewed in favour of people with higher income and that in employment and in business. However, these study findings also suggest that people with these characteristics are the people who are more likely to use and accept the online banking information systems. In this study, the acceptance of online banking information systems was studied using a hypothesised model, which comprised a number of constructs and hypotheses about relationships between the constructs. The next section therefore presents discussion about the study constructs and their items.

### **6.2.3 Constructs and items**

This section provides discussion on the ratings of construct items obtained through exploratory factor analysis (EFA)

#### **Behavioural intention**

The findings revealed that the mean scores for five measured items for this scale were between 4.78 ( $\pm 1.916$ ) and 5.01 ( $\pm 1.846$ ), which reflected participants' strong behavioural intentions towards use of an online banking information system. Item BI1 stating 'I intend to use the online banking information system as often as needed' was rated highly, while item BI4 related to the 'Given that I may have access to the online banking information system in the future, I predict that I will use it' was rated low (see Table 5.3 of Chapter 5). Nevertheless, the average mean score of these items was above the neutral point. The high ratings of the items of BI construct may suggest that respondents were highly interested in new channels for using banking services such as the online banking information systems. In addition, Cronbach's Alpha coefficient for this constructs was 0.947 (as shown in Table 5.22a). This finding suggests strong internal consistency of the measurement items of BI construct.



### **Perceived usefulness**

For this construct, perceptions of the study participants were measured by six items. The item 'Using the online banking information system enhances the productivity of my banking activities' (PU1), was rated highly among the respondents, with mean score 4.75, as shown in Table 5.4 of chapter 5. This finding suggests that the productivity of banking activities of the OBIS is the main reason for using it. On the other hand, the item 'Using the online banking information system improves my performance of banking activities' was rated low by the participants of the survey (PU4). However, overall, the findings revealed that all items relating to this construct were rated high by the respondents and the mean score for all five items was between 4.64( $\pm 1.788$ ) and 4.74( $\pm 1.885$ ), which suggested that the sample agreed with the usefulness of online banking information system. The participants might have compared the usefulness of the online banking with conventional methods of banking. Thus, their higher ratings of it suggest that they perceive online banking systems more efficient and useful than the conventional banking methods. Furthermore, the Cronbach's alpha estimate value of PU construct was .940 (see Table 5.21a), which indicated that this construct had strong reliability of the measurement item.

### **Perceived ease of use**

Six items were used to measure the PEOU construct and their mean ratings were between 4.75( $\pm 1.851$ ) and 4.87( $\pm 1.843$ ), which are greater than the neutral scale point (i.e. 4), and thus reveals that individual respondents agreed with the construct items. The item (PEOU1) with wording 'Learning to operate the online banking information system is easy for me' had high ratings than other measurements in the construct, with the mean score 4.88, as shown in Table 5.5 of Chapter 5. This finding indicated that respondents were confident of their ability to learn new systems, and thus rated it highly. The item code named PEOU4 with wording 'I find the online banking information system to be flexible to interact', was rated very low. This finding indicated that respondents believe it would not be easy to interact with OBIS; this might be due to the complex nature of OBIS, as it involves financial transactions. However, the overall mean score of the items of this construct was 4.8, which suggested that the sample agreed that online banking information systems

were easy to learn, understand and use, which might suggest higher implications for the acceptance of online banking information systems. Additionally, the reliability of measurement items of used in this construct was high with the .934 Cronbach's alpha value.

### **Trust**

The trust construct was measured by ten items on a seven point Likert scale. The overall mean score of all items of this construct was between 3.65 ( $\pm 1.865$ ) and 4.71 ( $\pm 1.858$ ), which suggested that some respondents had reservations about their trust in online banking information systems. This was evident from the low mean rating (3.65  $\pm 1.865$ ) for item TR5 i.e. the online banking information system offers secure personal privacy, which might suggest that respondents were concerned about the security of the online banking systems. This finding is not surprising because the security and privacy are the two major issues that have been found to greatly influence users' acceptance of online technologies especially in the financial and business sectors. In addition, the reliability statistics of the trust construct (as shown Table 5.19a) indicated .954 Cronbach's alpha reliability for this construct, which shows strong internal consistency of measurement items of this construct.

### **Technological self-efficacy**

This construct was measured through five items and the results showed that the mean rating for the items of this construct were between 4.73 ( $\pm 1.757$ ) and 4.88 ( $\pm 1.789$ ). The measurement item (TSE1) 'I could complete my banking tasks using the online banking information system, if I had never used a system like it before' was rated highly by the respondents, whereas, the item (TSE5) worded as 'I could complete my banking tasks using the online banking information system, if there was no one around to tell me what to do as I go' had low ratings among respondents. The average mean score of five items was 4.8, which was greater than the neutral point, reflected that respondents were agreeable to the measured items and they had the technological efficacy to use online banking information systems. In addition, the construct also showed strong internal consistency of measurement items with .915 reliability statistics, as shown in Table 5.23 (chapter 5).

### **Accessibility**

Two items measurement tool was used to measure the accessibility construct and the mean ratings for both the items were between 4.55 ( $\pm 1.963$ ) and 4.62 ( $\pm 1.989$ ), which suggested that the participants agreed with these items. Overall, ratings of both measured items of this construct suggested that this sample did not agree that there was any problem of access and restriction to the online banking in Pakistan. However, these findings might not be true representation of access of every bank account holder in Pakistan, where large number of the people has a low level of education (World Bank, 2008) and the availability of computers and access to the Internet is limited, which is due to a number of reasons but mainly due to economic reasons. Therefore, the government of Pakistan has reduced custom tariffs and duties on IT equipment and related items to encourage IT use in the country (Kundi and Shah, 2009). Cronbach's alpha coefficient value for accessibility was .864. Although this value was above the strict cut off point of this research (i.e.  $\geq .7$ ), however, it was lower compared to other constructs. This might be because of the two items used to measure this construct.

### **Terminology clarity**

This construct was also measured by two items and the results revealed that the mean ratings of individual items of this construct were higher than the neutral point (i.e. 4), which confirmed participants' acceptance of measured items. In short, the average mean score of all measurement items of this construct were between 4.6 ( $\pm 1.91$ ) and 4.64 ( $\pm 1.949$ ) that might suggest that the participants agreed that there was clarity of terms used in online banking systems; however, the ratings were not very high. This finding therefore might suggest using of online banking information systems in native language rather than in any international language such as the English, which might be a main barrier for the majority of population in developing countries such as Pakistan to avail IT facilities in banking. In addition, the reliability statistics of terminology clarity construct (as shown Table 5.25a) revealed that Cronbach's alpha reliability was .871, which suggested adequate reliability of this construct's items.

### **Output quality**

Two-items were used to measure this construct on a seven point Likert scale. The measurement item 'I have no problem with the quality of the online banking information system's output' with code name (OQ2) was rated highly among the respondents of survey. The mean score for this construct was 4.47. The measurement item OQ1 had lower rating than OQ2. The mean scores for both items were greater than 4 (i.e. neutral point) and the overall mean ratings were 4.4, which suggested that the respondents were agreeable to the measurement variables. It can therefore be implied from these findings that output quality positively affects respondents' beliefs towards online banking systems. The Cronbach's alpha reliability estimates for output quality were .892, which suggested good internal consistency.

### **Response time**

This construct was also measured by two items and the mean score of the both items was higher than 4 (the neutral scale) that suggested participants' agreement on these measured variables. Overall, the average mean score of RT construct items was 4.4, which reflected participants' agreement with the measurement variables. Alpha value for this construct was .888, which indicated adequate reliability of measurement items used in response time construct.

## **6.2.4 Hypotheses Testing**

### **Online banking information system acceptance and dependent variable**

System usage is a key variable in most of the theoretical frameworks in IS research literature focusing on technology acceptance by individual users. Self-reported usage measures have often been used in IS research to operationalise system usage, particularly when objective usage metrics are not available. With regard to the TAM research predicting new IT/IS acceptance, usage is often measured by Behavioural Intention (BI) (Mathieson, 2001). Thus, this research considered 'intention to use' as the dependent variable, rather than actual use, for the reason that in the original TAM, PU and PEOU were postulated to have a direct relationship with BI but not with actual use. This is also consistent with the findings of a number of previous research studies (Davis, 1991; Gefen and Straub, 2000; Jarvenpaa et al., 2000; Shih, 2004). The model proposed in this study helped to explain the overall relationships

among the predictor variables and the outcome variable i.e. behavioural intention to use. A total 45.7 per cent of the variance in the BI to use was explained by three direct predictor variables, which included the trust (TR = 0.279), perceived usefulness (PU: 0.397), and perceived ease of use (PEOU: 0.288). Among these direct predictors of BI, the PU was found most significant determinant followed by the PEOU and then the trust. A total of 28.1 per cent of the variance in the PU construct was predicted by the trust (0.453) and the technological self-efficacy (0.194). However, contrary to the hypothesised relationships between perceived usefulness and its predictors (i.e. ease of use, output quality, and response time) found insignificant. In the PEOU factor, a total of 21.8 per cent of the variance was predicted by the technological self-efficacy (0.373), accessibility (0.243), and terminology clarity (0.139). Technological self-efficacy (TSE) also was found to be more influential determinant of the PEOU than perceived usefulness. The next section presents a detailed discussion about hypotheses testing.

### **Perceived usefulness and behavioural intention to use**

In the proposed model, this researcher hypothesized that perceived usefulness will have a positive effect on the user acceptance of an online banking information system (H1). The parameter estimate results (H1: PU → BI;  $\beta = 0.397$ , t-value = 7.367, p = 0.001) for the above hypothesis was found both positive and statistically significant. This suggested existence of a positive effect of the usefulness beliefs on the behavioural intention to use an online banking information system. As such, this hypothesis was accepted. This hypothesis was drawn from the original technology acceptance model (as described in chapter 3). As implied in the TAM, PU was found to have a significant direct effect on the intended usage behaviour. The results of this research are consistent with the TAM findings and with those of prior research. Several researchers have provided empirical evidence of a significant effect of the PU on the IS acceptance and usage (Davis, 1989; Pikkarainen et al., 2004; Wang et al., 2003; Chan and Lu, 2004). The PU is often found to have a significant relationship with intention to use. This significance of PU in this research suggested that users think that the online banking system is useful hence it is more likely to be accepted. These results further suggested that users' positive beliefs about usefulness are a driving force for the acceptance of an online banking information system. In

summary, the result of this hypothesis are in agreement with the prior research indicating that the usefulness plays an important function in determining and shaping the behavioural intent of users to perform online banking transactions.

### **Perceived ease of use, perceived usefulness and behavioural intention**

In this research, the proposed model hypothesised that the perceived ease of use will have a positive effect on the intention to use an online banking information system through perceived usefulness by indirect and direct relationship (i.e. H:2a and 2b respectively).

The parameter estimate results ( $\beta = 0.093$ , CR-value = 1.641,  $p = 0.101$ ) for the hypothesis H2a (i.e. PEOU  $\rightarrow$  PU) were statistically found not significant. This hypothesis was therefore rejected. This finding suggests that the perceived ease of use does not influence users' beliefs of usefulness towards the acceptance of the online banking information system. This hypothesis was drawn from TAM model, as applied by (Davis et al., 1989) and other research studies regarding the technology acceptance (Adams et al., 1992; Davis et al., 1989; Igbaria et al., 1997; Lee et al., 2001). Although, these research studies empirically identified the presence of significant relationship between the ease of use and the usefulness belief constructs. However, results of this research study suggested that the perceived ease of use was not a significant determinant of the PU and it does not significantly influence users' intention towards the online banking information system (OBIS) acceptance through the perceived usefulness. The most likely explanation for this inconsistent result between the PEOU and PU may lie in the nature of the target system being investigated. It should be noted that previous TAM studies have mainly been conducted with office automation tools such as Word, Excel, and so on (e.g., Davis, 1989; Davis et. al., 1989; Igbaria et al., 1997; Lee et al., 2001; Taylor and Todd, 1995; Mathieson, 1991). Compared to office automation tools, an OBIS is more complex in nature as it involves monetary transactions. The online banking transaction may require users' complete confidence in the privacy and confidentiality of online security. Therefore, it can reasonably be concluded that a user's assessment of the usefulness of an OBIS cannot be influenced solely by the ease of use of these systems. Nevertheless, while studying acceptance of technology by physicians, Hu et

al. (1999) also found no significant relationship between ease of use and usefulness beliefs.

