Chapter One

Introduction

This chapter introduces the PhD thesis entitled "customers' acceptance of internet banking services in Sudan by using unified theory of acceptance and use of technology (UTAUT) model" and the research reported herein. Section 1.1 provides theoretical background. Section 1.2 introduces the research problem. Section 1.3 introduces objectives of the research. Section 1.4 presents a significance of the research. Section 1.5 presents scope of the research. Section 1.6 locations for the research. Finally, the structure of this research is presented in the section 1.7.

1.1 Theoretical Background

Internet banking (IB) has now become a global phenomenon. Almost every banking institution all over the world has embraced this technological system of banking due to the numerous benefits it brings, both to the banks themselves and their clients or customers notable among them are convenience and time-saving in doing transactions.

The internet banking in Sudan dates back to 1999 when the central bank of Sudan (CBS) took initiative to introduce modern information technology in Sudanese banking industry as a part of its banking system development plan for 1999-2000; consequently, the CBS established the e-banking services company (EBS) in 1999 to be responsible for building and developing E-banking industry in Sudan.

Apparently, the company offers diverse utilities, and working as a consultative body for the banks, monitoring the network, provision of maintenance, and executing all projects that lead to the development of e-banking activities to sustain excellent services delivery (Ismail & Osman , 2012).

IB is defined as “the provision of retail and small value banking products and services through internet network which include deposit-taking, lending, account management, the provision of financial advice, e-bill payment, and the provision of other electronic payment products and services such as E-money” (Basel committee report on banking supervision, 1998, p.3).

The emergence of new banking technology creates highly competitive market conditions, which have a critical impact upon customer behavior. therefore, internet banking providers must attempt to better understand of their customers and their attitudes towards technology in general considering the region in which services are going to be offered . If they succeed, the banks will be able to influence and determine customer behavior, which will become a major issue in creating competitive advantage in the future (Jay Awardhena and Foley, 2000; Nellis, 1998). Internet banking has become a very competitive area and companies are constantly looking for a way to make their services more attractive to customers.

The UTAUT model was selected for various reasons. The model is a good starting point for studying what degree the moderating variable of age, gender and experience play in the acceptance and utilization of information technology. UTAUT overcomes significant limitations by studying complex organizational technologies, studying employees in organizations undergoing technological changes, and studied both voluntary and mandatory usage by participants. UTAUT is an empirically validated model that combines eight major models of technology acceptance and their extensions. UTAUT outperformed each of the eight models of IT acceptance with each explaining between 17% and 53% of the variance in individual intention to use and acceptance of information technology (Venkatesh, Morris, Davis, & Davis, 2003). Multiple tests of the UTAUT showed that it explained approximately 70% of the variance (adjusted R2 of 69-70%), very high

for behavioral research. The UTAUT model depicts performance expectancy, effort expectancy, social influence, and facilitating conditions as the four core determinants of intention and Usage Behavior. Age, gender, experience and voluntariness are depicted as moderating variables, because they have been found to significantly impact the effects of the core determinants on intention and Usage Behavior (Venkatesh et. al. 2003).

So that this study attempts to identify the factors that influence on the customers' acceptance of internet banking in Sudan by using unified theory of acceptance and use of technology (UTAUT).

1.2 Research Problem

Technological innovations (Norton, Reed, and Walden, 1995) are replacing the traditional ways of banking. With a greater competition brought by deregulation, globalization, and widespread mergers and acquisitions in the banking industry, more banks are focusing on developing Internet banking. The use of the Internet banking is strongly promoted to bring about a change in consumers banking behaviors. However, Internet banking has not been widely adopted by bank customers in Sudan. This study investigates the factors that influence customers' acceptance of Internet banking in Sudan. So, the problem of this research can be summarized in the following main question:

What are the factors influencing customers' acceptance of the internet banking services in Sudan: using UTAUT model?

Which subsidiary of it these questions:

- What are the relationship between PE, EE, SI, and ability (awareness, accessibility, internet connection quality, and cost) and the customers' intention to use internet banking services in the banks operation in Sudan?

- Are the demographic variables (Age, Gender, Experience, Income, and Education) a moderate the relationship between PE, EE, SI, and ability and customers' intention to use IB in Sudan?

1.3 Objectives of the Research

This study intends to find out the factors affecting customers' acceptance of internet banking services in Sudan, by developing and testing an amalgamated model of the antecedents and consequents of individual's belief toward internet banking services acceptance and use. The proposed model integrates key constructs from the internet banking services acceptance research streams into the literature review of the unified theory of acceptance and use of technology (UTAUT) modeling. The results of the present study are expected to contribute significant literature on internet banking services and technology acceptance. By addressing the above stated research problem, this study aims to achieve the following three objectives:

1. To develop a model of the determinants of internet banking services acceptance based on unified theory of acceptance and use of technology as a foundation.
2. To test the hypothesized model for validating it by exploring relationships between studied factors.
3. Testing the effect of the demographic factors as a moderator variables on the relationships between latent variables.

1.4 Significance of the Study

Internet banking services (IBS) is defined as the use of technology to communicate instructions and to receive information from a financial institution. Internet banking includes the systems that enable financial institution, customers, individuals or business, to access accounts, transact business, or obtain information on financial

products and services through a public or private network, including the internet (Burnham, 2008). 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 UTAUT as it extends theoretical and empirical research on IBS acceptance. Secondly, the previous researches have contributed to the development of literature both theoretically and empirically related to IT usage. The results of the present study offers to the bank managements, who are actually using or planning to use IBS in their banks, better understanding of critical factors could assist them in achieving the most effective deployment of such a system, and for IS designer and developers, understanding the crucial factors related to IBS use will enable them to design more effective systems to enhance the acceptance and use of IBS among current and potential users. Finally, this study is also useful for IBS software consultants and vendors as this study provides them with 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 IBS practitioners in understanding some reasons regarding why some systems are preferable to 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 behavior of potential users of IBS. In this way, they can achieve an efficient and effective use of IT resources.

1.5 Rationale for the Current Research

Recently, the Internet has become a valuable means of reaching customers everywhere, anytime. This new tool of communication has its own characteristics and means of exchange. The usage requirement of internet technology is two-fold: on the one hand, there are the benefits that come with internet access, such as speed,

cost effectiveness and efficiency from both users' and vendors' perspectives; on the other hand, there is the ability that facilitates and enhances the internet behavior. Ability is defined as "a group of skills, competencies, and characteristics that enable a party to have influence within some specific domain" (Mayer et al., 1995) (Okonkwo, 2012).

Prior to the unified model introduction, research employed technology acceptance models to investigate users' behavior in the internet context. Interestingly, although the UTAUT is a parsimonious and robust model, little research in Sudan has utilized the model or attempted to examine its boundaries. The current research aims to fill this gap by examining the ability of the UTAUT model to explain internet behavior, while at the same time examining the unified model's boundaries.

1.6 Scope of the Research

The scope of the present study can be described from different angles. First, the area of application under investigation in this research is the acceptance of internet banking services. The rational for selecting this area is explained in section 1.1. Second, the investigation for the acceptance behavior is limited in developing economy context, i.e. from Sudanese's perspective. The choice of the scope 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 UTAUTs 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 UTAUT 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 internet banking

services, and specific user group (i.e. internet banking users). Thus, diligence is required when generalizing findings of this study to other IT/IS systems applications and user groups.

1.7 location of the Research

Sudan has been chosen as the site for data collection for this research. This western Africa country with a total population of 40,235,000 (Wikipedia, Wikipedia, the free encyclopedia, 2015), In 2010, Sudan was considered the 17th-fastest-growing economy in the world and the rapid development of the country largely from oil profits even when facing international sanctions was noted by The New York Times in a 2006 article. Because of the secession of South Sudan, which contained over 80 percent of Sudan's oilfields, Sudan entered a phase of Stagflation, GDP growth slowed to 3.4 percent in 2014, 3.1 percent in 2015 and is projected to recover slowly to 3.7 percent in 2016 while inflation remained as high as 21.8% in as of 2015 (Wikipedia, Wikipedia, the free encyclopedia, 2015), Sudan is among the countries of African in terms of increased rate of internet and broadband penetration, and mobile phone usage. Given below are the main reasons for selecting Sudan as the context for this study.

- Although enormous funds have been invested in IT in organizations in Sudan, especially in banking sector, the new technology acceptance rate is observed to be lower than expected.
- The culture of Sudan is different from the countries where the UTAUT originated (e.g. North American countries). Therefore, selecting Sudan will help to examine the applicability (validity and robustness) of extending the UTAUT, which may vary across different cultural settings (Mao and Palvia, 2006).

1.8 Research Structure

The dissertation is organized into the following chapters:

Chapter two Literature Review: this chapter presents a thorough literature review on the theories and models of technology acceptance. The chapter also covers concept of internet banking.

Chapter three Conceptual Framework: this chapter reviews the model development and research hypotheses.

Chapter four Research Methodology: this chapter focuses on research design, population, sample size, data collection, survey questionnaire, pre-test, data analysis, factor analysis, and structure equation modeling.

Chapter five Data Analysis: this chapter presents the results of the analysis of data collected from users.

Chapter six The Effect of Moderators: this chapter covers the effect of demographic factors (gender, age, education, experience, and income) on the relationship between latent variables.

Chapter seven Discussion and Conclusion: this final chapter provides discussion and conclusion.

Chapter two

Literature Review

Part One: The Theories and Models of Technology Acceptance

2.1.1 Introduction

These models have evolved over the years and came as a result of persistent efforts of models' validation and extension that took place during the period each was presented. For example, psychology contributed the theory of reasoned action (TRA) (Ajzen and Fishbein, 1980), which was extended to the theory of planned behavior (TPB) (Ajzen, 1985), which also had an extension to the decomposed theory of planned behavior (DTPB) (Taylor & Todd, 1995); information system contributed the technology acceptance model (TAM) (Davis, 1989), which is an extension of theory of reasoned action; yet also has an extension TAM2 (Venkatesh & Davis, 2000) and the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al. 2003), which is an aggregation of other models including the aforementioned in addition to the diffusion innovation theory (DIT) (Rogers, 2003), the social cognitive theory (SCT) (Brown, 1999), and the model of personal computer utilization (MPCU) (Thompson et al. 1991).

Hence, the coverage proceeding of the technology acceptance models is domain specific and within each domain a chronological organization of presentation is the utilized for tracking models evolvement and interconnections between them.

2.1.2 Theory of Reasoned Action (TRA)

The TRA (Fishbein & Ajzen, 1975) is a well-established social psychological model that is concerned with the determinants of consciously intended behaviors. From a theoretical point of view, the TRA is intuitive, parsimonious, and insightful in its ability to explain behavior (Bagozzi, 1982). The TRA assumes that individuals are

usually rational and will consider the implications of their actions prior to deciding whether to perform a given behavior (Ajzen & Fishbein, 1980) (Yousafzai, Foxall, & Pallister, 2010).

According to the TRA, presented in Figure 2.1, behavioral intention is the immediate antecedent of an individual's behavior. According to Ajzen and Fishbein (1980), the TRA posits that "most behaviors of social relevance are under volitional control and are thus predictable from intention" (p. 41). The theory also suggests that because many extraneous factors influence stability of intention, the relationship between intention and behavior depends on two factors: (a) the measure of intention must correspond to the behavioral criterion in action, target, context, and time; and (b) intention does not change before the behavior is observed (Ajzen & Fishbein, 1980) (Yousafzai, Foxall, & Pallister, 2010). The theory can be explained by model in figure 2.1.

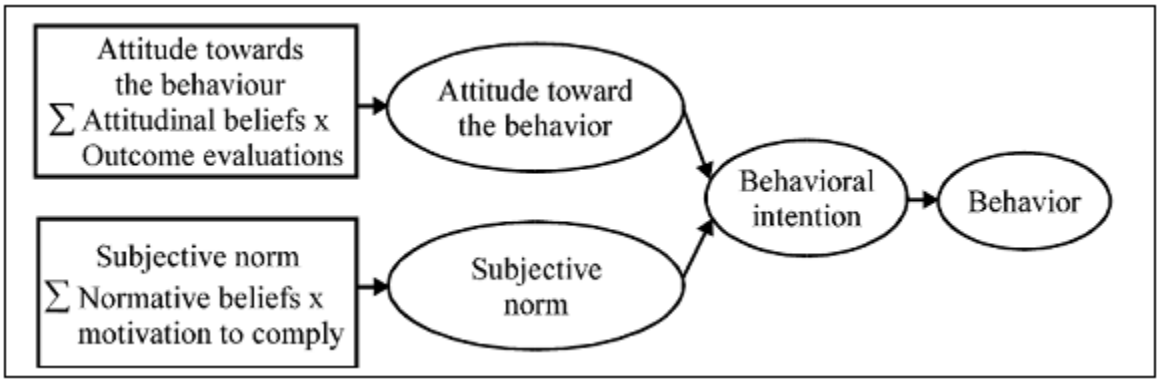

Figure 2.1: Theory of Reasoned Action (TRA)

Source: (Fishbein and Ajzen, 1975)

The major variables of the TRA model can be defined as follows:

Attitude towards the behavior: Fishbein and Ajzen defined the attitude towards a given behavior as a person's positive or negative feeling about performing the actual behavior (Chuttur, 2009).

Subjective norms: subjective norm is defined as the perceived social pressure to perform or not to perform the behavior (Al-Ajam & Nor, Predicting Internet Banking Adoption Determinants in Yemen Using Extended Theory of Reasoned Action., 2013).

Behavioral Intention: is an indicator of a person's readiness to perform certain behavior (Chuttur, 2009).

The TRA has been applied in the internet banking domain to predict the performance of behavior and individuals intention toward internet banking acceptance (Nor et al., 2008; Ok and Shon, 2010; Sadeghi and Farokhian, 2011; Yousafzai et al., 2010).

TRA considers only a narrow perspective of only two variables (attitude and subjective norm) that may affect individuals' behavioral intention. However, these two factors insufficient to predict individuals' intention toward adoption IBS. The psychological processes of TRA have been demonstrated to be applicable in understanding a variety of behaviors. It has been argued that the predictive power of TRA may be weak because it was designed to predict only behaviors under volitional control (Al-Ajam & Nor, Predicting Internet Banking Adoption Determinants in Yemen Using Extended Theory of Reasoned Action., 2013).

2.1.3 Theory of Planned Behavior (TPB)

The theory of planned behavior is an extension of the theory of reasoned action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) made necessary by the original model's limitations in dealing with behaviors over which people have incomplete volitional control. Figure 1 depicts the theory in the form of a structural diagram. For ease of presentation, possible feedback effects of behavior on the antecedent variables are not shown.

As in the original theory of reasoned action, a central factor in the theory of planned behavior is the individual's intention to perform a given behavior. Intentions are

assumed to capture the motivational factors that influence a behavior; they are indications of how hard people are willing

to try, of how much of an effort they are planning to exert, in order to perform the behavior. As a general rule, the stronger the intention to engage in a behavior, the more likely should be its performance. It should be clear, however, that a behavioral intention can find expression in behavior only if the behavior in question is under volitional control, i.e. (Ajzen, 1991).

Theory of reasoned action suggests that a person's behavior is determined by his/her intention to perform the behavior and that this intention is, in turn, a function of his/her attitude toward the behavior and his/her subjective norm. The best predictor of behavior is intention. Intention is the cognitive representation of a person's readiness to perform a given behavior, and it is considered to be the immediate antecedent of behavior. This intention is determined by three things: their attitude toward the specific behavior, their subjective norms and their perceived behavioral control. The theory of planned behavior holds that only specific attitudes toward the behavior in question can be expected to predict that behavior (Twente, 2014). The theory can be explained by model in figure 2.2.

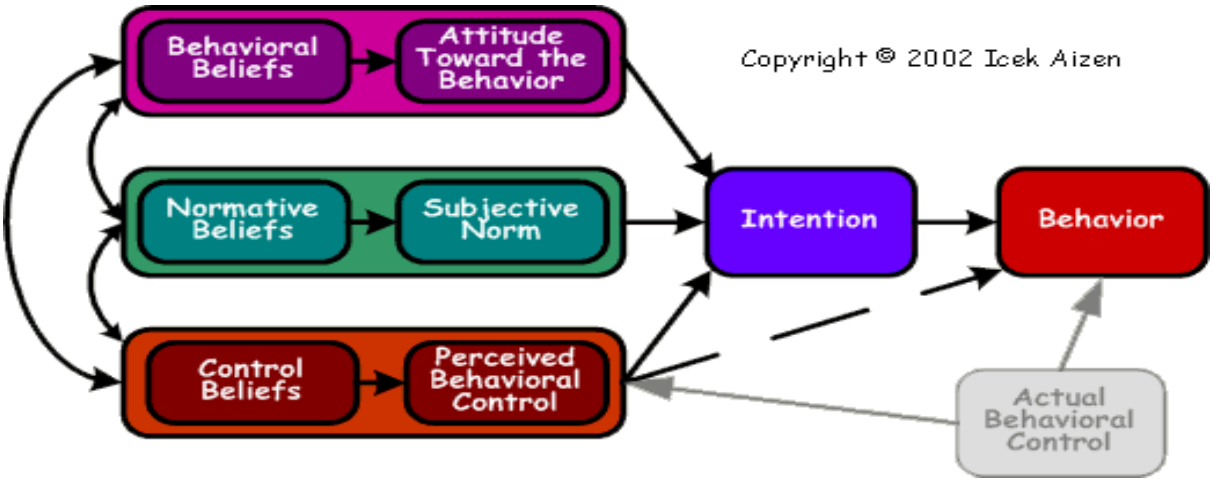

Figure 2.2: Theory of Planned Behavior (TPB)

Source: Ajzen (2006)

The major variables of the TRA model can be defined as follows:

Attitude toward the behavior: Attitude toward a behavior is the degree to which performance of the behavior is positively or negatively valued.

Subjective norm: Subjective norm is the perceived social pressure to engage or not to engage in a behavior.

Perceived Behavioral Control: Perceived behavioral control refers to people's perceptions of their ability to perform a given behavior.

Actual Behavioral Control: Actual behavioral control refers to the extent to which a person has the skills, resources, and other prerequisites needed to perform a given behavior.

Intention: Intention is an indication of a person's readiness to perform a given behavior, and it is considered to be the immediate antecedent of behavior. The intention is based on attitude toward the behavior, subjective norm, and perceived behavioral control, with each predictor weighted for its importance in relation to the behavior and population of interest.

Behavior: Behavior is the manifest, observable response in a given situation with respect to a given target (Ajzen, 1991).

The theory of planned behavior is based on cognitive processing and level of behavior change. Compared to affective processing models, the theory of planned behavior overlooks emotional variables such as threat, fear, mood and negative or positive feeling and assessed them in a limited fashion. In particular in the health-related behavior situation, given that most individuals' health behaviors are influenced by their personal emotion and affect-laden nature, this is a decisive drawback for predicting health-related behaviors. Poor predictability for health-related behavior in previous health research may be attributed to the exclusion of this variable. Most of the research is correlational, and evidence based on

experimental studies is less convincing (Wikipedia, http://en.wikipedia.org/wiki/theoryofplannedbehavior, 2014).

2.1.4 Technology Acceptance Model (TAM)

The technology acceptance model (TAM), developed by Davis et al. (1989), is one of the most widely used and influential models in the field of information systems, technology and services (Dash, Mohanty, Pattnaik, Mohapatra, & Sahoo, 2011). TAM is one of the most influential extensions of TRA and the TPB, which have long provided useful conceptual frameworks for dealing with the complexities of human social behavior. The main idea of the model is to describe the external factors affecting the internal attitudes and use intentions of the users and, through these, to predict the acceptance and use of the system. The goal of TAM is to provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behavior across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified (Safeena, Date, Hundewale, & Kammani, 2013).

By relying on prior work by Fishbein and Ajzen (1975), who formulated the theory of reasoned action, and other related research studies, Davis further refined his conceptual model to propose the technology acceptance model as shown in figure 2.3 (Chuttur, 2009).

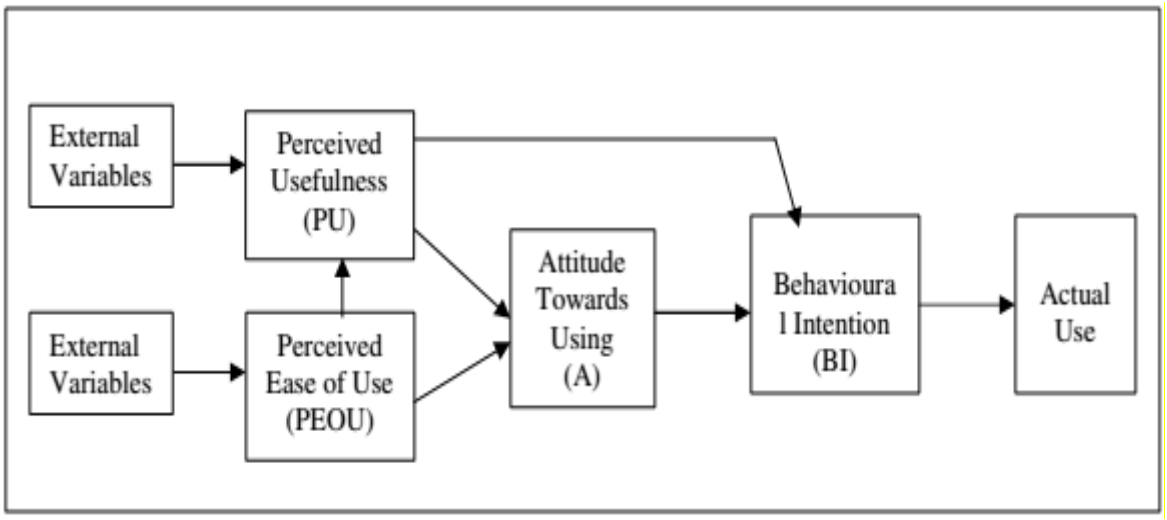

Figure 2.3: Technology Acceptance Model (TAM)

Source: Davis (1989)

In this proposal, Davis (1985) suggested that users' motivation can be explained by three factors: perceived ease of use, perceived usefulness, and attitude toward using the system. He hypothesized that the attitude of a user toward a system was a major determinant of whether the user will actually use or reject the system. The attitude of the user, in turn, was considered to be influenced by two major beliefs: perceived usefulness and perceived ease of use, with perceived ease of use having a direct influence on perceived usefulness. Finally, both these beliefs were hypothesized to be directly influenced by the system design characteristics, represented by external variables (Chuttur, 2009).

According to the TAM, the adoption of a new information technology is determined by a user's intention to use the system. The intention to use a system is motivated by the person's attitudes toward the system, which are in turn, are influenced by the user's beliefs about the system. The model incorporates five determinants of technology acceptance (Band, 2006):

Perceived Usefulness (PU): was defined by Fred Davis as "the degree to which a person believes that using a particular system would enhance his or her job performance".

Perceived Ease of Use (PEOU): Davis defined this as "the degree to which a person believes that using a particular system would be free from effort" (Davis F. , 1985).

External Variables: defined as all variables that influence PEOU or PU (e.g. onsite training, previous experience, and opinions of others).

Attitude toward Using (A): the attitude toward using a system if formed by beliefs about its usefulness and ease of use.

Behavioral Intention to Use (BI): the intention of a user to use the system (Band, 2006).

Despite its widespread use, TAM may not be universal in its applicability. Frist, the assertion that attitude determines behavior implies that users have a choice in their acceptance of the technology. TAM is therefore not applicable to the large group of users where technology use is compulsory. Second, the basic assumption of TAM, from its antecedents TRA and TPB, is that actions and behaviors are consciously, and rationally, planned by the user. Third, TAM substantially ignores external and situational influences particular to a given circumstance or culture (Sukkar & Hasan, 2005).

2.1.5 Model of PC Utilization (MPCU)

Triandis' (1977) theory of attitudes and behavior is a competing perspective to TRA and TPB. Triandis (1980) makes a distinction between cognitive and affective components of attitudes. Beliefs belong to the cognitive component of attitudes. "Behavior is determined by what people would like to do (attitudes), what they think they should do (social norms), what they have usually done (habits), and by the expected consequences of their behavior" (Thompson, Higgins, & Howell, 1991).

Thompson et al. (1991) refine Triandis' model to predict PC utilization behavior. The major constructs in the model and their definitions include:

Job-fit: "the extent to which an individual believes that using {a technology} can enhance the performance of his or her job".

Complexity: "the degree to which an innovation is perceived as relatively difficult to understand and use".

Long-term Consequences: "outcomes that have a pay-off in the future".

Affect towards Use: "feelings of joy, elation, or pleasure, or depression, disgust, displeasure, or hate associated by an individual with a particular act".

Social Factors: "individual's internalization of the reference group subjective culture, and specific interpersonal agreements that the individual has made with others, in specific social institutions"

Facilitating Conditions: "provision of support for users of PCs may be one type of facilitating condition that can influence system utilization".

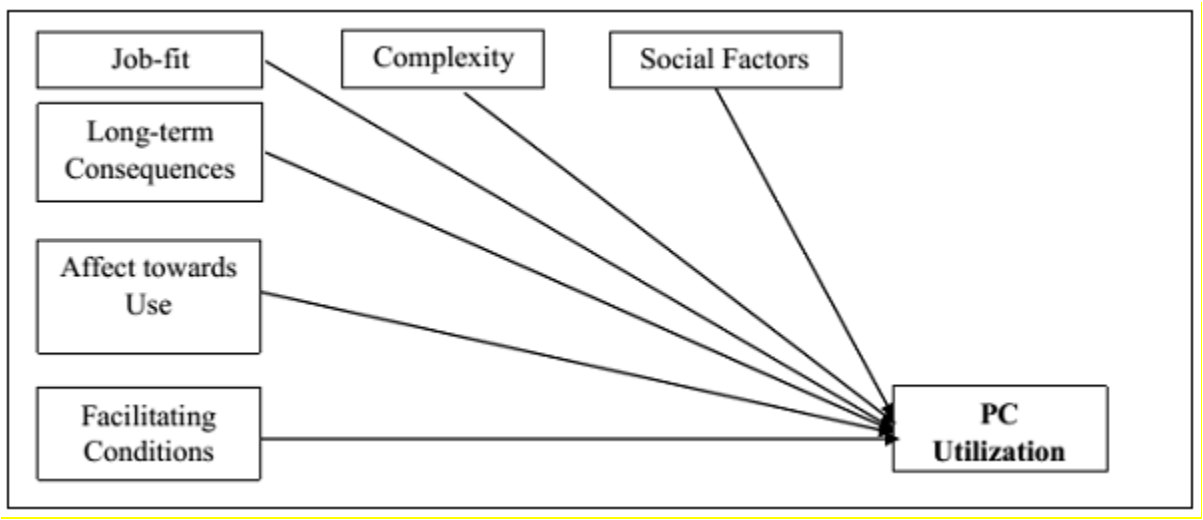

Figure 2.4: The Model of Personal Computer Utilization (MPCU)

Source: Thompson et al. (1991)

Thompson et al. (1991) they adopted Theory of Interpersonal Behavior (TIB) to the context of personal computer use by knowledge workers. In doing so, they augmented TIB with Complexity of PC Use and Job-fit.

The TIB included habit as a determinant of behavior. However, due to measurement difficulties, it was excluded from the MPCU as a contract. Thus, the model examined the influence of facilitating conditions for PC use, affect toward PC use, complexity of PC use, social factors influencing PC use, job-fit with PC use, and long-term consequences of PC use. The findings indicated that social factors, complexity, job fit, and long-term consequences have a significant influence on PC use. In contradiction with the TIB, there was no evidence that affect (attitude) and facilitating conditions have an impact on PC utilization (Band, 2006).

2.1.6 Motivational Model (MM)

Davis, Bagozzi and Warshaw (1992) tested the motivational model of technology acceptance based on Deci's extrinsic and intrinsic motivation and found them to be key drivers of an individual's intention to perform the behavior of technology usage. Davis's study was about extrinsic and intrinsic motivation to use computers in the workplace. From this perspective:

- Extrinsic motivation to use a technology in work will be supported by expected or anticipated reward (e.g. raise or bonus) provided that the technology is perceived as useful in achieving these goals.
- Intrinsic motivation to use technology refers to the perceived enjoyment of using the technology regardless of the performance outcome that might be obtained.

The findings showed that people's intentions to use computers at the workplace are influenced mainly by their perceptions of how useful the computers are for improving their job performance, and secondarily by the degree of enjoyment they experience using them. The study also pointed out that the positive interaction

observed between usefulness and enjoyment implies that enjoyment has a greater effect on intentions when computer systems are perceived to be more useful. In other words, increasing the enjoy ability of a system would enhance the acceptance of useful systems but have less of an effect on acceptance of useless systems (Davis, Bagozzi, & Warshaw, 1992).

Igbaria et al. (1996) integrated and examined the relative influence of the three motivators, perceived usefulness, or fun and social pressures, on an individual's decisions to use microcomputers. Their conceptual model was based on the motivational model in figure 2.5

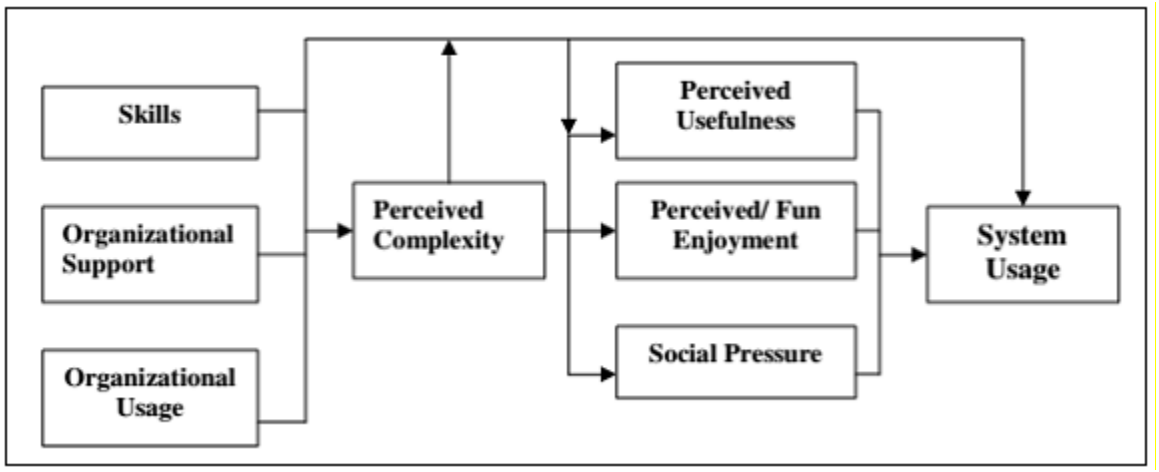

Figure 2.5: The Motivational Model of Microcomputer Usage.

