UNIVERSITY OF SOUTHAMPTON
Faculty of Physical Sciences and Engineering
School of Electronics and Computer Science
Electronic and Software Systems

The Factors Impacting the Acceptance of E-assessment by Academics in Saudi Universities

By
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December 2018

Thesis for the degree of Doctor of Philosophy in Computer Science

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بسم الله الرحمن الرحيم

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ABSTRACT

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As assessment is one of the important pillars of the learning process, E-assessment has been introduced to develop the models of assessment and to address some of the limitations and problems of paper-tests. In Saudi higher education, E-assessment has been emerging alongside E-learning systems. At present, few Saudi academics use E-assessment, but the factors that affect these academics' acceptance of E-assessment have not yet been investigated. Therefore, this study aims to find and investigate the factors that influence academics' behavioural intention to accept E-assessment. The theories and models of user acceptance of new technology that help to understand the individual behavioural intention have been reviewed and a Model of Acceptance E-assessment (MAE) proposed based on the models of user acceptance and use of technology and previous studies in the same field.

The MAE consists of: attitude (perceived ease to use, perceived usefulness, and compatibility), subjective norm (peer influence and superior influence) and perceived behavioural control (self-efficacy, resource facilitating conditions, and IT support). These three main factors were used as determinants of academic behavioural intention to accept E-assessment. Age and gender were added to the model as moderating factors. The study followed a sequential mixed methods approach, which gathered qualitative and quantitative data in an ordered sequence and used different data collection tools (interview, questionnaire, and focus group discussion).

The developed model (MAE) was validated through interviewing 15 experts, who confirmed all the factors except gender. Awareness of E-assessment and the existence of a strong security system were suggested by the experts as factors that should added to MAE. Later, an on-line questionnaire was sent to academics in Saudi universities and 306 responses were received from different universities in Saudi Arabia. The model and the relationship between the factors were assessed using Structural Equation Modelling (SEM). The results showed that MAE achieved a good fit with the collected data, and the model's instruments were reliable and valid. Finally, the SEM results were explored by focus groups discussions, among ten Saudi academics. The study found that Attitude is the most affecting factor on academics' behavioural intention to accept E-assessment, and Compatibility has high impact on academics' attitude, followed by perceived ease of use and perceived usefulness, while awareness has no effect on academics' attitude. Subjective norm was found to have a slight effect on academics' behavioural intention to accept E-assessment, and superior influence had a strong impact on subjective norm. Surprisingly, perceived behavioural control was found to have no influence on academics' intention, and only self-efficacy had an effect on perceived behavioural control. Additionally, the results showed that age has an effect on attitude, and slight effect on subjective norm.

The research contributes to the body of knowledge in the fields of technology acceptance research and use of technology to enhance education. The MAE provides a depth understanding of academics' beliefs regarding acceptance of E-assessment that can help developers and educational institutions in Saudi Arabia to be aware of the factors that encourage academics to accept E-assessment before implementing

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DECLARATION OF AUTHORSHIP

I, Nuha Alruwais, declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.
The Factors Impacting the Acceptance of E-assessment by Academics in Saudi Universities.
I confirm that:
1. This work was done wholly or mainly while in candidature for a research degree at this University;

2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;

3. Where I have consulted the published work of others, this is always clearly attributed;

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5. I have acknowledged all main sources of help;

6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;

7. Parts of this work have been published as:

Alruwais, N., Wills, G.B., & Wald, M. (2016). Factors that impact the acceptance and usage of E-assessment by academics in Saudi universities. In *3rd International Conference on Education and Social Sciences (INTCESS2016): Proceeding of the Conference 8th, 9th, and 10th February 2016 at Istanbul.*

Alruwais, N., Wills, G.B., & Wald, M. (2016). Identifying Factors that affect the acceptance and use of E-assessment by academics in Saudi universities. *International e-Journal of Advance in Education (IJAEDU),* 2(4).

Alruwais, N., Wills, G.B., & Wald, M. (2017). Validating factors that impact acceptance and use of E-assessment among academics in Saudi universities. *International Journal of Information and Education Technology (IJIET), 7*(10).

Alruwais, N., Wills, G.B., & Wald, M. (2018). Advantages and challenges of using E-assessment. *International Journal of Information and Education Technology (IJIET),* 8(1).

Alruwais, N., Wills, G.B., & Wald, M. (2018). An Evaluation of the Model of Acceptance of E-Assessment Among Academics in Saudi Universities. *Educational Journal,* 7(2).

Signed: ..... Date:.....

Acknowledgments

First thanks would be to GOD for blessing me give me everything I needed to complete this research. Allah supports me in the hard times and give me the power to continue.

I would like to express my sincere gratitude to my supervisors Dr. Gary Wills and Professor Mike Wald for their guidance through the research period. Their motivation helped me in my hard times and supported me to continue. The successful outcome of this research is due to them. I am pleased to know such knowledgeable individuals.

I would also like to thank my examiners, Dr. David Millard and Dr. Robert Walters, for their insightful comments and guidance that helped in improving this research.

My big thanks also goes to my parents, for their prayers, supporting and showing belief in me. A sincere thanks goes to my husband (Mohammed) and my sons (Firas and Abdullah), for their patience and support. My husband has always stood by me and my children have been understanding when I was busy with my study instead of spending time with them.

Finally, I am obliged to all those friends and staff members at the University of Southampton, who contributed to the study in any way, specifically, the Saudi academics and students who contributed in all three phases of this study.