As for as the direct relationship between the perceptions of ease of use and the behavioural intent towards OBIS use is concerned, the parameter estimate results ( $\beta = 0.288$ ,  $CR = 6.075$ ,  $p = 0.001$ ) for the hypothesis H2b (i.e. PEOU  $\rightarrow$  BI) were found statistically significant. Consequently, this hypothesis was accepted. This hypothesis was drawn from TAM and as explained in the chapter two, the TAM posits that PEOU was important factor that affects the behavioural intention towards the acceptance of new information systems (Davis et al., 1989; Mathieson, 1991). Previous published research studies have empirically shown the existence of a positive correlation between the beliefs of ease of use and the system usage of the new information systems (Mathieson, 1991; Adams et al., 1992; Igbaria et al., 1997; Davis, 1989) and the online banking systems (Alsajjan and Dennis, 2010; Wang et al., 2003; Pikkarainen et al., 2004). Consistent with the empirical findings of prior research, this study confirmed presence of a significant impact of the PEOU on BI to use an online banking information system (OBIS). This study therefore provided empirical evidence to support the earlier findings that the perceived ease of use was a significant predictor of the intention to use the OBIS.

As mentioned earlier, hypotheses related to the beliefs about ease of use and the usefulness and their effect on the BI towards use an online banking information system were drawn from the TAM model (Davis, 1989). The findings of this study suggested that the effect of the PU ( $\beta = 0.397$ ) on the BI was stronger than the effect of the PEOU ( $\beta = 0.288$ ) on the BI. This suggests that the PU is a strong determinant of the BI than the PEOU. These results are in agreement with earlier studies (Venkatesh et al., 2003; Gefen et al., 2003; Davis, 1989; Venkatesh and Davis, 2000; Igbaria et al., 1997; Mathieson, 1991). This finding implies that positive beliefs about the usefulness of online banking systems would contribute more towards the acceptance of these systems compared to the ease of use perception. Nevertheless, the users' intention to use the online banking system depends on both the perceived usefulness and the perceived ease of use.

### **Trust, perceived usefulness and intention to Use**

In the proposed model, it was hypothesised that the trust will have a positive effect on user acceptance of the online banking information system, directly and indirectly through perceived usefulness (H: 3a and 3b). The parameter estimate results ( $\beta = 0.453$ , CR = 7.306) for the hypothesis H3a (i.e. TR  $\rightarrow$  PU) were found statistically significant ( $p = 0.001$ ). As such, this hypothesis was proved valid and thus accepted. The results indicated that trust was a strong predictor of both PU and BI to use. This implies that if there is an increase in trust it would influence users' intention to perform online banking transactions. These findings are in accordance with the findings of previous research studies, which suggest a pressing need for trust in e-commerce (Gefen, 2000; Gefen et al., 2003) and internet banking (Alsajjan and Dennis, 2010; Yousafzai, 2005). This finding also validates the inclusion of trust in the TAM model by Gefen et al. (2003). Moreover, this finding demonstrates that those users who have higher levels of the trust are likely to have a more positive belief of usefulness in using OBIS.

The parameter estimate results ( $\beta = 0.279$ , CR = 4.874) for the hypothesis H3b (i.e. TR  $\rightarrow$  BI) was also statistically significant ( $p = 0.001$ ). This hypothesis was therefore accepted. These results indicate that the trust has a strong positive and significant influence on the behavioural intention towards online banking information system, implying that if there is increase in the trust it would positively influence user's intention towards acceptance of online banking systems. The literature identifies trust as a major predictor of the BI to use the online commerce (Gefen and Straub 2000; Doney and Canon 1997; Gefen et al. 2003). Moreover, the trust is an essential factor in explaining electronic commerce adoption and acceptance because uncertainty is present in any technology-driven environment (Gefen et al. 2003). The finding of this research study confirmed presence of positive relationship between the trust and the behavioural intent toward the online banking information system. Conclusively, the results of this research are in conformity with previous studies (Doney and Canon 1997; Gefen and Straub 2000; Gefen et al. 2003). In addition, this study revealed that apart from the PU and the PEOU, the trust appears to be a major factor that influences behavioural intention towards the acceptance of online banking system. Thus, these findings suggested the importance



of trust to capture individuals' behavioural intentions towards the acceptance of online banking systems.

In brief, findings of this research study suggested that users' positive beliefs of trust significantly affect their perceptions towards online banking information system acceptance. The banks should organise motivational sessions and educate users about the potential threats about security and privacy issues, and provide them solutions for how to avoid such threats. This would help banks to reinforce users' trust in the banks and the online banking systems. In addition, banks can help build users' trust by offering undertaking that they will indemnify the monetary losses incurred by an unauthorised access. This would boost users' confidence in banks and online transaction channels and it would subsequently speed up the rate of acceptance of online banking systems. On the other hand, there appears to be a role here for designers and developers by developing systems that provide potential users a secure service to perform an online transaction.

#### **Technological self-efficacy, perceived usefulness, and perceived ease of use**

Technological self-efficacy (TSE) was hypothesised to have a positive effect on PU and PEOU (Hypotheses: 4a and 4b). The parameter estimate results ( $\beta = 0.194$ , CR = 3.026) for hypothesis H4a (TSE  $\rightarrow$  PU) demonstrated statistical significance at  $p = 0.001$  level, which indicated that TSE was an influential factor affecting beliefs about usefulness of OBIS. These findings are in agreement with the proposed hypothesis in the model (i.e. 4a), which implies that the increase in technological self-efficacy would exert an influence on users' beliefs of usefulness towards BI towards acceptance and use of an OBIS. Previous research has empirically examined the effect of computer self-efficacy on expectations about outcome (Compeau and Higgins, 1995; Compeau et al., 1999) and perceived usefulness (Chau, 2001). From a technology acceptance perspective, it can be said that perceived usefulness reflects a user's beliefs or expectations about an outcome (Chau, 2001). The findings of this research study partially validate the findings of Igarria and Iivari (1995), who identified that computer-related self-efficacy, has a strong indirect effect on perceived usefulness rather than direct. However, this research study found that the TSE was a direct determinant of PU. This finding was consistent with the findings of

research conducted by Ong et al. (2004) and Ong and Lai (2006). In addition, the relationship between TSE and PEOU ( $\beta = 0.373$ ,  $CR = 6.43$ ) for the hypothesis i.e. H4b was found statistically significant ( $p = 0.001$ ). Thus, this hypothesis was also supported. Previous research has empirically proved the existence of a positive association between computer-related self-efficacy and ease of use perceptions toward intended use (Igbaria and Iivari, 1995; Venkatesh and Davis, 1996; Ong et al., 2004). In agreement with the empirical findings of prior research studies, TSE was found to have a significant effect on PEOU beliefs in this study. Moreover, this study has provided empirical evidence to support the fact that TSE is a significant predictor of PEOU. Although TSE significantly determined both PU and PEOU, the influence of TSE on PEOU was greater than that on the usefulness beliefs of OBIS. .

In short, this research study suggested that users' positive judgments and confidence of their abilities to use the internet technology in general would favourably influence their perceptions of the PU and the PEOU. This finding indicates that the technological self-efficacy would increase users' beliefs, which would subsequently affect the intention to use. The designers and developers of online banking information systems have to make sure that they must develop systems, which are easy to use and perceived to be useful. The IT team should organise technology training sessions and awareness seminars to enhance general technological self efficacy and boost confidence of the potential users of the systems as people who demonstrated higher technological self efficacy are more readily prepared to perform online transactions. By doing so, they (i.e. bank management and IT teams) will be able to increase the users' acceptance of online banking information systems.

#### **Accessibility and perceived ease of use**

The model in this research hypothesised that accessibility will have a positive effect on perceived ease of use beliefs toward the online banking system acceptance (Hypotheses 5). The parameter estimate results ( $\beta = 0.243$ ,  $CR = 4.126$ ,  $p = 0.001$ ) for the hypothesis i.e. H5: AC  $\rightarrow$  PEOU showed that the hypothesised association was statistically significant ( $p=0.001$ ); thus, this hypothesis was supported. These results suggest that the accessibility has a significantly positive effect on the perceived ease of use, which implies that accessibility is an important factor that

determines the ease of use perceptions toward acceptance of online banking information systems (OBIS). This result is in agreement with the findings of previous research (Karahanna and Straub, 1999). As mentioned earlier, the research model in this study proposed that accessibility would have an effect on the PEOU which, in turn, would exert a positive impact on the BI to use an OBIS. This study has therefore provided the empirical evidence to support the proposition that accessibility affects users' beliefs on the ease of use of OBIS. Thus, it can safely be concluded, that the more accessible an OBIS, so less effort is required to use it, which would subsequently help increase its acceptance by potential users.

### **Terminology clarity and perceived ease of use**

In this research study, the theoretical model hypothesised that 'terminology clarity would have a significant positive effect on the perceptions of perceived ease of use (Hypotheses 6). The parameter estimate results ( $\beta = 0.139$ , CR = 2.848) for this hypothesis i.e. H6: TC  $\rightarrow$  PEOU demonstrated that it was statistically significant ( $p = 0.01$ ). This hypothesis was therefore supported. Prior research had empirically proved the existence of a positive association between the terminology clarity and ease of use perceptions toward the intended use (Hong et al. 2002). It is noteworthy that study by Hong et al. (2002) examined factors affecting digital library adoption and their study empirically provided support for a strong effect of the terminology clarity on ease of use perceptions. Consistent with the empirical findings of earlier research, significant effect of the terminology clarity on perceived ease of use beliefs was also confirmed in this study. These findings suggest that users who find improved terminology clarity are likely to have more positive ease of use beliefs towards the online banking systems acceptance and use. In other words, it can be said that terminology clarity would help users to use online banking systems with ease. Therefore, it can rationally be concluded that user's assessment of the beliefs about the ease of use of online banking information system (OBIS) is influenced by the terminology clarity.

Although both the accessibility and the terminology clarity (TC) were found significant determinants of the PEOU of OBIS, the results in this research study have revealed that the effect of the accessibility ( $\beta = 0.243$ ) on the PEOU was greater than

the effect of the terminology clarity ( $\beta = 0.139$ ) on the PEOU of OBIS. These findings therefore suggest that the accessibility, in order of significance, is a stronger determinant of the PEOU of OBIS than the construct terminology clarity.

### **Output quality and perceived usefulness**

Output quality in this research study was hypothesised to have a positive effect on the perceived usefulness. The parameter estimate results ( $\beta = 0.077$ , CR = 1.177,  $p = 0.239$ ) revealed that this hypothesis (H7: OQ  $\rightarrow$  PU) was statistically not significant. Therefore, this hypothesis is not supported but it was rejected. This study suggested that output quality does not have a significant effect on users' beliefs of perceived usefulness, which may imply that users do not relate output quality with usefulness with regard to an online banking information system. Although previous studies have asserted a significant relationship between OQ and PU (Davis et al., 1992), the results of the present research suggest that OQ was not a significant determinant of PU which, in turn, does not significantly influence users' intentions towards acceptance of an OBIS through PU. One plausible explanation for inconsistent results centring on the relationship between OQ and PU may be that the respondents may not have had sufficient experience (i.e., performing complex transactions) with the OBIS. Jaspersen et al. (2005) argued that experience with using information systems to perform a variety of tasks could enhance understanding of the system characteristics, which subsequently could assist the user's view regarding its overall usefulness. Thus, it can reasonably be suggested that the actual contact with OBIS may possibly assist users in formulating their beliefs about the system's characteristics (output quality), which, in turn, will support users in their task performance.