Source: Igbaria et al. (1996)

The findings confirmed previous results regarding the key motivating role of PU in promoting technology usage (microcomputer in this study). The results also indicated the incentive properties of anticipated enjoyment and normative social pressures in stimulating usage. Additionally, results indicated moderate to strong support for the proposed linkages among the model variable. Perceived complexity was a key intervening variable linking the antecedent variables, skills, organizational support and usage, with perceived usefulness, perceived enjoyment, and social pressure; and its direct effect on usage. The authors acknowledged that the model

only explained 28 percent of the variance in usage and that the unexplained 72 percent suggest the need for additional research to incorporate other potential measures such as self-efficacy, user involvement and participation, and task characteristics (Venkatesh and Speier, 1999) (Al-Qeisi, 2009).

2.1.7 Decomposed Theory of Planned Behavior (DTPB)

The decomposed theory of planned behavior (DTPB) was introduced by Taylor and Todd in June 1995 in their study titled "Understanding Information Technology Usage: a test of competing models". This model more completely explores the dimensions of attitude belief, subjective norm (i.e., social influence) and perceived behavioral control by decomposing them into specific belief dimensions (Taylor & Todd 1995) (Kripanont, 2007).

Taylor & Todd (1995) indicated that a better understanding of the relationships between the belief structures and antecedents of intention requires the decomposition of attitudinal beliefs (Shih & Fang, 2004).

The DTPB suggests that behavioral intention is primary direct determinant of behavior, nevertheless, the original three core constructs still exist: attitude toward behavior, subjective norm, and perceived behavioral control as first introduced in TPB (see figure 2.6)

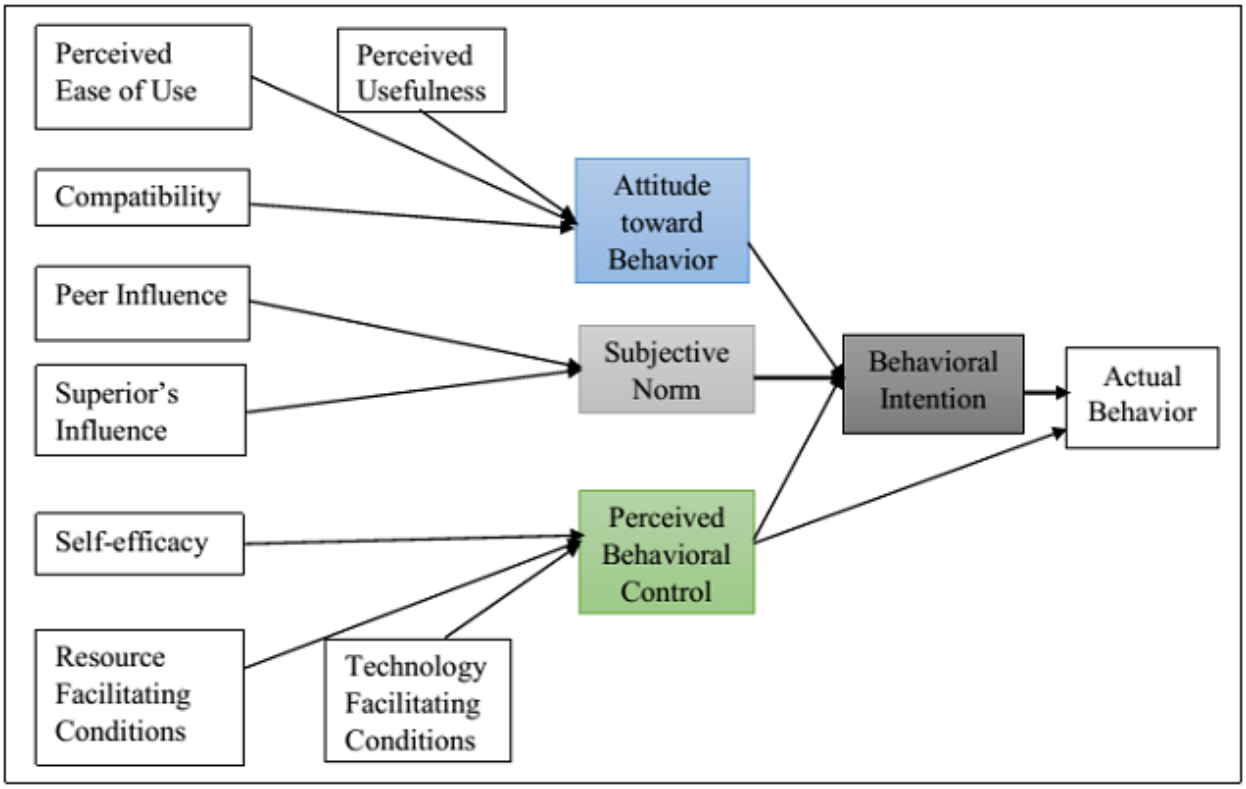

Figure 2.6: Decomposed Theory of Planned Behavior (DTPB).
Source: Taylor & Todd (1995)

Taylor and Todd (1995) suggest decomposing attitud toward behavior into three factors: perceived Usefulness (PU), perceived Ease of Use (PEOU), and Compatibility. PU refers to the degree to which a person believes that using a particular technology will enhance his performance, while PEOU refers to the degree to which a person believes that using a particular system would be free of effort (Davis, 1989, p. 320). Compatibility refers to the degree to which an innovation is perceived as being consistant with existing values, past experiences, and needs of potential adaptors (Moor & Benbasat, 1991, p. 195) (Al-Majali & Mat, 2010). These three factors have been found to be consistantly related specifically to IT usage (Kripanont, 2007).

Subjective norm was decomposed into peer influence and supperior's influence, because each may have different views on IT usage. Forexample, peers of the user may be opposed to the use of a particular system, because the think it requires too

much change in their work processes. But supperiors of the user may be encorageing the use of the system because they anticipate certain prodictivity payoffs. In such a situation, a monolithic normotive structure may shaw no influence on subjective norm or intention because the effects of the referent groups may cancel each other out. So it has been suggested to decompose normative belief into two referent groups (peers and superiors) because the expectations of peers , and superiors may be expected to differ (Taylor & Todd 1995).

Perceived behavioral control (PBC) was decomposed into three constructs: self-efficacy, resource facilitating conditions, and technology facilitating conditions. Self-efficacy (Bandora 1977) is related to perceived ability, and it is anticipated that higher levels of self-efficacy will lead to higher levels of behavioral intention and IT usage (Compeau, D. R. & Higgins 1991). The facilitating conditions construct provides two dimensions for control beliefs: one relating to resource factors (resource facilitating conditions) such as time and money and the other relating to technology compatibility issues (technology facilitating conditions) that may constrain usage. The absence of facilitating resources represents barriers to usage and may inhabit the formation of intention and usage. However the presence of facilitating resources may not encourage usage (Taylor & Todd 1995). This model seemed to have more capability in explaining usage behavior although is a less parsimonious model when compared to TPB (Kripanont, 2007).

2.1.8 Combined TAM and TPB (C-TAM-TPB)

Taylor and Todd (1995) contend TAM is meant to predict the behavioral intentions for using technologies among users and the capabilities of substantial usage behaviors. Although, it has been widely supported by a great number of scientific researches, yet there is no social factor and control factor integrated into the research model (Chen, 2013). In a more complex approach, Taylor and Todd (1995),

combined TAM-Todd model the predictors from TAM and TPB model, such as, attitude toward behavior (adapted from TRA/TPB), subjective norm (adapted from TRA/TPB), perceived behavioral control (adapted from TPB), and perceived usefulness (adapted from TAM) in their studies of assessing IT usage (Lee, 2005). (See fig.2.7)

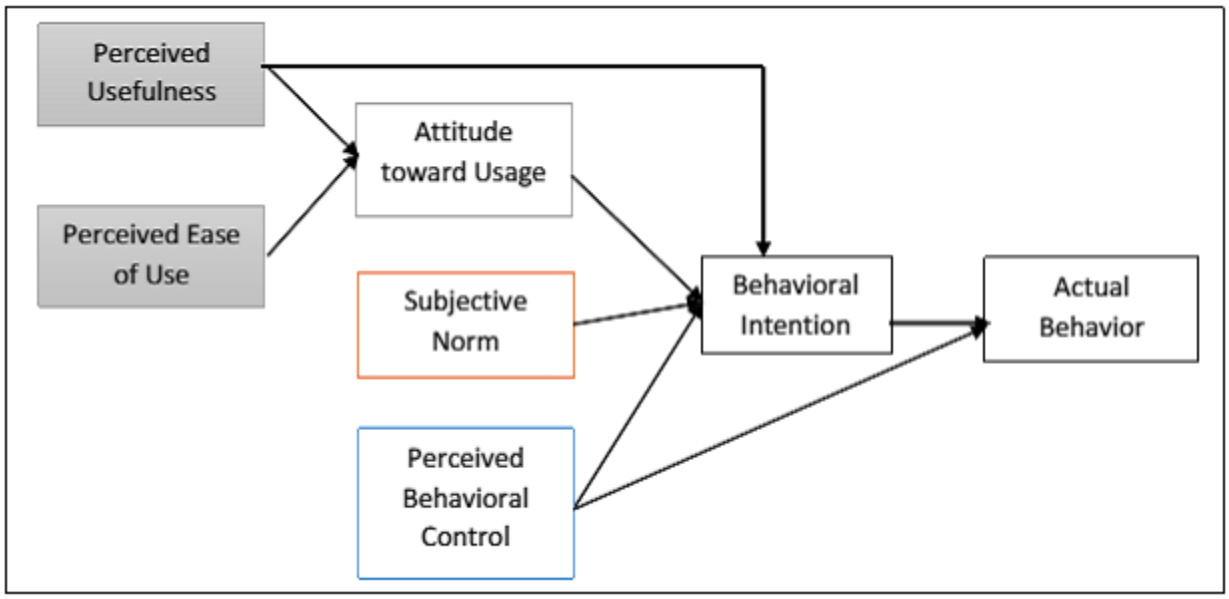

Figure 2.7: Combined TAM and TPB (C-TAM-TPB).

Source: Taylor & Todd (1995)

Taylor and Todd (1995) suggest that augmented TAM provides an adequate model of IT usage for both experienced and inexperienced users, accounting for a reasonable proportion of the variance in intention and behavior. For both groups, all direct determinants of intention, except attitude, were significant. Therefore, the augmented TAM can be used to predict subsequent usage behavior prior to users having any experience with a system (technology). This suggests that this model can be used to predict usage for people who have never used the technology before as well as the capacity to predict usage for people who have used the technology or for people who are familiar with the technology. So IT usage models may be employed

diagnostically prior to implementation or after implementation both with experienced and inexperienced users (Kripanont, 2007).

2.1.9 Social Cognitive Theory (SCT)

Social cognitive theory (SCT), first proposed by bandura (1977), provides a framework for understanding, predicting, and changing human behavior. The theory stems from social learning theory (SLT), which has a rich historical background dating back to the late 1800's. The theory identifies human behavior as an interaction of personal factors, behavior, and the environment (bandura, 1977). It state that a person's intention to perform a particular behavior is determined by their self-efficacy and outcome expectancy (Bandura, 1977).

Self-efficacy is confidence people have in their ability to perform a particular behavior. It is influenced by factors such as verbal persuasion, accomplishments, vicarious experiences and psychological signals (Bandura, 1997). Is affects an individual's choice of behaviors, their persistence in overcoming obstacles, and their ability to perform the behavior (Compeau and Higgins, 1995).

Outcome expectancy is a judgment that a behavior will result in one or more consequences (Bandura, 1986). The outcome may be physical (e.g. bodily harm), social (e.g. praise from others) or self-evaluative (e.g. pride) (Bandura, 1986). According to SCT, people who are more efficacious tend to perceive outcomes in a more positive light. Thus, outcome expectancy is directly influenced by self-efficacy (Bandura, 1986) (Band, 2006).

The social foundations of thought and action: a social cognitive theory was published by Bandura (1986). The theoretical perspective of social cognitive theory suggests that human functioning should be viewed as the product of a dynamic interpret the results of their own behavior informs and alters their environments and the personal factors they possess which, in turn, inform and alter subsequent behavior. This is

foundation of conception of reciprocal determinism by Bandura (1986) which views: (a) personal factors in the form of cognition, affect, and biological events, (b) behavior, and (c) environmental influences that create interactions that result in a triadic reciprocally (see figure 2.10). Bandura altered the label of his theory from social learning to social 'cognitive' both to distance it from prevalent social learning theories of the day and to emphasize that cognition plays a critical role in people's capability to construct reality, self-regulate, encode information, and perform behaviors (Kripanont, 2007).

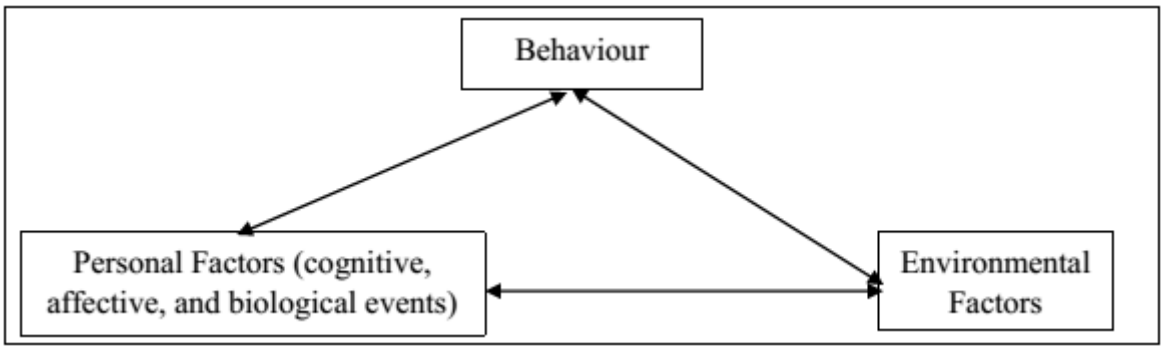

Figure 2.8: Social Cognitive Theory (SCT).

Source: Bandura (1995)

2.1.10 Extension of the Technology Acceptance Model (TAM2)

Technology acceptance model 2 (TAM2) was developed by Venkatesh and Davis, and it was first introduced in management science in 2000 on the research paper titled, "A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies" (Venkatesh & Davis 2000). The goal of TAM2 is a theoretical extension of the technology acceptance model (TAM) to (1) include additional key determinants of TAM that explain perceived usefulness and usage intentions in terms of social influence and cognitive instrumental processes and (2) to understand how the effects of these determinants change with increasing user experience over time with the target system. A better understanding of the

determinants of perceived usefulness would enable us to design organizational interventions that would increase user acceptance and usage of new systems (technologies) (Kripanont, 2007).

TAM2, an extension of TAM, includes additional key determinants of perceived usefulness and usage intention constructs which are meant to explain the changes in technology acceptance over time as individuals gain experience in using the targeted technology. Figure 2.11 shows the proposed model referred to as TAM2. The new model incorporates additional theoretical constructs covering social influence processes (subjective norm, voluntariness, and image) and cognitive instrumental processes (job relevance, output quality, result demonstrability, and perceived ease of use).

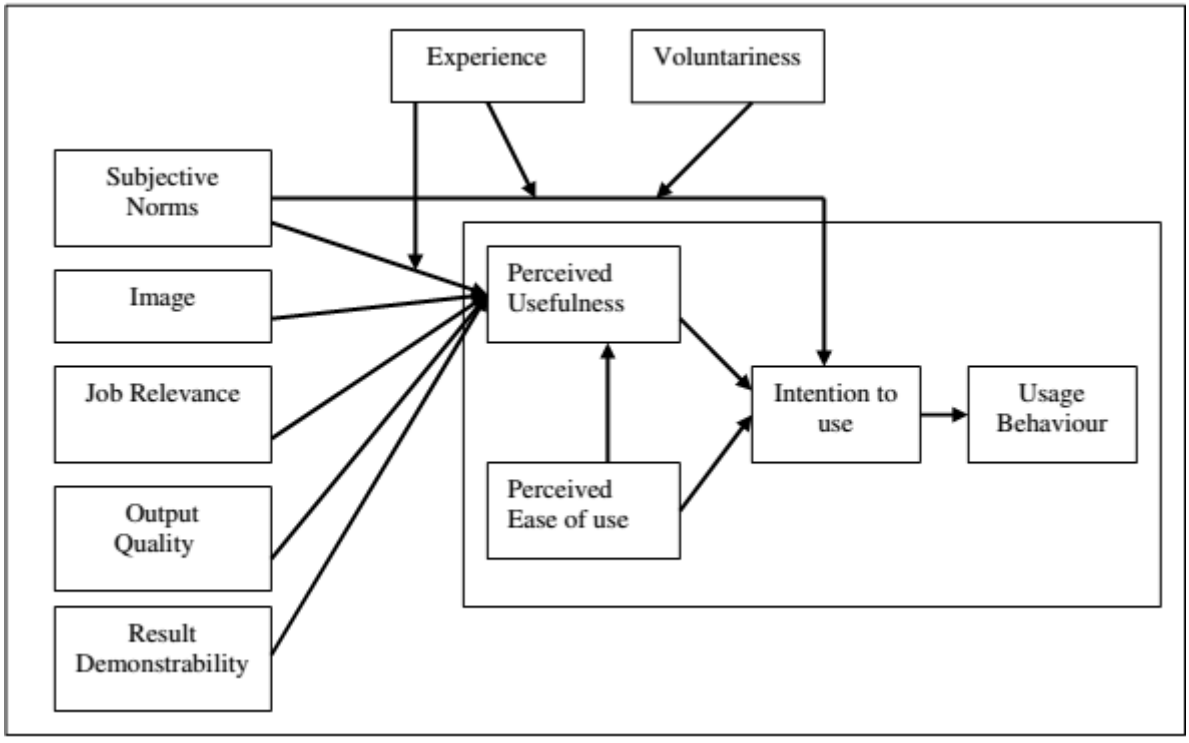

Figure 2.9: Extension of Technology Acceptance Model (TAM2).

Source: Venkatesh & Davis (2000)

Venkatesh & Davis explained the role of social influences in computer usage contexts. According to them, TAM2 theorizes that the subjective norms direct effect on intention over PU & PEOU will occur in mandatory system usage sittings. The model posits voluntariness as a moderating variable to distinguish between mandatory versus voluntary compliance with organizational sittings. Nevertheless, subjective norms can influence intention through PU or what is called internalization. In addition, TAM2 theorizes that internalization rather than compliance will occur no matter whether the usage context is voluntary or mandatory. That is, even when usage is mandated by the organization, it is the user's perception of a system's usefulness through persuasive social information that will increase his/her intention towards adoption or usage of the system. Experience is theorized to mediate the relations between subjective norms and intentions on one hand and subjective norms-PU (internalization) on the other. As mentioned previously, the relation between SN and intention would be stronger in mandatory usage context and prior to implementation or at early stages of use. Yet, the relation is expected to weaken with gained experience during system usage. Experience would have the same effect on the SN-PU relation. In contrast, TAM2 does not theorize that experience affects the image-PU (identification) relation or that such relation might weaken over time (Al-Qeisi, 2009).

2.1.11 Diffusion of Innovation Model (DOI)

Innovation Diffusion Theory (IDT) has been used since the 1950s to describe the innovation-decision process. It has gradually evolved until the best well-known innovation-decision process was introduced by Rogers (Kripanont, 2007).

The innovation-decision process is one through which an individual (or other decision-making unit) passes (1) from first knowledge of an innovation, (2) to forming an attitude toward the innovation, (3) to a decision to adopt or reject, (4) to

implementation of the new idea, and (5) to confirmation of this decision (Kripanont, 2007).

The theory of diffusion innovation (IDT) (Rogers 1983) could be considered as one of the earliest theories that has attempted to explore factors that may influence an individual to adopt an innovation or a new technology. The main thesis of this theory is that innovation adoption is a process of uncertainty reduction. To reduce uncertainty about the new technology, individuals will gather and synthesis information about the technology. The result of this process is beliefs about using the technology. These beliefs then cause individuals to accept or reject the technology.

In the persuasion stage Rogers (1995) suggested five key beliefs affecting the adoption of any innovation (Nor, Pearson, & Ahmad, 2010).

1. *Relative advantage*, which he defines as "the degree to which an innovation is perceived as being better than the idea it supersedes".
2. *Compatibility*, which is defined as "the degree to which an innovation is perceived as consistent with the existing values, past experiences, and the needs of potential".
3. *Complexity*, which is defined as "the degree to which an innovation is perceived as relatively difficult to understand and use".
4. *Trialability*, which is defined as "the degree to which an innovation may be experimented with on a limited basis".
5. *Observability*, which is defined as "the degree to which the results of an innovation are visible to others". Rambocas & Arjoon (2012) defined observability as "the extent to which the technology is observable by others" (Rambocas & Arjoon, 2012).

This model of innovation is one of the most well-known theories associated with the adoption of new technology up until now (see figure 2.10).

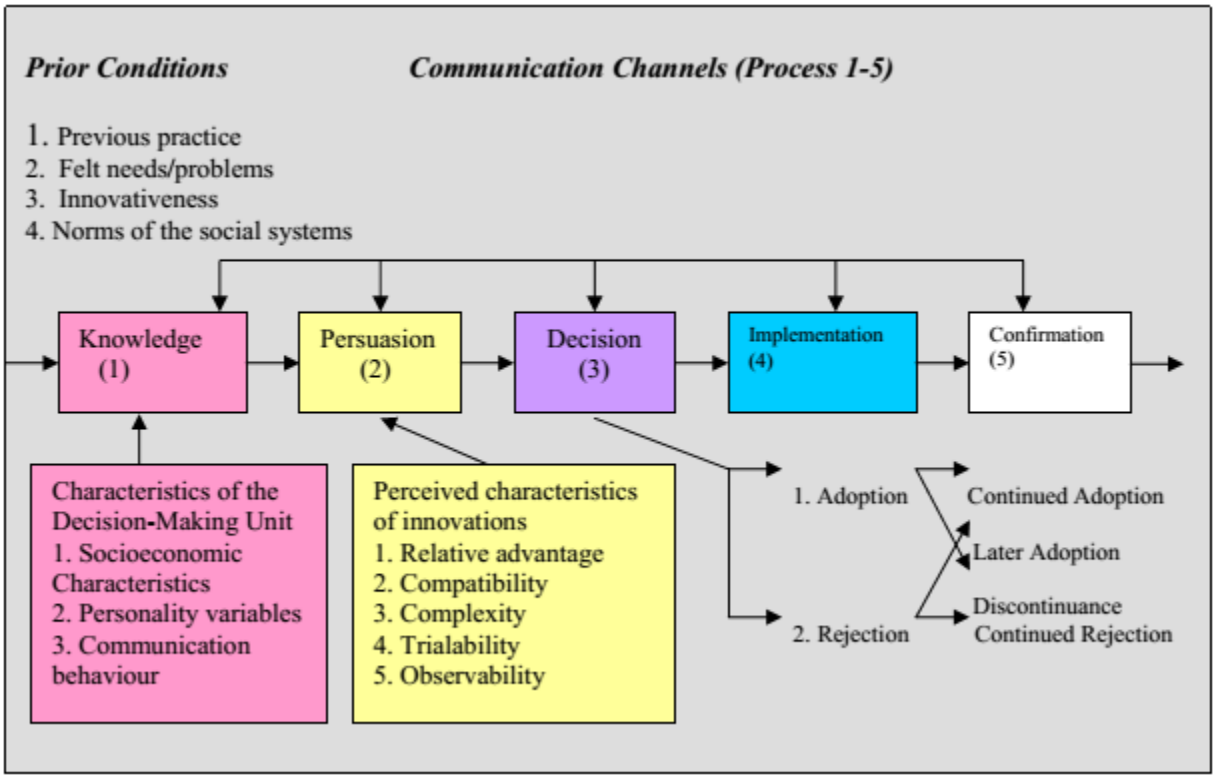

Figure 2.10: Diffusion of Innovation Model (DOI)

Source: Rogers (1995)

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

The unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al. 2003) is one of the latest developments in the field of general technology acceptance models. Like earlier acceptance models, it aims to explain user intentions to use an IS and increase usage behavior. Venkatesh et al. (2003) developed this synthesized model to present a more complete picture of the acceptance process than previous individual models had been able to do. The UTAUT model successfully integrates key elements from eight models previously used in IS field. These models are the theory of reasoned action (TRA), the theory of planned behavior (TPB), the technology acceptance model (TAM), the model of personal computer utilization (MPCU), the motivational model (MM), the social cognitive theory (SCT), the

extension of the technology acceptance model (TAM2), and the innovation diffusion theory (IDT) and they each attempt to predict and explain user behavior using a variety of independent variables. A unified model was created based on the conceptual and empirical similarities across these eight models (Venkatesh et al. 2003) (Alshehri, Drew, Alhussain, & Alghamdi, 2012). The theory holds that four key constructs: *Performance expectancy* is driven from perceived usefulness (TAM/TAM2), relative advantage (IDT), extrinsic motivates (MM), job-fit (MPCU), and outcome expectations (SCT). *Effort expectancy* captured the concept of perceived ease of use (TAM/TAM2), complexity (MPCU), and ease of use (IDT). *Social influence* captured subjective norm (TRA, TAM2, TPB/DTPB, and C-TAM-TPB), social factors (MPCU), and image (IDT). And *facilitating conditions* by capturing the concepts of perceived behavior control (TPB/DTPB, C-TAM-TPB), facilitating conditions (MPCU), and compatibility such as work style (IDT) (Yu, 2012). (See the table 2.1).

Table 1: Comparing the determinants of UTAUT with other technology acceptance models (Venkatesh et al., 2003)

Model name	Determinants (UTAUT)			
	Performance Expectancy (PE)	Effort Expectancy (EE)	Social Influence (SI)	Facilitating Conditions (FC)
TAM	Perceived usefulness	Perceived ease of use	-	-
TAM2	Perceived usefulness	Perceived ease of use	Subjective norm	-
TRA	-	-	Subjective norm	-
TPB/DPTB	-	-	Subjective norm	Perceived behavioral control
C-TAM-TPB	Perceived usefulness	-	Subjective norm	Perceived behavioral control
MPCU	Job-fit	Complexity	Social factors	Facilitating conditions
IDT	Relative advantage	ease of use	Image	Compatibility
MM	Extrinsic motivation	-	-	-
SCT	Outcome expectations	-	-	-

The first three being direct determinants of usage intention and behavior, and the fourth a direct determinant of use behavior. The variables of gender, age, experience and voluntariness of us all work to moderate the impact of the four key constructs on usage intention and behavior as indicated in figure 2.11

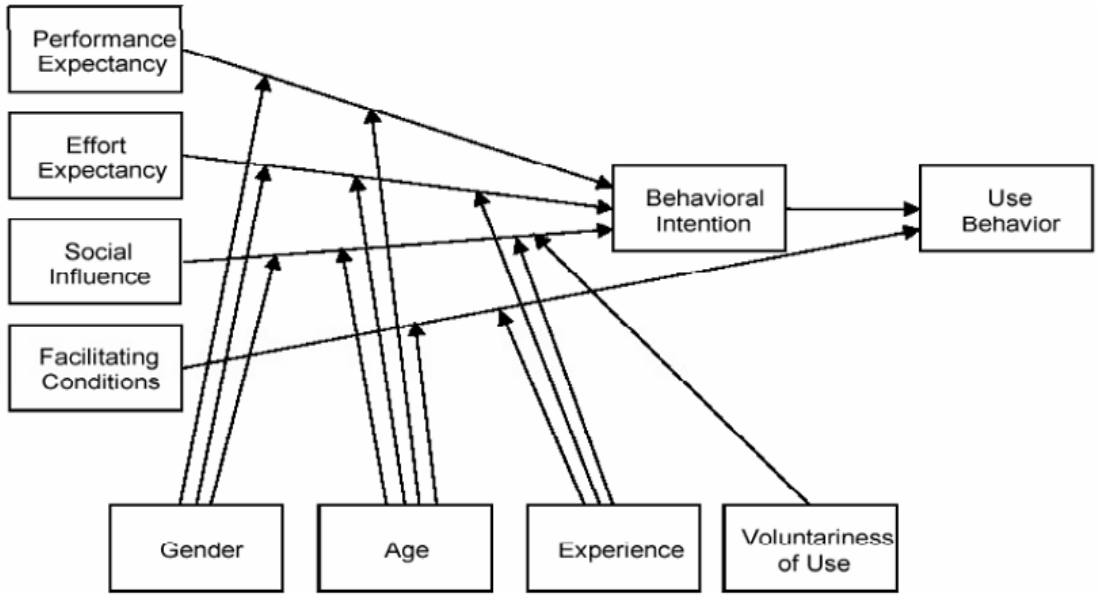

Figure 2.11: The UTAUT Model.
Source: Venkatesh et al., 2003, p.447

These determinants are defined as follows (Venkatesh et al. 2003, pp. 447-453) (Alshehri, Drew, Alhussain, & Alghamdi, 2012):

- *Performance expectancy* (PE): "the degree to which an individual believes that using the system will help him or her to attain gains in job performance".
- *Effort expectancy* (EE): "the degree of easy associated with use of the system".
- *Social influence* (SI): "the degree to which an individual perceives that important others believe he or she should use the new system". And
- *Facilitating conditions* (FC): "the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system".

Part Two: Internet Banking

2.2.1 Introduction

Internet banking is defined as "the use of internet as a remote delivery channel for banking services, and an internet banking is defined as a bank that offers (web-based) transactional services" (Gopal akrishnan, Wischnevsky and Damanpour 2003, p. 413). Internet banking offers customers the advantages of lower cost, location and time convenience, and the ease and speed of completing transactions. Banks achieve lower costs, customer responsiveness and satisfaction. The benefits of internet banking cannot be achieved unless customers use the bank website and its associate capabilities (Al-Ajam & Nor, Customers' Adoption of Internet Banking Service: An Empirical Examination of the Theory of Planned Behavior in Yemen, 2013).

2.2.2 The Concept of Internet Banking

The idea of internet banking and telephone banking emerged in the 1980s with the increase in the use of the internet at home (Cartwright 2000). In the 1980s, banking and financial institutions in Europe and the United States began to embrace "home banking" as a concept of research and programs. Initially, far more advanced computers and the internet helped customers contact machines and telephones (Sarel and Marmorstein 2003).

The United States "Net-Bank" was the first internet banking application and in 1996 "Atlanta Internet Bank" was founded. Citi-Bank and Wells Fargo established their internet services in 2001 (Gefen and Straub 2005).