List of Abbreviations

ATU	Attitude
AVE	Average variance extracted
AW	Awareness
β	standardised path coefficient or regression coefficient
BI	Behavioural intention
CFI	Comparative Fit Index
COM	Compatibility
CR	Composite reliability
df	Degree of freedom
DTPB	Decomposed Theory of Planned Behaviour
E-assessment	Assessment based on the use of information technology
E-exam	Exam based on the use of information technology
E-learning	Learning based on the use of information technology
FC	Resource facilitating conditions
GoF	Goodness of Fit
ICT	Information and Communication Technology
IDT	Innovation Diffusion Theory
IT	Information Technology
ITS	IT Support
JISC	Joint Information Systems Committee
JU	Jordan University
Jusur	Learning management system
MAE	Model of Acceptance of E-assessment

ML	Maximum Likelihood
NCEDL	National Centre for E-learning and Distance Learning
PBC	Perceived behavioural control
PEU	Perceived ease of use
PI	Peer influence
PLATO	Programmed Logic for Automatic Teaching Operations
PU	Perceived usefulness
RMR	Root Mean Square Residual
RMSEA	Root Mean Square Error of Approximation
SE	Self-efficacy
SEM	Structural Equation Modelling
SI	Supervisors influence
SMC	Squared multiple correlations
SN	Subjective norm
SPARK	Self Peer Assessment Resource Kit
SRMR	Standardised Root Mean Square Residual
TAM	Technology Acceptance Model
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
Web 2.0	The new generation of tools, applications and approaches.
ZU	Zayed University

Chapter 1: Introduction

1.1 Introduction

Assessment based on the use of information technology, which is called "E-assessment", has become one of the systems introduced to address some problematic issues in traditional assessment. E-assessment has been successful in providing direct results and feedback, reducing tutor time and effort, facilitating the assessment of problem-solving, and improving student performance (by providing direct feedback that gradually can enhance student results) (Ridgway et al., 2004; Crews & Curtis, 2010; Gikandi et al., 2011; Gilbert et al., 2011; Way, 2012; Sorensen, 2013).

Research into E-assessment applications has increased in some countries, to gain more understanding of its impacts on the education sector. The UK government has been increasing the usage of E-assessment through a very aspirational project (Ridgway et al., 2004). From the 1990s, the Joint Information Systems Committee (JISC) in the UK has recognized the importance of E-assessment in the UK education sector, and the requirements of research and education communities in this area (McGill, 2006). JISC supports many research studies and projects in the field of E-assessment in the UK. As a result, a large number of research studies have been carried out to cover E-assessment issues in UK.

In contrast, in Saudi Arabia, the focus region of this study, there is a shortage of research and studies that investigate E-assessment issue; instead, researchers focus on E-learning issues. There are many studies covering different issues in E-learning (Yushau, 2006; Almegran et al., 2007; Mirza, 2007; Al-fahad, 2009; Al-Shehri, 2010; Alebaikan & Troudi, 2010; Alenezi et al., 2010; Alkhalaf et al., 2012), and a few papers discussing E-assessment in Saudi Arabia (Abdelkader, 2014; Hakami et al., 2014). However, to the best of my knowledge and from my research into this this area of study, there is no study that investigates the lecturers' perceptions of E- assessment in Saudi Arabia and the factors that affect their acceptance of E-assessment. Consequently, this thesis will investigate the factors that have an impact on lecturers' acceptance of E-assessment in Saudi Arabian universities.

As the focus of this research will take place in Saudi universities, this chapter provides an overview of the current system of Saudi higher education. It also intends to clarify the aim of this study by discussing the research objectives. Finally, the chapter outlines the structure of the thesis.

1.2 The Higher Education System in Saudi Arabia

Higher education in Saudi Arabia consists of universities, colleges and other institutions. The Saudi government has 28 major public universities, each of which has different departments and schools. It has different levels of qualifications (Higher Education Diploma, Bachelor, Master and PhD). There are more than one million students enrolled at these universities and colleges, whereas in 1970 there were only 7000 students enrolled (Royal Embassy of Saudi Arabia in Washington, 2015). Each university has two separate sections one for males and the other for females. Moreover, most Saudi universities have more than one campus. For example, the main university, King Saud University has a separate campus, for medical science, and it also has two different sections one for male students and the other for females.

The Saudi government has provided internet access for the public since1999 (Alebaikan & Troudi, 2010). The number of internet users jumped from 200,000 users in 2000 to 6.4 million by 2007, which is about one-third of the total Saudi population of 24 million (Alebaikan & Troudi, 2010). In addition, the Saudi population has significantly increased and half of the population is under university age (Ministry of Economy and Planning, 2007). As a result, thousands of students are left without a place at university. To address his problem, the Ministry of Higher Education has introduced technology into education. In 2006, the National Centre for E-learning and Distance Learning (NCEDL) was established under the management of the Higher Education Ministry, to offer E-learning courses throughout the Kingdom (Almegran et al., 2007). According to Madar Research, the Saudi government spent USD 125 million in 2008 to set up the E-learning system (Gazette, 2008).

This centre provides nationwide E-learning development in the universities, with the assistance of the Open University in Malaysia and Multimedia Technology Enhancement Operations (Almegran et al., 2007). It is also responsible for research and development to facilitate E-learning in higher education, which includes the National Learning Management System (Jusur), and the National Repository (Maknaz) to save, manage, and share learning objects between Saudi universities (Al-fahad, 2009; Alkhalifa, 2010). Furthermore, NCEDL operates a project called Tajseer (in English: Bridging), that helps to improve the traditional methods of teaching and learning using technology (Al-fahad, 2009; Alkhalifa, 2010).

In addition, NCEDL provides training programmes for staff in universities to become familiar with E-learning systems. These sessions include the designing of interactive lessons using available technology tools, and how to use Learning Management Systems (Jusur) and the Jusur Learning Content (Alkhalifa, 2010).

International companies have distributed in constructing Saudi E-learning systems. The centre has been launched by a collaborative group of agencies: Jusur is a learning management systems that was introduced by a Malaysian company (METEOR), the Maknaz learning object repository is developed by an Australian company (HarvestRoad Hive) and the content was developed by an Indian E-learning company called TATA Interactive Systems (Alkhalifa, 2010).