### **Response time and perceived usefulness**

In this research, the response time was hypothesised to have a positive effect on the perceived usefulness. The parameter estimate results ( $\beta = 0.098$ , CR = 1.483,  $p = 0.138$ ) for the hypothesis (H8: OQ  $\rightarrow$  PU) showed that it was statistically not significant; therefore, this hypothesis was rejected. This finding may imply that RT does not increase usefulness beliefs towards an intention to use the OBIS. Response time is concerned with the perception of how quickly, consistently and reasonably

the OBIS responds to an individual's requests, and this perception is related to the attributes of IS generally (Wixom and Todd, 2005). Nelson et al. (2005) argued that IS characteristics need to be assessed in the context of the individual's task or work environment. As the present research study was conducted voluntarily, a possible explanation for this inconsistent relationship between the RT and PU may be due to respondents' infrequent (or total lack of) interaction with an OBIS. It can therefore be reasonably argued that frequent interaction with OBIS might help users to formulate beliefs about the system's characteristics, which, in turn, will assist users in their task performance.

In summary, the model in this research proposed five determinants (i.e., trust, technological self-efficacy, perceived ease of use, output quality, and response time) of the perceived usefulness. The results obtained from this research study revealed that only two determinants i.e. trust ( $\beta = 0.453$ ) and technological self-efficacy ( $\beta = 0.194$ ) were significantly related to the perceived usefulness. Among these two predictors, the trust showed a strong effect on the perceived usefulness Whereas, the three remaining factors i.e. perceived ease of use, output quality and the response time showed no significant effect on the perceived usefulness.

### **6.3 Conclusions**

This chapter aimed to discuss the key findings of the research study. It was observed that the response rate (i.e. 39.2 per cent) achieved in this study was higher than the initial expectation of the researcher, and compared reasonably well with earlier studies on online banking and information systems.

The demographic information suggested that majority of the respondents were male. In addition, the age of about 74 per cent of participants in this survey was between 20 years and 40 years. This finding suggested that the majority of the online banking users in Pakistan were adults of working age. In addition, the findings, regarding education, revealed that the level of education of the most of the participants was minimum bachelor's degree, which was higher compared to the education level of an average citizen in Pakistan where the literacy rate is low.

The model proposed in this study helped to explain the overall relationships among the predictor variables and the outcome variable i.e. behavioural intention to use (BI), the dependent variable. A total 45.7 per cent of the variance in the intention to use was explained by perceived usefulness, perceived ease of use and trust (these factors were hypothesised as direct determinants of BI). PU was found most significant determinant followed by the PEOU and then the trust. A total of 28.1 per cent of the variance in the PU was predicted by the trust and the technological self-efficacy (TSE). This finding suggested that trust was more significant determinant of PU than TSE. However, PEOU, output quality and response time were found insignificant determinant of PU.

In addition, in the perceived ease of use, a total of 21.8 percent of the variance was predicted by the technological self-efficacy, accessibility, and terminology clarity (TC). TSE was found to be more influential determinant of the perceived ease of use than perceived usefulness. These findings suggested that increase in TSE, accessibility, and TC would increase PEOU of the online banking information system. The following chapter will present the conclusions of this thesis.

## **CHAPTER SEVEN**

### **Conclusions**

In order of presentation, the first section of this chapter presents implications of research finding, i.e., theoretical and managerial. The next section is about research contributions followed by limitations of this research study and the directions for future research to be conducted for the further understanding. Finally, the last section presents conclusions about the key findings of this study.

#### **7.1 Implications of Research Findings**

The implications of the findings of this research study are presented under two headings i.e. theoretical implications and managerial implications, which are described as follows. Figure 7.1 depicts summary of theoretical and managerial implications.

## Implications

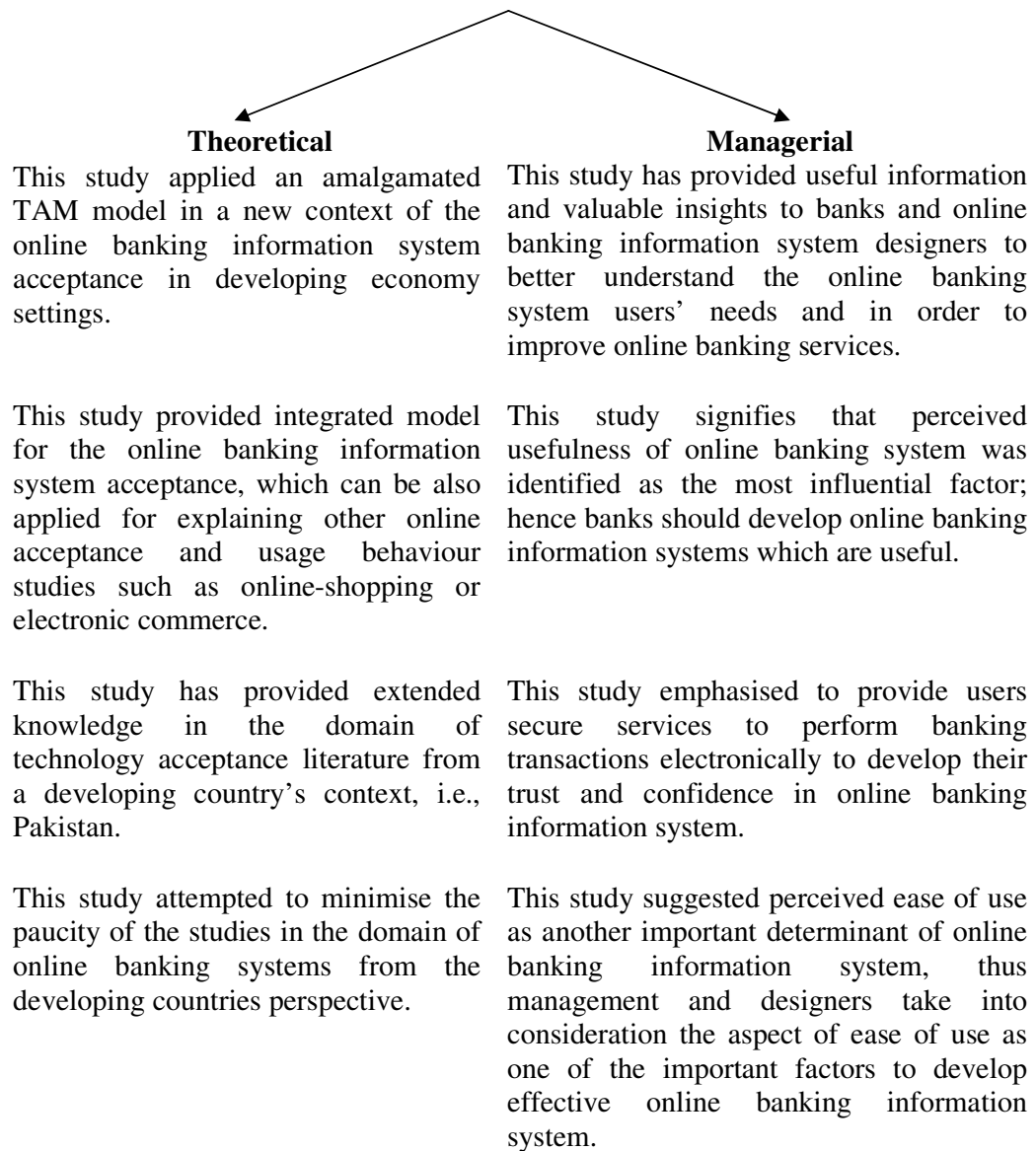


Figure 7.1 Summary of research implications



### **7.1.1 Theoretical Implications**

The results of this study have a number of significant theoretical implications. First, this research applied an extended TAM model in a new context of the online banking information system acceptance. The success of the incorporation of the trust and external factors (i.e. technological self-efficacy, accessibility, terminology clarity) in the TAM model is evident from the results. The results suggest that the proposed model of the online banking information system acceptance demonstrates a considerable explanatory and predictive power. Thus, the integration of the trust and external factors with the TAM is both theoretically appealing as well empirically significant.

Second, the integrated model for the online banking information system acceptance developed in this study can be employed for explaining other online acceptance and usage behaviour such as online-shopping or electronic commerce. This research has identified important factors from the extant literature on various online domains. Therefore, the comprehensive and parsimonious model developed for this research makes important contribution to the literature on web-based transactional systems acceptance.

Third, previous studies on the TAM mostly focused on the impact of core constructs i.e. perceived usefulness and perceived ease of use on the intended behaviour towards technology acceptance. However, little research had focused on how these beliefs of usefulness and ease of use are formed or what constitutes these beliefs. The present study, by investigating effects of external variables on perceived usefulness and perceived ease of use, highlights how usefulness and ease of use perceptions are formed, which in turn increase the acceptance of new information systems such as the online banking system.

Fourth, the data for the present empirical study was collected using multi methods approach, such as by post / mail, electronic mail, and face to face self-administered method. Combination of these methods together gives advantages of versatility, speed, and cost effectiveness. In addition, structural equation modelling (SEM) using the AMOS statistical package was used to test the measurement and structural

models. Use of this methodology employing sophisticated statistical tools has been limited in previous literature; thus, this study sets a new pattern in the research on online commerce applications.

### **7.1.2 Managerial Implications**

Findings of this research study have many managerial implications for different stakeholders such as the banks and designers of IS as discussed below.

The unprecedented increase in the e-commerce and its benefits (e.g. communications, distribution, and online transactions) are compelling different organisations and companies to develop systems that provide users access, anytime and anywhere, to perform online transactions using the internet. Given the large investment in developing new information systems, an understanding of the factors influencing users' acceptance of online banking information systems is useful for the banks so they can prioritise their resources in an effective way. For example, perceived usefulness was found to be the most significant factor that has a strong impact on users' intention towards acceptance of online banking systems. In addition, trust and technological self-efficacy were found to exert a significant impact on the perceived usefulness. In order to increase perceptions of usefulness, banks could organise motivational sessions and educate users about potential threats to the security and privacy of themselves and their transactions, and provide solutions (e.g. free security software) to avoid such threats. This would help to reinforce users' trust in the banks and online banking channels. In addition, banks could help build users' trust by offering an undertaking (i.e. statement of guarantee: depending on the situation) that they would indemnify monetary losses incurred by any unauthorised access. This would boost users' confidence in the banks and in online transaction channels and would speed up the rate of acceptance of online banking systems.

On the other hand, there appears to be a role for designers and developers of online banking systems; such that, the online banking system designer and developers must ensure that they design websites that provide users' a secure service to perform online transactions. In addition, as this research has suggested, users' positive

judgment and confidence in their abilities to use internet technology in general would favourably influence their perceptions of perceived usefulness. In order to increase technological self-efficacy, IT teams could organise technology training sessions and awareness seminars to increase general computer and internet self-efficacy and increase confidence of potential users of the systems because people who demonstrate higher technological self-efficacy are more readily prepared to perform online transactions.

Moreover, perceived ease of use of online banking systems has emerged as an important factor in determining behavioural intention to use. Three factors that influence perceived ease of use include technological self-efficacy, clarity of terminology and accessibility. In order to increase the perceived ease of use, banks should build online banking systems that are user-friendly, easily accessible and contain simple terminology for online banking. In summary, the findings of this research study suggest that the developers and designers of OBIS and the banks should carefully consider the requirements and values of potential users and ensure that online banking systems effectively meet the needs of users. Compatibility between an online banking system and the user's requirements will ultimately increase the acceptance of online banking information systems.

## **7.2 Summary of the Research Contributions**

This research study has made a number of contributions to the body of knowledge. The contributions of this study are explained as follows.

First, technology acceptance literature shows the scarcity of empirical research of the determinants of individuals' use of online banking information systems, especially in Pakistan. This study examined the viability of the TAM model, which was established in developed economy settings, in explaining a similar behaviour in developing economy settings. Thus, the results of present research contribute by filling this important gap by taking on a theory-based empirical investigation of the determinants of online banking information systems acceptance by individuals in the context of developing economies.

Second, prior research has suggested that TAM is not complete and researchers were encouraged to extend the model by adding important constructs from information systems (IS) acceptance and use literature (Wang et al., 2003; Moon and Kim, 2001). This study investigated the effect of user beliefs (i.e. PU and PEOU), trust and external variables (i.e. technological self-efficacy, output quality, response time, accessibility, terminology clarity) on BI towards acceptance of online banking information system by extending the TAM model. Thus, the present study extended the TAM model by developing a theoretical model and subsequently validated the model with empirical data collected in this study. The validated model contributes better and more systematic understanding of online banking information system acceptance and enhances the explanatory power of the TAM. Third, previous research mostly focused on students or office workers (as shown in Table 2.4 given in Chapter 2); however, this study examined the model in real world settings with sufficient sample of common internet banking users, who involved businesspersons, government sector employees, common citizens and private sector employees.