DBS Bank granted financial services over the internet for the first time in Singapore in 1997. It was followed by UOB, OCBC and then other banks (Gerrard et al., 2006) (Altun, 2012).

Concerning the increasing innovation and urgent need of up-to-date, convenient and reliable data, information systems (IS) have gained high importance in the organizational context. Against this background, a great dependency between the organizations' performance and their IS is emerging. Organizations can now profit from the evolution of new technologies and adapt to the emerging ways of interacting with their clients. The banking sector has been using IS not only to run internal business activities and to promote products, but also to provide main services to their customers. The dematerialization of customer relationships, that is, the better use of the numerous new IS available in the market, is a topical challenge facing this sector. Adjusting to this challenge will allow clients to satisfy almost all their banking needs with minimum human intervention (Jayawardhena & Foley, 2000; Tan & Teo, 2000) (Martins, Oliveira, & Popovic, 2014).

Internet banking is the latest in the series of technological wonders of the recent past. ATMs, Tele-Banking, Internet Banking, Credit Cards, and Debit Cards have emerged as effective delivery channels for traditional banking products. Internet or Electronic or Online Banking is the newest delivery channel to be offered by retail banks in many developed countries, and there is a wide agreement that this channel will have a significant impact on the market. Banks know that the internet opens up new horizons for them and moves them from local to global frontiers. Internet banking refers to systems that enable bank customers to get access to their accounts and general information on bank products and services through the use of bank's website, faxes, original signatures and telephone confirmations. In its simplest form, electronic banking may mean the provision of information about the bank and its products via a page on the internet. It is the types of services through which bank customers can request information and carry out most retail banking services such as balance reporting, inter-account transfers, bill-payment, etc., via a telecommunication network without leaving their homes or organizations. In

essence, it is an electronic customer interface and an alternative channel of distributions. Online banking has been regarded as the most important way to reduce cost and maintain or enhance services for customers. It provides universal connection from any location worldwide and is universally accessible from any internet linked computer. It is a process of innovation whereby customers handle their bank own transactions without visiting bank tellers (Safeena, Date, Hundewale, & Kammani, 2013).

According to Sadeghi & Hanzaee (2010) virtual banks or "branchless banks" is a relatively new concept used to define banks that do not have a physical location such as a branch, but offer services only through the internet and ATMs to deposit or withdraw funds.

Online banking differs in many respects from traditional branch banking. One of the most notable differences concerns the connection to the bank's information processing system. Previously, customers had a relationship with a bank's front-desk employee, who had access to the bank's information system.

In online banking, customers have a direct access to a bank's information system from home, work, school, or any other place where a network connection is available. In this new situation, the customer is defined as an end-user of the bank's data processing system. In end-user computing, the user's personal computer (PC) plays a pivotal role.

From a bank's prospective, using the internet is more efficient than using other distribution mediums because banks are looking for an increased customer base (Sadeghi & Hanzaee, 2010).

Information technology developments in the banking sector have sped up communication and transactions for clients. Online banking is also one of the technologies which are fastest growing banking practices now a days. It is vital to

extend this new banking feature to clients and service providers. The internet has an ever-growing importance in the banking sector because of the advantages it brings to both the entities and their customers. Although IS expenditure is regarded costly and risky financial institutions are one of the largest investors in IS. Internet is the cheapest delivery channel for banking products as it allows the entity to reduce their branch networks and downsize the number of service staff. The navigability of the website is a very important part of internet banking because it can become one of the biggest competitive advantages of a financial entity. Bankers consider minimizes inconvenience, minimizes cost of transactions and time saving to be important benefits and chances of government access, chances of fraud and lack of information security to be vital risks associated with electronic banking. Due to increase in technology usage the banking sector's performance increases day by day. Online banking is becoming the indispensable part of modern day banking services. Banking industry is also one of the influenced industries adopting technologies which are helpful in providing better services to customers. Quality of service is improved by using technological innovations (Safeena, Date, Hundewale, & Kammani, 2013).

2.2.3. The Differences between Electronic Banking, Internet Banking, and Online Banking

Internet banking can be defined as the use of technology to communicate instructions and to receive information from a financial institution where an account is held. Internet banking includes the systems that enable financial institution customers, individuals or business, to access accounts transact business, or obtain information on financial products and services through a public or private network, including the internet. When first introduced, internet banking was used mainly as an information presentation technologies, however, more banks have come forward to use internet

banking both as a transactional as well as an informational medium (Burnham, 2008).

But the term electronic banking is almost generic in its nature and therefore it is mostly used without any further explanation or definition. It should be remained that electronic banking is not equal to the term internet banking although the latter is undoubtedly the most widespread type of it. Electronic banking includes several traditional services like "telephone banking", "credit cards, debit cards", and "ATM". The more recent additions are internet banking, and mobile banking. Electronic banking is also known as electronic funds transfer (EFT) and basically is simply the use of electronic means to transfer funds directly from one account to another (Burnham, 2008).

But when we speak about online banking, we find that online banking was first introduced in the early of 1980s (Kalakota, 1997). Online banking provided the customer with an application software program that is operated on the customer's PC (Liao, 1999). The customer then dialed into the bank via a modem, downloaded, and operated the programs that are resident on his or her PC.

Thus internet banking lay under the umbrella of E-banking without a need to a specific software to be installed on the customer's PC just like online banking (Badah, 2010).

2.2.4 The Internet Banking in Sudan

Over the past decade, the number of banks in the Sudan has been steadily increasing; the number increased from 27 in 2000 to 37 banks in 2014 (Sudan, 2014). Currently the central bank of Sudan (CBS) oversees 37 licensed banks of which 27 are registered as commercial, including one state-owned bank, seven branches of foreign banks, and 24 joint-venture banks (table 2.2.1). Five banks are registered as specialized banks of which three state-owned banks and two joint-venture banks.

The specialized banks provide funds to specific sectors of the economy; agriculture, industry, and social development. All the banks in Sudan are head quartered in Khartoum, the capital city.

Table 2.2: licensed banks in Sudan

type	Commercial banks	Specialized banks	total
State-owned	1	3	4
Foreign	7	0	7
Joint-venture	24	2	26
total	32	5	37

Source: (Sudan, 2014)

The Sudanese banking industry as a whole has a network of 648 branches, which is quite low compared to the area of the country (1.886.068 Km^2) and the size of population which is estimated to be 30,894,000 peoples in 2014. In addition, the geographical distribution of banks' branches is uneven across the 17 country states with 258 branches located in Khartoum state, represented 39.8% of total branches (fig. 2.12)

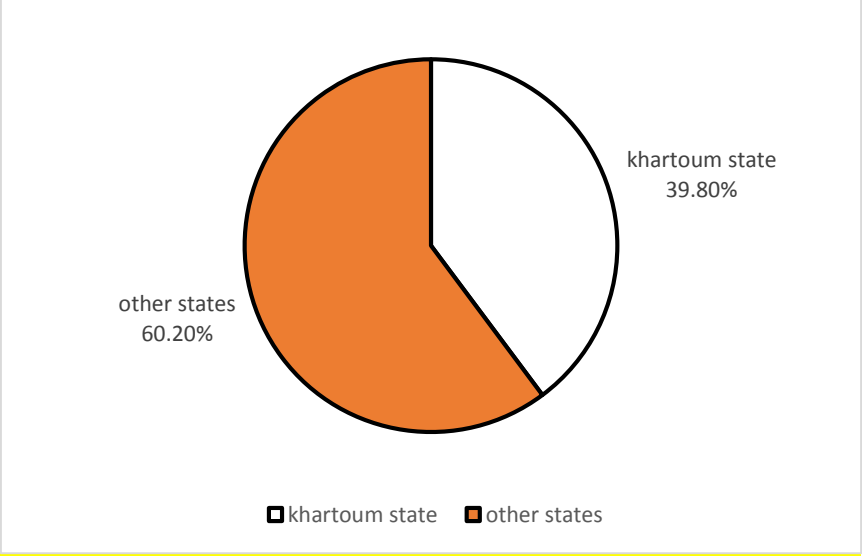

Fig. 2.12: geographical distribution of banks' branches

Source: (Sudan, 2014)

The electronic banking in the Sudan goes back to 1999 when the central bank of Sudan (CBS) took the initiative to introduce modern information technologies in Sudanese banking industry as a part of its banking system development plan for 1999 – 2000. Consequently, the CBS established the electronic banking services company (EBSC) in 1999 to be responsible for building and developing e-banking industry in Sudan (Mahdi, 2007) (Ismail & Osman , 2012). EBSC is a private company owned by CBS (49%), Sudatel telecom group (30%), and the Sudanese banks (21%). It started its operations in 2000 and is dedicated towards introducing banking technologies and solutions, and most importantly payment systems (http://www.ebs-sd.com).

EBS is in charge of the following six major systems hosted at or delegated by EBSC (Horus Development Finance, 2011; www.ebs-sd.com).

- SWIFT a shared worldwide data processing and communications link and a common language for international transactions came to Sudan in 2000,
- National switch is established in 2006 to provide automated teller machine (ATM) services, electronic point of sale (EPOS) service, electronic funds transfer (EFT), and allows Sudanese banks communication,
- Electronic cheque clearance (ECC) an electronic image-based check clearing solution, designed to provide end-to-end nationwide clearing of cheques within the same day, which was established in Sudan in 2007,
- Real time gross settlement (RTGS) is a funds transfer mechanism where transfer of money takes place from one bank to another on a “real time” and on “gross” based. This is the fastest possible money transfer system through the banking channel,
- Electronic link system, the core banking system of CBS, and
- Electronic reports system for CBS and commercial banks.

At present the Sudanese banks offer e-banking services to their customers through ATM, phone, mobile, internet, and POS (Ismail & Osman , 2012). Internet banking including balance inquiry, cheque book request, cheque status, demand draft cheque, fund transfer, standing instructions, and statement of accounts which is offered presently by Faisal Islamic Bank (www.fibsudan.com), Omdurman National Bank (www.onb.com.sd), Alnile Bank (www.alnilebank.com), Albaraka Bank (www.Albarakasudan.com), and Bank of Khartoum (http://bankofkhartoum.com).

2.2.5 Types of Internet Banking

Understanding the various type of internet banking products will help examiners assess the risk involved. Currently, the following three basic kinds of internet banking are being employed in the marketplace:

2.2.5.1 Informational

This is the basic level of internet banking. Typically, the bank has marketing information about the bank's products and services on a stand-alone server. The risk is relatively low, as informational systems typically have no path between the server and the bank's internal network. This level of internet banking can be provided by the bank or outsourced. While the risk to a bank is relatively low, the server or website may be vulnerable to alteration. Appropriate controls therefore must be in place to prevent unauthorized alterations to the bank's server or website (Sarma & Singh, 2010).

2.2.5.2 Communicative

This type of internet system allows some interaction between the bank's systems and the customer. The interaction may be limited to electronic mail, account enquiry, loan applications, or static life updates (name and address changes). Because this servers may have a path to the bank's internal networks, the risk is higher with this configuration than with informational systems.

Appropriate controls need to be in place to prevent, monitor, and altered management of any unauthorized attempt to access the bank's internal networks and computer systems. Virus controls also become much more critical in this environment (Mansour, Eljelly, & Abdalla, 2010).

2.2.5.3 Transactional

This level of internet banking allows customers to execute transactions. Since a path typically exists between the server and the bank's or outsourcer's internal network, this is the highest risk architecture and must have the strongest controls. Customer transactions can include accessing accounts, paying bills, transferring funds, etc. (Internet Banking Comptroller's Handbook, 1999)

2.2.6 Benefits of Internet Banking

Benefits expected to be gained are major factors for a firm to decide to go the internet banking direction. According to Basu and Muylle (2007), companies can gain two fundamental types of benefits from e-banking. These are generally described as value creation or value enhancement for one or more of a company's stakeholder groups and cost saving, increased market share, speed and efficiency of doing business and improvement in customer service. Value creation could also result in improvement in internal and external communication through effective e-marketing, increment of sales through e-commerce websites integrated with back office.

Akoh (2001) answers the question why firms should go the internet banking way and outlines the tremendous benefits derived by firms who have already integrated electronics into their business processes. According to him it is shown that if the cost of a full-service trading transaction is about $150, it will cost $69 doing the same using a discount broker and $10 using an online broker. He continued that it will cost all parties (the bank, consumer, service provider, etc.,) $1.27 for a banking transaction (eg., a simple cash withdrawal) at a bank branch, $0.27 using an ATM

machine and $0.01 using the internet. Akoh (2001) then adds that doing business electronically does not only reduce cost but tremendously affects the speed and efficiency of business.

Windrum and De-Berranger (2002) suggest that the commercial benefits of internet banking lie in five areas: firstly, firms are able to expand their geographical reach. Secondly, important cost benefits lie in improved efficiency in procurement, production and logistics processes. Thirdly, there is enormous scope for gaining through improved customer communications and management. Fourthly, the internet reduces barriers to entry for new market entrants and provides an opportunity for small firms to reorient their supply chain relationships to forge new strategic partnerships. And finally, internet banking technology facilitates the development of new types of products and new business models for generating revenues in different ways (Ofori-Dwumfuo & Dankwah, 2013).

The properties of internet make it an ideal medium for delivery of banking products and services (Jayawadhera and Foley, 2000) various studies have been conducted on internet banking and the benefits that accrue from the use of this innovation are summarized in table 2.2.6.1 (Thulani, Tofara, & Langton, 2009).

Table 2.3: benefits of internet banking.

No	Benefit	Related literature
1	Cost reduction	Bradly and Stewart (2003), Rotchanakitumnuai and Speece (2003), Jayawadhera and Foley (2000), Nath et al. (2001), Al-Sukkar and Hasan (2005), and Singh (2004), Corrocher (2002), Chang (2003), Sullivan and Wang (2005).
2	Increased customer base	Bradly and Stewart (2003), Jayawadhera and Foley (2000), Jen-Her Wu et al. (2006), Singh (2004), and Corrocher (2002).
3	Enable innovation and development of non-core business services	Jayawadhera and Foley (2000), Nath et al. (2001), Karem (2003), Corrocher (2002), and Singh (2004).
4	Marketing and communication	Jayawadhera and Foley (2000), Karem (2003), and Corrocher (2002).
5	Increased consumer loyalty and satisfaction	Jen-Her Wu et al. (2006), Al-Sukkar and Hasan (2005), and Nath et al. (2001).
6	High profit consumers	Nath et al. (2001).
7	Ability to attract new consumers	Al-Sukkar and Hasan (2005).

Source: (Thulani, Tofara, & Langton, 2009)

Chapter Three

Conceptual Framework

3.1 Introduction

According to the findings of literature review presented in the previous chapter, a theoretical framework was developed for this research and it is presented in this chapter.

3.2 Model Development and Research Hypotheses

So far, this research has presented the literature relevant to acceptance of IT/IS. In addition, the researcher has also provided discussion of the need for identification of additional factors that might be important in determining acceptance of internet banking services. 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 behavioral intention toward acceptance of internet banking services or use it.

The previous chapter have presented the models frequently used in explaining behaviors related to new technologies' adoption. Although TRA, TPB and TAM are the most used models for explaining technology acceptance, these models are criticized for their relatively low exploratory power in terms of behavioral intentions, which ranged between 30 – 40 percent only. The integrated acceptance model presented by Venkatesh et al. (2003) reports an exploratory powerful amounting 70 percent. While many studies utilized the technology acceptance models in

investigating various systems' adoption in different contexts, very few have utilized the UTAUT model.

The research model proposed by this study, as presented in figure 3.1, extension to UTAUT in the context of IBS based on prior research on technology acceptance. The model posits that user acceptance of IBS is jointly determined by performance expectancy (PE), effort expectancy (EE), and social influence (SI). The proposed model incorporates the PE, EE, and SI based on previous studies that have extended the UTAUT. In addition to ability variable which include four dimensions are internet banking awareness (IBA), accessibility (AC), internet connection quality (ICQ), and internet banking cost (IBC).

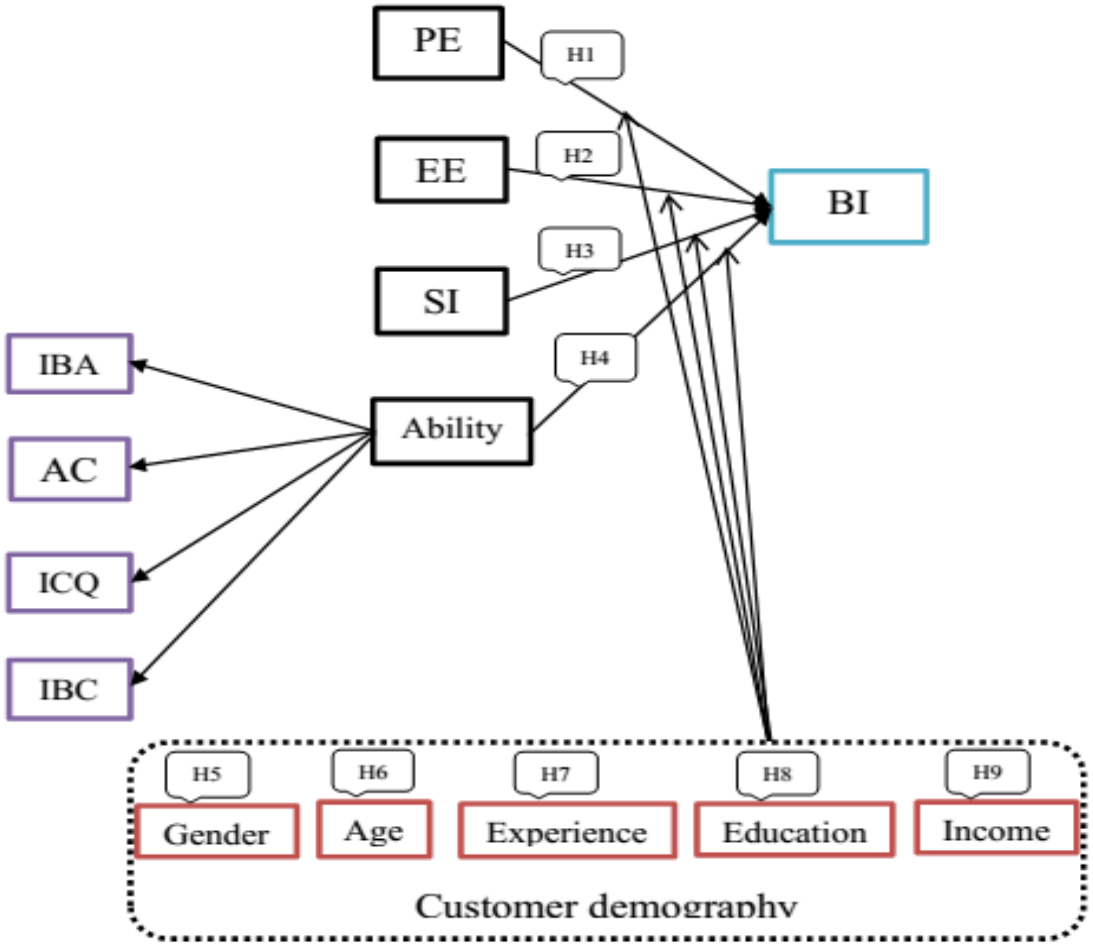

Figure 3.1 proposed research model

3.3 Dependent Variables

Dependent variable in this research is behavioral intention and it will be measured and investigated in a way that usage behavioral will significantly influence behavioral intention (Kripanont, 2007).

3.3.1 Usage Behavior

Normally in Sudanese banks sector, internet banking services usage by customers depends on their own free will. Because of this, it can be said that this study will be conducted in the context of voluntary use (used willingly, not because users are forced) which is similar to most previous study. Since a customer's stated preference to perform the transaction (such as behavioral intention) will in fact be closely related to the way they do behave, this assumption only applies when the behavior is under a person's volitional control (free will) (Ajzen & Fishbein 1980). Therefore, it is logically claimed that customer's intention to use the internet banking services will be closely related to their usage behavior if the use of the technology depends on their own free will. In addition, much previous research found that behavioral intention and usage behavior have a significant relationship (Chen, Gillenson & Sherrel 2002; Davis 1989; davis, Bagozzi & Warshaw 1992; Dishaw & Strong 1999; Mathieson, Peacock & Chin 2001; Moon & Kim 2001; Szajna 1996; Taylor & Todd 1995b; Venkatesh & Davis 2000; Venkatesh et al. 2003).

Thus, it can be said that having experience in using the internet banking services (IBS) will be closely related to customers' intention to use the IBS in the future. Therefore, this research expects that usage behavior will have a significant influence on behavioral intention to use the IBS in the future (Kripanont, 2007).

3.3.2 Behavioral Intention

The TAM asserts that intention is a proper proxy to examine and predict a user's behavior toward a particular technology or system. Results from much studies have

shown consistent results showing a significant correlation between behavioral intention and usage behavior. Moreover, the path from behavioral intention to user behavior is significant in the TAM, TPB, and DTPB models. User behavior is largely influenced by behavioral intention (BI), so BI plays an important role in predicting usage behavior. But it is important to note that BI is more predictive of usage behavior when customers have prior experience with the technology (Taylor & Todd 1995b).

Because this research is a cross-section study, and customers already have IBS experience customers' behavioral intention was actually influenced by actual usage. Significantly, behavioral intention will play an important role in predicting usage behavior of customers in the future. In addition, this study tends to investigate behavioral intention at the same time in the survey. It is rather not so similar to other previous studies in that other research either investigated usage behavior or behavioral intention but not both especially on a cross-sectional study. The aim of this research was to investigate behavioral intention because the investigation of behavioral intention may help in predicting future usage. Consequently, it is expected that usage behavior will significantly influence behavioral intention to use the IBS in the future (Kripanont, 2007).

3.4 Factors Influencing IBS Acceptance in Sudanese Banks

There are many factors influencing internet banking services acceptance in Sudanese banks, some of them:

3.4.1 Performance Expectancy

Performance expectancy (PE) is defined as "the degree to which an individual believes that using the system will help him/her to attain gains in job performance (Venkatesh et al. 2003) (Alshehri, Drew, Alhussain, & Alghamdi, 2012) (Ghalanddari, 2012). In the UTAUT, performance expectancy is a significant

determinant having an influence in behavioral intention to usage (Venkatesh et al. 2003). Several researchers have provide evidence of the significant influence of PE on behavioral intention to usage (AbuShanab & Pearson, 2007) (C. & E., 2011) (Ghalanddari, 2012) (Yu, 2012) (Ghalanddari, 2012) (Saibaba & Naryana, 2013) (Martins, Oliveira, & Popovic, 2014). PE is found to have a relationship with behavioral intention to usage. Similarly, in the internet banking services context, if users think that system is useful then they are more likely to accept it. Therefore, in accordance with the UTAUT, it is hypothesized that PE would have a significant positive influence on customers' intention to usage IBS in the Sudanese banks. Consequently, the first hypothesis developed for this study is as follows:

H1: PE a will have significant positive effect on the customers' behavioral intention to the acceptance of IBS in Sudanese banks.

3.4.2 Effort Expectancy

Effort expectancy (EE) is defined as "the degree of ease associated with use of the system" (Alshehri, Drew, Alhussain, & Alghamdi, 2012). The UTAUT posits that EE is an important factor affects behavioral intention to usage IBS (Alshehri, Drew, Alhussain, & Alghamdi, 2012) (Ghalanddari, 2012) (C. & E., 2011) (Martins, Oliveira, & Popovic, 2014). Found that EE has positive effect on behavioral intention to usage IBS. Other studies have found that EE has significant effect on the behavioral intention to usage IBS (AbuShanab & Pearson, 2007) (Ghalanddari, 2012) (Martins, Oliveira, & Popovic, 2014). Therefore, consistent with UTAUT, it is hypothesized that EE has an influence on behavioral intention to usage IBS. So, this hypothesis is summarized as follows:

H2: EE a will have significant positive effect on the customers' behavioral intention to the acceptance of IBS in Sudanese banks.

3.4.3 Social Influence

Social influence (SI) is defined as "the degree to which an individual perceives that important others believe he/she should use the new system" (Alshehri, Drew, Alhussain, & Alghamdi, 2012). The UTAUT posits that SI is an important factor that affects behavioral intention to usage IS, and found that SI has a positive effect on behavioral intention to usage IS (Venkatesh et al., 2003). In addition to that, other studies found that SI has a positive effect on behavioral intention to usage IS (Ghalanddari, 2012) (Yu, 2012) (Saibaba & Naryana, 2013) (Martins, Oliveira, & Popovic, 2014). Therefore, consistent with UTAUT, this study hypothesized that SI has an influence on behavioral intention to usage IBS. So, this hypothesis is summarized as follows:

H3: SI a will have significant positive effect on the customers' behavioral intention to the acceptance of IBS in Sudanese banks.

3.4.4 Ability

Ability is described as a group of skills, competences, and characteristics that enable a part to have influence within some specific domain (Mayer et al. 1995) (Okonkwo, 2012). They also state that the domain of the ability is specific because the trustee may be highly competent is some technical area. "Bhattacherjee (2002) refers to ability as the perception of the consumer about the competency and salient knowledge of the mobile banking service provider to deliver the expected service (Okonkwo, 2012). Folake (2014) studied the impact of trust antecedents in acceptance of internet banking in Nigeria, and the results of the study revealed that benevolence, ability, integrity and good reputation have a significant impact on trust in acceptance of internet banking (Folake, 2014). In this study ability is describe as group of internet banking cost, internet banking awareness, internet connection

quality, and accessibility that enables the customers to use internet banking service. These dimensions are summarized as follows:

3.4.4.1 Internet Banking Awareness

Rogers and Shoemaker (1971) defined the awareness as "customers go through a process of knowledge, persuasion, decision and confirmation before they are ready to adopt a product or service" (Saibaba & Naryana, 2013). Metwally (2013) stated that illiteracy among people could be accountable for absence of people's awareness of new innovations like e-commerce in general, and internet banking in specific (Metwally, 2013). Pikkarainen (2004), has reported that the amount of information a customer has about internet banking and its benefit may has a critical impact on the adoption of internet banking (Al-Somali, Gholami, & Clegg, 2009). Moreover, Sathye (1999) note that low awareness of internet is a critical factor in causing customers not to adopt internet banking (Al-Somali, Gholami, & Clegg, 2009). In addition Al-Somali, Gholami, & Clegg (2009); Musiime & Ramadhan (2011); Juwaheer, Pudaruth, & Ramdin (2012); and Sharma & Govinduri (2014) found that lack of awareness of internet banking services and its benefits are found to be reasons for customers' reluctance to use internet banking services.

3.4.4.2 Accessibility

According to Kling and Elliott (1994), accessibility is defined as the ease with which individual can locate specific computer system (such as an internet banking services). User perceptions of accessibility have been found to be related to technology and information use in both organizational communications and information systems research (Chandio, 2011). 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 (Chandio, 2011).

In addition, there is empirical evidence that supports a causal relationship between accessibility and customers' use of IBS. In an empirical studies, Musiime & Ramadhan (2011), C & E (2011), Singh P. (2013) examined the effect of accessibility on the behavioral intention to use E-commerce and customer adoption of internet banking. Their research findings indicated that accessibility has a positive influence on the adoption of internet banking. Therefore, it can be assumed that the more accessible IBS is, so less effort will be needed to use it. In accordance with the results of the studies by Musiime & Ramadhan (2011), C & E (2011).

3.4.4.3 Internet Connection Quality

The internet connection quality (ICQ) is defined in terms of speed and continuity, can influence user's perception of the behavioral intention to use IBS. A low-quality connection can make completion of banking tasks difficult and lead to uncertainty regarding the status of transaction. This can adversely impact the degree of behavioral intention to use IBS and affect the adoption of internet banking. On the other hand, a better internet service can enhance the user's perception of behavioral intention and make the user more inclined to use internet banking (Sharma & Govindaluri, 2014). Pikkarainen et al., (2004) identifies the importance of a decent internet connection and its quality in adopting internet banking and he conclude that without a proper internet connection, the use of internet banking is not possibles (Al-Somali, Gholami, & Clegg, 2009). Al-Somali et al. (2009) confirmed that a significant relationship between internet speed and use of online banking services exists (Maditions, Chatzoudes, & Sarigiannidis, 2013).

3.4.4.4 Internet Banking Cost

This is one of the major factors that influence customers' adoption of innovation. Burnham et al. (2003) identified procedural, financial and relational costs considered by consumers when switching between various types of services offerings and such costs were cited by participants (Lichtenstein & Williamson, 2006). C. & E., (2011) stated that the cost of transactions in an E-commerce system to both the customer and the merchant should be low, especially if micro payments are supported. The transaction cost should be very inexpensive and should depend on the number of transactions being made (C. & E., 2011). Muritala & S, (2012) studied Perceived attributes of Factors influencing consumers' engagement with electronic banking, their study revealed that there was not much significant difference in cost influencing the adoption/rejection of internet banking (Muritala & S, 2012). Abbad et al., (2012) in their study revealed that the study reinforced the literature in finding variable such as risk, cost, ease of use, and usefulness to be understood as important factors in the use of e-banking systems (Abbad, Abed, & Abbad, 2012). According to Suganthi et al. (2001), cost includes initial set up cost of computer and internet connection. Due to the cost of setting up infrastructure to the e-banking service, customers are reluctant to use these services. But, as these are just the startup cost, customers do not mind incurring them (Singh & Kaur, 2013). According to Singh p., (2013) this factor emerged out with maximum factor load of 3.255. It was comprised of five items related barriers in usage of internet banking in semi-urban areas (Singh P. , 2013). Aliyu et al., (2012a) stated that for customers to use new technology, the technologies must be reasonably priced relative to alternatives. Otherwise, the acceptance of the new technology may not be viable from the standpoint of the customer (Aliyu, Rosmain, & Takala, 2014). In this factor shows that customer having the fear towards cost related and due to this they were not using the internet banking services in semi-urban areas.

So, the ability is hypothesized that:

H4: Ability a will have significant positive effect on the customers' behavioral intention to the acceptance of IBS in Sudanese banks.

3.5 Demographic Characteristics

Many studies have investigated the effects of the customers' demographics such as gender, age, and experience on their attitude towards different banking technologies and individual acceptance of new technology (Al-Somali, Gholami, & Clegg, 2009). The international telecommunication union (ITU, 2005) noted that e-commerce adoption is more positive for younger people, especially males, with higher income living in mostly urban areas observing that the educated tech-savvy population in countries such as India, Argentina, Malaysia, and China has adopted e-commerce technologies faster than the population in countries such as Bolivia, Nigeria, Bangladesh, and Sudan where skilled technology professionals are few with little or no training and support. Here again income and education are described as strong control variables affecting the adoption of e-commerce in developing countries like Sudan (C. & E., 2011). Based on the reviews above, two additional control variables: education and income were added to our proposed conceptual model.