1.3 Research Purpose and Questions

The Saudi government has integrated E-learning and E-assessment systems within its educational systems for both schools and higher education (Hakami et al., 2014). However, while there have been many studies about E-learning in Saudi Arabia (Ali et al., 2003;Yushau, 2006; Mirza, 2007; Almegran et al., 2007; Al-fahad, 2009; Alebaikan & Troudi, 2010; Al-Shehri, 2010; Malek & Karim, 2010; Al-Siraihi Al-Harbi, 2011; Ahmed et al., 2011; Alkhalaf et al., 2012), only few studies have discussed E-assessment. One of these studies was about E-assessment in secondary schools in Saudi Arabia (Hakami et al., 2014), while Adbelkader discussed using E- assessment to assess Arabic grammar (2014). In addition, El Alamrousy (2014) investigated the efficacy of E-assessment in reducing exam stress, concluding that both academic staff and students found E-assessment was positive on the dimensions of the assessment scale of pressures resulting from psychological stress assessment. Bardesi and Razek (2014) described the e-exam management system in King Abdul-Aziz University. Alsamarai et al. (2014) compared the different views of teachers and students about E-assessment in Saudi Arabia and other countries, while Alsadoon's (2017) study showed that students in the Saudi Electronic University had a positive perception of E-assessment.

The previous section explained that the Saudi Ministry of Higher Education is seriously interested in developing its education system using technology, through its actions in establishing the National Centre for E-learning and Distance Learning (NCEDL) and spending millions of Dollars to provide E-learning for all the universities in the Kingdom. However, the actual extent of the use and acceptance of E-assessment by academics in Saudi universities is still not clear. This is due to the limited number of studies that have considered E-assessment in Saudi universities. Specifically, there is no research which has investigated the current usage of E-assessment and the factors that have an impact on academic's acceptance of E-assessment in Saudi universities. Therefore, this study will investigate the factors that influence the

academic's willingness to accept E-assessment, and will attempt to assess the current extent of use of E-assessment in Saudi universities.

This research will meet its goals by answering the following research question.

RQ: What is the appropriate model for the acceptance of E-assessment among academics in Saudi universities?

To answer the RQ, five sub research questions are introduced:

Q1: To what extent do the Saudi academics currently use E-assessment?

Q2: What are the factors affecting the acceptance of E-assessment among academic staff in Saudi universities?

Q3: What are the relationships between the factors that affect Saudi academics' intention to accept E-assessment?

Q4: What are the significant factors that can increase the acceptance of E-assessment amongst academics in Saudi universities?

Q5: Do gender and age moderate relationships between the observed factors and behavioural intention?

1.4 Structure of the Thesis

The remainder of this thesis is structured as follows:

Chapter 2 provides an introduction to assessment including definitions of E-assessment, its advantages, challenges and illustrates the cycle and process of E-assessment.

Chapter 3 reviews models and theories of user acceptance of ICT, to identify the factors that can influence the acceptance of E-assessment in Saudi higher education. It also presents and reviews the researches and studies which have been used to investigate individual behaviour and acceptance of E-assessment.

Chapter 4 introduces the proposed model of Acceptance of E-assessment (MAE), identifies factors involved in the model and provides the supportive theories and evidence from previous research for selecting these factors.

Chapter 5 presents the research methods used in this study. Qualitative and quantitative methods are used, as both are considered suitable for validating these factors. Finally, the

chapter discusses the research methods used and how they were applied to address the study's questions.

Chapter 6 presents the results of the mixed method research conducted with Saudi Arabian academics experts and further identifies the previously unexplored factors. The findings of the expert reviews obtained from the interviews are presented, and the analysis discussed.

Chapter 7 illustrates the questionnaire design, the process of conducting it and the sample size used. This chapter also introduces the analytic technique for the second phase of this study, which is Structural Equation Modelling (SEM).

Chapter 8 discusses the validity, reliability and model fit of construct in the Model of Acceptance of E-assessment (MAE). It exhibits the results of SEM, and compares them with the study's hypotheses.

Chapter 9 provides the details of final phase in this study (focus groups). This chapter presents design, sample size, and procedures of the focus groups. The results of the focus group phase are discussed.

Chapter 10 links the phases of this study and collects all the results together to obtain clear and final outcomes to answer the research questions.

Chapter 11 is for an overview of this study and the answers obtained for the research's questions, together with suggestions and recommendations for future work in this field of study. The limitations of the study are also discussed in this chapter.