Fourth, this study applied sophisticated statistical techniques, i.e., structural equation modelling (SEM) using AMOS v.16. SEM allows simultaneous evaluation of the adequacy of the measurement model and the causal model that was proposed to investigate the intended behaviour. The measurement model validated the TAM and other constructs (trust, technological self-efficacy, output quality, accessibility, and terminology clarity) measures as developed by their authors. In addition, structural model showing empirical support for the interrelationships between the important constructs, contributed to the knowledge in technology acceptance in general and online banking system acceptance in particular.

Finally, another contribution to the research on IT/IS acceptance is the identification of some important determinants of perceived ease of use and perceived usefulness. The results demonstrated that perceived usefulness is determined in order of importance by trust and technological self-efficacy. Whereas perceived ease of use is determined in order of importance by technological self-efficacy, accessibility and terminology clarity.

### **7.3 Limitations**

Although the findings of this study are encouraging and useful, it has some limitations as most field surveys suffer from. First, the data collected for this study was cross-sectional, longitudinal data will be needed in the future to investigate what factors will influence individuals' perceptions in continuing to use the online banking information system. Second, the study was conducted in voluntary settings; the findings may not therefore be generalised to the mandatory settings. Third, the findings presented here were obtained from a single study that focused on a specific IS (i.e. online banking information system), and user group (i.e. online banking users). Thus, care is needed to be taken while generalising findings of this study to other IT/IS systems applications and user groups. Therefore, additional research is expected to authenticate the generalisability of these findings to other technologies and user groups.

### **7.4 Future Research**

This thesis has developed an integrated model that provided systematic way to understand acceptance of online banking information system by intended users, several beneficial areas for future research, however, remain to be explored. For example, results of current study are limited to online banking information system; future research may apply or replicate this study in other online domains, such as online shopping or e-commerce environment. This would be valuable in establishing the external validity of model.

In addition, it will be interesting for future research to test and explore the model developed for this study in other cultural settings, like other Asian or Western developed countries. This will be valuable in providing evidence concerning the robustness of research model across different cultural settings. It is understood that the robustness of the model may vary across different cultural settings and thus need to be empirically tested (Mao and Palvia, 2006).

In addition, the data for this study was collected using cross-sectional survey, future research is needed to obtain longitudinal data to investigate what factors will influence individuals' perceptions in continuing to use the online banking

information system. Prior literature indicates that individuals' perceptions are formed with the passage of time, experience and continuous feedback from surroundings (e.g. Venkatesh and Davis, 2000; Davis et al., 1989). Thus, it is expected that the future research will inspect the findings of this research with more in-depth investigations using longitudinal data.

Another direction for further research could be the selection of dependent variable to measure the IS acceptance. For example, this study used intention to use as dependent variable to measure the acceptance of online banking information system, although it was consistent to prior research (Davis, 1991; Gefen and Straub, 2000; Jarvenpaa et al., 2000; Shih, 2004), future research is needed to measure actual usage of online banking information system rather than intention to use.

Future research could also be conducted to expand the research model by including additional factors. For example, perceived risk has been found as one of the significant factor influencing online purchase intentions (Lee et al. 2000; Pavlou 2003), future research may include perceived risk in the model to gain a comprehensive understanding of the user acceptance of online transactional systems, such as online shopping or electronic -commerce.

## **7.5 Conclusions**

Research on factors influencing user acceptance of online banking information system (OBIS) was stimulated by the tremendous advancement in information technology (IT), which was considered as one of the most fundamental forces for change in the financial services sector. This includes the availability of online banking services in the retail banking sector. Together with innovative business thinking, IT has transformed the ways in which personal financial services are designed and delivered. After the development of secure internet services, financial institutions such as the banking sector started introducing OBISs to facilitate and complement their traditional service channels, namely counter teller, ATMs, TB, and so on. The introduction of OBIS allowed consumers to conduct a wide range of banking transactions through the internet, using sophisticated websites, at any time of day, anywhere, much faster, and in a cost-saving manner compared to traditional

banking services offered at the bricks-and-mortar branches of banks (Pikkarainen et al., 2004; Alsajjan and Dennis, 2010). Despite the fact that the potential benefits of electronic services in banking have been described in detail in the prior research, the underutilisation of online banking systems by the potential customer was still a major problem. Thus, it was important to understand why customers accept or reject new information systems and identify those factors that influence acceptance of online banking systems.

This research study intended to address this research issue by developing and testing a structural model of OBIS acceptance and use. The proposed model in this study was based on the model of technology acceptance and relevant constructs from the information systems and e-commerce acceptance research streams. The model was then tested against data from 353 Internet banking users from Pakistan, using sophisticated statistical software packages, such as SPSS version 16.0 and AMOS version 16.0.

The current study investigated the effect of user beliefs (i.e. PU and PEOU), trust and external variables (i.e. technological self-efficacy, output quality, response time, accessibility, terminology clarity) on behavioural intention towards acceptance of an OBIS by extending the TAM, which provides a conceptual framework to explain individual's acceptance of an information system based on user perceptions. TAM model postulates that individual's beliefs of ease of use and usefulness are primary determinants of acceptance of new information system technologies. The present research proposed a conceptual causal model that incorporated trust as additional direct determinant of intention to use an OBIS, along with, the antecedents of user beliefs (i.e. PU and PEOU) to supply a better explanation and understanding of the factors influencing user acceptance of the OBIS. The results of this research study provide empirical support for the extended model of the TAM.

In this study, the beliefs about ease of use and usefulness were observed to have significant impact on behavioural intentions towards acceptance of OBIS, revealing more than half of the total variance in the acceptance intention. However, beliefs about usefulness had a stronger effect on the intended use than the perceived ease of

use beliefs. Thus, suggesting that usefulness beliefs contribute more in OBIS acceptance than the ease of use beliefs. These findings provide additional external validity to the technology acceptance model, especially in the new contextual settings i.e., online banking information systems.

In addition to TAM use antecedents, the findings of the present extended model show a positive influence of trust on the behavioural intent to use an OBIS. Thus, this study has revealed that apart from the beliefs about usefulness and the ease of use, the trust also predicted intended behaviour about online banking information systems. Therefore, findings of this study suggest the importance of trust to capture individuals' behavioural intention towards acceptance of online banking information systems. Moreover, trust also demonstrated a significant influence on the major TAM belief construct usefulness. This implies that if there is an increase in the trust it would influence users' belief of usefulness to perform online banking transactions. This study has revealed that the technological self-efficacy has a significant effect on both ease of use and usefulness perceptions about online banking information system. This suggests that individuals' positive judgments and confidence of their abilities to use the technology in general would favourably influence their perceptions of the ease of use and usefulness, which would subsequently influence their behavioural intention towards acceptance of an OBIS.

This study found that some factors such as the output quality, response time, and perceived ease of use do not have a significant influence on the perceived usefulness. These results call for a need to re-evaluate the efficacy of these factors in the context of online banking information systems. Lastly, the accessibility and terminology clarity were found to have a greater impact on ease of use perceptions about online banking information systems. Although both accessibility and the terminology clarity were found significant determinants of the PEOU of OBIS, the results suggested that accessibility in this study was strong determinant of ease of use of OBIS. In order to improve accessibility, banks' management together with IT professionals should provide adequate support to help potential users effectively perform needed transactions. Such efforts will assist potential users to access the system more easily, and consequently, will increase their willingness to use the



online banking information system.

## References

- Aaker, D.A., Kumar, V. and Day, G.S. (1998), *Marketing Research*, 6th edn., John Wiley & Sons, Canada.
- Abbasi, M.S., Chandio, F.H., Soomro, A.F., & Shah, F. (2011), "Social influence, voluntariness, experience and the internet acceptance: An extension of technology acceptance model within a south-Asian country context", *Journal of Enterprise Information Management*, Vol. 24(1):30-52.
- Adams, D.A., Nelson, R.R. & Todd, P.A. (1992) "Perceived Usefulness, Ease of Use, and Usage of Information Technology - a Replication", *MIS Quarterly*, vol. 16, no. 2, pp. 227-247.
- Agarwal, R. and Karahanna, E. (2000), "Time flies when you're having fun: cognitive absorption and beliefs about information technology usage", *MIS Quarterly*, 24(4), 665-694.
- Al-Abdullah, F.S., Alshammari, F.H., Alnaqeib, R., Jala, H.A., Zaidan, A.A., Zaidan, B.B (2010), "Analytical Study on Internet Banking System", *Journal of Computing*, vol. 2, Issue 6.
- Alreck, P.L. & Settle, R.B. (1995), *The Survey Research Handbook*, Irwin, Illinois, USA.
- Alsajjan, B. & Dennis, C. (2010), "Internet banking acceptance model: Cross-market examination", *Journal of Business Research*, vol. 63, no. 9-10, pp. 957-963.
- Al-Somali, S.A., Gholami, R, and Clegg, B. (2009), "An Investigation into the acceptance of online banking in Saudi Arabia, *Technovation* 29(2), pp. 130-141.
- Amor, D. (1999), *The E-business (R)evolution: Living and Working in an Interconnected World*, Prentice Hall, Upper Saddle River.
- Anderson, C., & Gerbing, W. (1988), "Structural equation modelling in practice: a review and recommended two-step approach", *Psychological Bulletin*, 103: 411-423.
- Armitage, C. J., and Conner, M. (2001)," Efficacy of the theory of planned behaviour: A meta-analytic review", *British Journal of Social Psychology*, 40, 471-499.

- Ayer, A. J. (1959), *Logical positivism*, New York: The Free Press.
- Ba, S. and Pavlou, P. A. (2002), "Evidence of the effect of trust building technology in electronic markets: Price premiums and buyer behaviour, " *MIS Quarterly*, Vol. 26, No. 3, pp. 243-268.
- Babbie, E. (1990), *Survey Research Methods*, 2nd edn, Wadsworth Publishing Company, Belmont.
- Bailey, J.E., and Pearson, S.W. (1983) "Development of a tool for measuring and analysing computer user satisfaction", *Management Science*, 29(5):530-545.
- Baines, P. and Chansarkar, B. (2002), *Introducing Marketing Research*, England: John Wiley & Sons, Ltd.
- Bandura, A. (1997), *Self-Efficacy: The Exercise of Control*, Worth Publishers, New York.
- Bandura, A., (1977), *Social Learning Theory*, Prentice-Hall, Englewood Cliffs, NJ.
- Bandura, A., (1982), "Self-efficacy mechanism in human agency", *American Psychologist* 37(2): 122–147.
- Bentler, P.M. (1995), *EQS Structural Equations Program Manual*, Encino, CA: Multivariate Software.
- Bishop, A. P. (1998), "Measuring access, use, and success in digital libraries", *Journal of Electronic Publishing*, 4(2), Retrieved from (<http://www.press.umich.edu/jep/04-02/bishop.html>).
- Black, J., Lockett, A., Winklhofer, H., & Ennew, C. (2001), "The adoption of Internet financial services: a qualitative study", *International Jr. of Retail and Distribution Management*, 29:390-398.
- Bollen, K. A. (1989), *Structural Equations with Latent Variables*, New York: Wiley.
- Bradley, L. and Stewart, K. (2003), "A Delphi study of the drivers and inhibitors of Internet Banking", *International Journal of Bank Marketing*, 20(6):250-260.
- Branscum, D. and Tanaka, T. (2000), "Guarding Online Privacy", *Newsweek*, June 5, p.77-8.
- Bryman, A. (2001), *Social Research Methods*, Oxford, UK, Oxford University Press.
- Bryman, A. and Cramer, D. (2005), *Quantitative Data Analysis with SPSS 12 and 13: A guide for social scientists*, East Sussex: Routledge.
- Burns, A.C. and Bush, R.F. (1995), *Marketing Research*, Prentice-Hall, Englewood Cliffs, New Jersey, USA.