3.5.1 Gender

Concerning gender, previous studies have found a stronger proportion of perceived usefulness of mobile services among men than among women (Nysveen et al., 2005). The reason is men appear more task-oriented than women and e-banking services are typically motivated by goal achievement (Cruz et al., 2010). Additionally, many empirical studies have revealed the statistical difference between female and male respondents in the banking siting. For example, women perceive more risk in an online purchase than men do (Garbarino & Strahilevitz 2004), peer opinions have a higher effect on females in mobile services (Nysveen et al., 2010),

and men are more likely to use mobile banking than women are (Laukkanen & Pasanen 2008; Koenig-Lewis 2010), and men are more concerned on the cost of internet access and service fees than women are when using mobile banking services (Cruz et al., 2010).

By using gender as a moderating variable in an extended TAM, Riquelme and Rios (2010) sampled 681 respondents in Singapore and found that the influence of social norm on intention to adopt and perceived ease of use on the perception of perceived usefulness were stronger among women than among men. In contrast Puschel et al., (2010) collected 666 respondents in Brazil and discovered that mobile banking users were predominantly males. Likewise, through gathering 553 respondents in India, Joshua and Koshy (2010) observed that men might use electronic banking services more than women would (Yu, 2012). Therefore, based on the current research model, it is hypothesized:

H5: Gender will moderate the relationships among the proposed model constructs.

3.5.2 Age

Gan et al. (2006) study reported that senior consumers, being more risk aversive, prefer a personal banking relationship. Wan et al. (2005), found that Internet banking adoption was highest among middle adulthood and lower for younger and older customers. Dennis et al. (forthcoming) argue that younger consumers seek more information than older ones; however, the latter show more product satisfaction and loyalty. In organizational context during sustained usage, older workers are driven by attitude beliefs and perceived behavioral control toward using technology, while younger workers are only influenced by attitude beliefs toward technology usage. Venkatesh et al. (2003) reported that age was a moderator for the relationships within the UTAUT model. The path PE-behavioral intention was stronger for younger workers; social influence-behavioral intention was valid for older worker under

mandatory use conditions; and facilitating conditions-usage effect was stronger for older workers with increased experience. More recently, Floh and Treiblmaire (2006) reported that younger people rated the importance of website quality and service quality significantly higher than did elderly people (Al-Qeisi, 2009). Therefore, based on the current study model, it is hypothesized:

H6: Age will moderate the relationships among the proposed model constructs.

3.5.3 Experience

Increased direct-used experience has been found to influence customer's beliefs in information systems such as internet banking services (King & Xia, 1997; Rivard & Huff, 1988; Venkatesh & davis, 2000; Venkatesh et al., 2003) and enhance the customer's confidence in their ability to understand and use the information systems in performing their tasks (DeLone 1988; Kraemer, Danziger, Dunkle & King, 1993; Venkatesh et al., 2003). As customers' direct-use experience with information systems increases over time, their perceptions and adoption intentions change substantially (Venkatesh & Davis, 2000; Xia & Lee 2000). Venkatesh et al. (2003) defined experience in their empirical study as 'experience with the technology'. They gathered their results at different stages of the training program run in conjunction with their study and found in their research that experience had a moderating influence on the relationship between: effort expectancy, social influence, and facilitating conditions and system use (Seymour, Makanya, & Berrange, 2007). Hence, it is hypothesized that:

H7: Experience will moderate the relationships among the proposed model constructs.

3.5.4 Education

Computer knowledge is also related to educational level. Innovators are usually younger, educated, and wealthy or with access to plentiful resources (Rogers, 2003).

Previous research also reported a positive impact of higher levels of education in respect to computer training environments, computer ease (versus anxiety) and positive attitudes (Zmud, 1979; Howard, 1988; Davis & Davis, 1990; and Igbaria & Parasuraman, 1989 cited in Sun & Zhang, 2006). Agarwal & Prasad (1999) report that levels of education are positively associated with PEOU beliefs but not with PU; hence, lower levels of education are expected to be more sensitive to effort expectancy owned to technology here present a barrier. Additionally, increased educational levels lead to increased e-banking adoption (Al-Ashban & Burry, 2001; Stavins, 2001 cited in Gan et al., 2005). Furthermore, increased education and experience empower users and decrease the effect of social influence on their behavior (Burton-Jones & Hubona, 2006). Contrary to Agarwal & Prasad (1999), the authors argue that education leads to positive association with PU and greater education should increase PEOU by reducing anxiety and improving attitude (Al-Qeisi, 2009). Hence, it is hypothesized that:

H8: Education will moderate the relationships among the proposed model constructs.

3.5.5 Income per month

The results from the previous studies related to Internet banking showed that income is a significant determinant of choices between various channels. The higher income individuals might have the need to access their online banking much more than middle income individuals, however, they prefer to use the branch for complex transactions (Gan et al. 2005). Wan et al (2005) found that adoption of Internet banking was associated with moderate income household while low income households rely on branch banking an high income household tend to use all channels available to them. Lassar et al. (2005) also reported that income positively affects e-banking adoption. Dennis et al. (forthcoming), state that income and

education are correlated in the sense that higher education is associated with higher income levels (Al-Qeisi, 2009). Thus, it is hypothesized that:

H9: Income per month will moderate the relationships among the proposed model constructs.

Chapter Four

Research Methodology

4.1 Introduction

This chapter aims to explain appropriate methodology for achieving the research objectives. The overall purpose of this research was to examine as well as extend the body of knowledge and understanding regarding customers' acceptance of internet banking services. Based on the published literature review, a conceptual model and hypotheses concerning the customers' acceptance of an internet banking services (IBS) was developed. In order to examine the key determinants of an IBS acceptance, customers 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 analysis methods that were used in this research.

This research employed a quantitative data collection method using the survey approach to collect data concerning the usage of internet banking services by intended customers. The survey questionnaire was designed 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 present chapter, was adapted as necessary from the previous published literature to fit within the context of this research. 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 hypothesized manner, and demographic variables as a moderated variables.

Details of the methodology used in this study are described in the following sections: Section 4.2 describes the design of this Study. Section 4.3 focuses on population of the study. Section 4.4 explains the sampling strategy used in this study. Section 4.5 gives and 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 pre-test. Section 4.8 describes the data analysis procedures and techniques. Section 4.9 describes the factor analysis of this study, and finally, section 4.10 concludes this chapter.

4.2 Research Design

A research design is a framework or plan for a study that is used as a guide to collect and analyze information. Generally, there are three major types of research designs namely, explorative research, descriptive research and causal research (Churchill and Iacobucci, 2005).

An exploratory research design focuses on the discovery of ideas and insights. Exploratory research can be used to formulate problems more precisely, develop hypotheses, clarify concepts, and etc. (Churchill and Iacobucci, 2005). In addition, Dillon, Madden and Firtle (1993) point out that exploratory research should form the basis of causal and descriptive research designs to be used.

A descriptive research design is typically concerned with determining the frequency with which something occurs or the relationship between variables (Dillon et al., 1993). A descriptive study is typically guided by an initial hypothesis.

Causal research designs, on the other hand, are concerned with determining cause-and effect relationships, and these are studied via experiments. Causal research is most appropriate when the research objectives include the need to understand which decision variable (e.g. advertising) are the cause of the dependent phenomenon (e.g. sales) defined in the research problem (Shui, Hair, Bush and Ortinau, 2009).

To answer the research question "what are the factors influencing the customers' acceptance of the internet banking services in Sudan by using Unified Theory of Acceptance and Use of Technology (UTAUT)" a descriptive research design will be the most appropriate research design for the following reasons. Firstly, the research problem is well-defined and hypotheses have been developed; hence, an exploratory research design is not appropriate. Secondly, the hypotheses are formulated to assess the relationships between dependent and independent variables and not causation. Therefore, a casual research design is also not appropriate. Another reason why a descriptive research design is appropriate is that the research question requires the assessment of relationships between variables, which is the use of a descriptive research design according to Dillon et al. (1993).

The appropriate research design for the study can be further identified based on the following criteria (Cooper and Schindler, 2006):

- The study is a communication study and not a monitoring study. In a monitoring study, the researcher inspects the activities of a subject or the nature of some material without attempting to elicit responses from anyone. In a communication study, the researcher questions the subjects and collects their responses by means of internet or telephone conversations, self-administered or self-reported instruments, instruments presented before and/or after a treatment or stimulus condition in an experiment. In this study, respondents' beliefs related to internet banking services will be collected by means of a questionnaire. Therefore, the design can be classified as a communication study.
- As the study is not an experiment one, the research design can also be classified as ex post facto. In an ex post facto study, the criterion variable Y (in this study intention to adopt internet banking services) is observed. The researcher then attempts to find one or more causal variables, X's (in this study beliefs regarding internet banking services) that offer plausible explanations as to why Y occurs.

In contrast to an experiment, this kind of retrospective analysis (the ex post factor search design) allows little control of the X's and therefore contains more potential for error (Churchill and Iacobucci, 2005).

- The study is a cross-sectional study as it is carried out only at a specific point in time. Considering the research question it is not necessary to repeat the study over an extended period of time (as in the case of a longitudinal study).
- The topical scope of the study is statistical as hypotheses will be tested by means of structural equations modelling.
- The research environment required to collect the information to assess the hypotheses and address the research question is the actual environment of the respondent. Hence, the research environment can be classified as field conditions.

To summarize, the research design followed in this study can be best described as a descriptive research design, where information is collected by means of a self-administered questionnaire in field conditions at a specific point in time and the topical scope of the study is statistical. (Nel, 2013)

4.3 Population

To investigate the research questions in this research, relevant information must be collected that can be analyzed to address the research questions. In the process of collecting the data to address the research questions, the first important step is to define the population for the research. The population of the research can be defined as the "identifiable set of elements of interest to the researcher" (Shui et al., 2009). 'Elements' are usually a person, an organization or an object from which information is sought. In this research the population of interest is bank customers with access to the Internet. For practical considerations it was not possible to do a census of the defined population. A census is the collection of primary data

from every member of the defined population. Therefore, the sample must be drawn from the population. According to Shui et al. (2009) the purpose of sampling is to select a relatively small number of elements from a larger defined group of elements and expecting that the information collected from the small group will enable accurate judgments about the larger group (Shui et al., 2009). Shui et al. (2009) further advise that if a research involves sampling, the target population must be defined, rather than the population. The target population is the defined set of elements identified for investigation based on the evaluation of the research objectives, feasibility and cost-effectiveness (Nel, 2013). Considering these three criteria, the target population consists for this research are defined as bank customers 18 years of age and older who are using internet banking services provided from Sudanese banks (Faisal Islamic bank, Omdurman National Bank, AL Baraka Bank, Bank of Khartoum, and Al Nile bank).

4.4 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 research 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) (Chandio, 2011). 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, 375 questionnaires were distributed to the participants in order to get the required sample size.

4.5 Data Collection Procedure

The process of data collection involves collecting opinions and useful information from target participant about the research questions (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 research was gathered using a combination of these methods (i.e., self-administered, e-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 (Chandio, 2011).

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 Khartoum state. 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 and/or acceptance of internet banking services.

The questionnaires were distributed to Khartoum state. According to Sekaran, Uma (2003), if population size 15,000 with error margin 5%, the sample size is 375 (Sekaran, 2003). So, 375 questionnaires were distributed to five banks present internet banking services. The response rate varied from one to another (see Table 4.1).

Table 4.1. Questionnaire Distribution and Response Rate

Name of bank	Population	Questionnaire distributed	Questionnaire returned	Response rate in %
Faisal Islamic Bank	8,800	$\frac{8800}{12400} \times 375 = 266$	200	75%
Omdurman National Bank	950	$\frac{950}{12400} \times 375 = 29$	20	69%
Al Nile Bank	1,100	$\frac{1100}{12400} \times 375 = 33$	30	91%
Bank of Khartoum	900	$\frac{900}{12400} \times 375 = 27$	20	74%
Al Baraka Bank	650	$\frac{650}{12400} \times 375 = 20$	19	95%
Total	**12,400**	**375**	**289**	**77%**

In total, 289 questionnaires were returned out of 375 distributed, which represented a response rate of 77% of the original sample. However, among those returned questionnaires, 82 responses were discarded because 55 of them were returned completely blank, seven respondents had put the same answers on all the Likert scale

items, nine respondents mentioned that they had never used internet before (i.e. not satisfying the inclusion criteria) and 11 questionnaires were partially answered (i.e. some questions and/or some parts such as demographic questions were left blank). Therefore, remaining 207 questionnaires were used for further data analysis. Consequently, the final usable response rate in this study was 55.2%.

4.6 Survey Questionnaire

Survey questionnaire is efficient and economical tool to collect the required data. In this research, the survey questionnaire was accompanied with a covering letter, which explained the purpose of the research and ensured confidentiality of the data gathered. The participants were informed that the study was being conducted to explore their perception of and/or acceptance of internet banking services, and that the participation in the survey was voluntary. They were further informed that they have the right to withdraw from the survey 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 demographic data (such as gender, age, education, marital status, occupation, experience, and income) and back ground information about computer and internet usage. In the second part, the items for different constructs mentioned in the research model. In the third part, the actual use of internet banking.

The questionnaire was administered to the users personally as well as it was sent to the potential participants by e-mail, as mentioned earlier. The questionnaire was

accompanied by a covering letter from the researcher stating the goals and significance of research.

The following section provides a details of the development process of the questionnaire used in this study.

4.6.1 Development of Survey Questionnaire

4.6.1.1 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 research, the question items and response categories were designed to motivate the respondents to participate in the research. 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 questionnaire.

According to Sekaran (2000) questionnaire was well-organized 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, the researcher developed a questionnaire in order to collect the data to meet the aims and objectives of the research. The questionnaire development process in this research was divided into a number of steps on the basis of the objectives of the research. Aaker et al. (1998), Zikmund (2003), (Sekaran, 2003) have suggested certain steps that are described below.

1. **Set up clear objectives**: The research 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 internet banking services 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 prefect representation of the concept, according to Churchill (1987).
5. **Experts' comments**: Comments from experts i.e. those people who often use internet banking studies 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.

4.6.1.2 Questionnaire Content Development

The data collection for this research was based on the opinions and beliefs of respondents towards the research topic (i.e. customers' acceptance of internet banking services). 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 (Cooperand Schindler, 2001; Frazerand 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.

4.6.1.3 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, there viewed 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 internet banking services in developing economy context, such as Sudan. This helped to ensure that respondent's biases and measurement errors were minimized and adequate responses were provided.

4.6.2 Response Formatting

The questions of the research are related to the individuals' perceptions of and/or acceptance of IBS. Therefore, the researcher incorporated some closed ended and scaled-response formats, depending on the nature of the questions, to encourage participation in the research 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 research however mostly used the closed-ended or structured questions in the 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) (Chandio, 2011).

In addition, scaled-response questions were used because the 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 five categories was used for questions. 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) (Chandio, 2011). 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.

4.6.3 Scale Development

The selection and construction of a scale requires the consideration of several factors that influence the reliability, validity, and practicality of the scale. These factors are, according to Cooper and Schindler (2006):

- Research objectives: The primary objective of the study is ''To develop a model of the determinants of internet banking services acceptance based on unified theory of acceptance and use of technology as a foundation'' Considering this objective, the selection of scales used in this research were based on two criteria. Firstly, to identify respondents as users of internet banking services. Therefore, scaling must measure the characteristic of the respondents with regard they use IBS. Secondly, scaling was used to measure respondents' beliefs about the constructs in the conceptual model.
- Response and data types: To ascertain whether respondents were using internet banking a not at all, once a week, 2-3 times, and 4 times & more response must be recorded. According to Cooper and Schindler (2006) a categorization scale is

appropriate as such a scale allows respondents to put themselves in a specific category. The measurement scale must also record the extent to which respondents agreed or disagreed with statements on IBS. Therefore, a rating scale was required. In previous technology acceptance studies such as Gu et al. (2009) and Luarn and Lin (2005) a Likert-type scale was used to measure respondents beliefs about the technology of interest.

- Number of scale points: In this research, a five-point Likert scale was used to measure respondents' beliefs about internet banking services acceptance. An example of the scale is shown in Figure 4.2. The primary scale point descriptors range for Strongly agree to Strongly disagree, whilst the secondary scale point descriptors are whole integer numbers ranging from 1 for Strongly agree to 5 for Strongly disagree. The Likert scale is a balanced scale, i.e. an equal number of categories above and below the midpoint.

Table 4.2 Example of Likert scale

Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
	1	2	3	4	5

4.6.4 Measurement of Variables

The theoretical constructs were measured 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 research. The Measurement of Questionnaire items for each construct is described as follows.

4.6.4.1 Measurement of Behavioral Intention (BI)

The Measurement of BI, measured on a five point scale with 1 = strongly agree and 5 = strongly disagree, was based on three items adapted from Davis (1989), Davis et al.(1989), Davis (1993),Venkatesh and Davis (2000), and Moon and Kim (2001), El-Kasheir, Ashour, & Yacout (2009), Al-Somali, Gholami, & Clegg (2009). As follows.

BI1: I expect my use of IBS will continue in the future.
BI2: I intend to continue using IBS in the future.
BI3: I will strongly recommend others to use IBS.

4.6.4.2 Measurement of Performance Expectancy (PE)

The Measurement of PE on a five point scale (with strongly agree = 1 and strongly disagree = 5) was based on four items, which were adapted from Davis (1989), Davis et al. (1989), Venkatesh et al. (2003), Abu-Shanab & Pearson (2007), Abu-Shanab & Pearson (2009) . The items were as follows:
PE1: I expect internet banking services (IBS) will be useful in my life.
PE2: Using IBS will enable me to accomplish transaction more quickly.
PE3: Using IBS will increase my productivity.
PE4: If I use IBS I will increase the quality of my banking services output at minimal efforts.

4.6.4.3 Measurement of Effort Expectancy (EE)

The Measurement of EE on a five point scale (with strongly agree = 1 and strongly disagree = 5) was based on four items, which were adapted from Davis (1989), Davis et al. (1989), Venkatesh et al. (2003), Abu-Shanab & Pearson (2007), Yeow, Yuen, Tong, & Lim (2008), Abu-Shanab & Pearson (2009). The items were as follows:
EE1: I expect my interaction with IBS will be understandable.

EE2: I expect it would be easy for me to become skillful at using IBS.

EE3: Learning to use IBS will be easy for me.

EE4: I find it easy to get to the IBS system to do what I want.

4.6.4.4 Measurement of Social Influence (SI)

The Measurement of SI on a five point scale (with strongly agree = 1 and strongly disagree = 5) was based on four items, which were adapted from Davis (1989), Davis et al. (1989), Venkatesh et al. (2003), Abu-Shanab & Pearson (2007), Abu-Shanab & Pearson (2009), Foon & Fah (2011), . The items were as follows:

SI1: People who influence my behavior think that I should use IBS.

SI2: People who are important to me think that I should use IBS.

SI3: The bank staffs is helpful in the use of IBS.

SI4: The branch encourages the use of internet channel.

4.6.4.5 Measurement of Internet Banking Awareness (IBA)

The measurement of IBA on a five point scale (with strongly agree = 1 and strongly disagree = 5) was based on four items, which were adapted from Al-Somali, Gholami, & Clegg (2009), Sharma & Govindaluri (2014). The items were as follows:

IBA1: I have sufficient information about (IBS).

IBA2: I have sufficient information regarding the various products offered by IBS.

IBA3: I have sufficient information regarding the use of internet banking.

IBA4: I am well informed about the benefits of using IBS.

4.6.4.6 Measurement of Accessibility (AC)

The Measurement of AC on a five point scale (with strongly agree = 1 and strongly disagree = 5) was based on three items, which were adapted from Chandio (2011). The items were as follows:

AC1: The internet banking services is accessible.

AC2: My access to the internet banking services is unrestricted.

AC3: I find it easy to get access to the internet banking services.

4.6.4.7 Measurement of Internet Connection Quality (ICQ)

The Measurement of ICQ on a five point scale (with strongly agree = 1 and strongly disagree = 5) was based on four items, which were adapted from Al-Somali, Gholami, & Clegg (2009). The items were as follows:

ICQ1: The internet enables to handle my online financial transactions accurately.

ICQ2: Using the internet for handling online financial transactions is efficient.

ICQ3: The internet enables customers to access the bank's website 24\7.

ICQ4: Internet guarantees that all transactions to the bank have been completed.

4.6.4.8 Measurement of Internet Banking Cost (IBC)

The Measurement of IBC on a five point scale (with strongly agree = 1 and strongly disagree = 5) was based on four items, which were adapted from Yu (2012). The items were as follows:

IBC1: The cost of using IB is higher than using other banking channels.

IBC2: The wireless link fees are expensive when using IB.

IBC3: The sources setup to using IB charged me lot of money.

IBC4: Using IB services does cause a burden to me.

4.7 Pre-test

Pre-test is essential part of questionnaire design and according to Sekaran (2003), it 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, pre-test was conducted prior to using the questionnaire in the main research. The purpose of pre-testing was to avoid participants' confusions and misinterpretations as well as to identify and detect any errors and ambiguities.

4.7.1 Pre-test 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, the pre-test was conducted by distributing questionnaires to 30 PhD and master researchers who were studying at different universities in the Sudan. Twenty one questionnaires returns meant a very good response rate of (about 70%). The rationale for using these subjects was that all of them were from Sudan and some of them were technology professionals while others had experience of technology in general and internet banking services in particular. In addition, respondents were asked to suggest potential problems with the questionnaire design in order to obtain feedback for improving the questionnaire. Questionnaire pre-testing was successful in obtaining were some interesting comments from the respondents. For example, four participants suggested that they would not like to answer their job and location in the space provided. 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 job and location.

Other participants' 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.

4.7.2 Demographic Profile of Respondents of Pre-test

This section presents the demographic information of the respondents of pre-test. Table 4.3 presents participants' gender, age, education, marital status, occupation, experience, and average monthly income in Sudanese currency (pound).

Table 4.3 Demographic details of pre-test respondents ((N=21)

Variable	Category	Frequency	%
Gender	Male	18	85.7
	Female	3	14.3
Age	Less than 25 yrs	0	0
	25 – 34 yrs	10	47.6
	35 – 44 yrs	10	47.6
	45 – 54 yrs	1	4.8
	55 yrs and more	0	0
Education	Basic	0	0
	Secondary school	0	0
	Diploma	0	0
	Bachelor	8	38.1
	High diploma	0	0
	Master	9	42.9
	Doctorate	4	19
	Other	0	0

Marital status	Married	14	66.7
	Single	7	33.3
Occupation	Job	--	--
	Location	--	--
Experience	Less than 5 yrs	0	0
	5 yrs and less than 10 yrs	2	9.5
	10 yrs and less than 15 yrs	9	42.9
	15 yrs and less than 20 yrs	6	28.6
	20 yrs and more	3	14.3
Income per month	Less than 1,000 SDG	1	4.8
	1,000 and less than 3,000 SDG	9	42.9
	3,000 and less than 5,000 SDG	8	38.1
	5,000 and less than 10,000 SDG	2	9.5
	10,000 SDG and more	2	9.5

4.7.3 Reliability of the Instrument

In this pre-test, 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 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 4.4 presents the Cronbach's alpha coefficients for all constructs obtained in the pre-test.

Table 4.4 show Cronbach's Alpha coefficients for all constructs in pilot study

N	Construct	Cronbach's Alpha
1	Performance Expectancy (PE)	0.893
2	Effort Expectancy (EE)	0.911
3	Social Influence (SI)	0.964

4	Internet Banking Awareness (IBA)	0.930
5	Accessibility (AC)	0.880
6	Internet Connection Quality (ICQ)	0.906
7	Internet Banking Cost (IBC)	0.958
8	Behavior Intention (BI)	0.909

All of the measures used in the pre-test showed an adequate reliability with Cronbach's Alpha values, which ranged between 0.880 and 0.964 that are considered to be very good and acceptable**.**

4.8 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". The primary purpose of this research was to identify and investigate the factors that affect customers' acceptance of IBS. In order to achieve this objective, this research used two different statistical software tools. Statistical Package for Social Sciences (SPSS) was used for analyzing 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 hypothesized model explained in Chapter Three. Following sub-sections describe and provide justification for using these statistical software and the techniques mentioned above.

4.8.1 Preliminary Data Analysis

Statistical Package for Social Sciences (SPSS), version 22, was used to analyze the quantitative data obtained from the questionnaire. This software package is widely accepted and used by researchers in different disciplines including social sciences, business studies, and banking studies (Zikmund, 2003). Therefore, this tool has been

used to screen the data of this research 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 summarize the demographic profile of the respondents in order to get preliminary information and the feel of the data (Sekaran, 2003). Furthermore, before applying SEM, SPSS was used to conduct exploratory factor analysis (EFA) for the first stage of data analysis to summarize 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) (Chandio, 2011).

4.8.2 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 minimizes 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) (Chandio, 2011). 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) 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 research 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.

4.8.3 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). 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) (Chandio, 2011). 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 ±1 for the skewness and up to ±3 for the kurtosis. Thereafter, the researcher used factor analyses and structural equation modelling for inferential statistical analyses.

4.9 Factor Analysis

Factor analysis techniques are used to address the problem of analyzing, 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. Factor analysis takes a large set of variables and summarizes or reduces them using a smaller set of variables or components (factors) (Hair et al., 2006). The main purposes of the factor analysis 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). 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 factor analysis: summarization and data reduction (Hair et al., 995). 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) (Chandio, 2011).

This research 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 hypothesized construct (Zikmund, 2003; Hair et al., 2006). The Next section explains exploratory factor analysis performed by using SPSS version 22.

4.9.1 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". The EFA has been widely used to select items from a large group then 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) (Chandio, 2011).

This research employed the principal components analysis (PCA) and orthogonal model with varimax rotation to perform factor analysis using SPSS (version 22). The reason for using the orthogonal rotation was that the results generated from it have a higher generalizability 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.

4.10 Structure Equation Modeling

IBM SPSS Amos implements the general approach to data analysis known as Structural Equation Modeling (SEM), also known as analysis of covariance structures, or causal modeling. This approach includes, as special cases, many well-known conventional techniques, including the general linear model and common factor analysis.

SEM is sometimes thought of as difficult to learn and use. This is incorrect. Indeed, the growing importance of SEM in data analysis is largely due to its ease of use. SEM opens the door for non-statisticians to solve estimation and hypothesis testing problems that once would have required the services of a specialist. (Al-Qeisi, 2009) Amos was originally designed as a tool for teaching this powerful and fundamentally simple method. For this reason, every effort was made to see that it is easy to use. Amos integrate an easy to use graphical interface with an advanced computing

engine for SEM. The publication-quality path diagrams of Amos provide a clear representation of models for students and fellow researchers. The numeric methods implemented in Amos are among the most effective and reliable available (Arbuckle, 2010).

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 study involving multiple independent-dependent relationships that were hypothesized in the proposed research model, which was described in Chapter 3.

SEM software package called Analysis of Moment Structures (AMOS), version 20, was used in this research to explore statistical relationships between the test items of each factor and among the factors of independent variables (i.e. PE, EE, SI, and Ability) and the dependent variable (i.e., Behavioral 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.

4.10.1 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 prior 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) (Chandio, 2011). Therefore, the research used the measurement model in this for assessing the unidimensionality, validity, and reliability of the measures, which are explained as follows.

4.10.1.1 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 (x^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) (Chandio, 2011). 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 4.5.

Table 4.5 goodness of fit statistics in SEM

Index	Abbreviation	Type of fit measure	Recommended criteria	References
Chi-square	x^2	Model fit	x^2, df, p > 0.05	Joreskog and Sorbom (1988); Hair et al. (1998); Bryne (2001); Hair et al. (2006)
Normal chi-square	x^2/df	Absolute fit and parsimony of model	1.0 <x^2/df < 5.0	
Goodness of fit index	GFI	Absolute fit	> 0.90	
Root mean square error of approximation	RMSEA		< 0.05 good fit < 0.08 acceptable fit	
Normal fit index	NFI	Incremental fit	> 0.90	
Comparative fit index	CFI		> 0.90	
Adjusted goodness of fit index	AGFI	Parsimonious fit	> 0.90	

4.10.1.2 Model Estimates

In addition to the goodness of fit criteria, other standardized estimates are also used to evaluate the measurement model. For example, standardized regression weight (factor loadings), and critical ratio (CR) estimates criteria. This research used the cut-off point suggested 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) (Chandio, 2011). Table 4.6 summarize these criteria.

Table 4.6 Measurement Model Estimates

Estimates	Recommended values	References
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 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 research 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 research used the five 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 minimizes the difference between covariance and observed matrices; as a result, it improves the parameter estimates (Hair et al., 2006). Therefore, in this research, 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) (Chandio, 2011).

4.10.2 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, three items were used to measure behavioral intentions, four items for measuring PE, EE, and SI, as explained earlier. In the present research, 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 (Nunally, 1978). Cronbach's alpha reliability coefficient was 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, 2003). Nunnaly (1978) suggested that Cronbach's alpha reliability coefficient equal to 0.7 or greater show adequate reliability. While, Hair et al. (2006) suggested the Cronbach's alpha reliability coefficient of 0.7 or higher indicate adequate internal consistency. Therefore, a minimum cut off value of 0.7 for Cronbach's alpha reliability coefficient was employed in the present research.

4.10.3 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". 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) (Chandio, 2011). 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.

4.10.3.1 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) (Chandio, 2011). In addition, Hair et al. (2006) suggested that ideal standardized 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 research, the minimum cut off criteria for loadings > 0.7, AVE > 0.5, and reliability > 0.7 were used for assessing the convergent validity.

4.10.3.2 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.

4.10.3.3 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 eight construct model proposed in this research (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) (Chandio, 2011). The construct correlations (estimates) were used to assess the nomological validity of the model.

4.10.4 Structure 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 hypothesized relationships between the latent constructs in the proposed model (Kline, 2005; Hair et al., 2006). The structural model (hypothesized 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) (Chandio, 2011). Data analysis are presented in chapter five.

Chapter Five

Data Analysis

This chapter presents the data analysis, which is divided into thirteen sections. The first section is about response rate. The second section presents demographic characteristic characteristics of participants. The third section gives descriptive statistics of constructs items. The fourth section data normality for individual items. The fifth section reports results of exploratory factor analysis. The sixth section creation of latent factors. The seventh section person's correlation between latent factors. The eighth section normality of data for latent factors. The ninth section homogeneity of variance in the data. The tenth section reports presents findings of structural equation modeling analysis. The eleventh section assessment of reliability and validity of constructs. The twelfth section reports presents findings of structural model evaluation and hypotheses testing. Finally, reports presents findings of modifying structural model by removing non-significant paths in the section thirteenth.