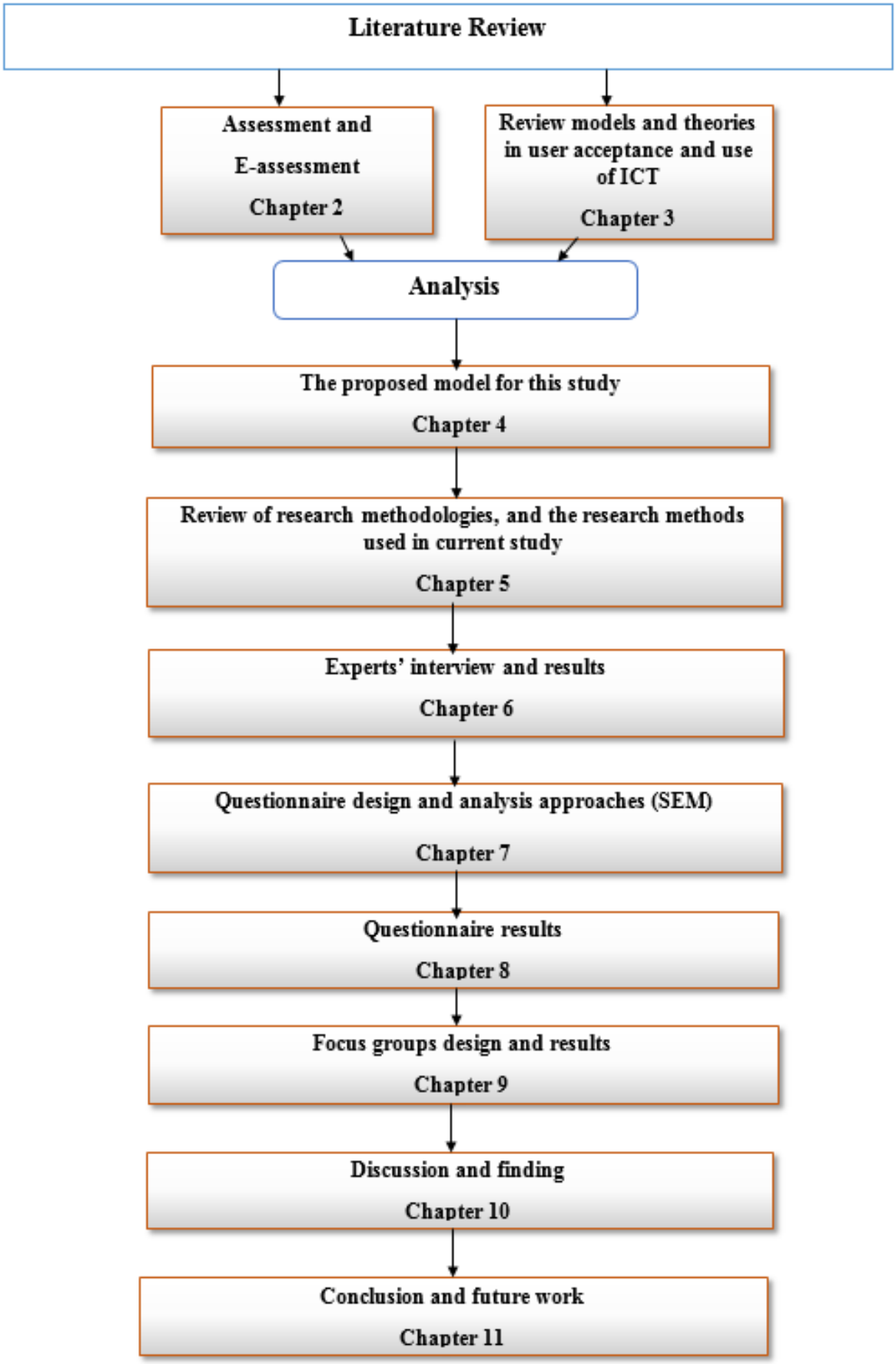


Figure 1-1 Structure of the thesis

Chapter 2: Literature Review (Assessment and E-assessment)

Assessment considered as a vital part of learning (Gilbert et al., 2011). It is a measure used to evaluate the humans performance and their progress (Llamas-Nistal et al., 2013). This chapter discusses theories of assessment, it types, aims for assessing student and the effective assessment properties. Moreover, its illustrates the E-assessment definitions, processes, advantages of using E-assessment from different domains and challenges.

2.1 Assessment

According to Llamas-Nistal et al. (2013), assessment is the process of collecting information about leaner performance to measure their progress. In contrast, another study, by Gilbert et al. (2011) defines assessment as focus on learning outcomes. They describe assessment as a crucial part of course learning design which is driven by the intended learning outcomes, which determine the competency to be demonstrated and the subject matter to be covered (Gilbert et al., 2011).

Regarding the learning outcomes, Dodridge (1999) describes these as the achievements that the student produces throughout the learning process. He asserts that there is a strong relationship between the formulation of learning outcomes and planning, scheduling, criteria and methods of assessment. Otter (1992) defined learning outcomes by the process of using four approaches: objectives (the intentions of the course), subject knowledge (the knowledge content often described in syllabuses or course documentation), discipline (the concept of the discipline as a culture and value system to which the graduate is taken), competence (the ability of leaner after the course). He also emphasises that learning outcomes help the teacher to review the teaching methods to ensure that adequate opportunities are offered for students to practice and produce outcomes (1992).

Learning outcomes can be summarised in this question '*What should the student be able to do at the end of the course*?' As Dodridge (1999) explains, the learning outcome is the performance of students through engagement in the learning process. Bloom's Taxonomy of educational objectives provides a framework for classifying statements of what we expect or intend student to learn (Krathwohl, 2002). Bloom's model is the most popular for categories the cognitive

learning (Dodridge, 1999). Bloom classifies cognitive learning to (Figure 2-1) (Krathwohl, 2002):

- **Knowledge**: This level of Bloom taxonomy tests if the students gain specific information from the lesson. This information may include facts, classifications, methodology, criteria, principles, theories and conventions. For example, *what the date of the World War II? What was the consequences of this war?*
- **Comprehension**: In this level, it is asked if the students are recalling the information or understanding it. The students at this level should have the capability to interpret the fact rather than just recall it. This level includes: translation, interpretation and extrapolation. The questions in this level can begin with: describe, contrast or predict.
- **Application**: At this level the students should use the information acquired during the lesson to do something. For instance, the students may solve a problem using the knowledge that they learned from the lesson.
- **Analysis**: The student at this level should be reflecting on the knowledge and its application. In the analysis level students should find patterns that help to analyse the problem. This analysis level includes analysis of elements, relationships and organizational principles.
- **Synthesis**: Students at this level should use the information and facts that they have acquired from multiple subjects to create new theory, or idea, or make prediction. The synthesis level includes: production of a unique communication, production of a plan or set of operations and derivation of a set of abstract relations. Synthesis questions can be formed using: invent, imagine or create.
- **Evaluation**: This is the top level of Bloom's Taxonomy. The students at this level should measure and evaluate the acquired information and produce a conclusion. The evaluation level includes: evaluation in terms of internal evidence and judgement in terms of external criteria. Questions at this level can be formulated using words like: judge, debate or recommend.

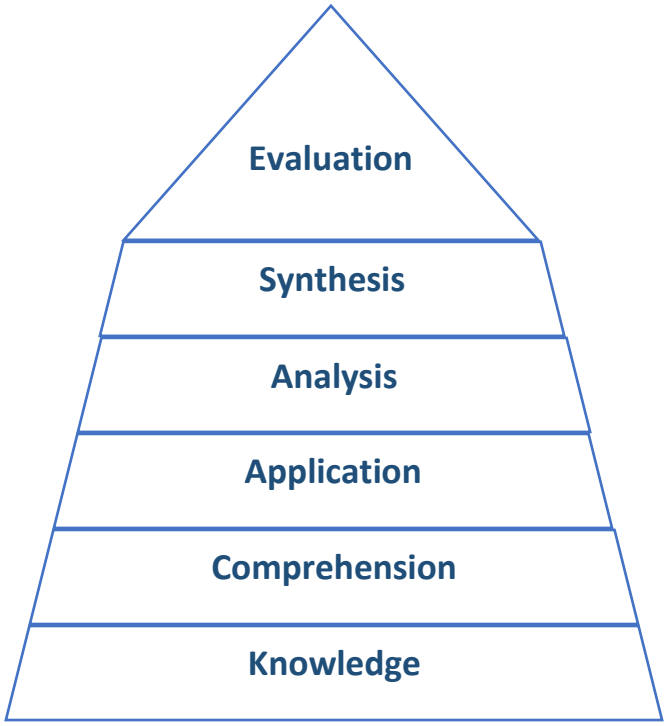


Figure 2 -1 Bloom's Taxonomy Model

Later, in the 1990's, Anderson updated the Bloom's Taxonomy model (Figure 2-2). He aimed to make a balance between the familiar and the novel (Lorin & Anderson, 1999). Also, he said there are many key differences between the original taxonomy and the revisions.