- Burrell, G. and Morgan, G. (1979), *Sociological Paradigms and Organizational Analysis*, London: Heinemann Educational Books.
- Burton-Jones, A., Hubona, G.S. (2006), "The mediation of External variables in the technology acceptance model", *Information & Management*, 43:706-717.
- Busher, H. (2002), Ethics of research in education, in M. Coleman and A. Briggs, (eds) *Research Methods in Educational Leadership and Management*, London: Sage Publications, pp. 73-87.
- Busher, H. and Clarke, S. (1990), The ethics of using video in educational research, in A. Anning, P. Broadhead, H. Busher, S. Clarke, H. Dodgson, L. Taggart, S. White, and R. Wilson, (eds) *using Video Recordings for Teacher Professional Development*, Leeds: University of Leeds, School of education.
- Byrne, B. (1998). *Structural equation modelling with LISREL, PRECIS, and SIMPLIS*. Hillsdale, NJ: Lawrence Erlbaum.
- Byrne, B. M. (2001), *Structural Equation Modelling with Amos: Basic Concepts, Applications, and Programming*, Mahwah, NJ: Erlbaum.
- Caudill, E.M. and Murphy, P.E. (2000) "Consumer online privacy: Legal and Ethical Issues", *Journal of Public Policy & Marketing*, Vol. 19(1):7-19.
- Chan, S. & Lu, M. (2004) "Understanding internet banking adoption and use behavior: A Hong Kong perspective", *Journal of Global Information Management*, vol. 12, no. 3, pp. 21-43.
- Chang, Y. (2002), "Dynamics of banking technology adoption: An application to Internet banking", Working paper, University of Warwick, Coventry, UK.
- Chau, P. (2001),"Influence of computer attitude and self-efficacy on IT usage behaviour", *Journal of End User Computing*, 13(1):26- 33.
- Chau, P. Y. K., and Hu, P. J. H. (2001), "Information technology acceptance by individual professionals: A model comparison approach", *Decision Sciences*, 32: 699-719.
- Chen, L. & Tan, J. (2004), "Technology Adoption in E-commerce; Key Determinants of Virtual Stores Acceptance", *European Management Journal*, vol.22,no.1,pp.74-86.

- Cheng, T., Lam, D.Y.C. & Yeung, A.C.L. (2006) "Adoption of internet banking: an empirical study in Hong Kong", *Decision Support Systems*, vol. 42, no. 3, pp. 1558-1572.
- Chin, W. W., & Gopal, A. (1995), "Adoption intention in GSS: Relative importance of beliefs", *Data Base for Advances in Information Systems*, 26(2&3): 42-64.
- Chin, W.W. (1998b) "The Partial Least Squares Approach to Structural Equation Modeling" in *Modern Methods for Business Research*, ed. G.A. Marcoulides, London, pp. 295-336.
- Chircu, M., Davis, B., & Kauffman, J. (2000). Trust, expertise and ecommerce intermediary adoption. In *Proceedings of the 6th Americas Conference on Information Systems*. Long Beach, CA.
- Chismar, W. G., & Wiley-Patton, S. (2002), "Does the extended technology acceptance model apply to physicians?", Paper presented at the Proceedings of the 36th Hawaii International Conference on System Sciences, Hawaii.
- Churchill, G.A (1979), "A paradigm for developing better measures of marketing constructs", *Journal of Marketing Research*, vol.19, pp.64-73.
- Churchill, G.A. (1995), *Marketing Research: Methodological Foundations*, sixth edition, The Dryden Press, Chicago.
- Churchill, G.A. (1987), *Marketing Research: Methodological Foundations*, Fifth edition, The Dryden Press, New York, USA.
- Cohen, J. & Cohen, P. (1983) *Applied multiple regression/correlation analysis for the behavioral science*, 2nd edn, Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Cohen, L., Manion, L. and Morrison, K. (2000) *Research Methods in Education*, 5th ed, London: RoutledgeFalmer.
- Cohen, L., Manion, L. and Morrison, K. (2007), *Research Methods in Education*. Sixth ed., London: Routledge.
- Compeau, D., Higgins, C.A. & Huff, S. (1999) "Social cognitive theory and individual reactions to computing technology: A longitudinal study", *MIS Quarterly*, vol. 23, no. 2, pp. 145-158.
- Compeau, D.R. & Higgins, C.A. (1995a) "Application of Social Cognitive Theory to Training for Computer Skills", *Information Systems Research*, vol. 6, no. 2,

pp. 118-143.

- Compeau, D.R. & Higgins, C.A. (1995b) "Computer Self-Efficacy: Development of a Measure and Initial Test", *MIS Quarterly*, vol. 19, no. 2, pp. 189-211.
- Cooper, D.R. and Schindler, P.S. (2001), *Business Research Methods*, 7th ed., Irwin/McGraw-Hill, Singapore.
- Coorley, W. W. (1978), "Explanatory observation studies", *Educational Researcher*, 9-15.
- Corritore, C., Kracher, B. and Weidenbeck, S. (2001), "Trust in the online environment", in Smith, M., Salvendy, G., Harris, D., Koubek, R. (eds), "Evaluation and interface design: cognitive engineering, intelligent agents, and virtual reality", NJ: Lawrence Erlbaum. 1548- 552.
- Cox, E. P. (1980), "The optimal number of response alternatives for a scale: A review", *Journal of Marketing Research*, 17, 407-422.
- Crane, D.B., & Bodie, Z. (1996), The transformation of Banking: Forms follows function, *Harvard Business Review*, March-April, 109-117.
- Creswell, J. W. (1994), *Research Design: Qualitative and Quantitative Approaches*. Thousand Oaks: Sage Publications.
- Cronbach, L. J. (1951),"Coefficient Alpha and the Internal Structural of Tests", *Psychometrika*, 16(3): 297-334.
- Crotty, M. (1998), *The Foundations of Social Research: Meaning and Perspective in the Research Process*, London: Sage Publications.
- Cullen, R. (2001), Addressing the Digital Divide, *Online Information Review*, 25(5).
- Culnan, M.J. (1984), "The dimensions of accessibility to online information: Implications for implementing office information systems", *ACM Transactions on Information Systems (TOIS)*, vol. 2, no. 2, pp. 141-150.
- Culnan, M.J. (1985), "The dimensions of perceived accessibility to information: Implications for the delivery of information systems and services", *Journal of the American Society for Information Science*, vol. 36, no. 5, pp. 302-308.
- Daniel, E. (1999), "Provision of electronic banking in the UK and the Republic of Ireland", *International Jr. of Bank Marketing*, 17: 72-82.
- Davis, F., Bagozzi, R. & Warshaw, P. (1989) "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models", *Management*

*Science*, vol. 35, no. 8, pp. 982-1003.

- Davis, F.D. (1993), "User acceptance of information technology: system characteristics, user perceptions and behavioural impacts", *International Journal of Man-Machine Studies*, Vol. 8, pp. 475-87.
- Davis, F.D., (1989), "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology", *MIS Quarterly*, Vol. 13, No. 3, pp. 319-339.
- Davis, F.D., Bagozzi, R.P. & Warshaw, P.R. (1992) "Extrinsic and Intrinsic Motivation to Use Computers in the Workplace", *Journal of Applied Social Psychology*, vol. 22, no. 14, pp. 1111-1132.
- Davis, F., Venkatesh, V. (1996), "A critical assessment of potential measurement biases in the technology acceptance model: Three experiments", *Internat. J. Human-Comput. Stud.* 45(1) 19-45.
- Davison, R. M. (1998), *An Action Research Perspective of Group Support Systems: How to Improve Meetings in Hong Kong*, PhD Dissertation, City University of Hong Kong.
- de Vaus, D. A. (1996), *Surveys in Social Research (Fourth Edition)*, UCL Press.
- Diener, E. and Crandall, R. (1978) *Ethics in Social and Behavioral Research*, Chicago: University of Chicago Press.
- Dillman, D.A. (1978), *Mail and Telephone Surveys – The Total Design Method*, Wiley, New York.
- Dillon, R. W., Kumar, A., and Mulani, N. (1987), "Offending estimates in covariance Structural analysis: Comments on the causes and solutions to Haywood cases", *Psychological Bulletin*, 101(1): 126-135.
- Doll, H. K. and Torkzadeh, G. (1988), "The measurement of end-user computing satisfaction", *MIS Quarterly*, 12 (2): 259-274.
- Doll, W. J., Raghunathan, T. S., Lim, J-U., and Gupta, Y. P. (1995), "A Confirmatory Factor Analysis of the User Information Satisfaction Instrument", *Information Systems Research*, Vol. 6, No. 2:177-189.
- Doney, P. M., Cannon, J. P., (1997), An examination of the nature of trust in buyer-seller relationship. *Journal of Marketing* 61 (1), 35-51.
- Easterby-Smith, M., Thorpe, R. and Lowe, A. (1991), *Management research: An introduction*, London: Sage.

- Eisner, E. W., and Peshkin, A. (eds) (1990) *Qualitative Inquiry in Education*, New York: Teachers College Press.
- Eisner, E.W. (1991), *The Enlightened Eye*, New York: Macmillan.
- Field, A. (2006), *Discovering Statistics Using SPSS*, Second Edition edn, SAGE Publications, London.
- Fink, A. (1995), *How to analyze survey data, the survey kit*, (8'h Edition), California, USA, Sage Publications.
- Fishbein, M., Ajzen, I., (1975), "Belief, Attitude, Intention, and Behaviour: An Introduction to Theory and Research", Addison-Wesley, Reading, MA.
- Fisher, M. (2007), Why banks still grow branches, *Washington Post* (September 18) B3.
- Flavian, C., Guinaliu, M. and Torres E. (2005), "The influence of corporate image on consumer trust: A comparative analysis in traditional versus Internet banking", *Internet Research: Electronic Networking Applications and Policy*, Vol. 15, No. 4. pp. 447-470.
- Fornell, C. & Larcker, D., F. (1981), "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error", *Journal of Marketing Research*, vol. 18, no. 1, pp. 39-50.
- Frankfort-Nachmias, C. and Nachmias, D. (1992), *Research Methods in the Social Sciences*, London: Edward Arnold.
- Frazer, L. and Lawley, M. (2000), *Questionnaire Design and Administration: A Practical Guide*, John Wiley & Sons Australia, Singapore.
- Fusaro, M., Theoret Y. and Charron, C.-Y. (2002), "Generating Trust in Online Business", *The Communicators*, IQ Books, Montreal.
- Gall, M. D., Gall, J. P. and Borg, W. (2007), *Educational Research - An Introduction*, Eighth ed. Boston: Pearson.
- Gall, M.D., Gall, J.P, and Borg, W.R. (2003), *Educational Research, An Introduction*, Seventh Edition, Boston: Pearson Education Inc.
- Gay, L.R and Airasian, P. (2000), *Educational Research, Competencies for Analysis and Application*, Sixth Edition, MERRIL an Imprint of Prentice Hall.
- Gefen, D. & Straub, D. (2000) "The Relative Importance of Perceived Ease of Use in IS Adoption: A Study of E-Commerce Adoption", *Journal of the Association for Information Systems*, vol. 1, no. 8, pp. 1-30.