5.1 Response Rate

In this research, 289 out of 375 distributed questionnaires were returned, which represented a response rate of 77% of the original sample. However, among those returned questionnaires, 82 responses were discarded because 55 of them were returned completely blank, seven respondents had put the same answers on all the Likert scale items. Nine respondents mentioned that they had never used internet before (i.e. not satisfying inclusion criteria) and 11 questionnaires were partially answered (i.e. some questions and/or some parts such as demographic questions were left blank). Therefore, remaining 207 questionnaires were used for further data analysis. Consequently, the final response rate in this study was 55.2%.

5.2 Demographic Characteristics of Participants

This section presents the demographic characteristics of the participants of the survey questionnaire. Data analysis of participants' gender, age, education, marital status, occupation, experience, and average monthly income (given in Sudanese currency i.e. pounds (SDG)).

Table 5.1: the frequencies and percentages of the demographic variables

variable	Category	frequency	Percentage %
gender	Male	158	76.3
	Female	47	22.7
	Missing	2	1
	Total	**207**	**100**
Age	Less than 25 years	25	12.1
	25 – 34 years	110	53.1
	35 – 44 years	53	25.6
	45 – 54 years	12	5.8
	55 year and more	5	2.4
	Missing	2	1
	Total	**207**	**100**
Education	Basic	3	1.4
	Secondary School	12	5.8
	Diploma	15	7.2
	Bachelor	111	53.6
	High Diploma	8	3.9
	Master	50	24.2
	Doctorate	7	3.4
	Missing	1	.5
	Total	**207**	**100**
Marital Status	Married	107	51.7
	Single	96	46.4
	Missing	4	1.9
	Total	**207**	**100**

Occupation	Student	12	5.8
	Public Sector	50	24.2
	Private Sector	112	54.1
	Business	24	11.6
	Other: (specify) …….....	5	2.4
	Missing	4	1.9
	Total	**207**	**100**
Experience	Less than 5 years	64	30.9
	5 years and less than 10 years	65	31.4
	10 years and less than 15 years	46	22.2
	15 years and less than 20 years	11	5.3
	20 years and more	13	6.3
	Missing	8	3.9
	Total	**207**	**100**
Income per month	Less than 1,000 SDG	22	10.6
	1,000 SDG and less than 3,000 SDG	101	48.8
	3,000 SDG and less than 5,000 SDG	36	17.4
	5,000 SDG and less than 10,000 SDG	27	13
	10,000 SDG and more	11	5.3
	Missing	10	4.8
	Total	**207**	**100**

Table 5.2: the frequencies and percentages of information of computer and internet

variable	Category	frequency	Percentage %
How do you describe your general computer knowledge?	Very poor	4	1.9
	Poor	5	2.4
	Moderate	40	19.3
	Good	71	34.3
	Very good	84	40.6
	Missing	3	1.4
How would you describe your internet knowledge?	Very poor	4	1.9
	Poor	5	2.4
	Moderate	32	15.5
	Good	73	35.3

	Very good	89	43
	Missing	4	1.9
How long have you been using the internet?	Less than one year	16	7.7
	1 – 2 years	20	9.7
	3 – 5 years	40	19.3
	More than 5 years	127	61.4
	Missing	4	1.9
How often do you use the internet per day?	Don't use	23	11.1
	1 -`2 hours	72	34.8
	3 - 4 hours	42	20.3
	More than 4 hours	63	30.4
	Missing	7	3.4
	Total	**207**	**100**

Table 5.3: the actual use of internet banking

Variable	Category	Frequency	Percentage %
I have a bank account for	Less than 5 years	96	46.4
	5 – 10 years	65	31.4
	11 -15 years	24	11.6
	16 – 20 years	12	5.8
	More than 20 years	8	3.9
	Missing	2	1
How long have you been using the internet banking?	Less than 6 months	64	30.9
	6 – 12 months	60	29
	13 – 18 months	24	11.6
	19 – 24 months	16	7.7
	More than 24 months	36	17.4
	Missing	7	3.4
Location internet usage	At home	60	29
	At work	79	38.2
	In a bank	40	19.3
	At school or university	8	3.9
	In a friend's place	7	3.4

	In a library	2	1
	Other place	5	2.4
	Missing	6	2.9
Weekly, how many times do you use internet banking?	Not at all	32	15.5
	Once a week	67	32.4
	2 – 3 times	28	13.5
	4 times and more	73	35.3
	Missing	7	3.4
	Total	**207**	**100**

Table 5.4: I use the internet banking for

The Services	Rarely		Sometimes		Continually		Missing	
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Balance enquiry	22	10.6	73	35.3	111	53.6	1	0.5
Download banking statement	51	24.6	103	49.8	52	25.1	1	0.5
Fund transfer between accounts	101	48.8	50	24.2	55	26.6	1	0.5
Bills payment	52	25.1	68	32.9	86	41.5	1	0.5
ATMs card request	145	70	35	16.6	25	12.1	2	1
Cheque book request	160	77.3	31	15	15	7.2	1	0.5
Cheque clearing status enquiry.	153	73.9	27	13	26	12.6	1	0.5
ATMs card notification.	168	81.2	23	11.1	13	6.3	3	1.4
Book cheque notification.	175	84.5	20	9.7	8	3.9	4	1.9
Other: like ……	9	4.3	--	--	1	0.5	197	95.2

5.3 Descriptive Statistics of Construct Items

This section presents descriptive statistics of survey constructs as follows.

5.3.1 Performance Expectancy (PE)

The respondents' perceptions of PE were measured by four items using a five point Likert scale ranging from "strongly agree" (scale 1) and "strongly disagree" (scale 5). Table 5.5 presents the descriptive statistics of measured items of PE construct. The mean rating of PE construct items was between 1.52(±0.582) and 1.76(±0.729). Results show that all items relating to PE were lowest rated by the respondents and the entire items' mean score was less than the neutral point (3). And the average mean score of PE construct items was 1.62 reflected that respondents were strongly agreeable to the variable. The average standard deviation of 0.630 showed that the respondents were not dispersed around their mean score.

Table 5.5: descriptive statistics of measured items of PE construct

Items	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness Statistic	Kurtosis Statistic
PE1	1.46	.581	.337	.818	-.315
PE2	1.52	.582	.338	.606	-.591
PE3	1.76	.729	.531	.854	.844
PE4	1.54	.629	.396	.513	-.376

5.3.2 Effort Expectancy (EE)

The respondents' perceptions of EE were measured by four items. Table 5.6 reports the descriptive statistics of measured items of EE construct. The mean rating of EE construct items was between 1.61(±0.636) and 1.88(±0.794). Results show that all items relating to EE were lowest rated by the respondents and the entire items' mean

score was less than the neutral point (3). And the average mean score of EE construct items was 1.75 reflected that respondents were strongly agreeable to the variable. The average standard deviation of 0.659 showed that the respondents were not dispersed around their mean score.

Table 5.6: descriptive statistics of measured items of EE construct

Items	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness Statistic	Kurtosis Statistic
EE1	1.82	.579	.335	.033	-.250
EE2	1.69	.625	.391	.107	-.366
EE3	1.61	.636	.404	.556	-.620
EE4	1.88	.794	.631	.044	-.738

5.2.3 Social Influence (SI)

The respondents' perceptions of SI were measured by four items. Table 5.7 presents the descriptive statistics of measured items of SI construct. The mean rating of SI construct items was between 2.31(±1.359) and 2.66(±1.076). Results show that all items relating to SI were low rated by the respondents and the entire items' mean score was less than the neutral point (3). And the average mean score of SI construct items was 2.46 reflected that respondents were agreeable to the variable. The average standard deviation of 1.227 showed that the respondents were not dispersed around their mean score.

Table 5.7: descriptive statistics of measured items of SI construct

Items	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness Statistic	Kurtosis Statistic
SI1	2.66	1.067	1.139	.165	-.862-
SI2	2.54	1.135	1.289	.362	-.871-
SI3	2.31	1.359	1.848	.867	-.444-
SI4	2.33	1.347	1.816	.852	-.464-

5.3.4 Internet Banking Awareness (IBA)

The respondents' perceptions of IBA were measured by four items. Table 5.8 presents the descriptive statistics of measured items of IBA construct. The mean rating of IBA construct items was between 1.82(±0.707) and 2.23(±0.961). Results show that all items relating to IBA were low rated by the respondents and the entire items' mean score was less than the neutral point (3). And the average mean score of IBA construct items was 2.11 reflected that respondents were agreeable to the variable. The average standard deviation of 0.904 showed that the respondents were not dispersed around their mean score.

Table 5.8: descriptive statistics of measured items of IBA construct

Items	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness Statistic	Kurtosis Statistic
IBA1	2.19	.975	.950	.885	.475
IBA2	2.23	.961	.924	.756	.078
IBA3	2.20	.973	.946	.680	.082
IBA4	1.82	.707	.500	.361	-.166

5.3.5 Accessibility (AC)

The respondents' perceptions of accessibility were measured by three items. Table 5.9 presents the descriptive statistics of measured items of AC construct. The mean rating of AC construct items was between 1.89(±0.625) and 2.27(±0.937). Results show that all items relating to AC were lowest rated by the respondents and the entire items' mean score was less than the neutral point (3). And the average mean score of AC construct items was 2.02 reflected that respondents were agreeable to the variable. The average standard deviation of 0.785 showed that the respondents were not dispersed around their mean score.

Table 5.9: descriptive statistics of measured items of AC construct

Items	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness Statistic	Kurtosis Statistic
AC1	1.89	.625	.391	-.038	-.155
AC2	2.27	.937	.878	.221	-.688
AC3	1.89	.793	.629	.075	-.844

5.3.6 Internet Connection Quality (ICQ)

The respondents' perceptions of internet connection quality were measured by four items. Table 5.10 presents the descriptive statistics of measured items of ICQ construct. The mean rating of ICQ construct items was between 1.91(±1.001) and 2.32(±1.022). Results show that all items relating to ICQ were lowest rated by the respondents and the entire items' mean score was less than the neutral point (3). And the average mean score of ICQ construct items was 2.11 reflected that respondents were agreeable to the variable. The average standard deviation of 0.985 showed that the respondents were not dispersed around their mean score.

Table 5.10: descriptive statistics of measured items of ICQ construct

Items	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness Statistic	Kurtosis Statistic
ICQ1	1.97	.861	.742	.848	.545
ICQ2	2.32	1.022	1.043	.541	-.618-
ICQ3	1.91	1.001	1.002	.850	-.381-
ICQ4	2.22	1.056	1.115	.294	-1.065-

5.3.7 The Internet Banking Cost (IBC)

The respondents' perceptions of the IBC were measured by four items. Table 5.11 reports the descriptive statistics of measured items of IBC construct. The mean rating of IBC construct items was between 3.57(±1.171) and 3.94(±1.073). Results show that all items relating to IBC were highest rated by the respondents and the entire items' mean score was greater than the neutral point (3). And the average mean score of IBC construct items was 3.73 reflected that respondents were disagreeable to the variable. The average standard deviation of 1.131 showed that the respondents were not dispersed around their mean score.

Table 5.11: descriptive statistics of measured items of IBC construct

Items	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness Statistic	Kurtosis Statistic
IBC1	3.61	1.241	1.539	-.756-	-.462-
IBC2	3.57	1.171	1.372	-.603-	-.509-
IBC3	3.81	1.042	1.086	-.785-	.053
IBC4	3.94	1.073	1.152	-1.073-	.852

5.3.8 Behavior Intention (BI)

The respondents' perceptions of behavioral intention were measured by three items. Table 5.12 presents the descriptive statistics of measured items of BI construct. The mean rating of BI construct items was between 1.61(±0.658) and 1.83(±0.698). Results show that all items relating to BI were lowest rated by the respondents and the entire items' mean score was less than the neutral point (3). And the average mean score of PE construct items was 1.61 reflected that respondents were strongly agreeable to the variable. The average standard deviation of 0.677 showed that the respondents were not dispersed around their mean score.

Table 5.12: descriptive statistics of measured items of BI construct

Items	Mean Statistic	Std. Deviation Statistic	Variance Statistic	Skewness Statistic	Kurtosis Statistic
BI1	1.63	.698	.487	.831	.651
BI2	1.58	.676	.458	.829	.516
BI3	1.61	.658	.432	.607	.003

5.4 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 5.5 to 5.12. The Skewness and Kurtosis statistics were found less than ±1 and ±3 which indicated that the data distribution in normality.

5.5 Exploratory Factor Analysis

Employing the principal components analysis (PCA) and orthogonal method with varimax rotation, exploratory factor analysis was performed using SPSS version 22.

5.5.1 KMO and Bartlett's test of Sphericity

The result of KMO and Bartlett's test of sphericity are presented in table 5.13, which shows that the value of Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy value was 0.800 and the Bartlett's test of sphericity was ($p < 0.000$), which revealed the appropriateness of sample data for conducting factor analysis.

Table 5.13: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.800
Bartlett's Test of Sphericity	Approx. Chi-Square	3210.917
	df	325
	Sig.	.000

5.5.2 Communalities

Communalities between measured items loaded on the EFA model varied from 0.555 for IBA4 item to 0.901 for SI2 (table 5.20). The lowest communality of the EE1, SI3, SI4, and AC2 showed that these items was the weakest measured items, which might be dropped.

Table 5.14: Communalities

	Initial	Extraction
PE1	1.000	.691
PE2	1.000	.756
PE3	1.000	.678
PE4	1.000	.625
EE2	1.000	.581
EE3	1.000	.742
EE4	1.000	.677
SI1	1.000	.880
SI2	1.000	.901
IBA1	1.000	.823
IBA2	1.000	.888
IBA3	1.000	.869
IBA4	1.000	.555
AC1	1.000	.711
AC3	1.000	.772
ICQ1	1.000	.682
ICQ2	1.000	.749
ICQ3	1.000	.787
ICQ4	1.000	.731
IBC1	1.000	.721
IBC2	1.000	.724
IBC3	1.000	.802
IBC4	1.000	.748
BI1	1.000	.820
BI2	1.000	.900
BI3	1.000	.828

Extraction Method: Principal Component Analysis.

5.5.3 Exploratory Factor Extraction Model

Kaiser's criterion of Eigen values greater than one and the scree plot were applied for factors' extraction. Table 5.15 presents results of factors' extraction on the basis of the Eigen values greater than one criterion, which resulted in identification of eight factors. The first factor explained 27.322% of the total variance and other eight factors explained the remaining variance in the model.

Table 5.15: Total Variance Explained

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	6.992	26.891	26.891	6.992	26.891	26.891	3.188	12.262	12.262
2	3.712	14.275	41.166	3.712	14.275	41.166	3.014	11.594	23.857
3	2.301	8.849	50.015	2.301	8.849	50.015	2.721	10.466	34.323
4	1.724	6.631	56.646	1.724	6.631	56.646	2.702	10.391	44.714
5	1.496	5.755	62.402	1.496	5.755	62.402	2.585	9.941	54.655
6	1.324	5.091	67.492	1.324	5.091	67.492	1.845	7.096	61.751
7	1.081	4.159	71.652	1.081	4.159	71.652	1.821	7.002	68.753
8	1.013	3.896	75.547	1.013	3.896	75.547	1.766	6.794	75.547

Figure 5.8 shows the scree plot test used to confirm the maximum number of factors extracted in this model under eigenvalues greater than one criterion. The slop of the scree plot revealed extraction of eight factors, which confirmed extraction of the same number of factors through the eigenvalues criterion.

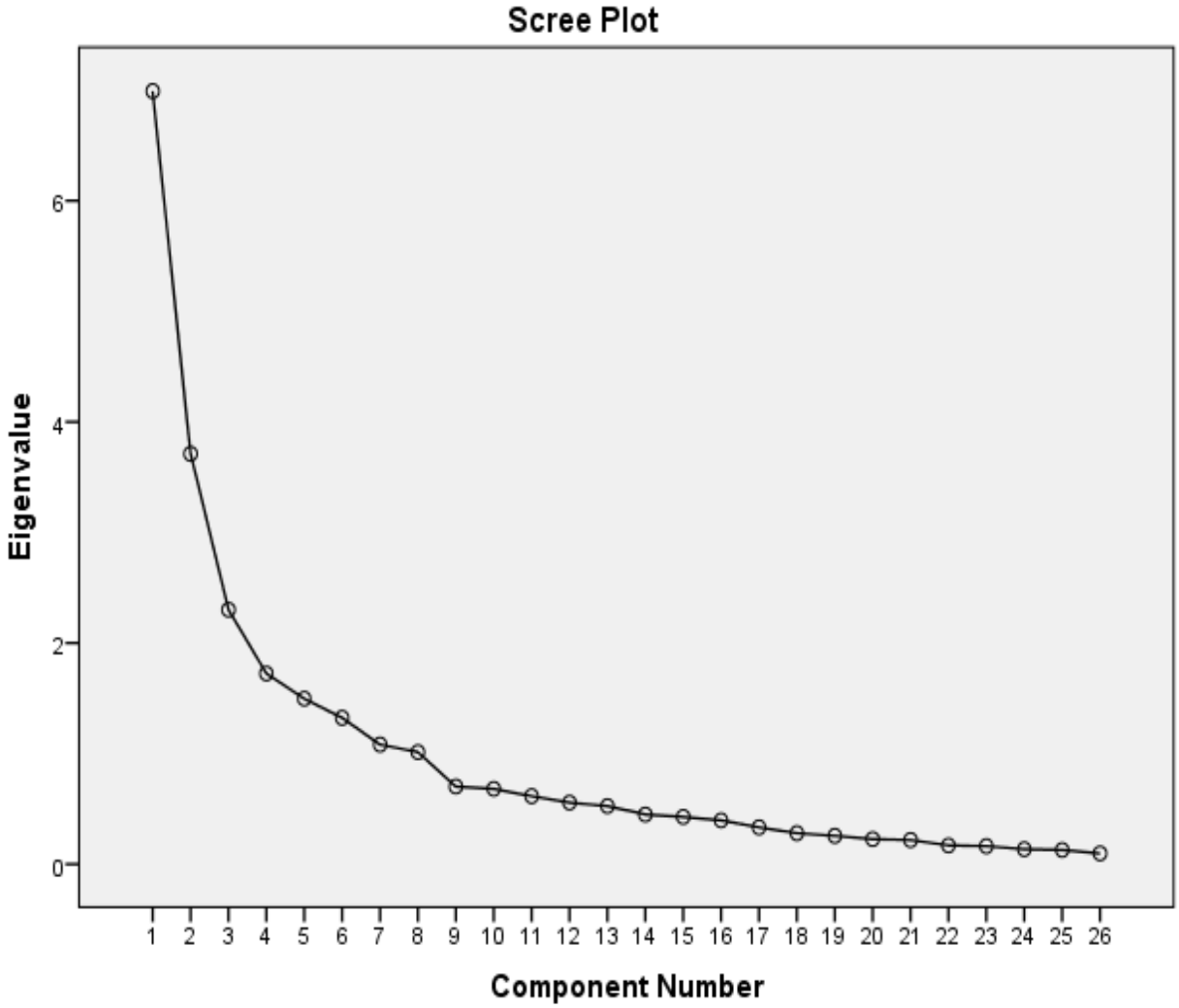

Figure 5.1: the scree plot test

5.5.4 Loading of Measured Items on Latent Factors

The rotated component matrix (table 5.16) presents loadings of each measured item on each of the eight latent factors identified in the EFA model. The loading matrix shows that the measured items have lower loadings on their hypothesized constructs and the cross loading 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 5.16: Rotated Component Matrix[a]

	Component							
	1	2	3	4	5	6	7	8
IBC3	.887							
IBC4	.860							
IBC1	.810							
IBC2	.806							
IBA2		.927						
IBA3		.895						
IBA1		.852						
IBA4		.562						
ICQ3			.800					
ICQ2			.779					
ICQ4			.777					
ICQ1			.628					
PE2				.801				
PE4				.747				
PE1				.741				
PE3				.723				
BI2					.909			
BI3					.834			
BI1					.826			
SI2						.879		
SI1						.834		
EE3							.808	
EE4							.732	
EE2							.524	
AC3								.806
AC1								.738

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.[a]

a. Rotation converged in 6 iterations.

5.6 Creation of Latent Factors

On the basis of the findings of the exploratory factor analysis, eight latent factors were created by adding 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.

5.6.1 Performance Expectancy (PE)

Table 5.17a presents the reliability statistics of the performance expectancy construct, which comprised four items and shows 0.806 Cronbach's alpha reliability for this construct. The summary item statistics (table 5.17b) for this construct revealed the mean value of the items means was 1.570 that confirmed that the sample were positive about performance expectancy of the internet banking acceptance. The item total statistics (table 5.17c) revealed that, if item PE1 deleted, the Cronbach's alpha for this construct can be increased to 0.787.

Table 5.17a: reliability statistics PE

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.806	.809	4

Table 5.17b: summary item statistics PE

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	1.570	1.464	1.763	.300	1.205	.018	4
Item Variances	.401	.337	.531	.194	1.575	.008	4
Inter-Item Covariances	.204	.148	.249	.101	1.680	.001	4
Inter-Item Correlations	.514	.406	.566	.160	1.394	.003	4

Table 5.17c: item total statistics PE

	Scale mean if item deleted	Scale variance if item deleted	Corrected item total correlation	Squared multiple correlation	Cronbach's Alpha if item deleted
PE1	4.8696	3.163	.561	.355	.787
PE2	4.8309	3.073	.685	.480	.727
PE3	4.6135	3.034	.643	.417	.746
PE4	4.8164	3.180	.602	.418	.766

5.6.2. Effort Expectancy (EE)

The reliability statistics of the effort expectancy construct (table 5.18a) revealed 0.742 Cronbach's alpha reliability for this construct, which comprised four items. The summary item statistics (table 5.18b) for this construct showed the mean value of the items means was 1.748 that confirmed that the sample were positive about effort expectancy of the internet banking acceptance. The item total statistics (table 5.18c) revealed that if item EE1 deleted the Cronbach's alpha can be increased to 0,692.

Table 5.18a: reliability statistics EE

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.742	.748	4

Table 5.18b: summary item statistics EE

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	1.748	1.609	1.879	.271	1.168	.015	4
Item Variances	.440	.335	.631	.296	1.883	.017	4
Inter-Item Covariance	.184	.146	.249	.102	1.700	.001	4
Inter-Item Correlations	.426	.363	.497	.134	1.368	.003	4

Table 5.18c: item total statistics EE

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
EE1	5.1739	2.649	.524	.305	.692
EE2	5.3043	2.494	.549	.326	.676
EE3	5.3816	2.470	.548	.309	.676
EE4	5.1111	2.090	.544	.313	.688

5.6.3 Social Influence (SI)

The reliability statistics of the social influence construct (table 5.19a) revealed 0.876 Cronbach's alpha reliability for this construct, which comprised four items. The summary item statistics (table 5.19b) for this construct showed the mean value of the items means was 2.460 that confirmed that the sample were positive about social influence of the internet banking acceptance. The item total statistics (table 5.19c) revealed that if item SI1 deleted the Cronbach's alpha can be increased to 0,854.

Table 5.19a reliability statistics SI

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.876	.880	4

Table 5.19b summary item statistics SI

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	2.460	2.314	2.657	.343	1.148	.027	4
Item Variances	1.523	1.139	1.848	.708	1.622	.131	4
Inter-Item Covariances	.974	.722	1.521	.799	2.108	.074	4
Inter-Item Correlations	.648	.502	.842	.340	1.677	.020	4

Table 5.19c: item total statistics SI

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
SI1	7.1836	11.490	.711	.720	.854
SI2	7.3043	10.951	.737	.731	.842
SI3	7.5266	9.416	.781	.723	.824
SI4	7.5072	9.785	.732	.699	.845

5.6.4 Internet Banking Awareness (IBA)

The reliability statistics of the internet banking awareness construct (table 5.20a) revealed 0.883 Cronbach's alpha reliability for this construct, which comprised four items. The summary item statistics (table 5.20b) for this construct showed the mean value of the items means was 2.107 that confirmed that the sample awareness of the internet banking acceptance. The item total statistics (table 5.20c) revealed that if item IBA4 deleted the Cronbach's alpha can increase more than the observed Cronbach's alpha for this construct in this study.

Table 5.20a: reliability statistics IBA

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.883	.879	4

Table 5.20b: summary item statistics IBA

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	2.107	1.816	2.227	.411	1.226	.038	4
Item Variances	.830	.500	.950	.450	1.899	.048	4
Inter-Item Covariances	.542	.321	.770	.449	2.399	.042	4
Inter-Item Correlations	.645	.466	.824	.358	1.768	.022	4

Table 5.20c: item total statistics IBA

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
IBA1	6.2415	5.359	.778	.649	.837
IBA2	6.2029	5.201	.842	.759	.809
IBA3	6.2319	5.169	.837	.724	.811
IBA4	6.6135	7.229	.550	.329	.915

5.6.5 Accessibility (AC)

The reliability statistics (table 5.21a) for the accessibility construct reveal 0.695 Cronbach's alpha reliability for this construct that consisted three items. The summary item statistics for this construct (table 5.21b) revealed the mean value of the items means as 2.018, which showed that the respondents confirmed the accessibility of the internet banking acceptance. The item total statistics of this construct (table 5.21c) revealed that if item AC2 deleted the Cronbach's alpha can be increased the observed Cronbach's alpha for this construct in this study.

Table 5.21a: reliability statistics AC

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.695	.722	3

Table 5.21b: summary item statistics AC

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	2.018	1.889	2.271	.382	1.202	.048	3
Item Variances	.633	.391	.878	.487	2.248	.059	3
Inter-Item Covariance	.273	.257	.287	.030	1.118	.000	3
Inter-Item Correlations	.464	.346	.554	.208	1.601	.009	3

Table 5.21c: 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	4.1643	2.021	.633	.409	.509
AC2	3.7826	1.569	.464	.249	.700
AC3	4.1594	1.843	.494	.314	.624

5.6.6 Internet Connection Quality (ICQ)

The reliability statistics of the internet connection quality construct (table 5.22a) revealed 0.832 Cronbach's alpha reliability for this construct, which comprised four items. The summary item statistics (table 5.22b) for this construct showed the mean value of the items means was 2.105 that confirmed that the sample were positive about the internet connection quality of the internet banking acceptance. The item total statistics (table 5.22c) revealed that if item ICQ1 deleted the Cronbach's alpha can be increased to 0,827.

Table 5.22a: reliability statistics ICQ

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.832	.831	4

Table 5.22b: summary item statistics ICQ

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	2.105	1.913	2.319	.406	1.212	.039	4
Item Variances	.976	.742	1.115	.374	1.504	.027	4
Inter-Item Covariance	.540	.327	.743	.416	2.270	.023	4
Inter-Item Correlations	.552	.379	.702	.323	1.851	.016	4

Table 5.22c: item total statistics ICQ

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
ICQ1	6.4541	7.045	.567	.448	.827
ICQ2	6.1014	5.762	.729	.583	.756
ICQ3	6.5072	6.135	.654	.516	.791
ICQ4	6.1981	5.723	.701	.562	.769

5.6.7 Internet Banking Cost (IBC)

The reliability statistics of the internet banking cost construct (table 5.23a) revealed 0.880 Cronbach's alpha reliability for this construct, which comprised four items. The summary item statistics (table 5.23b) for this construct showed the mean value of the items means was 3.734 that confirmed that the sample were negative about cost of the internet banking acceptance. The item total statistics (table 5.23c) revealed that if item IBC4 deleted the Cronbach's alpha can be increased to 0,859.

Table 5.23a: reliability statistics IBC

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.880	.883	4

Table 5.23b: summary item statistics IBC

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.734	3.575	3.937	.362	1.101	.029	4
Item Variances	1.257	1.030	1.539	.509	1.494	.058	4
Inter-Item Covariance	.813	.662	1.078	.415	1.627	.019	4
Inter-Item Correlations	.654	.557	.783	.226	1.405	.008	4

Table 5.23c: item total statistics IBC

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
IBC1	11.3237	8.055	.737	.591	.851
IBC2	11.3623	8.349	.749	.608	.843
IBC3	11.1256	8.848	.783	.685	.832
IBC4	11.0000	9.350	.710	.623	.859

5.6.8 Behavioral Intention (BI)

The reliability statistics of the behavioral intention to use construct (table 5.24a) revealed 0.905 Cronbach's alpha reliability for this construct, which comprised three items. The summary item statistics for this construct (table 5.24b) showed the mean value of the items means was 1.609 that showed study respondents' positive behavioral intention to use the internet banking. The item total statistics (table 5.24c) revealed that if BI2 deleted the Cronbach's alpha can be decreased to 0,816.

Table 5.24a: reliability statistics BI

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.905	.906	3

Table 5.24b: summary item statistics BI

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	1.609	1.585	1.628	.043	1.027	.000	3
Item Variances	.459	.432	.487	.055	1.127	.001	3
Inter-Item Covariance	.350	.317	.374	.057	1.180	.001	3
Inter-Item Correlations	.762	.690	.805	.115	1.167	.003	3

Table 5.24c: 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	3.1981	1.606	.781	.635	.892
BI2	3.2415	1.553	.868	.755	.816
BI3	3.2126	1.692	.789	.655	.884

5.7 Person's Correlations between Latent Factors\Constructs

Bivariate person'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). Results of bivariate person's correlations between all latent factors/ constructs are presented in table 5.25 all latent factors were positively and significantly correlated with each other ($p < 0.01$).

Table 5.25: person's bivariate correlations between latent factors/ constructs

	PE	EE	SI	IBA	AC	ICQ	CO	BI
PE	1							
EE	.848 (**)	1						
SI	.815 (**)	.837 (**)	1					
IBA	.792 (**)	.870 (**)	.942 (**)	1				
AC	.812 (**)	.874 (**)	.934 (**)	.976 (**)	1			
ICQ	.788 (**)	.895 (**)	.930 (**)	.928 (**)	.926 (**)	1		
CO	.652 (**)	.766 (**)	.837 (**)	.814 (**)	.801 (**)	.855 (**)	1	
BI	.966 (**)	.876 (**)	.832 (**)	.819 (**)	.836 (**)	.813 (**)	.669 (**)	1

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

5.8 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 5.26). All statistics for the both tests were found significant, which indicated departure from the normality of the data. However, this two tests are recognized to be sensitive to large sample size, such as the sample size of 207 in this study; therefore, they tend to become significant. Nevertheless, skewness and kurtosis statistics found less than ±1 (see table 5.5 to 5.12), 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 5.26: test of normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
BI	.305	206	.000	.755	206	.000
PE	.313	206	.000	.739	206	.000
EE	.281	206	.000	.781	206	.000
SI	.250	206	.000	.873	206	.000
IBA	.308	206	.000	.828	206	.000
AC	.260	206	.000	.845	206	.000
ICQ	.253	206	.000	.839	206	.000
IBC	.268	206	.000	.857	206	.000

a. Lilliefors Significance Correction

5.9 Homogeneity of Variance in the Data

Presence of the homogeneity of variance was determined by the Levene's test and the results of the test (table 5.27) revealed that all latent constructs were significant except the AC, IBC, and EE constructs, which confirmed that there was no homogeneity of variance in the data for five out of eight latent constructs.