He made some changes, the level names were edited from noun to verb to describe the different levels of Bloom's Taxonomy (Forehand, 2010). He further, renamed the knowledge level to remembering. This is because, he realised that the first level of taxonomy is for recalling the information and remembering it, whereas the term "knowledge" can imply another meaning, not just recalling the information (Lorin & Anderson, 1999). He pointed out that there have been different attempts to classify and define "knowledge" term.

Additionally, he explained that there are differences between problem solving and application. The problem solving learning activities (action, monitor, progress and correct) emphasise the importance of metacognition in problem solving (Lorin & Anderson, 1999). So he renamed the application level to "Apply".

In addition, he retitled the other levels changing the comprehension level to "Understanding" and analysis level to "Analysing". He also switched the order of the evaluation and synthesis level, and renaming the latter as "Creating" (Forehand, 2010) (Figure 2-2). The creating level includes collecting and mixing the elements to form coherent and planning or producing new patterns (Forehand, 2010).

Furthermore, each of Anderson Taxonomy levels is divided into categories. For example, Remembering is subdivided into remembering, recognizing and recalling (Forehand, 2010).

Figure 2 -2 Anderson's Taxonomy Model

2.2 Why Do We Assess Students?

Assessment can be used for different purposes, such as improving the learner outcomes, or to collect the feedback in order to develop learning performance and methods. As Sitthisak et al. (2008) pointed out that the main aim of assessment is to assess the intended learning outcomes. The teacher designs assessment to check if the student's performance aligns with the intended learning outcomes (Gilbert et al., 2011).

Otter (1992) identifies two reasons for the importance of using assessment. Firstly, assessment helps to develop the curriculum and defines learning outcomes which assist in ensuring that the learner has adequate opportunities to exercise and realise these outcomes. The second reason is to focus on learning outcomes and concern about quality of assessment.

Stiggins et al. (2004) explain that assessment of learning occurs during the teaching and learning process to indicate what the students require; plan the next step in instruction; offer feedback for the students to improve their performance; and help students to see and feel in control of their journey to success.

Kellough & Kellough (1999) clarify the purposes of assessment as including those related to the student, the teacher, the curriculum and learning methods. They identify the aims of assessment as improving student learning, recognising the weakness and strengths of the student, evaluating and assessing the effectiveness of different teaching strategies and curricular programs in addition to improving teaching effectiveness (Kellough & Kellough, 1999).

2.1.1 Assessment Types:

Assessment consists of three different types:

- **Formative assessment:** it is an assessment that is planned to produce feedback on performance to improve and accelerate learning (Sadler, 1998).
- **Summative assessment:** it is employed to know what knowledge, skills and attitudes the student has learnt over a period of time and at the end of course. It benefits to establish whether learners have achieved the competences required. This type does not focus on supporting learning (Sitthisak et al., 2009).
- **Diagnostic assessment:** Sewell defined diagnostic assessment as an in-depth assessment which is related to strengths and weaknesses in each skill aiming to identify priorities and requirements (2004).

2.1.2 Who is the Assessment For?

As Brown & Knight (1994) pointed out, assessment is used for different aims and for different people; for example:

- **Student:** to assess their outcomes through different levels of learning (school, higher education).
- **Other students:** with special needs, such as disabled students or from distance area.
- **Tutors:** to assess their ability to teach and develop their skill level.
- **Mentors:** to improve their ability to monitor and support others.
- **Employers:** to find out employees ability to work and at which level.
- **University management:** to improve the university services.
- **Financing and other government bodies**.

They also point out that, depending on the people who are being assessed, the assessment needs to:

- Have different forms.

- Have various levels of reliability and validity.
- Be completed at different points in a students' undergraduate occupations.
- Have its findings linked in different methods.

2.1.3 Effective Assessment:

The main issue for any assessment is to evaluate what is intended to assess (Otter, 1992). This issue includes validity and reliability (Otter, 1992). To create an effective assessment we have to consider reliability and validity.

Reliability: Brown & Knight (1994) define reliability as making sure that any evaluation result describes the phenomenon being evaluated and is not a product of the measurement tool used.

Validity: An integrated assessment of the degree to which empirical evidence and theoretical rational support the adequacy and appropriateness of inferences and actions based on test marks (Messick, 1988).

If the outcome of a test is dependable, repeatable and consistent, then the assessment result will be reliable. Also, if the test evaluates the specific knowledge and skills that is specifically designed for it, then the assessment is considered valid (Peterson, 2013). Thus, according to Way (2012), having a correct assessment means the result will be reliable, valid, usable credible and interpretable.

2.3 E-assessment

Since E-learning and E-assessment have been introduced the learning process has developed. E-assessment has enhanced the measurement of learner outcomes and made it possible for them to obtain immediate and direct feedback (Gilbert et al., 2011). It is essential to create a system to assess students, which take into account the educational goals of developing student's skills which, in turn, will be useful for the society for in a long-term horizon (Ridgway et al., 2004).

E-assessment can have different forms such as, automatic administrative procedures, digitising paper-based systems and online testing that contains multiple choice tests and assessment of problem solving skills (Ridgway et al., 2004). Sitthisak et al. (2008) also indicate that E- assessment includes supporting the assessment by using a computer for example: web- based assessment tools.

However, Reju & Adesina (2009) clarify that E-assessment comprises the end-to-end electronic assessment procedures. This is confirmed by PingSoft (2007), in their explanation that the design of the system should include a complete examination process, for example, comprising the proposition, composing papers, signing up, examining, batching, statistics and analysis. Moreover, JISC (2007) defined E-assessment as the end-to-end electronic assessment process, that Information Communication Technology (ICT) is used for the whole assessment processes from the presentation of questions to the saving of the leaners' responses.