- Gefen, D. (2000), "E-Commerce: The Role of Familiarity and Trust", *Omega: The International Jr.of Management Science*, 28:725-737.
- Gefen, D. and Straub, D.W. (2004), "Consumer trust in B2C e-commerce and the importance of social presence: experiments in e-products and e-services", *Omega*, Vol. 32, pp. 407-24.
- Gefen, D., Karahanna, E. & Straub, D.W. (2003) "Trust and TAM in online shopping: An integrated model", *MIS Quarterly*, vol. 27, no. 1, pp. 51-90.
- Gefen, D., Karahanna, E., Straub, D.W., (2003), "Trust and TAM in Online Shopping: An Integrated Model", *MIS Quarterly*, Vol. 27, No. 1, pp. 51-90.
- Gendall, P. & Hoek, J. (1990), "A Question of Wording", *Marketing Bulletin*, vol. 1, p.25-36.
- Gerbing, D.W. and Anderson, J.C. (1993), Monte Carlo evaluation of goodness-of-fit indices for structural equation modeling, in KABSJ long (ed.), *Testing Structural Equation Models*, Sage Publications, Newbury Park.
- Gist, M.E., Schwoerer, C. & Rosen, B. (1989), "Effects of alternative training methods on self-efficacy and performance in computer software training", *Journal of Applied Psychology*, vol. 74, no. 6, pp. 884-891.
- Gorbacheva, E., Niehaves, B., Plattfaut, R., & Becker, J. (2011), " Acceptance and Use of Internet Banking: A Digital Divide Perspective", *ECIS 2011 Proceedings*.
- Gorsuch, R. L. (1983), *Factor Analysis*, Hillsdale, NJ: Lawrence Erlbaum.
- Grewal, D., Mullikin, J.L. and Munger, J. (2003), "Loyalty in e-tailing: a conceptual framework", *Journal of Relationship Marketing*, Vol. 2, No. 3/4, pp. 31-45.
- Guba, E. G. (1990), The alternative paradigm dialog, In E. G. Guba (Ed.), *The paradigm dialog* (pp. 17–27). Newbury Park, CA: Sage.
- Guba, E. G., and Lincoln, Y. S. (1989), *Fourth generation evaluation*, Newbury Park, CA: Sage.
- Guba, E.G. and Lincoln, Y.S. (1994), Competing paradigm in qualitative research, in Denzin, N.K. and Lincoln, Y.S. (eds) *Handbook of Qualitative Research*. Sage Publication, London.
- Hair Joseph F. Jr., Black William C., Babin Barry J., Anderson Rolph E. & Tatham Ronald L. (2006) *Multivariate Data Analysis*, 6th edn, Pearson Prentice Hall, Pearson Education, Inc., Upper Saddle River, New Jersey 07458.

- Hair, J.F. Jr., Anderson, R.E., Tatham, R.L., & Black, W.C. (1998). *Multivariate Data Analysis*, (5<sup>th</sup> Edition). Upper Saddle River, NJ: Prentice Hall.
- Hall, S.D., Ray, W.E., Knight, L.E. (1999), "Using internet for retail access: Banks found lagging", *Journal of Retail Banking Services*, 21: 51-55.
- Harris, M. and Schaubroeck, J. (1990), "Confirmatory modelling in organizational behaviour/human resource management: issues and applications", *Journal of Management*, 16: 2.
- Hendrickson, A. R., & Collins, M. R. (1996), "An assessment of structure and causation of IS usage", *DATA BASE for Advances in Information Systems*, 27(2): 61-67.
- Hendrickson, A. R., Massey, P. D., and Cronan, T. P. (1993), "On the test-retest reliability of perceived usefulness and perceived ease of use scales", *MIS Quarterly*, 17: 227 - 230.
- Hiltunen, M., Heng, L. and Helgesen, L. (2004), "Personalized electronic banking services", in Karat, C. M., Blom, J. and Karat, J. (Eds. ), *Designing Personalized User Experiences in e-Commerce* , 5:119-140, Netherlands: Kluwer Academic Publishers.
- Hoffman, D., Novak, T., and Peralta, M. A. (1999), "Building Consumer Trust Online", *Communications of the ACM*, 42: 80-85.
- Holmes-Smith, P (2002), *Applied Structural Equation Modelling*, Feburay, Canberra.
- Hong, W., Thong, J.Y.L., Wong, W.M. & Tam, K.Y. (2002), "Determinants of user acceptance of digital libraries: an empirical examination of individual differences and system characteristics", *Journal of Management Information Systems*, vol. 18, no. 3, pp. 97-124.
- Hsu, M. & Chiu, C. (2004), "Internet self-efficacy and electronic service acceptance", *Decision Support Systems*, vol. 38, no. 3, pp. 369-381.
- Hu, P.J., Chau, P.Y.K., Liu Sheng, O.R. & Kar, Y.T. (1999) "Examining the Technology Acceptance Model Using Physician Acceptance of Telemedicine Technology", *Journal of Management Information Systems*, vol. 16, no. 2, pp. 91-112.
- Hussey, J. and Hussey, R. (1997), *Business Research: A Practical Guide for Undergraduate and Postgraduate Student*, Palgrave, New York.

- Igbaria, M. & Iivari, J. (1995), "Effects of self-efficacy on computer usage", *Omega-International Journal of Management Science*, vol. 23, no. 6, pp. 587-605.
- Igbaria, M., Guimaraes, T., and Davis, G. (1995), "Testing the Determinants of Microcomputer Usage Via a Structural Equation Model", *Jr. of Management Information System*. 11: 87-114.
- Igbaria, M., Zinatelli, N., Cragg, P. & Cavaye, A.L.M. (1997) "Personal computing acceptance factors in small firms: A structural equation model", *MIS Quarterly*, vol. 21, no. 3, pp. 279-305.
- Jarvenpaa, S. L. and Tractinsky, N. (1999), "Consumer trust in an Internet store: A cross cultural validation", *Journal of Computer Mediated Communication*, Vol. 5, No. 2, pp. 1-35.
- Jarvenpaa, S. L., Knoll, K. and Leidner, D. E. (1998), "Is Anybody Out There? Antecedents of Trust in Global Virtual Teams", *Journal of Management Information Systems*, 14(4):29-64.
- Jarvenpaa, S.L., Tractinsky, N. and Vitale, M. (2000), "Consumer trust in an internet store", *Information Technology and Management*, Vol. 1 No. 12, pp. 45-71.
- Jaspersen, J., Carter, P.E. & Zmud, R.W. (2005), "A comprehensive conceptualization of post-adoptive behaviors associated with information technology enabled work systems", *Mis Quarterly*, pp. 525-557.
- Jayawardhena, C. & Foley, P. (2000), "Changes in the banking sector—the case of Internet banking in the UK", *Internet Research*, vol. 10, no. 1, pp. 19-31.
- Johnson, R., B., and Onwuegbuzie, A., J. (2004), "Mixed Methods Research: A Research Paradigm Whose Time Has Come", *Educational Researcher*, Vol. 33, No. 7, pp.14-2.
- Joreskog, K. G. and Sorbom, D. (1988), *A Guide to the Program and Applications*. Chicago: SPSS, Inc.
- Jun, M. & Cai, S. (2001), "The key determinants of internet banking service quality: a content analysis", *International Journal of Bank Marketing*, vol. 19, no. 7, pp. 276-291.
- Kalakota, R. and Whinston, A. B. (1996), *Frontiers of Electronic Commerce*, Addison Wesley, Reading, M A.
- Kaplan, B. and Maxwell, J.A. (1994), *Qualitative Research Methods for Evaluating Computer Information Systems*, Evaluating Health Care Information

Systems: Methods and Applications, J.G. Anderson, A.C. and S.J. Say, Thousand Oaks, CA, Sage.

- Karahanna, E. & Straub, D.W. (1999) "The psychological origins of perceived usefulness and ease-of- use", *Information & Management*, vol. 35, no. 4, pp. 237-250.
- Karahanna, E., and Limayem, M. (2000), "E-Mail and V-Mail Usage: Generalizing Across Technologies", *Journal of organizational computing and electronic commerce*, 10: 49-66.
- Karjaluoto, H., Mattila, M. and Pento, T. (2002), "Factors underlying attitude formation towards online banking in Finland", *International Journal of Bank Marketing*, 20(6): 261-272.
- Karjaluoto, H., Mattila, M., Pento, T. (2002), "Electronic banking in Finland: Consumer beliefs and reactions to a new delivery channel", *Journal of Financial Services Marketing*, 6: 346-361.
- Katherine J., Stewart (2003), "Trust transfer on the World Wide Web. Organization Science. Vol.14 (1):5-17.
- Khalil, M.N., Pearson, J.M., (2007), "The Influence of Trust on Internet Banking Acceptance", *Journal of Internet Banking and Commerce*, Vol. 12, No. 2.
- Khan, S. (2007), "Adoption Issues of Internet Banking in Pakistani' Firms", Master's thesis available at (<http://epubl.ltu.se/1653-0187/2007/009/index-en.html>).
- Kim, J. (2006), "Toward an understanding of Web-based subscription database acceptance", *Journal of the American Society for Information Science and Technology*, vol. 57, no. 13, pp. 1715-1728.
- Kline, R. B. (2005). Principles and Practice of Structural Equation Modelling. New York: The Guilford Press.
- Kling, R. & Elliott, M. (1994) "Digital library design for organizational usability", *ACM SIGOIS Bulletin*, vol. 15, no. 2, pp. 59-70.
- Kolodinsky, J.M., Hogarth, J.M., & Hilgert, M.A. (2004), "Adoption of electronic banking technologies by US consumers", *The International Journal of Bank Marketing*, Vol, 22 (4), pp., 238-259.
- Kramer, R. (1999), "Trust and distrust in organizations: emerging perspectives, enduring questions", *Annual Reviews in Psychology*, pp. 569-98.

- Kuhn, T.S. (1996), *The structure of Scientific Revolution*, University of Chicago Press, Chicago.
- Kundi, G.M. & Shah, B. (2009), "IT in Pakistan: Threats & opportunities for eBusiness", *The Electronic Journal of Information Systems in Developing Countries*, vol. 36, no. 0.
- Kvale, S. (1996), *Interviews: An Introduction to Qualitative Research Interviewing*, Thousands Oaks: Sage Publications.
- Laitinen, E. K. (2002), "A dynamic performance measurement system: Evidence from small Finish technology company", *Scandinavian Journal of Management*. 18: 65-69.
- Lederer, A. L., Maupin, D. J., Sena, M. P., and Zhuang, Y. (2000), "The technology acceptance model and the World Wide Web", *Decision Support Systems*, 29: 269-282.
- Lee, Y.H., Ng, H.C., Phua, Y.M. & Nanyang Business School. (2001) *Factors affecting the adoption of Electronic Commerce by businesses in Singapore*, Nanyang Business School Nanyang Technological University, Singapore.
- Lewicki, R.J. and Bunker, B.B., (1995), "Trust in Relationships: A Model of Trust Development and Decline", *Conflict, Cooperation, and Justice*, San Francisco: Jossey-Bass.
- Lewis, J. D. and A. Weigert (1985), "Trust as a Social Reality", *Social Forces*, 63:967-985.
- Lewis, W., Agarwal, R. & Sambamurthy, V. (2003) "SOURCES OF INFLUENCE ON BELIEFS ABOUT INFORMATION TECHNOLOGY USE: AN EMPIRICAL STUDY OF KNOWLEDGE WORKERS.", *MIS Quarterly*, vol. 27, no. 4, pp. 657-678.
- Liao, Z. & Cheung, M.T. (2002), "Internet-based e-banking and consumer attitudes: an empirical study", *Information & Management*, vol. 39, no. 4, pp. 283-295.
- Lichtman, M. (2006), *Qualitative Research in Education - A User's Guide*. California: Sage.
- Lin, T., T. (2006), "An Internet banking system establishment with transaction rate uncertainty: a real options approach", *Journal of Information & Optimization Sciences*, Vol. 27 (1):1-15.

- Lincoln, Y. S., and Guba, E. G. (2000), Paradigmatic controversies, contradictions and emerging confluences, In N. K. Denzin, and Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 163–188). Thousand Oaks, CA: Sage.
- Lincoln, Y.S. (1990), Toward a categorical imperative for qualitative research, in E.W. Eisner and A. Peshkin, (eds) *Qualitative Inquiry in Education*, New York: Teachers College Press, pp. 277-295.
- Lindgaard, G. (1994) *Usability testing and system evaluation: A guide for designing useful computer systems*, Nelson Thornes.
- Little, R. J. A. (1988). "Missing data adjustments in large surveys", *Journal of Business and Economic Statistics*, 6: 296-297.
- Little, R. J. A. and Rubin, D. B. (1987), *Statistical Analysis with Missing Data*, New York: Wiley. London: RoutledgeFalmer.
- Lovlie, L. (1993), "Of rules, skills, and examples in moral education", *Nordisk Pedagogik*, vol. 13, pp.76-91.
- Luck, J. D., and Rubin, S. R. (1987), *Marketing Research*, 7th ed. Prentice Hall International.
- Malhotra, N.K. (1999), *Marketing research: an applied orientation*: Prentice Hall, Upper Saddle River, New Jersey.
- Mao, E. & Palvia, P. (2006), "Testing an extended model of IT acceptance in the Chinese cultural context", *ACM SIGMIS Database*, vol. 37, no. 2-3, pp. 20-32.
- Marakas, G., Yi, M. & Johnson, R. (1998), "The Multilevel and Multifaceted Character of Computer Self-Efficacy: Toward Clarification of the Construct and an Integrative Framework for Research", *Information Systems Research*, vol. 9, no. 2, pp. 126-163.
- Mathieson, K. (1991) "Predicting User Intentions: Comparing the Technology Acceptance Model with the Theory of Planned Behavior", *Information Systems Research*, vol. 2, no. 3 (September), pp. 173-191.
- Mathieson, K., Peacock, E. & Chin, W.W. (2001) "Extending the technology acceptance model: The influence of perceived user resources", *Database for Advances in Information Systems*, vol. 32, no. 3, pp. 86.
- Maxwell, J. (1997), Designing a qualitative study, In L. Bickman and D. J. Rog (Eds.) *Handbook of applied social research methods* (pp. 69-100). Thousand

Oaks, CA: Sage.