Table 5.27: test of homogeneity of variance

	Levene Statistic	df1	df2	Sig.
PE	5.217	4	201	.001
EE	2.105	4	202	.081
SI	5.132	4	202	.001
IBA	4.280	4	202	.002
AC	2.292	4	201	.061
ICQ	7.298	4	202	.000
IBC	1.590	4	202	.178
BI	2.157	4	202	.075

5.10 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) (Chandio, 2011). 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.20.0. In the second step, the structural model related to dependent and independent variables were 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.

5.10.1 Measurement Model Specification and CFA 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.

5.10.2 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 5.28.

CFA was performed on the measurement model comprising eight factors, which were: PE; EE, SI, ability (IBA, AC, ICQ, & IBC), and BI. Figure 5.2 depicts the initial hypothesized measurement model. These factors were measured using number of items (indicators). In total, 30 items were used which were derived from the EFA. Details of all constructs and their measurement items along with their code names are given in Table 4.2 in chapter Four.

The measurement model was evaluated by using the maximum likelihood (ML) estimation techniques provided by the AMOS 20. Table 5.28 provides summarized results of the initial CFA. The results revealed that chi-square statistics (x^2= 1041.22, df = 377) 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 = 0.75, AGFI = 0.691, CFI = 0.821, and RMSEA = 0.092 (Table 5.28). 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.

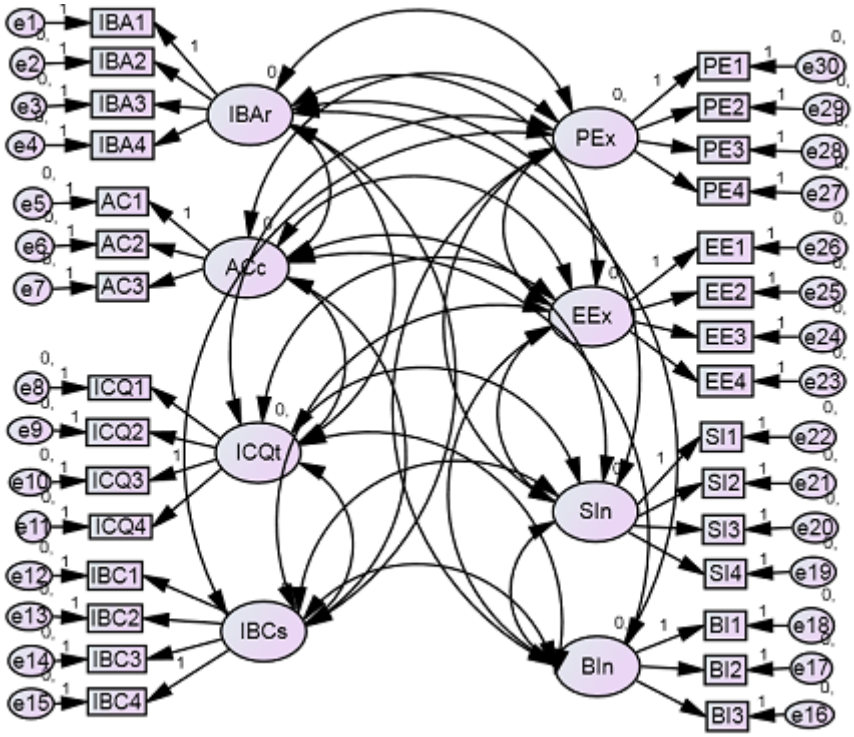

Figure 5.2: hypothesized CFA model derived from CFA

Table 5.28: measure of the model fit for the initial CFA

Goodness-of-fit Measures		**Acceptable Level**	**Structural Model**
x^2 = Chi-squire			1041.22
df = degree of freedom			377
x^2/df	Absolute fit measures	$1 < x^2/df < 5$	2.762
Goodness of fit index (GFI)		≥ 90	0.75
Root-mean-squire error of approximation (RMSEA)		< 0.05	0.092
Normal fit index (NFI)	Incremental fit measures	≥ 90	0.751
Comparative fit index (CFI)		≥ 90	0.821
Adjusted goodness of fit index (AGFI)	Parsimony fit measures	≥ 90	0.691

Source: (Bian, 2011)

Given the fact that the goodness of fit indices of the initial run of CFA (e.g. GFI, RMSEA, NFI, 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) (Chandio, 2011). The model refinement procedure applied following criteria recommended by researchers. According to Al-Qeisi (2009) factor loading (i.e. standard regression weight (SRW) in AMOS 20) value should be above 0.5 (preferably 0.7). And Squared multiple correlations (SMCs) value should be greater than the cut-off point 0.5. The standard residual covariance (SRC) should be within the threshold (above 2.8 or below – 2.8). Finally, modification indices (MI) that reveal high covariance between measurement errors accompanied by high regression weights between these errors' construct are candidate for deletion (Byrne, 2001; Hair et al., 2006) (Al-Qeisi, 2009).

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 majority of standard regression weight and SMCs were above the recommended level (> 0.7) and (> 0.5) except (EE1, SI3, SI4, and AC2) respectively. However, evaluation of standardized residuals indicated that the values of items demonstrated high covariance plus high regression weight in the modification indexes should be candidate for deletion. Based on that, the following items (EE1, SI3, SI4, and AC2) were deleted. Thus, after dropping these problematic items, the measurement model was re-run, as recommended (Byrne, 1998; Kline, 2005; Hair et al., 2006) (Chandio, 2011). Final CFA model is depicted in Figure 5.3.

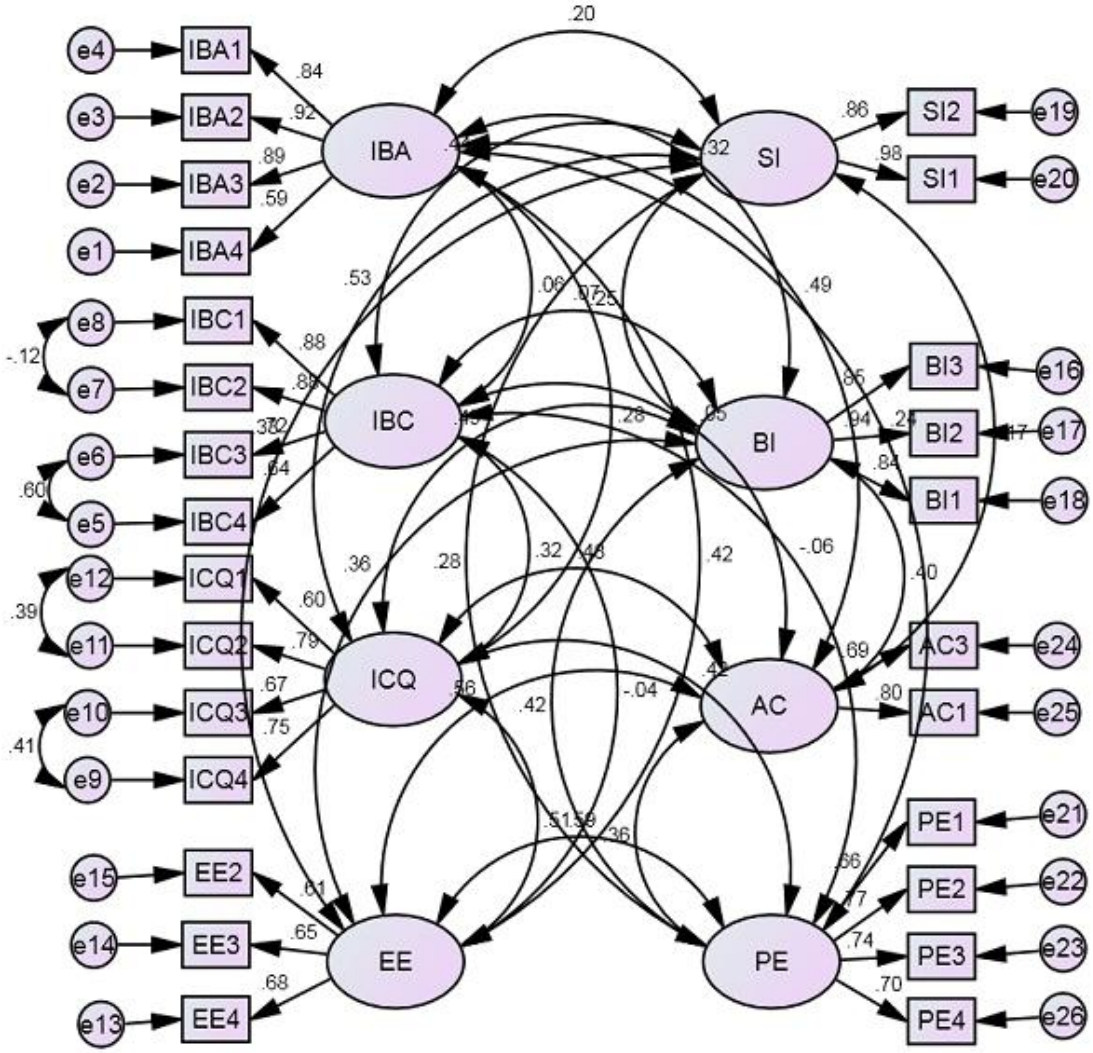

Figure 5.3: final CFA model

After dropping these problematic items 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 5.29) indicated the absolute fit measures i.e. GFI and RMSEA were 0.836 and 0.069, respectively, the incremental fit measures i.e. NFI and CFI were 0.842 and 0.913, respectively and the parsimony fit measure i.e. AGFI was 0.785. All these measures surpassed the minimum recommended values. In addition to these indices, the ratio of x^2/df was 1.993, which was within the acceptable threshold level (i.e., $1.0 < x^2/df < 5.0$). These goodness of fit statistics therefore confirmed that the model adequately fitted the data.

Table 5.29: measure of the model fit of revised CFA Model

Goodness-of-fit Measures		**Acceptable Level**	**Structural Model**
$x^2 =$ Chi-squire			532.210
df = degree of freedom			267
x^2/df	Absolute fit measures	$1 < x^2/df < 5$	1.993
Goodness of fit index (GFI)		≥ 90	0.836
Root-mean-squire error of approximation (RMSEA)		< 0.05	0.069
Normal fit index (NFI)	Incremental fit measures	≥ 90	0.842
Comparative fit index (CFI)		≥ 90	0.913
Adjusted goodness of fit index (AGFI)	Parsimony fit measures	≥ 90	0.785

Besides, other estimation criteria show that model fit the data adequately well, such that, standard regression weight were all greater than 0.5. Standard residual were all within the threshold level (+2.8, – 2.8), 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) (Chandio, 2011).

5.11 Assessment of Reliability and Validity of Constructs

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

5.11.1 Reliability of Constructs

In this research, 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.

The results mentioned in the table 5.30 showed that the reliability coefficient for the construct behavioral intention (BI) was 0.91, 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.

Results of construct reliability calculated are presented in Table 5.30. The construct reliabilities varied between 0.91 for the IBA construct and 0.70 for the AC construct. Construct reliabilities for all eight constructs were found greater than the minimum acceptable level of construct reliability = 0.7 for each construct. While validity equals squire root of reliability.

Table 5.30: construct reliability statistics

No	Constructs	Construct Reliability	Validity = squire root of reliability
Criteria ≥ 0.70			
1	Performance Expectancy (PE)	0.81	0.66
2	Effort Expectancy (EE)	0,74	0.55
3	Social Influence (SI)	0.88	0.77
4	Internet Banking Awareness (IBA)	0.88	0.77
5	Accessibility (AC)	0.70	0.49
6	Internet Connection Quality (ICQ)	0.83	0.69
7	Internet Banking Cost (IBC)	0,88	0.77
8	Behavioral Intention (BI)	0.91	0.83

5.12 Structural Model Evaluation and Hypotheses Testing

This section presents results of hypotheses testing. Table 5.31 shows four hypotheses represented by causal paths (H1, H2, H3, and H4) 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 performance expectancy, social influence, internet banking awareness, accessibility, internet connection quality and internet banking cost while endogenous constructs were the behavioral intention). Goodness of fit indices and other parameters estimates were examined to evaluate the hypothesized structural model. Assessment of parameter estimates results suggested that three out of four hypothesized paths were significant. Thus, indicating not support for the one hypotheses. These results are presented in detail as follows.

Table 5.31: hypotheses testing/ path causal relationships

N	Constructs	Code	Hypotheses	Hypothesized Relationships (positive)
1	Performance Expectancy	PE	H1	PE → BI
2	Effort Expectancy	EE	H2	EE → BI
3	Social Influence	SI	H3	SI → BI
4	Ability	Ability	H4	IBA → BI

The fit indices shown in Table 5.32 indicate that the hypothesized structural model provided the good fit to the data. Although the likelihood ratio chi-square (x^2 = 620.236; df = 204; 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 0.886 and 0.099 respectively indicating acceptable fit of model. The incremental fit measures i.e. NFI and CFI were 0.784 and 0.841 respectively, which were above the minimum requirement showing adequate fit and the parsimony fit measure i.e. AGFI was 0.837, which also was above the cut-off point of > 0.8). In addition to these indices, the x^2/ df = 3.040 was within the threshold level i.e. 1.0 < x^2 / df < 5.0) supporting these findings.

Table 5.32: structural model fit measure assessment

Goodness-of-fit Measures		Acceptable Level	Structural Model
x^2 = Chi-squire			620.236
df = degree of freedom			204
x^2/df	Absolute fit measures	1 < x^2/df < 5	3.040
Goodness of fit index (GFI)		≥ 90	0.886
Root-mean-squire error of approximation (RMSEA)		< 0.05	0.099
Normal fit index (NFI)	Incremental fit measures	≥ 90	0.784
Comparative fit index (CFI)		≥ 90	0.841
Adjusted goodness of fit index (AGFI)	Parsimony fit measures	≥ 90	0.837

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 30 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 0.05 levels (Hair et. al. 2006) (Chandio, 2011). 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, four causal paths were examined in this research. For three causal paths estimates t-values were above the 1.96 critical values at the significant level $p \leq 0.05$. The t-values for remaining one construct was found statically not significant ({t-value = 0.647; p = 0.518}). These results implied the regression weight estimates. The overall structural model is depicted in Figure 5.3, and parameter estimates are presented in Table 5.33. It is to be noted that the measurement items and error terms associated with latent constructs are not shown for clarity.

Table 5.33: regression estimates of latent constructs

No		**Estimate**	**S.E.**	**C.R.**	**P**
1	BI <--- PE	.292	.090	3.222	.001
2	BI <--- EE	.233	.098	2.378	.017
3	BI <--- SI	.021	.033	.647	.518
4	BI <--- Ability	.489	.121	4.053	***

Note: PE = performance expectancy; EE = effort expectancy; SI = social influence; BI = behavioral intention; Estimate = regression weight; S.E. = standard error; C.R. = critical ratio; P = significance value.

Results presented in Table 5.34: indicate that the three of four hypothesized paths between independent and dependent variables were significant. For instance, the hypothesized paths between performance expectancy and behavioral intention; effort expectancy and behavioral intention; and ability and behavioral intention with CR value of 3.222, 2.378, and 4.053 respectively (> 1.96) was statistically significant ($p < 0.05$). The hypothesized path between the social influence and behavioral intention indicated that their t-values did not exceed the cut-off point required for statistical significance. Thus, these path was not statistically significant.

Table 5.34: hypotheses testing/ path causal relationships

N	Constructs	Code	H	Hypothesized Relationships (positive)	Standardized regression weights (β)	supported
1	Performance Expectancy	PE	H1	PE → BI	0.251	Yes
2	Effort Expectancy	EE	H2	EE → BI	0.101	Yes
3	Social Influence	SI	H3	SI → BI	0.078	No
4	Ability	Ability	H4	Ability → BI	0.327	Yes

Furthermore, in testing the hypotheses, results shown in Table 5.34 revealed that three hypotheses i.e. H1, H2, and H4 were positive and statistically significant. The results suggest that standardized estimates for these hypotheses (β= 0.251, 0.101, 0.327 respectively) indicate statistical significance and thus showing support for these hypotheses. While, one hypothesis i.e. H3 having standardized estimate (β = 0.078) was found statistically not significant. Hence, this hypothesis was rejected.

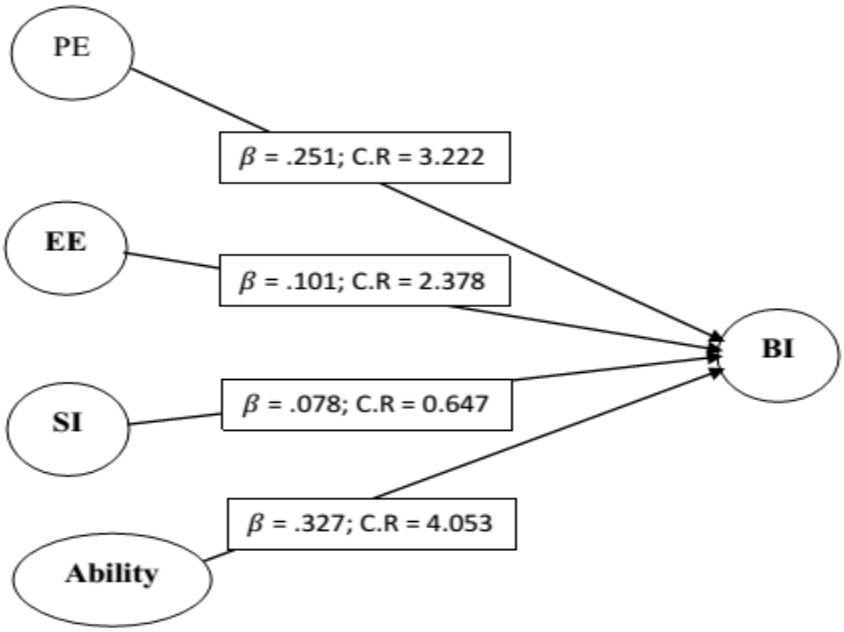

Figure 5.4: Structural Model

As shown in Figure 5.4, the main model estimations revealed that three out of four hypotheses were significant while one was not significant. The following three hypotheses were positively significant; hence, they were supported.

H1. Performance expectancy will have a significant positive effect on the behavioral intention to use internet banking in Sudan.

As shown in the Figure 5.4, the standardized regression weight and critical ratio for PE to BI is 0.251 and 3.222 respectively, suggesting that this path is statistically significant at the p =.05. The results demonstrated strong support for hypothesis H1, which was proposed in the model (presented in chapter three). This indicated that the performance expectancy has strong significant effect on behavioral intention to use of IBS in Sudan, implying that if there was increase in the PE then it would positively influence user's intention towards acceptance of the IBS. In summary, these results further suggest that PE was a major determinant of behavioral intentions.

H2. Effort expectancy will have a significant positive effect on the behavioral intention to use internet banking in Sudan.

As shown in the Figure 5.4, the standardized regression weight and critical ratio for EE to BI is 0.101 and 2.378 respectively, suggesting that this path is statistically significant at the p =.05. The results demonstrated strong support for hypothesis H2, which was proposed in the model (presented in chapter three). This indicated that the effort expectancy has strong significant effect on behavioral intention to use of IBS in Sudan, implying that if there was increase in the EE then it would positively influence user's intention towards acceptance of the IBS. In summary, these results further suggest that EE was a major determinant of behavioral intentions.

H4. Ability will have a significant positive effect on the behavioral intention to use internet banking in Sudan.

As shown in the Figure 5.4, the standardized regression weight and critical ratio for ability to BI is 0.327 and 4.053 respectively, suggesting that this path is statistically significant at the p =.05. The results demonstrated strong support for hypothesis H4, which was proposed in the model (presented in chapter three). This indicated that the ability has strong significant effect on behavioral intention to use of IBS in Sudan, implying that if there was increase in the ability (IBA, AC, ICQ, and IBC) then it would positively influence user's intention towards acceptance of the IBS. In summary, these results further suggest that ability was a major determinant of behavioral intentions.

5.13 Modifying Structural Model by Removing Non-significant Paths

As discussed in the previous section, one hypothesis (i.e. H3) out of four hypotheses was statistically not significant and thereby it was rejected. Consequently, the structural model was re-specified by removing one not significant path. 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 path i.e. SI → BI was deleted to get the parsimonious model that adequately fits the data. Revised structural model is shown in Figure 5.5 and results are presented in Table 5.35 and 5.36.

Table 5.35: Results of revised structural model

N	Constructs	Code	H	Hypothesized Relationships (positive)	Standardized regression weights (β)	C.R	supported
1	Performance Expectancy	PE	H1	PE → BI	0.264	2.923	Yes
2	Effort Expectancy	EE	H2	EE → BI	0.118	2.251	Yes**
3	Ability	Ability	H4	Ability → BI	0.371	4.061	Yes***

*** Significant at 0.001 level (two tailed); ** significant at 0.01 level (two tailed)

Table 5.36: Goodness of fit indices revised structural model

Goodness-of-fit Measures		Acceptable Level	Structural Model
x^2 = Chi-squire			447.407
df = degree of freedom			166
x^2/df	Absolute fit measures	$1 < x^2/df < 5$	2.695
Goodness of fit index (GFI)		≥ 90	0.886
Root-mean-squire error of approximation (RMSEA)		< 0.05	0.090
Normal fit index (NFI)	Incremental fit measures	≥ 90	0.818
Comparative fit index (CFI)		≥ 90	0.875
Adjusted goodness of fit index (AGFI)	Parsimony fit measures	≥ 90	0.837

In testing the revised structural model, results shown in Table 5.35 indicated that all of the hypotheses i.e. H1, H2, and H4 were statistically significant. The results suggested that standardized estimates and critical ratio values for these hypotheses ($\beta = 0.264$, C.R = 2.923; $\beta = 0.118$, C.R = 2.251; $\beta = 0.371$, C.R = 4.061 respectively) indicated statistical significance and thereby showing support for these hypotheses. Furthermore, the fit indices presented in Table 5.36 indicated that the hypothesized structural model provided the better fit to the data after deletion of not significant path (n = 1). Although the likelihood ratio chi-square ($\chi 2$ = 447.407; df = 166; 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 0.090 respectively indicating good fit of model, incremental fit measures i.e. NFI and CFI were 0.818 and 0.875 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 = 2.695 was within the threshold level (i.e.,

1.0 < x2/ df < 5.0), which supported these findings. In summary, the results suggested that after removing one not significant path i.e. H3, a best parsimonious model was achieved. Besides, the revised model adequately fit the observed data. The final revised model is shown in figure 5.5.

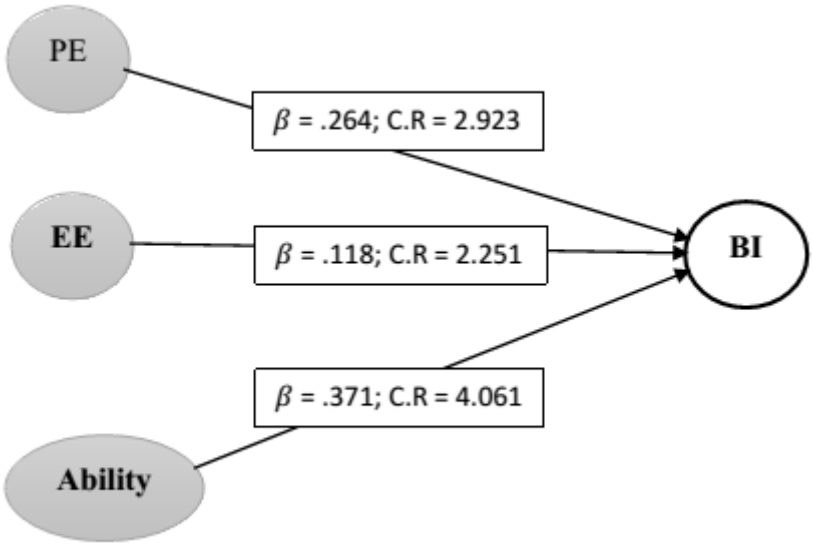

Figure 5.5: Final revised model

Chapter six

The Effect of Moderators

6.1 Introduction

This chapter presents the effect of moderators on the research model. The moderators investigated here are the demographic variables and in specific variables such as gender, age, experience, education, and income. The impact of these moderators on the relations among the variables in the model is investigated through multi-group analysis and measurement invariance. Measurement invariance, defined as the extent to which items or subscales have equal meanings across groups (French & Finch, 2006), is investigated through two levels. The first level investigates the equivalence of the psychometric properties of the instrument (i.e., configural, metric, and measurement error). The second level investigates group differences using latent means and covariance analysis. Multiple-group or multi-sample confirmatory factor analysis (MCFA) is a common method for examining levels of measurement invariance (French & Finch 2006). Configural invariance, factor loading, intercept, and residual invariance are the most commonly tested forms of invariance for first-order factors' models. Configural invariance refers to the examination of whether the same item is an indicator of the same latent factor in each group, although the factor loadings might differ among the groups. Thus, having similar but not identical indicators per variable allows for variable presentation in each group and indicates achieving configural invariance. Factor loadings invariance (also known metric invariance, Hair et al., 2006) is a step further from configural invariance and refers to whether the loadings of each item on the underlying factor are equal in the two groups (identical unit of measurement). Hence, only when metric invariance is achieved, factorial invariance is the next level to be checked. Factorial invariance enables for the comparison of the relations between the factor and other external

variables especially across groups. Nevertheless, the configural level of invariance does not require that the scales of factors have a common origin (intercepts), which if so, leads to the second level of invariance investigation, mean and intercept invariance analysis. The intercept represents the origins of the scale and when equalized among the groups, the groups' means can be compared. Intercept invariance examination enables determining whether any difference between groups on factor means is a true group difference or a measurement artefact (Chen et al., 2005) (Al-Qeisi, 2009). Consequently, the invariance analysis process followed in this chapter is as follows:

Using AMOS multiple group covariance structure analysis to assess measurement invariance produces four levels of invariant output: measurement weights; structural weights; structural residuals; and measurement residuals. Only the first two levels of invariance are checked for the purpose of this investigation.

When the measurement weights invariance is achieved, the next step is to check scalar invariance using mean and covariance structure (MACS) analysis to assess differences in mean scores or compare means between the two groups.

In case where the measurement weights are non-invariant; the next step would be to allocate the variant factor loadings (by constraining one factor equal at a time). In other words, measurement weight invariance answers for item-variable presentation in each model and item loading on related variable. This type of invariance is named metric invariance (Hair et al., 2006). Hence, if measurement weights are not significantly different across the groups under investigation, it is assumed that the metric is reasonably non-invariant.

If the structural weights level of invariance is not established, the next test would be to check which paths are non-equivalent between the groups; using path constraining (one at a time) to locate the path differences. This is assessed by the significance of change in Chi-square ($\Delta\chi^2$). In other words, if constraining a path produces a

significant change ($\Delta\chi^2$) indicated by a p-value < .05, it is concluded that the two groups do not have factorial invariance with regard to that path.

6.2 Steps in Applying the MACS Analysis

Applying the MACS analysis requires adding constraints to the MACS model. The process, in first-order structure, involves the following steps: (1) all factor loadings (except those fixed to one) are constrained equal between the two groups (2) one group is treated as a reference group, where its latent means are constrained to zero, (3) the latent mean of the other group is estimated and compared to the reference group, (4) all factor intercepts are constrained equal between the two groups (Arbuckle, 2006).

In higher-order structure, constraints are imposed as follows: (1) all first-order factor loadings (except those fixed to 1.0) and intercepts are constrained equal between groups, (2) all higher-order factor loadings are constrained equal between groups, (3) all higher-order intercepts are constrained equal between groups (intercepts at the higher level actually represent the means of the first-order latent factors and by virtue of specification is constrained to zero in both groups as discussed next), and (4) the higher-order factor mean is estimated for one group and fixed to zero for the reference group.

However, In higher-order structure, under-identification is a common difficulty in testing for latent mean intercept (i.e., intercepts of the first-order) as the number of estimated intercepts exceeds the number of number of observed measures in a single group (Byrne & Stewart, 2006). In reviewing the model, Figure 6.1, there are 19 intercepts (15 observed variable intercepts; 4 latent factor intercepts) associated with the higher-order structure of ability.

Thus, this situation must be addressed before proceeding with invariance testing of the higher-order model intercept. Byrne (2006) addressed this issue of under

identification and described three model specifications that can be used in testing latent mean differences related to higher-order factor structure. One proposed strategy, which is applicable to the current study models, is to constrain the first-order latent factor intercept to zero.

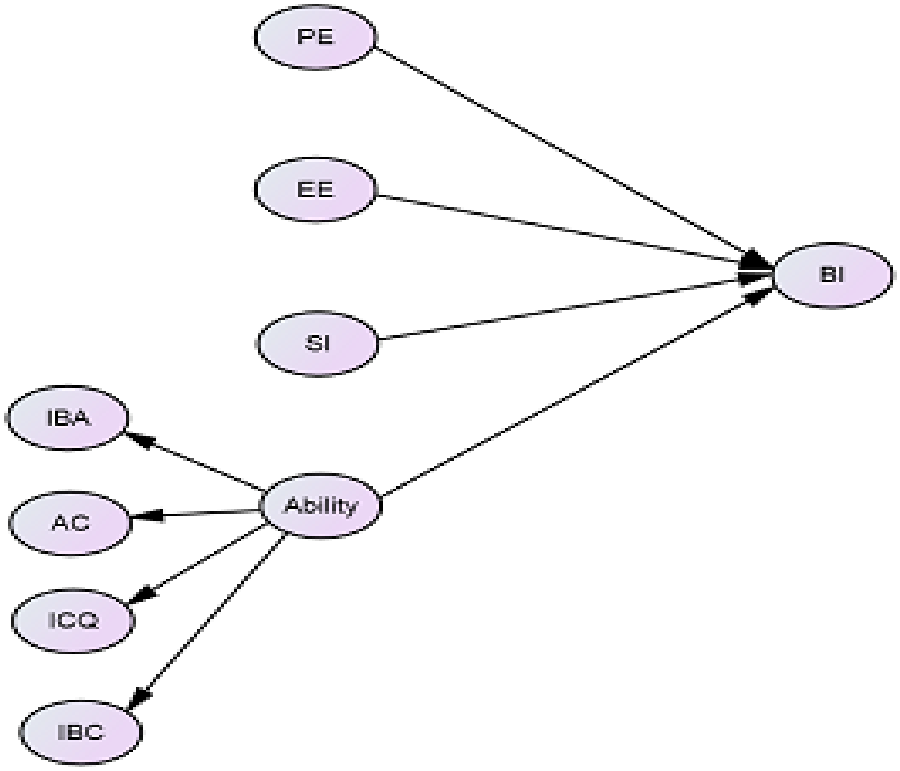

Figure 6.1: the covarience structure model

Accordingly, the first-order latent means are constrained to zero for both groups (within the multiple group analysis), which is the same as constraining the four latent factors' intercepts equal across groups. As such, the number of estimated intercepts is reduced from 19 to 16; thereby, rendering a just-identified structure that is testable. In this case, the higher-order factor mean is sufficient to account for mean differences across all ability items while hypothesizing the three latent means to be approximately equal in magnitude (Byrne & Stewart, 2006).