It can be concluded that most research agrees that E-assessment is an electronic assessment in which all the assessment procedures from the start to the end of assessment should be carried out electronically. This means that the design, test implementation, recording the response and providing the feedback are all completed using ICT.

Whitelock et al. (2006) explain E-assessment processes using cycles between E-assessment stages (Figure 3-1). They claim that this framework enables educationalists to address the barriers and the cultural debate surrounding E-assessment strategies. They point out that motivation is the main point that drives the application, thus, it is the first step in the cycle. They emphasise that motivation is a crucial stage in assessment. The next stage is the design of the assessment, and then the creation phase. After that, the students commence the test and when they have finished the outcomes are delivered. Later, the data is processed and the feedback is gained. Next, there is an evaluation of the outcomes and a review of the feedback. After this last step, the cycle moves back to the design and creation steps. Thus, the testing, data retrieval or evaluation outcomes, depend on the outcomes and feedback to enhance the assessment and feedback in order to meet the aims of course and reach the desired outcomes.

2.3.1 The Beginning of E-assessment

Computers have been an assistance tool in education for a long time. The use of technology in assessment began in the 1920s', when Sidney L. Presses designed machines for automatic testing (Skinner, 1958). Moreover, at the same time the schools started to use standardised assessment, and automatic scoring technology, which helped to make a large-scale testing convenient and cost-effective (Audette, 2005). Later, in 1960's PLATO (Programmed Logic for Automatic Teaching Operations) was introduced and firstly used in University of Illinois (Woolley, 1994). Programmers, were also, introduced to test students automatically and release the results, one of these programmes was called 'Automatic Grader' (Hollingsworth, 1960). During 1980's, according to Raser (2001) there was increasing interest of using computer and it was used in automating some industrial design tasks.

The World Wide Web was introduced in the 1990's (Llamas-Nistal et al., 2013), which has made a significant change in many sectors, especially in education . From that time onwards, many companies introduced their own E-assessment system. In England, Wales and Northern Ireland principles and guidance for E-assessment were introduced by JISC (Joint Information Systems Committee) to clarify the different qualifications regulators in United Kingdom (JISC, 2007). In 2009 IMS Global Learning Consortium produced IMS Question and Test interoperability Specification (IMS, 2008). In the same year (2009), Cisco, Intel and Microsoft produced Transforming Education: Assessing and Teaching 21st Century Skills (Cisco, Intel & Microsoft, 2009).

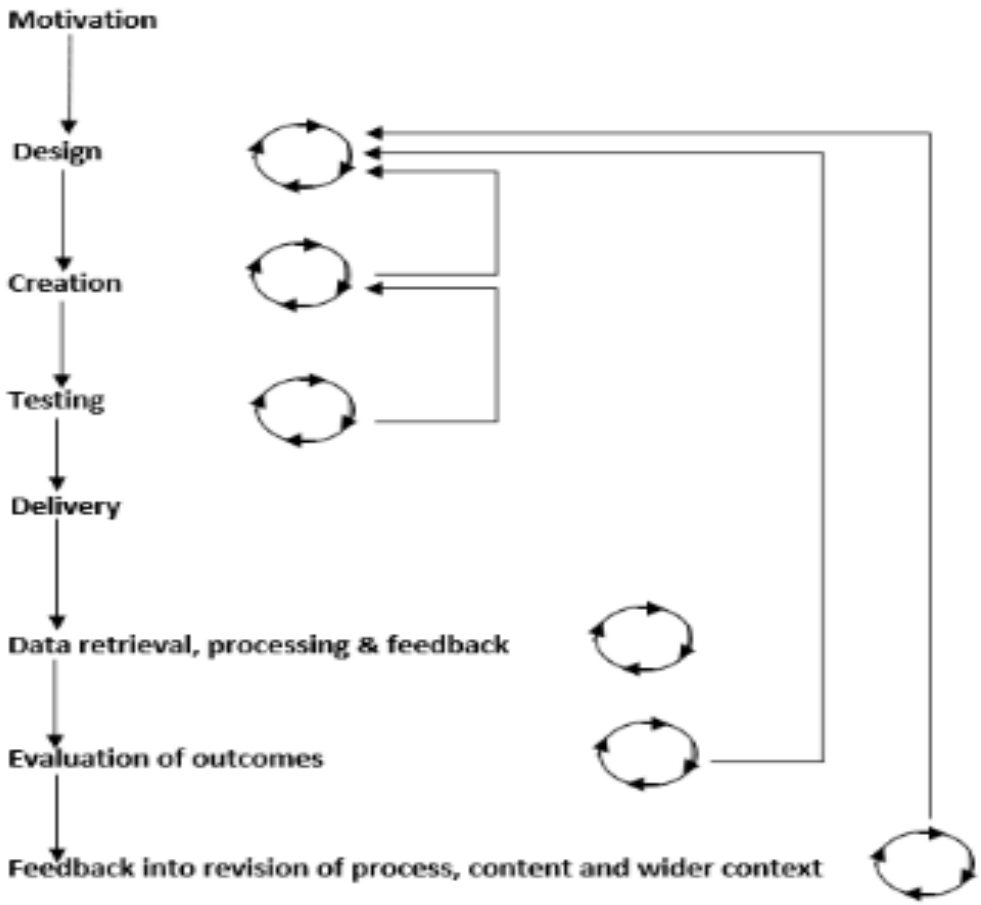


Figure 2-3 Cycles of E-assessment (Whitelock et al., 2006)

2.3.2 The Advantages of E-assessment

Universities adopt E-assessment to obtain accurate and faster methods to assess students, rather than traditional measures (paper-tests). This section presents the advantages of using E-

assessment in different domains, from the perspective of: students, teachers, institutions, and in education aims.