- Maxwell, S. E., and Delaney, H. D. (2004), *Designing experiments and analyzing data*, Mahwah, NJ: Lawrence Erlbaum.
- Mayer, R. C., J. H. Davis and F. D. Schoorman (1995), "An Integrative Model of Organizational Trust", *Academy of Management Review*, 20:709-734.
- McKnight, D. H. and Chervany, N. L. (2002), "What trust means in e-commerce customer relationships: An interdisciplinary conceptual typology", *International of Electronic Commerce*, 6:35-39.
- McKnight, D. H., Choudhury, V. and Kacmar, C. (2000), "Trust in ecommerce vendors: a two stage model", *Proceedings of the 21 International Conference of Information Systems*. Brisbane. Australia: 532-536.
- McKnight, D. H., Choudhury, V. and Kacmar, C. (2002), "Developing and validating trust measures for e-Commerce: An integrative typology", *Information Systems Research*, 13(3):334-359.
- McKnight, D.H., Choudhury, V. & Kacmar, C. (2003) "Developing and validating trust measures for e-commerce: An integrative typology", *Information systems research*, vol. 13, no. 3, pp. 334-359.
- Miles, M. B., and Huberman, A. M. (1984), *Qualitative data analysis: a source book of new methods*, Sage Publications, London.
- Miller, D. C. (1991), *Handbook of research design and social measurement* (5th edition), Sage Publications, London.
- Miller, G. A. (1956), "The magical number seven, plus or minus two: Some limits on our capacity for processing information", *Psychological Review*, 63, 2, 81-97.
- Miller, R., Acton, C., Fullerton, D. and Maltby, J. (2002), *SPSS for Social Scientists: Cover Versions 9, 10 and 11*, New York: Palgrave Macmillan.
- Mingers, J. (2001), "Combining IS Research Methods: Towards a Pluralist Methodology", *Information Systems Research*, 12(3) 240-259.
- Mishra, A.K. (1996), "Organizational responses to crisis: the centrality of trust", in Kramer, R. and Tyler, T. (Eds), *Trust in Organizations*, Sage, Thousand Oaks, CA.
- Molla, A., Licker, P.S. (2001), "E-Commerce System Success: An Attempt to Extend and Respecify the Delone and Maclean Model of IS Success",

*Journal of Electronic Commerce Research*, vol. 2, no 4.

- Mols, N.P. (1999), "The Internet and the banks' strategic distribution channel decisions", *International Journal of Bank Marketing*, vol. 17, no. 6, pp. 295-300.
- Moon, J.W. & Kim, Y.G. (2001), "Extending the TAM for a World-Wide-Web context", *Information & Management*, vol. 38, no. 4, pp. 217-230.
- Moore, G. C. and Benbasat, L. (1991), "Development of an instrument to measure the perceptions of adopting an information technology innovation", *Information Systems Research*, 2(3): 192-222.
- Morgan, R. M. and Hunt, S. D. (1994), "The commitment-trust theory of relationship marketing", *Journal of Marketing*, 58(3): 20-38.
- Nagel, T. (1986), *The view from nowhere*, New York: Oxford University Press.
- Ndubisi, N. O. and Sinti, Q. (2006), "Consumer attitudes, system's characteristics and Internet banking adoption in Malaysia", *Management Research News*, 29(1/2): 16-27.
- Nelson, R.R., Todd, P.A. & Wixom, B.H. (2005), "Antecedents of information and system quality: an empirical examination within the context of data warehousing", *Journal of Management Information Systems*, vol. 21, no. 4, pp. 199-235.
- Nielsen (2005), published at [www.nielsen.com](http://www.nielsen.com).
- Nunnally, J. (1978), *Psychometric theory*, New York: McGraw-Hill.
- O'Reilly, C. A. (1982), "Variation in decision makers' use of information sources: The impact of quality and accessibility of information", *Academy of Management Journal*, 25: 756-771.
- Ody, P. (2000), "The challenging task of building strong e-loyalty: customer relationship marketing", *The Financial Times*, pp. 16.
- Olinsky, A., Chen, S. & Harlow, L. (2003), "The comparative efficacy of imputation methods for missing data in structural equation modeling", *European Journal of Operational Research*, vol. 151, no. 1, pp. 53-79.
- Ong, C. & Lai, J. (2006), "Gender differences in perceptions and relationships among dominants of e-learning acceptance", *Computers in Human Behavior*, vol. 22, no. 5, pp. 816-829.
- Ong, C.S., Lai, J.Y. & Wang, Y.S. (2004) "Factors affecting engineers' acceptance of



asynchronous e-learning systems in high-tech companies", *Information & Management*, vol. 41, no. 6, pp. 795-804.

Orlikowski, W. and Baroudi, J.J. (1991), "Studying information technology in organizations: research approaches and assumptions", *Information Systems Research*, 2: 1-28.

Parasuraman, A. (1991), *Marketing research*, 2nd edn, Addison-Wesley publishing.

Parasuraman, A., Berry, L.L., & Zeithaml, V.A. (1991), "Refinement and reassessment of the SERVQUAL scale", *Journal of Retailing*, 67 (4), 420-450.

Pavlou, P. (2003), "Consumer Acceptance of Electronic Commerce: Integrating Trust and Risk with the Technology Acceptance Model", *International Journal of Electronic Commerce*, 7: 69-103.

Pikkarainen, T., Pikkarainen, K., Karjaluoto, H. & Pahlila, S. (2004), "Consumer acceptance of online banking: an extension of the technology acceptance model", *Internet research*, vol. 14, no. 3, pp. 224-235.

Pituch, K.A. & Lee, Y. (2006), "The influence of system characteristics on e-learning use", *Computers & Education*, vol. 47, no. 2, pp. 222-244.

Podder, B. (2005), *Factors Influencing the Adoption and Usage of Internet Banking: A New Zealand Perspective*, Master of Information Technology Dissertation. Auckland University of Technology.

Podsakoff, P.M., MacKenzie, S.B., Lee, J. & Podsakoff, N.P. (2003) "Common method biases in behavioral research: A critical review of the literature and recommended remedies", *Journal of Applied Psychology*, vol. 88, no. 5, pp. 879-903.

Poon, W. C. (2008), "Users' adoption of e-banking services: The Malaysian perspective", *Journal of Business & Industrial Marketing*, 23(1): 59-69.

Popper, K. R. (1959), *The logic of scientific discovery*. New York: Routledge.

Reichheld, F.F. & Scheffer, P. (2000), "E-loyalty: your secret weapon on the web", *Harvard business review*, vol. 78, no. 4, pp. 105-113.

Robinson, G. (2000), "Bank to the future", *Internet Magazine*. (online) available at: [www.findarticles.com](http://www.findarticles.com).

Roca, J.C., Chiu, C.M. & Martínez, F.J. (2006), "Understanding e-learning continuance intention: An extension of the Technology Acceptance Model",

*International Journal of Human-Computer Studies*, vol. 64, no. 8, pp. 683-696.

- Rotchanakitumnuai, S., Speece, M., (2003), "Barriers to internet banking adoption: a qualitative study among corporate customers in Thailand", *International Journal of Bank Marketing*, pp. 312-323.
- Rousseau, M., Sitkin, B., Burt, S. & Camerer, C. (1998), "Not so Different after all: A Cross Discipline View of Trust", *Academy of Management Review*, 23:393-404.
- Sabherwal, R., Jeyaraj, A., Chowa, C., (2004), "Information system success: Dimensions and Determinants", *College of business administration*, University of Missouri.
- Sarel, D. & Marmorstein, H. (2003), "Marketing Online banking services: The voice of the Customer", *Journal of Financial Services Marketing*, vol. 8, no. 2, pp. 106-118.
- Sathye, M. (1999), "Adoption of Internet banking by Australian consumers: an empirical investigation", *International Journal of Bank Marketing*, Vol. 17, No. 7, pp. 324-334.
- Sayar, C., and Wolfe, S. (2007), "Internet banking market Performance: Turkey versus the UK", *International Journal of Bank Marketing*, Vol. 25 No. 3, pp. 122-14.
- Schrag, F. (1992), "In defense of positivist research paradigms", *Educational Researcher*, 21(5): 5-8.
- Schurr, Paul H. and Julie L. Ozanne. (1985), "Influences on Exchange Processes: Buyers' Preconceptions of a Seller's Trustworthiness and Bargaining Toughness", *Journal of Consumer Research*, 11:939-953.
- Schwandt, T. A. (2000), Three epistemological stances for qualitative inquiry: Interpretivism, hermeneutics, and social constructionism, In N. K. Denzin & Y. S. Lincoln, *Handbook of qualitative research* (pp. 189-213), Thousand Oaks, CA: Sage.
- Scott, D. (2000), *Realism and Educational Research: New Perspectives and Possibilities*,
- Seddon, P., Kiew, M., (1996), "A partial test and development of DeLone and McLean's model of IS success", *Australian Journal of Information Systems*,

4 (1):90–109.

- Seddon, P.B., Staple, S., Patnayakuni, R., Bowtell M. (1999), "Dimension of Information Systems Success", *Communications of the Association for Information Systems*, 2(20):1-39.
- Segars, A. H., & Grover, V. (1993), "Re-examining perceived ease of use and usefulness: A confirmatory factor analysis", *MIS Quarterly*, 18: 517-525.
- Sekaran, U. (2000), *Research Methods for Business: A Skill Building Approach*, John Wiley and Sons.
- Sekaran, U. (2003), *Research Methods for Business: A Skill-Building Approach*. 4th ed. U. S. A.: John Wiley and Sons, Inc.
- Seyal, A.H., Awais, M.M., Shamail, S. and Abbas, A. (2004), "Determinants of electronic commerce in Pakistan: a preliminary evidence from small and medium enterprises", *Electronic Markets*, Vol. 14 No. 4, pp. 372-87.
- Shah, M.H., Braganza, A., & Morabito, V. (2007), "A survey of critical success factors in e-Banking: an organisational perspective", *European Journal of Information Systems*, 16, 511–524.
- Shakaib, M.K. (2006), *The future of e-commerce in Pakistan*, *The International Web Magazine*, Karachi, July, 62-63.
- Shih, H., (2004a), "An empirical study on predicting user acceptance of e-shopping on the web", *Information & Management*, Vol. 41, pp. 351-368.
- Shih, H., (2004b), "Extended technology acceptance model of Internet utilization behaviour", *Information & Management*, Vol. 41, pp. 719-729.
- Shih, Y. & Fang, K. (2004) "The use of a decomposed theory of planned behavior to study Internet banking in Taiwan", *Internet Research*, vol. 14, no. 3, pp. 213-223.
- Singh, A. (2004), "Trends in South African Internet Banking", *Aslib Proceeding: New Information Perspectives*. 15: 187-196.
- Smith, J. K. (1983), Quantitative versus qualitative research: An attempt to clarify the issue, *Educational Researcher*, 12, 6–13.
- Smith, J. K. (1984), The problem of criteria for judging interpretive inquiry. *Educational Evaluation and Policy Analysis*, 6, 379–391.
- Stake, R. (2005), Qualitative case studies, in N. Denzin and Y. Lincoln, (eds) *The Sage Handbook of Qualitative Research*, 3rd ed, Thousand Oaks: Sage

Publications, pp.443-466.