Finally, the z test value serves as the test for significance of the latent factor mean differences between the two groups (Chen et al., 2005). If the mean estimates of the non-reference group are positive, it is concluded that this group have higher means than the reference group, and if mean estimates were negative, the reference groups is concluded to have higher means (Byrne & Stewart, 2006).

Prior to investigating the impact of the five demographic moderators, the data set for these variables, except for gender, is recoded into two groups using the median split approach (Hair et al., 2006) to enable or facilitate the running of the group analysis examination.

6.3. Gender Impact

The sample is distributed into 158 males and 47 females. In other words, there are nearly as thrice many males as females. Following the guidelines (Byrne, 2001; Hair et al., 2006), the final structural model depicted in Figure 6.1, is applied first to males and females separately to examine if each group can achieve an adequate fit separately (Hair et al., 2006).

The sample fit statistics reading are: CMIN = 1056.877 with df = 433 and CMIN/df ratio = 2.441; standardized RMR = .242; CFI =.78; and RMSEA =.084 with 90 per cent confidence interval (.078 and .091) and PCLOSE =.000. In general indicating an acceptable fit.

Having established a satisfactory model fit for gender samples, a group analysis test for factor structure equivalence is run for the two groups simultaneously rather than separately. The estimates (coefficients) output and critical ratio (t-value) are reported in Table 6.1.

Table 6.1: the estimate output and critical ratio

Paths	males		Females		Supported	
	Estimates	C.R	Estimates	C.R	Male	Female
$PE \rightarrow BI$	0.144	1.497	0.549	2.929	No	Yes
$EE \rightarrow BI$	0.371	2.887	- 0.111	- 1.004	Yes	No
$SI \rightarrow BI$	0.086	2.111	0.078	2.638	Yes	Yes
$ability \rightarrow BI$	0.432	2.857	0.175	1.348	Yes	No

The path $SI \rightarrow BI$ is significant for both gender groups, the path $EE \rightarrow BI$ and $ability \rightarrow BI$ are significant for males, and the path $PE \rightarrow BI$ is significant for females.

AMOS model comparison text output revealed that the two groups (males and females) are invariant. Assuming model unconstrained to be correct, the measurement weights between the two gender groups are not invariant (equal) as indicated by the significant p-value (< .05).

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement weights	13	24.594	.026	.007	.009	-.002	-.003

Assuming the measurement model to be correct, the two genders are not invariant on the structural weights as well. The reading also shows an insignificant p-value (> .05), which indicates invariance between the two groups.

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural weights	3	7.417	.060	.002	.003	.000	.000

In this level, it is assumed that the factor loadings are equal between the two groups. Assuming that the structure weights are correct, the structural residuals are invariant between the two groups, indicated by the significant p-value reading:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural residuals	9	9.250	.415	.003	.003	-.004	-.005

Most researchers stop at the structural weights level of investigation and assume that examining residual invariant is more stringent than necessary (Byrne, 2004; Byrne & Stewart, 2006). Accordingly, the residual invariance is not tested in the following sections.

Historically, evidence of invariance has been based on differences in χ^2 test; if the value of $\Delta\chi^2$ is statistically insignificant, it is suggested that the constraints specified in the more restricted model hold true. More recently, researchers have argued that the $\Delta\chi^2$ value is as sensitive to sample size and non-normality as the χ^2 statistic itself, thereby render it an impractical and unrealistic criterion on which to base evidence of invariance. Consequently, there has been a tendency to argue for evidence of invariance based on the ΔCFI value between models being insignificantly small. In other words, the differences in CFI should not exceed .01 (Cheung & Rensvold, 2002; Byrne et al., 2007). In light of the latest trends, the model fit statistics output for the multiple group analysis revealed satisfactory results in respect to Δ CFI (being less than .01) as shown in Table 6.2. Accordingly, it is concluded that the model is operating equivalently across males and females.

Table 6.2: selected AMOS output text: model fit statistics-Baseline Compression-gender

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI	$\Delta\ CFI$
Unconstrained	.678	.656	.781	.764	.779	
Measurement weights	.670	.658	.776	.766	.775	.004
Structural weights	.668	.658	.774	.766	.773	.002
Structural residuals	.665	.662	.773	.771	.773	.000
Measurement residuals	.628	.640	.735	.745	.736	.037
Saturated model	1.000		1.000		1.000	
Independence model	.000	.000	.000	.000	.000	

An important consequence of establishing measurement weights invariance is the possibility to carry out the subsequent tests of invariance, differences in structural weights and latent means. This second level of investigation involves estimation of means on observed and latent variables using the mean and covariance structure (MACS) analysis (Byrne & Stewart, 2006). Applying the guidelines mentioned in section (6.2), and using AMOS graphics while constraining the female group to be the reference group, the scalar invariance showed males' means scores are positive indicating that males have higher mean scores compared to the females' reference group.

Table 6.3: selected AMOS output text: scalar estimate-means males

	Estimate	S.E.	C.R.	P
PE	.295	.056	5.227	***
EE	.176	.107	1.643	.100
SI	1.090	.474	2.300	.021
Ability	.135	.029	4.678	***
BI	.298	.050	5.960	***

The output also shows that the mean scores of all variables are higher for males than they are for females and these differences are statistically significant ($p < 0.05$).

According to Byrne et al. (2007), multiple fit indices are suggested for assessing model goodness of fit in reporting results of MACS, which include CFI, SRMR, and RMSEA. The model fit statistics readings for these indices are CFI = 0.90, standardized RMR = 0.09 and RMSEA = 0.066 with 90 per cent confidence interval (0.058 and 0.075) and PCLOSE = 0.001, all indicating an acceptable fit.

In summary, the invariant result at the structural weights level indicates that factor loadings for the structural paths are insignificantly different between males and females. Thus, the hypothesized moderating effect of gender (H5) is not supported for the sample.

6.4. Age Impact

The age variable is also recoded into two groups of age: 34 years and less; more 34 years. Running the model fit statistics for two age groups: CMIN = 1071.881 with df = 433 and CMIN/df ratio = 2.475; standardized RMR = .233; CFI =.767; and RMSEA = .085 with 90 per cent confidence interval (.078 and .091) and PCLOSE = .000, all indicting an acceptable fit. Despite the modest fit, there are no meaningful modifications suggested by the modification indices. Overall, the model fit statistics are within acceptable ranges. Running the multiple group analysis resulted in the models' estimates and critical ratios reported in Table 6.4.

Table 6.4: the estimate output and critical ratio

Paths	34 years & less		More than 34 years		Supported	
	Estimates	C.R	Estimates	C.R	34 years & less	More than 34 years
$PE \rightarrow BI$	0.100	0.892	0.711	4.108	No	Yes
$EE \rightarrow BI$	0.341	2.368	- 0.071	- 0.621	Yes	No
$SI \rightarrow BI$	0.185	2.224	0.015	0.814	Yes	No
$ability \rightarrow BI$	0.535	2.215	0.485	2.940	Yes	Yes

The path $ability \rightarrow BI$ is significant for both age groups, the path $EE \rightarrow BI$ and $SI \rightarrow BI$ are significant for age group one, and the path $PE \rightarrow BI$ is significant for age group two.

Running the multiple group analysis to test for structural fit equivalence for the two groups simultaneously resulted in equivalent measurement invariance. Assuming that the unconstrained model is correct, both groups' measurement weights are not equal as evident from the significant p-value readings (< 0.05).

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement weights	14	30.020	.008	.009	.011	-.001	-.002

Assuming that the model measurement weights are correct, the structural weights are non-invariant as well (p value < .05).

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural weights	4	15.171	.004	.005	.006	.002	.002

To check further the measurement invariance results, Table 6.5 shows the changes in CFI, which do not exceed the .01; thus supporting the measurement invariance results.

Table 6.5: Amos selected text output-model fit: baseline compression age

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI	$\Delta\, CFI$
Unconstrained	.665	.642	.769	.751	.767	
Measurement weights	.656	.644	.762	.753	.761	.006
Structural weights	.651	.642	.758	.751	.757	.004
Structural residuals	.623	.622	.728	.727	.728	.029
Measurement residuals	.595	.612	.701	.715	.703	.025
Saturated model	1.000		1.000		1.000	
Independence model	.000	.000	.000	.000	.000	

Having established measurement invariance, it is possible to check the latent mean score differences between the two age groups. Running the MACS analysis while constraining age group 2 to be the reference group, the scalar mean scores show that the younger group (34 years and less) has lower mean scores than the older group (more than 34 years).

Table 6.6: selected AMOS text output: scalar means estimate-age

	Estimate	S.E.	C.R.	P
PE	.293	.070	4.196	***
EE	.032	.032	.991	.322
SI	.249	.253	.983	.325
Ability	.104	.028	3.748	***
BI	.302	.053	5.755	***

The model fit statistics are: CMIN = 561.752 with df = 298 and CMIN/df = 1.885; standardized RMR = .065; CFI =.899; and RMSEA = .066 with 90 per cent confidence interval (.057 and .074) and PCLOSE = .001, overall indicating good model fit.

In summary, the result of invariance at the structural weights level indicates the structural paths are significantly different between the two age groups. Thus, the hypothesized age moderating effect (H6) is supported for the sample.

6.5 Experience Impact

The experience variable is also recoded into two groups of experience: less than 10 years; and 10 years and more. Running the model fit statistics for both experience groups: CMIN = 942.493 with df = 435 and CMIN/df ratio = 2.167; standardized RMR = .191; CFI = .794; and RMSEA = .077 with 90 per cent confidence interval (.070 and .084) and PCLOSE = .000, all indicting an acceptable fit. Despite the

modest fit, there are no meaningful modifications suggested by the modification indices. Overall, the model fit statistics are within acceptable ranges. Running the multiple group analysis resulted in the models' estimates and critical ratios reported in Table 6.7.

Table 6.7: the estimate output and critical ratio

Paths	Less than 10 years		10 years and more		Supported	
	Estimates	C.R	Estimates	C.R	Less than 10 years	10 years and more
$PE \rightarrow BI$	0.067	0.576	0.767	4.198	No	Yes
$EE \rightarrow BI$	0.311	2.104	- 0.002	- 0.236	Yes	No
$SI \rightarrow BI$	0.184	2.451	0.024	0.803	Yes	No
$ability \rightarrow BI$	0.486	1.991	0.537	2.751	Yes	Yes

The bath $ability \rightarrow BI$ is significant for both groups, while $EE \rightarrow BI$ and $SI \rightarrow BI$ paths are significant for experience group one, and $PE \rightarrow BI$ bath is significant for experience group two. Running the multiple group analysis to test for structural fit equivalence for the two groups simultaneously resulted in equivalent measurement invariance. Assuming that the unconstrained model is correct, both groups' measurement weights are equal as evident from the significant p-value readings (< .05).

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement weights	13	26.338	.015	.009	.011	-.001	-.001

Assuming that the model measurement weights are correct, the structural weights are non-invariant as well (p-value < .05).

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural weights	4	12.359	.015	.004	.005	.001	.002

To check further the measurement invariance results, Table 6.8 shows the changes in CFI, which not exceed the .01; thus supporting the measurement invariance results.

Table 6.8: Amos selected text output-model fit: baseline compression experience

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI	ΔCFI
Unconstrained	.678	.658	.797	.782	.794	
Measurement weights	.669	.659	.790	.782	.789	.005
Structural weights	.665	.658	.787	.781	.786	.003
Structural residuals	.649	.648	.770	.769	.769	.017
Measurement residuals	.623	.639	.746	.758	.748	.021
Saturated model	1.000		1.000		1.000	
Independence model	.000	.000	.000	.000	.000	

Having established measurement invariance, it is possible to check the latent mean score differences between the two experience groups. Running the MACS analysis while constraining experience group 2 to be the reference group, the scalar mean scores show that the group1 (less than 10 years) has lower mean scores than the group2 (10 years and more).

Table 6.9: selected AMOS text output: scalar means estimate-experience

	Estimate	S.E.	C.R.	P
PE	.266	.068	3.899	***
EE	.027	.019	1.456	.145
SI	.569	.073	7.841	***
Ability	.093	.027	3.481	***
BI	.279	.049	5.733	***

The model fit statistics are: CMIN = 578.199 with df = 318 and CMIN/df = 1.818; standardized RMR = .064; CFI =.891; and RMSEA = .064 with 90 per cent

confidence interval (.056 and .0731) and PCLOSE =.003, overall indicating good model fit.

In summary, the result of invariance at the structural weights level indicates the structural paths are significantly different between the two experience groups. Thus, the hypothesized experience moderating effect (H7) is supported for the sample.

6.6 Education Impact

The education variable for the sample is recoded into two groups: undergraduate degree level and graduate degree level. The model fit indices for two groups are: CMIN = 1089.941 with df = 435 and CMIN/df ratio = 2.506; standardized RMR = .232; CFI = .767; and RMSEA =.086 with 90 per cent confidence interval (.080 and .092) and PCLOSE =.000. Indicating an acceptable fit.

Running of the multiple group covariance analysis produced the regression weights estimates depicted in Table 6.10. The table shows that $ability \rightarrow BI$ bath is significant for both groups, whereas, $EE \rightarrow BI$ and $SI \rightarrow BI$ paths are significant for undergraduate degree level, and $PE \rightarrow BI$ path is significant for the graduate degree level.

Table 6.10: unstandardized estimates and critical ratio for education level groups

Paths	Undergraduate		Graduate		Supported	
	Estimates	C.R	Estimates	C.R	Undergraduate	Graduate
$PE \rightarrow BI$	0.176	1.337	0.396	3.409	No	Yes
$EE \rightarrow BI$	0.333	2.156	0.027	0.356	Yes	No
$SI \rightarrow BI$	0.180	2.578	0.009	0.461	Yes	No
$ability \rightarrow BI$	0.462	2.080	0.449	2.890	Yes	Yes

Running the measurement invariance analysis, the output results showed that: assuming the model unconstrained to be correct, the measurement weights are not

invariant, with p-value < .05. In other words, the two groups are not invariant on the measurement level.

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement weights	14	24.697	.038	.008	.009	-.003	-.004

Assuming the model measurement weights to be correct, the second level of invariance, structural weights, is non-invariant, with p-value < .05. In other words, the two groups are invariant on the measurement level. Amos output readings are:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural weights	4	12.249	.016	.004	.004	.001	.001

The p-value is insignificant (> .05) indicating that the structural weights are invariant. This is illustrated by changes in CFI (ΔCFI), which are below .01.

Table 6.11: selected AMOS text output: comparison baseline for education

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI	$\Delta\, CFI$
Unconstrained	.667	.647	.770	.753	.767	
Measurement weights	.660	.650	.765	.757	.763	.004
Structural weights	.656	.649	.761	.756	.761	.002
Structural residuals	.637	.636	.741	.740	.741	.020
Measurement residuals	.593	.610	.696	.710	.698	.043
Saturated model	1.000		1.000		1.000	
Independence model	.000	.000	.000	.000	.000	

Having established measurement weights invariance, the next step is to run MACS to assess mean score differences between the two groups while treating the second group (graduate) as the reference group. The results shown in table 6.12 indicate that education level undergraduate degree has positive estimates indicating that the reference group has higher means scores than the graduate degree level of education.

Table 6.12: selected AMOS text output: scalar means estimates-education.

	Estimate	S.E	C.R	P
PE	.239	.061	3.901	***
EE	.043	.035	1.241	.215
SI	.631	.076	8.245	***
Ability	.114	.028	4.026	***
BI	.307	.052	5.913	***

The model fit indices are: CMIN = 573.688 with df = 299 and CMIN/df ratio = 1.919; standardized RMR = .067; CFI = .897; and RMSEA = .065 with 90 per cent confidence interval (.059 and .075) and PCLOSE =.001, all indicating a good fit.

In summary, the invariant result at the structural weights level indicates that the structural paths are significantly different between the two levels of education. Thus, the hypothesized education moderating effect (H8) is supported for the Sudan sample.

6.7 Income Per-Month Impact

The income variable is recoded into two categories: those incoming less than 3,000 SDG per month, and those incoming more than 3,000 SDG per month. The model fit statistics are: CMIN = 920.909 with df = 435 and CMIN/df ratio = 2.115; standardized RMR = .175; CFI =.797; and RMSEA =.076 with 90 per cent confidence interval (.069 and .082) and PCLOSE = .000. Overall, model fit statistics are within acceptable levels.

Having reached an acceptable model fit for the two groups, a run of multiple group analysis to assess factor structure equivalence for both groups simultaneously rather than separately is carried out.

Table 6.13: unstandardized estimates and critical ratio for income groups

Paths	Less than 3,000 SDG		3,000 SDG and more		Supported	
	Estimates	C.R	Estimates	C.R	Less than 3,000 SDG	3,000 SDG and more
$PE \rightarrow BI$	0.022	0.189	0.786	4.211	No	Yes
$EE \rightarrow BI$	0.297	1.994	0.058	0.583	Yes	No
$SI \rightarrow BI$	0.172	2.202	0.041	1.195	Yes	No
$ability \rightarrow BI$	0.599	2.319	0.467	2.461	Yes	Yes

The models' estimates and critical ratios reported in Table 6.13 show that$EE \rightarrow BI$, $SI \rightarrow BI$ $ability \rightarrow BI$ paths are significant for income level one, while, $PE \rightarrow BI$ and $ability \rightarrow BI$ paths are significant for income level two. Results of group analysis showed that the two groups are equivalent in respect to measurement weights. Assuming the unconstrained model to be correct; the measurement weighs reading are:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Measurement weights	14	22.443	.070	.008	.009	-.003	-.003

The p-value (> .05) indicates that the two groups are equal on the measurement weights. The next level of invariance analysis output is the structural weights. Assuming model measurement weights to be correct, the p-value (< .05) indicates structural weights not invariance between the two groups:

Model	DF	CMIN	P	NFI Delta-1	IFI Delta-2	RFI rho-1	TLI rho2
Structural weights	4	12.688	.013	.004	.005	.002	.002

To further assess the measurement invariance results, the changes associated in CFI reading revealed that such change have not exceeded the stated level of .01 for the first two invariance levels as shown in Table 6.14.

Table 6.14: Amos selected text output-model fit: baseline compression income

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI	$\Delta\, CFI$
Unconstrained	.677	.657	.799	.784	.797	
Measurement weights	.669	.660	.795	.787	.793	.004
Structural weights	.665	.658	.791	.786	.790	.003
Structural residuals	.651	.650	.776	.775	.776	.014
Measurement residuals	.626	.642	.754	.766	.756	.020
Saturated model	1.000		1.000		1.000	
Independence model	.000	.000	.000	.000	.000	

Having established invariance on the measurement weights level, it is possible then to check for mean score differences between the two income levels using the MACS analysis while treating income level 2 as the reference group. The results show that the mean scores for the first income group are lower than the mean scores of the reference group (all estimates are negative). Also, the critical ratios and the p-values show that the mean scores are significantly different between the two income levels in respect to all latent variables.

Table 6.15: selected AMOS text output: scalar means estimates-income.

	Estimate	S.E	C.R	P
PE	.265	.067	3.985	***
EE	.034	.018	1.858	.063
SI	.552	.072	7.707	***
Ability	.090	.027	3.341	***
BI	.273	.050	5.446	***

The fit statistics for the MACS are: CMIN = 552.884 with df = 318 and CMIN/df ratio=1.739; standardized RMR = .059; CFI = .898; and RMSEA = .062 with 90 per

cent confidence interval (.053 and .070) and PCLOSE = .015, all indicting an acceptable fit.

In summary, the result of invariance at the structural weights level indicates that factor loadings are significantly different between the two levels of income. Thus, the hypothesized income moderating effect (H9) is supported for the sample.

Chapter Seven

Discussion and Conclusion

The chapter starts with overview of the main objectives of this research. It then presents discussion on the key findings of research: the descriptive statistical findings, the hypothesized relationships, and impact of moderator variables. The last section of the chapter presents the conclusions.

7.1 Overview of This Research

The purpose of this study was to determine factors affecting user acceptance of internet banking service by using UTAUT model. This thesis were developed and empirically tested a hypothesized model for understanding the factors that influence users' intention to use an internet banking services in a proper way. By extending the UTAUT model in the context of internet banking services, this research incorporated factors from other well-known theories and models applied in IS research stream. Given this background, the main objectives of the research included identifying factors that influence users' intention to accept an internet banking services, developing a model of factors influencing users' beliefs toward the internet banking acceptance, and testing the hypothesized 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 internet banking services is affected by user intention, which included performance expectancy (PE), effort expectancy (EE), social influence (SI) from UTAUT, and ability (IBA, AC, ICQ, and IBC) from other models. Demographic variables were proposed to moderate the effects of PE, EE, SI, and ability on the behavioral intention (BI) to use internet banking services. In order to

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

The unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al. 2003) is one of the latest developments in the field of general technology acceptance models. Like earlier acceptance models, it aims to explain user intentions to use an IS and increase usage behavior. Venkatesh et al. (2003) developed this synthesized model to present a more complete picture of the acceptance process than previous individual models. Hence, the UTAUT was selected as a base model. However, it was identified that the UTAUT core constructs i.e. PE, EE, SI, and FC were not sufficient to explain an internet banking service's acceptance and usage behavior; therefore, this study replaced facilitating condition by ability which included four dimensions i.e. IBA, AC, ICQ, and IBC 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 exiting measurement scales reported by previous studies. Prior to using questionnaire in the main survey, one pre-test was conducted. The purpose of pre-test 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 4.7 of Chapter 4). The scales were revised and modified where necessary. A final sample of 207 responses was used for data analysis. The data collected was then analyzed using two statistical software tools i.e. SPSS and AMOS. The SPSS version 22 was used for the descriptive analysis and exploratory factor analysis while the AMOS version 20 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 hypothesized relationships between the constructs were examined by structural equation modelling. A three-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 hypothesized structural model was assessed using the path analysis technique for testing the hypothesized causal relationships among the constructs proposed in the research model. And in the third stage multiple group analysis was used to test demographic variables as a moderator variables. The proposed research model was found to be valuable in explaining the acceptance of the internet banking services (IBS) by potential users and adequately fit the data.

The results of this study largely support the hypothesized relationships proposed in the model. Particularly, the results suggested that PE, EE, and Ability jointly influence the behavioral intentions towards IBSs acceptance, and demographic variables as a moderate variables. 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 organized around hypotheses testing results and findings in respect to the proposed hypothesized research model. This is followed by the conclusions of this chapter.

7.2 Discussion

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

7.2.1 Response Rate

This research employed a quantitative approach using a cross-sectional survey for collecting data. Out of 375 surveys distributed, 289 surveys were returned; however, only 207 responses were included in the data analysis while the remaining 82 surveys were incomplete; hence, they were discarded. Thus, the final response rate was 55.2%. The overall useable response rate 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 is reasonably higher than that of in earlier studies on internet 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 research can be considered relatively better than the previous studies mentioned above.

7.2.2 Participants' Demographic Characteristics

The results of participants' demographic characteristics revealed that the majority of the respondents were male (76.3 %). 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 internet banking users than female in Sudan. 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 53.1% per cent of respondents in this survey was between 25 years and 34 years. This finding suggests that the majority (about 53%) of the

internet banking users in Sudan 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 54.1% of the respondents were working as private sector employees, public (government) sector employees (24.2%), business (11.6%), and student (5.8%).

The findings also revealed that the level of education of the most majority of the participants were a bachelor's degree and above (about 85 %), which was higher compared to an average citizen in Sudan where the literacy rate is low i.e. 54 %, (World Bank, 2008). These findings suggest that the internet banking users in Sudan 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 5.7, chapter 5) revealed that about 59.2% of participants had monthly income < 3,000 SDG, which is considered lower income in Sudan where the average monthly salary of the population is low (World Bank, 2008). This finding suggests that the internet access and usage in Sudan is skewed in favor of people with lower income and that in employment and in business. However, these research findings also suggest that people with these characteristics are the people who are more likely to use and accept the internet banking services.

Finally, the table 5.6 revealed that 31% of respondents had experience 5 years and less than 10 years, which is considered simple experience.

In this research, the acceptance of internet banking services was studied using a hypothesized 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.

7.2.3 Constructs and Items

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

Behavioral Intention (BI)

The findings revealed that the mean scores for three measured items for this scale were between 1.58 (±0.676) and 1.63(±0.698), which reflected participants' strong behavioral intentions toward use of an internet banking services. Item BI2 stating 'I intend to continue using the internet banking services in the future' was rated highly, while item BI1 related to the 'Given that I expect my use of internet banking services continue in the future' was rated low (see Table 5.18 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 internet banking services. In addition, Cronbach's Alpha coefficient for this constructs was 0.905 (as shown in Table 5.30a). This finding suggests strong internal consistency of the measurement items of BI construct.

Performance Expectancy (PE)

For this construct, perceptions of the research participants were measured by four items. The item 'using IBS will enable me to accomplish transaction more quickly' (PE2), was rated lower among the respondents, with mean score 1.52, as shown in Table 5.11 of chapter 5. On the other hand, the item 'using IBS will increase my productivity' was rated lowest by the participants of the survey (PE3). However, overall, the findings revealed that all items relating to this construct were rated

low by the respondents and the mean score for all four items was between 1.52(±0.582) and 1.76(±0.729), which suggested that the sample agreed with the PE of internet banking services. The participants might have compared the PE of the internet banking with conventional methods of banking. Thus, their lower ratings of it suggest that they perceive internet banking services more efficient and useful than the conventional banking methods. Furthermore, the Cronbach's alpha estimate value of PE construct was .806 (see Table 5.23a), which indicated that this construct had strong reliability of the measurement item.

Effort Expectancy (EE)

Four items were used to measure the EE construct and their mean ratings were between 1.61(±0.636) and 1.88(±0.794), which are greater than the neutral scale point (i.e. 3), and thus reveals that individual respondents agreed with the construct items. The item (EE3) with wording 'learning to use IBS will be easy for me' had lower ratings than other measurements in the construct, with the mean score 1.61, as shown in Table 5.12 of Chapter 5. This finding indicated that respondents were confident of their ability to learn new systems, and thus rated it lower. The item code named EE4 with wording 'I find it to get to the IBS system to do what I want, was rated very low. This finding indicated that respondents believe it would not be easy to interact with IBS; this might be due to the complex nature of IBS, as it involves financial transactions. However, the overall mean score of the items of this construct was 1.75, which suggested that the sample agreed that internet banking services were easy to learn, understand and use, which might suggest higher implications for the acceptance of internet banking services. Additionally, the reliability of measurement items of used in this construct was high with the .742 Cronbach's alpha value.

Social Influence (SI)

The social influence construct was measured by four items on a five point Likert scale. The overall mean score of all items of this construct was between 2.31 (±1.359) and 2.66 (±1.067), which suggested that some respondents had reservations about their opinions in effect SI on the IBS acceptance. This was evident from the high mean rating (2.66 ±1.067) for item SI1 i.e. people who influence my behavior think that I should use IBS, which might suggest that respondents were concerned about the social influence of the internet banking services. This finding is not surprising because the SI is the major issue that have been found to greatly influence users' acceptance of internet technologies especially in the financial and business sectors. In addition, the reliability statistics of the SI construct (as shown Table 5.25a) indicated .876 Cronbach's alpha reliability for this construct, which shows strong internal consistency of measurement items of this construct.

Internet Banking Awareness (IBA)

This construct was measured through four items and the results showed that the mean rating for the items of this construct were between 1.82 (±0.707) and 2.23 (±0.961). The measurement item (IBA4) 'I am well informed about the benefits of using IBS' was rated lower by the respondents, whereas, the item (IBA2) worded as 'I have sufficient information regarding the various products offered by IBS ' had low ratings among respondents. The average mean score of four items was 2.11, which was less than the neutral point, reflected that respondents were agreeable to the measured items and they had the internet banking awareness to use internet banking services. In addition, the construct also showed strong internal consistency of measurement items with .883 reliability statistics, as shown in Table 5.26a (chapter 5).

Accessibility (AC)

Three items measurement tool was used to measure the accessibility construct and the mean ratings for the items were between 1.89 (±0.793) and 2.27 (±0.937), which suggested that the participants agreed with these items. Overall, ratings of the measured items of this construct suggested that this sample did not agree that there was any problem of access and restriction to the internet banking in Sudan. Cronbach's alpha coefficient value for accessibility was .695. Although this value was down the strict cut off point of this research (i.e. < =.7), however, it was lower compared to other constructs. This might be because of the three items used to measure this construct.

Internet Connection Quality (ICQ)

This construct was measured through four items and the results showed that the mean rating for the items of this construct were between 1.91 (±1.001) and 2.32 (±0.022). The measurement item (ICQ3) 'the internet enables customers to access the bank's website 24\7' was rated low by the respondents, whereas, the item (ICQ1) worded as 'the internet enables to handle my online financial transactions accurately' had high ratings among respondents. The average mean score of four items was 2.105, which was less than the neutral point, reflected that respondents were agreeable to the measured items and they believes that the internet connection quality is good to use internet banking services. In addition, the construct also showed strong internal consistency of measurement items with .832 reliability statistics, as shown in Table 5.28a (chapter 5).

Internet Banking Cost (IBC)

This construct was measured through four items and the results showed that the mean rating for the items of this construct were between 3.57 (±1.171) and 3.94 (±1.015). The measurement item (IBC4) 'using IBS does cause a burden to me' was

rated highly by the respondents, whereas, the item (IBC2) worded as 'the wireless link fees are expensive when using IBS' had low ratings among respondents. The average mean score of four items was 3.73, which was greater than the neutral point, reflected that respondents were disagreeable to the measured items and they believes that the internet banking cost to use internet banking services is suitable. In addition, the construct also showed strong internal consistency of measurement items with .880 reliability statistics, as shown in Table 5.29a (chapter 5).