2.3.2.1 Students

Students prefer E-assessment because they can have more control, friendly interfaces and tests as games and simulations which resemble learning environments and recreational activities (Ridgway et al., 2004). It is also fast and easy to use (Eljinini & Alsamarai, 2012; Peterson, 2013). E-assessment provides immediate feedback compared with paper tests, which helps to improve the learning level (Ridgway et al., 2004; Crews & Curtis, 2010; Gilbert et al., 2011; Way, 2012). According to studies in Glamorgan University and Leeds Metropolitan University, E-assessment can improve student performance (Gilbert et al., 2011). According to a study in the University of Winchester, it increases students' motivation to enhance their performance (Marriott, 2009). Furthermore, it helps students in remote areas to learn and be assessed in their own locations which can be taken at any time, which provides flexibility for students to sit the exams (Ridgway et al., 2004; Gilbert & Gale, 2007; Williams & Wong, 2009; Way, 2012). Furthermore, E-assessment allows students to access their scores rapidly and hence helps them to manage their performance (Ellaway & Masters, 2008).

Regarding the students' opinions of E-assessment, a study conducted using a survey found that 88.4% of students preferred E-assessment (Donovan et al., 2007), Llamas- Nistal et al. (2013) found that 43 out of 52 students surveyed would choose online evaluation rather than traditional evaluation. Moreover, a survey in Jordan University (JU) and Zayed University (ZU) concluded that 59% from JU and 50% from ZU preferred online exams, while only 21% from JU and 43% from ZU preferred traditional exams (Tubaishat & El-qawasmeh, 2006). A study by Sorensen's (2013) study indicated that students feel that E-assessment plays a role in higher education and adds a value to their learning. In the University of New South Wales a survey found that 92% of the students agreed that E-assessment helped them towards better learning (Gilbert et al., 2011). Moreover, a high level of acceptance and satisfaction of E-assessment was expressed by students in King Khalid University and King Abdul-Aziz University in Saudi Arabia. Alsamarai et al., found that 96% of student who used E-assessment in King Khalid University preferred it (2014).

2.3.2.2 Teachers

The paper test consumes time for teachers to correct each paper, but using E-assessment will save teacher time (Ridgway et al., 2004; Donovan et al., 2007; Crews & Curtis, 2010; Gikandi et al., 2011; Gilbert et al., 2011; Eljinini & Alsamarai, 2012; Sorensen, 2013); for example, in Leeds Metropolitan University, research found that E- assessment saved up to £3000 per cohort in staff time. Moreover, E-assessment helps the teacher to improve the quality of feedback for the students (Ridgway et al., 2004; Way, 2012). In a study in an Australian university, academics noted that E-assessment facilitated the marking process and help to avoid losing exam papers; they also mentioned that they preferred E-assessment to avoid misunderstanding of student handwriting, which could disadvantage students (Wibowo et al., 2016). Moreover, E-assessment enables the teacher to track students' performance and make an analysis across many assessments (Ellaway & Masters, 2008). The direct feedback from E-assessment further allows the teacher to find the misconceptions, points which are not clear for the students, and resolves these before the final exam (Ellaway & Masters, 2008). In King Khalid University, Saudi teachers were found to be satisfied with using E- assessment; they preferred to use E-assessment to provide immediate results and feedback, and to ensure a reliable evaluation strategy (Alsamarai et al., 2014). Additionally, using E-assessment can reduce the teachers' burden in assessing large student numbers (Nicol, 2007; Al-smadi & Gütl, 2008). E-assessment was considered as an excellent tool to help teachers evaluate students in programming courses (Rajala et al., 2016).

2.3.2.3 Institutions

Different organizations have started using E-assessment due to advantages that it provides compared to paper test methods (Al-Saleem & Ullah, 2014). The increasing the numbers of students also increases the institutions' demand for fast and accurate method for assessment (Ridgway et al., 2004; Gilbert & Gale, 2007; Way, 2012). In addition, universities need timely results to arrange for places for providing appropriate qualified applicants, this can be achieved easily using E-assessment (Ridgway et al., 2004). Moreover, as the time is reduced, using E-assessment decreases the cost for an institution to assess students (Ridgway et al., 2004; Donovan et al., 2007; Crews & Curtis, 2010; Gikandi et al., 2011; Gilbert et al., 2011; Way, 2012; Sorensen, 2013).

E-assessment has its own set of security measures, which provide the questions and make them impossible for the student to copy the questions, and can also assist in reducing student cheating by providing different questions in different orders (Peterson, 2013). These measures include checking identification and password verification to ensure the identity of student (Crews & Curtis, 2010; Peterson, 2013).

2.3.2.4 Educational Aims

E-assessment supports educational goals by supporting high-order thinking skills such as critiquing, reflection on cognitive processes and facilitating group work projects (Ridgway et al., 2004). It also supports new educational goals, that focus on problem solving using mathematics and science supported by information technology, for instance, when understanding and presenting the problem, especially in developing mathematical and scientific literacy (Ridgway et al., 2004). E-assessment has the ability to sort questions, which cannot be done using a paper test, for instance, by software simulation, it helps to represent the information in simple and fast way (Ridgway et al., 2004; Peterson, 2013;). Moreover, it provides more accurate results than a paper test, by adaptive testing, which can change the difficulty of the test depending on the user's response, by increasing the difficulty if he/she responds correctly and decreasing the difficulty if he/she has chosen the wrong answer (Ridgway et al., 2004). Table 2-1 summaries the E-assessment advantages.

Table 2-1 Summary of E-assessment advantage

Domain	Advantages	References
Student	Easy to control, friendly interfaces	Ridgway et al. 2004
	Fast and easy to use	Eljinini & Alsamarai 2012; Peterson 2013
	Provides immediate feedback	Ridgway et al. 2004; Crews & Curtis 2010; Gilbert et al. 2011; Way 2012
	Assess student in remote area	Ridgway et al. 2004; Gilbert & Gale 2007; Williams & Wong 2009; Way 2012;
Teacher	Save the time	Ridgway et al. 2004; Donovan et al. 2007; Crews & Curtis 2010; Gikandi et al. 2011; Gilbert et al. 2011; Eljinini & Alsamarai 2012; Sorensen 2013
	Improve the quality of feedback	Ridgway et al. 2004; Way 2012
	Track the students' performance and solve the misunderstanding of the concepts before the final exam	Ellaway & Masters, 2008