- Stewart K. J. (2003), "Trust transfer on the World Wide Web", *Organization Science*, 14: 5-17.
- Subramanian, G. H. (1994), "A replication of perceived usefulness and perceived ease of use measurement", *Decision Sciences*, 25: 863-874.
- Suh, B., and Han, I. (2002), "Effect of trust on customer acceptance of Internet banking", *Electronic Commerce Research and Applications*, 12:47-263.
- Swanson, E. B. (1988), *Information System Implementation: Bridging the Gap between Design and Utilization*, Irwin, Homewood, IL.
- Szajna, B. (1994), "Software evaluation and choice: Predictive validation of the technology acceptance instrument", *MIS Quarterly*, 18: 319-324.
- Tabachnick, B. & Fidell, L. (2001), "Using multivariate statistics", Boston: Allyn and Bacon.
- Talja, S.; Heinisuo, R.; Kasesniemi, E.; Kempainen, H.; Luukkainen, S.; Pispä, K.; and Järvelin, K. (1998), "Discourse analysis of user requests", *Communications of the ACM*, 41(4): 93-94.
- Tashakkori, A., & Teddlie, C. (1998), *Mixed methodology: Combining qualitative and quantitative approaches*, Applied Social Research Methods Series (Vol. 46), Thousand Oaks, CA: Sage.
- Tashakkori, A., and Teddlie, C. (Eds.). (2003), *Handbook of mixed methods in social and behavioral research*. Thousand Oaks, CA: Sage.
- Taylor, S., and Todd, P. A. (1995), "Understanding information technology usage: A test of competing models", *Information Systems Research*, 6: 144-176.
- Teddlie, C. & Yu, F. (2007) "Mixed methods sampling", *Journal of Mixed Methods Research*, vol. 1, no. 1, pp. 77.
- Thong, J.Y.L., Hong, W.Y. & Tam, K.Y. (2002) "Understanding user acceptance of digital libraries: what are the roles of interface characteristics, organizational context, and individual differences?", *International Journal of Human-Computer Studies*, vol. 57, no. 3, pp. 215-242.
- van der Heijden, H., Verhagen, T. and Creemers, M. (2003), "Understanding online purchase intentions: contributions from technology and trust perspectives", *European Journal of Information Systems*, Vol. 12, pp. 41-8.

- Venkatesh, V. & Bala, H. (2008) "Technology Acceptance Model 3 and a Research Agenda on Interventions", *Decision Sciences*, vol. 39, no. 2, pp. 273-315.
- Venkatesh, V. (2000) "Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model", *Information Systems Research*, vol. 11, no. 4, pp. 342-365.
- Venkatesh, V., and Davis, F.D. (1996), "A model of the antecedents of perceived ease of use: development and test", *Decision Sciences*, Vol. 27 No. 3, pp. 451-81.
- Venkatesh, V., and Morris, M.G. (2000), "Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior", *MIS Quarterly*, Vol. 24 No. 1, pp. 115-39.
- Venkatesh, V., Davis, F.D., (2000), "Theoretical extension of the technology acceptance model: four longitudinal field studies", *Management Science*, Vol. 46(2): 186-204.
- Venkatesh, V., Morris, M.G. & Ackerman, P.L. (2000) "A Longitudinal Field Investigation of Gender Differences in Individual Technology Adoption Decision-Making Processes", *Organizational behavior and human decision processes*, vol. 83, no. 1, pp. 33-60.
- Venkatesh, V., Morris, M.G., Davis, G.B. and Davis, F.D. (2003), "User acceptance of information technology: toward a unified view", *MIS Quarterly*, Vol. 27 No. 3, pp. 425-78.
- Vijayasarathy, L.R. (2004), "Predicting consumer intentions to use on-line shopping: the case for an augmented technology acceptance model", *Information & Management*, 41:747-762.
- Wang, Y.S., Wang, Y.M., Lin, H.H. & Tang, T.I. (2003), "Determinants of user acceptance of Internet banking: an empirical study", *International Journal of Service Industry Management*, vol. 14, no. 5, pp. 501-519.
- West, S. G., Finch, J. F. and Curran, P. J. (1995), Structural Equation Models with nonnormal variables, in Hoyle, R. H. (edition), *Structural Equation Modelling: Concept, Issues, and Applications*, Thousand Oaks, CA: Sage Publications.
- Wixom, B.H. & Todd, P.A. (2005), "A theoretical integration of user satisfaction and technology acceptance", *Information systems research*, 16(1), pp. 85-102.

- Wixom, B.H., Todd, P.A. (2005), "A theoretical integration of user satisfaction and technology acceptance", *Information Systems Research*, Vol. 16, p. 85(18).
- World Bank (2008), report on Pakistan, <http://data.worldbank.org/country/pakistan>.
- Wu, I. L. (2003), "Understanding senior management's behaviour in promoting the strategic role of IT in progress reengineering: Use of the theory of reasoned action", *Information and Management*, 1-11.
- Xue, M., Hitt, L.M., and Chen, P. (2011), "Determinants and Outcomes of Internet Banking Adoption", *Management Science*, 57(2), pp. 291–307.
- Yi, M.Y. & Hwang, Y. (2003) "Predicting the use of web-based information systems: self-efficacy, enjoyment, learning goal orientation, and the technology acceptance model", *International Journal of Human-Computer Studies*, vol. 59, no. 4, pp. 431-449.
- Yin, R.K. (1994), *Case Study Research: Design and Methods*, Sage, Beverley Hills, CA.
- Yiu, C. S., Grant, K. and Edgar, D. (2007), "Factors affecting the adoption of Internet banking in Hong Kong-implications for the banking sector", *International Journal of Information Management*, Vol. 27, No. 5, pp. 336-351.
- Yousafzai, S.Y. (2005), "Internet Banking in the UK: A Customer behaviour Perspective", Doctoral thesis, Cardiff University, UK.
- Yousafzai, S.Y., Pallister., J. G., and Foxall, G. R. (2003), "A proposed model of e-trust for electronic banking", *Technovation*. 23 (11):847-860.
- Zikmund, W.G. (2000), *Business Research Methods*, 6<sup>th</sup> ed., The Dryden Press, Chicago, IL.
- Zikmund, W.G. (2003), *Business Research Method*, 8<sup>th</sup> ed., Cincinnati, Ohio: Thomson/South-Western.

## **Appendix A: Questionnaire**



Brunel Business School

### **A Covering Letter**

Dear Respondent,

This survey is being carried out as part of my PhD dissertation to understand the acceptance of Online Banking Information System, and identify the factors affecting its acceptance. Please answer the questions freely. You cannot be identified from the information you provide.

The questionnaire should take about 10 - 15 minutes to complete. Please answer the questions in the space provided. Also, do not spend too long on any question. Your first thoughts are usually your best!

Even if you feel the items covered may not apply to you please do not ignore them. Your answers are essential in building an accurate picture of the issues that are important to identify factors affecting acceptance of online banking information system.

**WHEN YOU HAVE COMPLETED THE QUESTIONNAIRE PLEASE RETURN IT TO THE  
CONTACT WHO SUBMITTED IT TO YOU**

I hope you find completing the questionnaire enjoyable, and thank you for taking the time to help. If you have any queries or would like further information about this research, please contact me: [fida.chandio@brunel.ac.uk](mailto:fida.chandio@brunel.ac.uk)

Thank you for your cooperation

Fida Hussain Chandio  
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**Consent:**

I wish to be identified in the report      YES       NO

I have read the above information and I agree to participate in this study.

Please Tick the box

Signature \_\_\_\_\_ Date: \_\_\_\_\_



**Part 1: Background Information (Internet usage)**

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- 1 Have you used the Internet before?  Yes  No
- 2 Where do you use Internet? (i.e. location of Internet use)  At home  At work  At school/university  In Library  Internet cafe
- 3 For how many years you have been using internet?  < 1  1-2  3-4  5-6  >6
- 4 Have you ever used the online banking information system?  Yes  No
- 

**Part 2: Personal Information (Please tick the relevant box)**

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- 5 Income in rupees (per month)  Less than 10,000  10,000-20,000  21,000-30,000  31,000-40,000  41,000-50,000  More than 50,000
- 6 Age  Less than 20  20-30  31-40  41-50  51-60  More than 60
- 7 Gender  Male  Female
- 8 Education  Less than high school  High school  Diploma  Bachelor  Post-graduate
- 9 Occupation  Student  Government employee  Private sector  Businessperson  Private sector
-

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**Part 3: Please indicate your level of disagreement/ agreement with the following: using a rating scale of 1 to 7 (1=Strongly Disagree; 7 = Strongly Agree)**

Strongly Disagree    ↔    Strongly Agree

- |    |   |   |   |   |   |   |   |   |
|----|---|---|---|---|---|---|---|---|
| 10 | I intend to use the online banking information system as often as needed  | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 11 | I intend to continue using the online banking information system in the future                                    | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 12 | Assuming I have access to the online banking information system, I intend to use it                               | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 13 | Given that I may have access to the online banking information system in the future, I predict that I will use it | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 14 | I will strongly recommend others to use the online banking information system                                     | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 15 | Using the online banking information system enhances the productivity of my banking activities                    | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 16 | Using the online banking information system makes it easier to do my banking activities                           | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 17 | Using the online banking information system enables me to accomplish banking activities more quickly              | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 18 | Using the online banking information system improves my performance of banking activities                         | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 19 | Using the online banking information system enhances my   | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
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	effectiveness of banking activities								
20	Overall, I find the online banking information system useful for my banking activities	1	2	3	4	5	6	7	
21	Learning to operate the online banking information system is easy for me	1	2	3	4	5	6	7	
22	I find it easy to get the online banking information system to do what I want it do	1	2	3	4	5	6	7	
23	My interaction with the online banking information system is clear and understandable	1	2	3	4	5	6	7	
24	I find the online banking information system to be flexible to interact	1	2	3	4	5	6	7	
25	It is easy for me to become skilful at using the online banking information system	1	2	3	4	5	6	7	
26	Overall, I find online banking information system easy to use	1	2	3	4	5	6	7	
27	The online banking information system is trustworthy	1	2	3	4	5	6	7	
28	I am quite certain what to expect from the online banking information system	1	2	3	4	5	6	7	
29	I trust the online banking information system	1	2	3	4	5	6	7	
30	The online banking information system would do the job right even if not monitored	1	2	3	4	5	6	7	
31	The online banking information system offers secure personal privacy	1	2	3	4	5	6	7	
32	I trust in the ability of the online banking information system to secure my privacy	1	2	3	4	5	6	7	

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33	I believe that the online banking information system would act in my best interest	1	2	3	4	5	6	7
34	The online banking information system keeps its promises and commitments	1	2	3	4	5	6	7
35	I could complete my banking tasks using the online banking information system, if I had never used a system like it before	1	2	3	4	5	6	7
36	I could complete my banking tasks using the online banking information system, if I had only the system manuals for reference	1	2	3	4	5	6	7
37	I could complete my banking tasks using the online banking information system, if I had seen someone else using it before trying it myself	1	2	3	4	5	6	7
38	I could complete my banking tasks using the online banking information system, if I had just the built-in-help facility for assistance	1	2	3	4	5	6	7
39	I could complete my banking tasks using the online banking information system, if there was no one around to tell me what to do as I go	1	2	3	4	5	6	7
40	The quality of the output I get from the online banking information system is high	1	2	3	4	5	6	7
41	I have no problem with the quality of the online banking information system's output	1	2	3	4	5	6	7
42	The online banking information system returns answers to my requests quickly	1	2	3	4	5	6	7

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43	In general, the response time of the online banking information system is consistent	1	2	3	4	5	6	7
44	The online banking information system is accessible	1	2	3	4	5	6	7
45	My access to the online banking information system is unrestricted	1	2	3	4	5	6	7
46	I find it easy to understand the terms used throughout the online banking information system	1	2	3	4	5	6	7
47	I understand most of the terms used throughout the online banking information system	1	2	3	4	5	6	7

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**Thank you**