7.2.4 Hypotheses Testing

IBS 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 operationalize system usage, particularly when objective usage metrics are not available. With regard to the UTAUT research predicting new IT/IS acceptance, usage is often measured by Behavioral Intention (BI) (Mathieson, 2001). Thus, this research considered 'intention to use IBS' as the dependent variable, rather than actual use, for the reason that in the original UTAUT, PE,EE and SI 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 research helped to explain the relationships between predictor variables and the outcome variable i.e. behavioral 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 performance expectancy (PE = 0.279), effort expectancy (EE = 0.397), social influence (SI = 0.397) and ability (ability = 0.288). Among these direct predictors of BI, the ability was found most significant determinant followed by the PE, EE and then the SI.

A total of 28.1 per cent of the variance in the ability construct was predicted by the IBA (0.453), AC (0.234), ICQ (0.356), and the IBC (0.194). The next section presents a detailed discussion about hypotheses testing.

Performance Expectancy and Behavioral Intention to Use

In the proposed model, this research hypothesized that performance expectancy will have a positive effect on the behavioral intention to use an internet banking services in Sudan (H1). The parameter estimate results (H1: PU → BI; $\beta = 0.251$, t-value = 3.222, $p = 0.001$) for the above hypothesis was found positive and statistically significant. This suggested existence of a positive effect of the PE on the behavioral intention to use an internet banking services. As such, this hypothesis was accepted. This hypothesis was drawn from the original UTAUT model (as described in chapter 3). As implied in the UTAUT, PE was found to have a significant direct effect on the intended usage behavior. The results of this research are consistent with the UTAUT findings and with those of prior researches.

Several studies have provided empirical evidence of a significant effect of the PE on the IS acceptance and usage (Davis, 1989; Pikkarainen et al. 2004; Wang et al., 2003; Chan and Lu, 2004). The PE is often found to have a significant relationship with intention to use. This significance of PE in this research suggested that users think that the internet banking services is useful hence it is more likely to be accepted. These results further suggested that users' positive beliefs about PE are a driving force for the acceptance of an internet banking services. In summary, the result of this hypothesis are in agreement with the prior researches indicating that the PE plays an important function in determining and shaping the behavioral intent of users to perform internet banking transactions.

Effort Expectancy and Behavioral Intention to Use

In this research, the proposed model hypothesized that the effort expectancy will have a positive effect on the intention to use an internet banking services in Sudan (i.e. H2).

The parameter estimate results ($\beta = 0.233$, t-value = 2.378, $p = 0.017$) for the hypothesis H2 (i.e. EE → BI) were found statistically significant. Consequently, this hypothesis was accepted. This hypothesis was drawn from UTAUT and as explained in the chapter two, the UTAUT posits that EE was important factor that affects the behavioral intention towards the acceptance of new information systems (Davis et al., 1989; Mathieson, 1991). Previous studies have empirically shown the existence of a positive correlation between the beliefs of EE and the system usage of the new information systems (Mathieson, 1991; Adams et al., 1992; Igbaria et al., 1997; Davis, 1989) and the internet banking services (Alsajjan and Dennis, 2010; Wang et al., 2003; Pikkarainen et al., 2004). Consistent with the empirical findings of prior research, this research confirmed presence of a significant impact of the EE on BI to use an internet banking services (IBS). This research therefore provided empirical evidence to support the earlier findings that the effort expectancy was a significant predictor of the intention to use the IBS.

Social Influence and Behavioral Intention to Use

Social influence in this research was hypothesized to have a positive effect on the behavioral intention. The parameter estimate results ($\beta = 0.021$, CR = 0.647, $p = 0.518$) revealed that this hypothesis (H3: SI → BI) was statistically not significant. Therefore, this hypothesis is not supported but it was rejected. This research suggested that social influence does not have a significant effect on users' beliefs of behavioral intention, which may imply that users do not relate SI with BI with regard to an internet banking services. Although previous studies have asserted a significant

relationship between SI and BI (Davis et al., 1992), the results of the present research suggest that SI was not a significant determinant of BI which, in turn, does not significantly influence users' intentions toward acceptance of an IBS. One plausible explanation for inconsistent results centering on the relationship between SI and BI may be that the respondents may not had social influence (i.e., people who influence my behavior, people who are important me, the bank staff, and the branch) with the IBS. Jasperson 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 IBS may possibly assist users in formulating their beliefs about the system's characteristics (SI), which, in turn, will support users in their task performance.

Ability and Behavioral Intention to Use

The model in this research hypothesized that Ability will have a positive effect on behavioral intention toward the internet banking services acceptance (H4). The parameter estimate results ($\beta = 0.489$, CR = 4.053, $p = 0.000$) for the hypothesis i.e. H4: Ability → BI showed that the hypothesised association was statistically significant ($p = 0.000$); thus, this hypothesis was supported. These results suggest that the ability has a significantly positive effect on the behavioral intention, which implies that ability is an important factor that determines the behavioral intention perceptions toward acceptance of internet banking services (IBS). This result is in agreement with the findings of previous researches (Karahanna and Straub, 1999). As mentioned earlier, the research model in this research proposed that ability would have an effect on the BI which, in turn, would exert a positive impact on the BI to use an IBS. This research has therefore provided the empirical evidence to support the proposition that ability affects users' beliefs on the IBS.

7.2.5 Discussion of Results Related to the Impact of Moderators

This section is devoted to the discussion of the impact of moderators on the relationships in the model. The moderators refer to respondents' demographics such as gender, age, education, experience, and income level. The discussion is organized around the impact of each demographic variable in model.

Gender Impact

The measurement invariance testing for the model resulted in gender invariance on the measurement weight level and the structural weight level indicating that gender is not a moderator for behavioral intention to use internet banking services in Sudan. The latent mean analysis showed that males have higher mean scores compared to females and that these scores are significantly different with respect to performance expectancy, social influence, ability and behavioral intention (Table 6.3), which indicates that these variables are rated higher by males than by females. In view of the recent research findings (Morris et al., 2005; Venkatesh et al., 2003; Morris & Venkatesh, 2000) and the fact that respondents in the current research are actual users with prior computer and Internet knowledge, the non-moderating effects of gender confirm the conceptualization that under discretionary conditions and with increased experience, gender differences tend to fade away. The gender results in the current study confirm findings reported in similar conditions.

Age Impact

The invariance analysis showed that the model is not invariant at the measurement level and the structural weights level. Hence, age is a moderator for behavior intention to use Internet banking services in Sudan.

The latent mean analysis showed that the younger age group mean scores were significantly higher than the mean scores of the older group, except for two variables,

effort expectancy and social influence (Table 6.6). This indicates that effort expectancy and social influence are rated higher by the older adults.

The results can be interpreted in light of the age ranges comprising the two groups in the sample. In the current study, the two age groups in sample, according to this age categorization, fall within the "Younger age": less than 34 years, the second age group is 34 years and more (refer to appendices for frequency tables). This result consistent with

Experience Impact

The measurement invariance testing for the model resulted in education invariance on the measurement weight level and the structural weight level indicating that the experience years is a moderator for behavioral intention to use internet banking services in Sudan.

The latent mean analysis indicated that respondents with a less than 10 years have significantly higher mean scores than individuals with 10 years and more (Table 6.9). The hypothesized moderating effect of experience on the paths EE → BI and SI → BI were supported for those that have experience less than 10 years produced significant path estimates. whereas, the hypothesized moderating effect of experience regarding path PE → BI was supported for those that have experience 10 years and more because estimates were significant. Whereas, the hypothesized moderating effect of experience regarding Ability → BI was supported for both groups of experience produced significant path estimates.

Education Impact

The measurement invariance testing for the model resulted in education invariance on the measurement weight level and the structural weight level indicating that the educational level is a moderator for behavioral intention to use internet banking services in Sudan.

The latent mean analysis indicated that respondents with an undergraduate level have significantly higher mean scores than individuals with graduate level (Table 6.12). The hypothesized moderating effect of education on the paths EE → BI and SI → BI were supported for undergraduate level of education produced significant path estimates. Also, the hypothesized moderating effect of education regarding path PE → BI was supported for graduate level of education because estimates were significant. Whereas, the hypothesized moderating effect of education regarding path Ability → BI was supported for both levels of education produced significant path estimates.

Income Impact

The measurement invariance analysis showed that the model are invariant on the measurement weights level and the structural weights.

The latent mean analysis showed that the lower income group have higher mean scores compared to the higher income group. All mean scores were significantly different except EE, indicating that the variables were rated higher by lower income group.

The hypothesized moderating effect of experience on the paths EE → BI and SI → BI were supported for those that have income less than 3,000 SDG produced significant path estimates. And the hypothesized moderating effect of income regarding path PE → BI was supported for those that have income 3,000 SDG and more because estimates were significant. Whereas, the hypothesized moderating effect of income regarding Ability→ BI was supported for both groups of income produced significant path estimates.

This part of discussion covered the impact of moderators, specifically gender, age, education, experience, and income per month, on the model. It is concluded that demographics exhibit moderating effect, for the sample, in the context of the

extended UTAUT. However, age is not moderator for the sample. The findings regarding gender none moderating effects confirm previous research findings: with increased experience and under none mandatory usage condition, the gender differences tend to disappear (Morris et al., 2005).

7.3 Limitations of the Study

Although this study provides contributions from both a theoretical and practical perspective, there are a few limitations. The first limitation is the scope of study is limited to 207 customers of internet banking all of them individuals, and not extending to business customers. The second limitation is that since same study was not carried out in Sudan before, it well be difficult to get secondary data. The study had solved to the problem by searching any secondary data that has relevance to the study in other regions. The third limitation is the questionnaires for this study is developed in English language whereby most of respondents are not familiar with the language. Therefore, the study had to do double-job which is changing in between the two language Arabic and English and testing to ensure the validity and reliability. Finally, the scope of the study was limited to customers in Khartoum. Some of the respondents refused to take part in this study while others claimed not having a time to fill the questionnaire.

7.4 Future Research

This study has developed an integrated model that provided systematic way to understand acceptance of internet banking services by intended users, several beneficial areas for future research, however, remain to be explored. For example, results of current study are limited to internet banking services; future research may apply or replicate this research in other electronic banking services, such as mobile

banking, ATMs, telephone banking, and credit cards. 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 research in other cultural setting, like other African developing countries.

Another direction for further research could be the selection of dependent variable to measure the IBS acceptance. For example, this research used intention to use as dependent variable to measure the acceptance of IBS in Sudan, although it was consistent to previous studies (Davis, 1991; Gefen and Straub, 2000; Shih, 2004), future research is needed to measure actual usage of IBS rather than intention to use. Future research could also be conducted to expand the research model by including additional factors. For example, trust has been found as one of the significant factor influencing IBS (Lee et al. 2000).

7.5 Research Implications

The implications of the results of this research are presented under two headings i.e. theoretical implications and managerial implications, which are described as follows

7.5.1 Theoretical Implications

- This research applied an amalgamated UTAUT model in a new context of the IBS acceptance in developing economy settings.
- This research provided integrated model for IBS acceptance, which can be also applied for explaining other e-banking acceptance and usage behavior studies such as mobile banking or other e-banking services.
- This research has provided extended knowledge in the domain of technology acceptance literature for a developing countries like Sudan.

- This research attempted to minimize the paucity of the studies in the domain of electronic banking from the developing countries perspective.

7.5.2 Managerial Implications

- This research has provided useful information and valuable to banks and IBS designers to better understand the IBS users' needs and in order to improve internet banking services.
- This research signifies that ability of IBS use was identified as the most influential factor; hence banks should develop IBS which are enable the customers to use it.
- This research emphasized to provide users secure services to perform banking transactions electronically to develop their trust and confidence in internet banking services.
- This research suggested the trust as another important determinant of internet banking services, thus management and designers take into consideration the aspect of trust as one of the important factors to develop effective internet banking services.

7.6 Research Contributions

The contribution of this work lies in several areas of implementation and empirical analysis. First, in implementation, the research examined the viability of the UTAUT model, which was established in a western culture, in explaining a similar behavior in a non-western culture. Second, the research implemented the model, which was established in an organizational context and applied it to a voluntary type of usage behavior. Third, the research extended the UTAUT model to account for the online behavior. The extension comprised decomposing the technical sources dimension of the facilitating condition construct of the UTAUT and replacing it with

the ability variable. Fourth, the current work validated the UTAUT measures as developed by its authors, in addition to supporting the interrelationships among the key constructs in technology acceptance research.

The empirical analysis of this research contributed to knowledge in this area of research. First, the current work introduced the ability construct as a higher-order structure. The higher-order structure has not been often employed in the technology acceptance literature. Most work published in respect to utilizing higher-order structures in the structural equation modelling techniques context comes from the Psychology discipline. Second, the current research introduced and validated the ability structure for the sample. Third, the research utilized a structural equation analytical technique that permits a concurrent assessment of the adequacy of the measurement model and the conceptual model used to assess the target behavior. Specifically, the research employed confirmatory factor analysis to validate the measurement model with the higher-order structure incorporated in the proposed research model. Fourth, studies only recently began examining invariance using the mean and covariance structure analysis, which is an important advanced technique in answering questions related to group comparison or differences among culture and demographics such as gender. The current research utilized two types of group analysis using SEM technique: measurement and structural weights invariance using the covariance structure analysis, and the mean and covariance structure analysis, to examine the impact of moderators on the research model for both countries' models.

The research provided a theoretical understanding of how perceptions of the ability (e.g., internet banking awareness, accessibility, internet connection quality, and internet banking cost) are considered important factors to IBS acceptance among customers in Sudan.

While previous research has focused on TAM's transferability and although the aggregated model succeeded TAM, little research has utilized the UTAUT model or attempted testing its viability in different contexts than where it was established or for which it was tested. As a consequence, the current research contributes to theory by providing a new perspective to the UTAUT by exhibiting that previously established relationships among TAMs' constructs are also valid the key constructs in the UTAUT model. This is considered a new addition to our understanding with respect to the unified theory of acceptance and use of technology.

Finally, the current research expands knowledge in the area of IT adoption and usage within developing nations' culture, specifically that of Sudan, while utilizing the parsimonious version of the UTAUT and its proposed extension.

7.7 Conclusion

In conclusion, the researcher presents how the current research objectives have been realized in light of the previous elaborated discussion of results and the nature of the non-western location of the study.

The research proposed an extension to the UTAUT model that accounts for the utilization of the unified model within the online behavior contexts. The proposed extension, ability perceptions, multidimensional and interrelated nature as a concept has resulted in its introduction as a higher-order structure, which was successfully integrated into model. The results showed that the ability structure has an impact on the behavioral intention to use IBS and that its total impact is greater than any other construct in the model. These results demonstrate the success of the proposed extension in achieving the objectives of this current work.

The primary focus of this research was to address the applicability of the UTAUT, which was established in developed nations, to other developing nations. The general perception is that most technologies that are designed and produced in

developed countries are culturally-biased in favor of those developed countries' social and cultural systems (Hill et al., 1998). This bias may apprehend the applicability of these technologies when transferred to other culturally different societies. However, technologies advancements in the past fifteen years, since the commercialization of the Internet and the materialized benefits of the revolutionary communication technologies, made it practically impossible for businesses globally to disregard these advantages or eschew the Internet channel. The competitive pricing climate and the state initiative project, making ICT available for all, resulted in facilitating a countrywide embrace of communication technology.

Perhaps the advancement in the communication technology was the more readily transferable. If the world is becoming smaller because of the Internet and the telecommunications revolution, it is natural that information flowing freely changes Sudanese' perceptions and expectations. Therefore, where the digital divide is minimizing based on ICT distribution; it is acceptable that the UTAUT model be used for predicting technology acceptance in a non-western nation such as Sudan. This fulfils the first research objective.

As such, this work has added to the understanding of technology adoption within theories of technology acceptance research and in discretionary online behavior contexts. The extended model provides an avenue to conceptualize how various ability choices might influence the overall ability perceptions through the attributes of the four quality dimensions. This provides an approach for linking ability perceptions to their ultimate effects on systems' effort and performance expectancy, and usage in the context of the Internet banking environment.

In summary, this work supports the application of the UTAUT in Sudan culture, albeit subject to some reservations concerning the generalizability of the measurement weights and moderators' impact.

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بسم الله الرحمن الرحيم

Sudan University of Science and Technology
جامعة السودان للعلوم والتكنولوجيا
College of Graduate Studies
كلية الدراسات العليا

Dear respondent,

I am a PhD student under the supervision of Dr. Babekir Elfaki Elmansour, and Dr. Mohamed Hamed Mahmoud co-supervisor. At Department of Banking & Finance, College of Business Studies, Sudan University of Science and Technology, Khartoum, Sudan.

We would like to invite you to be a part of research. This research entitled: ***Customers' Acceptance of Internet Banking Services in Sudan: Using the Unified Theory of Acceptance & Use of Technology (UTAUT) Model.*** The objective of this research is to identify to factors influencing the customers' acceptance of internet banking services in the banks operating in Sudan.

We would appreciate hearing your opinion about internet banking services. This research will require that you complete a questionnaire. The information that you provide will be kept confidentiality and would be used for research purpose only.

Your help would be greatly appreciated, thank you very much for your time and cooperation.

عزيزي\ عزيزتي المستجيب

السلام عليكم ورحمة الله تعالى وبركاته

انا طالب دكتوراه تحت إشراف الدكتور ***بابكر الفكي المنصور*** كمشرف رئيسي، والدكتور ***محمد حمد محمود*** مشرف مساعد. قسم البنوك والتمويل – كلية الدراسات التجارية – جامعة السودان للعلوم والتكنولوجيا – الخرطوم – السودان.

إختارناك كجزء من هذه الدراسة، بعنوان: ***قبول العملاء لخدمة الإنترنت المصرفي في السودان: باستخدام نموذج النظرية الموحدة لقبول واستخدام التكنولوجيا***. تهدف هذه الدراسة للتعرف علي العوامل المؤثرة على قبول خدمة الانترنت المصرفي في البنوك العاملة في السودان. لتحقيق هذا الهدف يتطلب ملأ الإستبانة بالكامل، علماً أن المعلومات التي تقدمها ستكون في سرية تامة وتستخدم لأغراض البحث العلمي فقط.

نشكرك على حسن تعاونك

If you have any questions or concern, please contact me on:
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Researcher

الباحث

Part one: personal information **الجزء الاول: المعلومات الشخصية**

1. **Gender: النوع**

   Male ☐ ذكر Female ☐ أنثى

2. **Age: العمر**

   Less than 25 yrs ☐ أقل من 25 سنوات 25 – 34 yrs ☐ 25 – 34 سنة

   35 – 44 yrs ☐ 35 – 44 سنة 45 – 54 yrs ☐ 45 – 54 سنة

   55 yrs and more ☐ 55 سنة فأكثر

3. **Education: المستوى التعليمي**

   Basic ☐ أساس Secondary school ☐ ثانوي Diploma ☐ دبلوم وسيط

   Bachelor ☐ بكلاريوس High diploma ☐ دبلوم عالي Master ☐ ماجستير

   Doctorate ☐ دكتوراه Other (specify): ……..…… أخرى (أذكرها):.

4. **Marital status: الحالة الزواجية**

   Married ☐ متزوج Single ☐ عاذب

5. **Occupations: الوظيفة**

   Student ☐ طالب Public Sector ☐ قطاع عام Private Sector ☐ قطاع خاص

   Business ☐ أعمال حرة Other (Specify):…… أخرى (اذكرها)

6. **Experience: الخبرة**

   Less than 5 yrs ☐ أقل من 5 سنوات

   5 yrs and less than 10 yrs ☐ 5 وأقل من 10 سنوات

   10 yrs and less than 15 yrs ☐ 10 وأقل من 15 سنة

   15 yrs and less than 20 yrs ☐ 15 وأقل من 20 سنة

   20 yrs and more ☐ 20 سنة فأكثر

7. **Income per month: الدخل الشهري**

   Less than 1,000 SDG ☐ أقل من 1,000 جنيه

   1,000 and less than 3,000 SDG ☐ 1,000 وأقل من 3,000 جنيه

   3,000 and less than 5,000 SDG ☐ 3,000 واقل من 5,000 جنيه

   5,000 and less than 10,000 SDG ☐ 5,000 وأقل من 10,000 جنيه

   10,000 SDG and more ☐ 10,000 جنيه فأكثر

8. Information about computer and internet: معلومات عن الكمبيوتر والانترنت

Please tick (√) in front of the answer that suits your status: ضع علامة (√) امام الإجابة التي تناسبك

8.1. How do you describe your general computer knowledge? معرفتي بالكمبيوتر بشكل عام

Very poor ☐ فقير جداً Poor ☐ فقير Moderate ☐ متوسط

Good ☐ جيد Very good ☐ جيد جداً

8.2. How would you describe your internet knowledge? معرفتي بالانترنت

Very poor ☐ فقير جداً Poor ☐ فقير Moderate ☐ متوسط

Good ☐ جيد Very good ☐ جيد جداً

8.3. How long have you been using the internet? فترة استخدامي للانترنت

Less than 1 yrs ☐ أقل من سنة 1 – 2 yrs ☐ 2 – 1 سنة

3 – 5 yrs ☐ 5 – 3 سنة More than 5 yrs ☐ أكثر من 5 سنوات

8.4. How often do you use the internet per day? غالبا استخدم الانترنت يومياً حوالي

Don't use ☐ لا استخدمه 1 – 2 hrs ☐ 2 -1 ساعة

3 – 4 hrs ☐ 4 – 3 ساعات More than 4 hrs ☐ أكثر من 4 ساعات

Part two: items of variables الجزء الثاني: عبارات المتغيرات

Please tick (√) in front of the answer that suits your status: ضع علامة (√) امام الإجابة التي تناسبك

N	Items العبارات					
	Performance Expectancy الأداء المتوقع	**Strongly agree موافق بشدة**	**Agree موافق**	**Neutral محايد**	**Disagree لا اوافق**	**Strongly disagree لا اوافق بشدة**
1	I expect internet banking services (IBS) will be useful in my life. أتوقع أن خدمة الانترنت المصرفي سيكون مفيد لي في حياتي.					
2	Using IBS will enable me to accomplish transaction more quickly. استخدام خدمة الانترنت المصرفي سيمكنني من تنفيذ معاملاتي المالية بسرعة.					
3	Using IBS will increase my productivity. استخدام خدمة الانترنت المصرفي سيزيد من انتاجيتي (أداء المزيد من أعمالي).					
4	If I use IBS I will increase the quality of my banking services output at minimal efforts. إذا استخدمت خدمة الانترنت المصرفي سيزيد من قدرتي على الاستفادة من الخدمات المصرفية بأقل جهد.					
	Effort Expectancy الجهد المتوقع	**S. agree موافق بشدة**	**Agree موافق**	**Neutral محايد**	**Disagree لا اوافق**	**S. disagree لا اوافق بشدة**
1	I expect my interaction with IBS will be understandable. أتوقع أن تفاعلي مع خدمة الانترنت المصرفي سيكون مفهوم.					
2	I expect it would be easy for me to become skillful at using IBS. أتوقع أن يكون خدمة الانترنت المصرفي سهل لاصبح ماهر في استخدامه.					

3	Learning to use IBS will be easy for me. تعلّم استخدام خدمة الانترنت المصرفي سيكون سهل بالنسبة لي.					
4	I find it easy to get to the IBS system to do what I want. اجد نظم الخدمات المصرفية الالكترونية سهلة لكي افعل ما اريد.					
	التأثير الإجتماعي Social Influence	**S. agree** **موافق بشدة**	**Agree** **موافق**	**Neutral** **محايد**	**Disagree** **لا اوافق**	**S. disagree** **لا اوافق بشدة**
1	People who influence my behavior think that I should use IBS. الاشخاص المؤثرين على قراراتي يعتقدون أنه يجب أن استخدم الانترنت المصرفي.					
2	People who are important to me think that I should use IBS. الاشخاص المهمين بالنسبة لي يعتقدون أنه يجب أن استخدم الانترنت المصرفي.					
3	The bank staffs is helpful in the use of IBS. موظفي البنك يقدمون المساعدة للعملاء في استخدام الانترنت المصرفي.					
4	The branch encourages the use of internet channel. فرع البنك يشجع العملاء على استخدام خدمة الانترنت المصرفي.					
	Internet Banking Awareness **الوعي بخدمة الانترنت المصرفي**	**S. agree** **موافق بشدة**	**Agree** **موافق**	**Neutral** **محايد**	**Disagree** **لا اوافق**	**S. disagree** **لا اوافق بشدة**
1	I have sufficient information about (IBS). أمتلك معلومات كافية عن خدمات الانترنت المصرفي.					
2	I have sufficient information regarding the various products offered by IBS. أمتلك معلومات كافية فيما يتعلق بالخدمات المتعددة المقدمة عبر الانترنت المصرفي.					
3	I have sufficient information regarding the use of internet banking. أمتلك معلومات كافية فيما يتعلق باستخدام الانترنت المصرفي.					
4	I am well informed about the benefits of using IBS. اعلم جيدا بفوائد استخدام الانترنت المصرفي.					
	إمكانية الوصول الى خدمة الانترنت المصرفي Accessibility	**S. agree** **موافق بشدة**	**Agree** **موافق**	**Neutral** **محايد**	**Disagree** **لا اوافق**	**S. disagree** **لا اوافق بشدة**
1	The internet banking services is accessible. خدمة الانترنت المصرفي ممكن الوصول اليه.					
2	My access to the internet banking services is unrestricted. وصولي لخدمة الانترنت المصرفي غير مقيد.					
3	I find it easy to get access to the internet banking services. من السهل الوصول الى خدمة الانترنت المصرفي.					
	جودة الاتصال بالانترنت Internet Connection Quality	**S. agree** **موافق بشدة**	**Agree** **موافق**	**Neutral** **محايد**	**Disagree** **لا اوافق**	**S. disagree** **لا اوافق بشدة**
1	The internet enables to handle my online financial transactions accurately. الانترنت يمكنني من التعامل مع معاملاتي المالية الالكترونية بدقة.					
2	Using the internet for handling online financial transactions is efficient. استخدام الانترنت للتعامل مع المعاملات المالية الالكترونية كفء.					

3	The internet enables customers to access the bank's website 24\7. الانترنت يمكن العملاء من الدخول لموقع البنك 24 ساعة خلال الاسبوع.					
4	Internet guarantees that all transactions to the bank have been completed. الانترنت يضمن ان كل المعاملات مع البنك قد اكتملت.					
	تكلفة استخدام الانترنت المصرفي Cost	**S. agree موافق بشدة**	**Agree موافق**	**Neutral محايد**	**Disagree لا اوافق**	**S. disagree لا اوافق بشدة**
1	The cost of using IB is higher than using other banking channels. تكلفة استخدام الانترنت المصرفي أعلى من تكلفة استخدام القنوات المصرفية الاخرى.					
2	The wireless link fees are expensive when using IB. تكلفة الاتصال بالشبكة أغلى عند استخدام الانترنت المصرفي.					
3	The sources setup to using IB charged me lot of money. تحميل البرامج لاستخدام الانترنت المصرفي يكلفني مبالغ كبيرة.					
4	Using IB services does cause a burden to me. استخدام خدمات الانترنت المصرفي يرهقني بالتكاليف.					
	نية استخدام الانترنت المصرفي Behavioral Intention	**S. agree موافق بشدة**	**Agree موافق**	**Neutral محايد**	**Disagree لا اوافق**	**S. disagree لا اوافق بشدة**
1	I expect my use of IBS to continue in the future. اتوقع ان يستمر إستخدامي للانترنت المصرفي في المستقبل.					
2	I intend to continue using IBS in the future. انوي الاستمرار في استخدام الانترنت المصرفي في المستقبل.					
3	I will strongly recommend others to use IBS. سأوصي الآخرين بشدة على استخدام الانترنت المصرفي.					

Part three: the actual use of internet banking: الجزء الثالث: الإستخدام الفعلي للانترنت النصرفي

Please tick (√) in front of the answer that suits your status ضع علامة (√) امام الإجابة التي تناسبك

1. I have a bank account for? لدي حساب في البنك منذ حوالي

   Less than 5 yrs ☐ أقل من 5 سنوات 5 – 10 yrs ☐ 5 – 10سنوات

   11 - 15yrs ☐ 11 -15 سنة 16 – 20 yrs ☐ 16 – 20 سنة

   More than 20 yrs ☐ أكثر من 20 سنة

2. How long have you been using the internet banking ? استخدم خدمة الانترنت المصرفي منذ

   Less than 6 months ☐ أقل من 6 شهور 6 – 12 months ☐ 6 – 12 شهر

   13 -18 months ☐ 13 – 18 شهر 19 – 24 months ☐ 19 – 24 سهر

   more than 24 months ☐ أكثر من 24 شهر

3. I use internet banking mainly استخدم الانترنت المصرفي بشكل رئيسي

   at home ☐ في المنزل at work ☐ في مكان العمل in a bank ☐ في البنك

   at school or university ☐ في المدرسة او الجامعة in a friend's place ☐ مع الاصدقاء

   in a library ☐ في المكتبة other place (specify): ……..…….. في مكان آخر (أذكرها)

4. On weekly basis, how many times do you use internet banking?

أستخدم الانترنت المصرفي بشكل اسبوعي

Not at all ☐ لا استخدمه once a week ☐ مرة في الاسبوع

2 – 3 times ☐ 3 – 2 مرات 4 times and more ☐ أكثر من 4 مرات

5. I use the internet banking for استخدم الانترنت المصرفي ل

N	The services الخدمات	Rarely نادراً	Sometimes احياناً	Continually بإستمرار
1	Balance enquiry. الاستفسار عن الرصيد			
2	Download banking statement. تحميل كشف الحساب			
3	Fund transfer between accounts. تحويل الاموال بين حسابات العميل			
4	Bills payment.(الخ..... سداد الفواتير (كهرباء، ماء، تلفون،			
5	ATMs card request. طلب بطاقة صراف آلي			
6	Cheque book request. طلب دفتر شيكات			
7	Cheque clearing status enquiry. الاستفسار عن شيكات المقاصة			
8	ATMs card notification. التبليغ عن فقدان بطاقة صراف آلي			
9	Book cheque notification. التبليغ عن فقدان دفتر الشيكات			
10	Other (specify): أخرى أذكرها			
11	……..……			
12	……..……			
13	……..……			
14	……..……			
15	……..……			

Thank you