	Reduce the teacher burden to exam a large number of students	Nicol, 2007; Al-smadi & Gütl, 2008
Institution	Increase the demand of fast assessment method	Ridgway et al. 2004; Gilbert & Gale 2007; Way 2012
	Decrease the cost	Ridgway et al. 2004; Donovan et al. 2007; Crews & Curtis 2010; Gikandi et al. 2011; Gilbert et al. 2011; Way 2012; Sorensen 2013
	E-assessment has its own set of security	Crews & Curtis 2010; Peterson 2013
Educational aims	Supports high- order thinking skills	Ridgway et al. 2004
	Supports problem solving	Ridgway et al. 2004
	Sorts question which cannot create it using the paper test	Ridgway et al. 2004; Peterson 2013
	Provides more accurate results	Ridgway et al. 2004

2.3.3 E-assessment Challenges Critique

The implementation of E-assessment in higher education could face some challenges. Different studies have discussed these challenges and criticised E-assessment in different aspects:

- Students may be inexperienced with computers or with the online assessment process (Donovan et al., 2007; Way, 2012). Students need training at the beginning to be familiar with E-assessment (Way, 2012). Other studies pointed out that E-assessment, specifically the formative assessment, faces some obstacles even if the students familiar with E-assessment system. They claimed that students not fully advantages from E- assessment, and hence it is difficult to motivate them to benefit from all E-assessment's advantages (Bacigalupo et al., 2010). Another research claimed that using E-assessment can disadvantage older students or female students, because it is stressful for students to use (Gilbert et al., 2011).
- Some authors argued that the teacher's efforts that saved at the end of assessment (to correct the test), is required at the beginning to create a bank questions (Gilbert et al., 2011). The researchers contended that the cohort performed in paper test is better than E- assessment (Gilbert et al., 2011), Lee and Weerakoon (2001) found that "computer- based multiple-choice questions assessments can be used with confidence for ranking, but caution is advised in using them for grading". Moreover, some academics asked if E-assessment can be used to address higher learning skills effectively (Gilbert et al., 2011).

- Access to computers and the internet is a challenge for students to use E-assessment (Crews & Curtis, 2010; Way, 2012). A study by Bacigalupo et al. (2010) discussed that E-assessment's accessibility and usability need an improvement, especially for students with learning difficulties.
- Poor technical infrastructure development, especially in poor countries for instance in Nigeria (Way, 2012). Another researchers concern of the possibility of a technical failure accrue on the day of the exam if use E-assessment rather than paper-test (JISC, 2007). Also, Anderson et al. (2005) mentioned that students may face a technical problems when using on-line assessment.
- Ridgway et al. (2004) discuss the difficulty in scoring and correcting questions with student open responses, such as giving explanations. They offer some solutions. They conclude that the most successful one is comparing the correlation between computer and human judges, and the correlation between the scores of two human judges. Moreover, using the computer is appropriate for questions that have well-defined answers such as short answer questions (Ridgway et al., 2004). Mitchell et al. (2003) provided an example in Dundee Medical School, where the responses of exams in the school were made to be more well-defined for each questions in the exams, using computer correlation. They found that human scoring time significantly decreased and staff reported that the questions' quality type improved and that they could rewrite questions to clarify students, misconceptions (Mitchell et al., 2003).
- Assessing group projects is a difficult job. It involves monitoring of the communication skills, evaluating the group work, assessing each member and the whole group, and providing feedback. It is hard to use a computer in this task. However, SPARK (Self Peer Assessment Resource Kit) is an academic open source project that is designed to support the evaluation of effective group work, which has been used in many universities in different contexts (Ridgway et al., 2004). Other research claimed that in some assessment types such as measuring and drawing, the test using E-assessment may change the nature of what is assessed, because this type of assessment requires the use of actual tools (e.g. ruler and protractor) (Ridgway et al., 2004).
- Some teachers are unfamiliar with technology, or most of them may be using E- assessment for first time. Therefore, teachers need training to be confident for using an E-assessment system (Ridgway et al., 2004; Jordan & Mitchell, 2009).

- Ensuring the reliability and validity of the test is one of the challenges when using E- assessment. The test should measure what is designed to measure, and it should be reliable (Ridgway et al., 2004; Gilbert et al., 2008). The reliability and validity includes ensuring that computer system is work well and the questions discriminated between more able and less able students (Gilbert et al., 2008).
- E-assessment implementation entails providing staff with technical competencies to support the teachers and students when they need it (Ridgway et al., 2004; Conole & Warburton, 2005).
- Plagiarism and cheating is one of the key obstacles to using E-assessment (Ridgway et al., 2004). The interviewers in Gilbert et al. (2008) report emphasised that E- assessment should include a strong security system to have a high quality E- assessment. To overcome and reduce the chance of cheating, the identification of students can be tested using two or three forms of recognition, such as fingerprints and eye-pattern with the user ID and password (Al-Saleem & Ullah, 2014). Furthermore, IT departments must protect the E-assessment system from hacking and prevent the ability to download, print, or copy the exam questions (Gilbert et al., 2008).

2.4 Chapter Summary

Assessment is a tool to evaluate student outcomes and compare these with the desired learning outcomes to provide feedback for the student and determine the student's level and what he/she needs to improve. Also, assessment is considered as a part of the procedure of learning and is linked to achievement of learning outcomes. The main aims of using assessment in learning include: improving student learning, identifying the weakness and strengths of student, evaluating and assessing the effectiveness of different teaching strategies and curricular programs and improving teaching effectiveness. In addition, effective assessment means that the result should be reliable and valid.

Different studies have attempted to define E-assessment. E-assessment is the end-to-end electronic assessment, all the assessment processes should occur electronically, from the design to the marking and displaying the feedback. This chapter illustrates E-assessment and the advantages of E-assessment that encourage the higher education institutions to use E- assessment such as saving the time and providing direct feedback. Additionally, it demonstrates E-assessment challenges and discuses some other studies views about using E- assessment.

Chapter 3: Review Models and Theories

Many researchers and practitioners have attempted to explain and introduce theoretical perspectives for user's acceptance and adoption of ICT (Information Communication Technology). Among the examples are: the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975), Theory of Planned Behaviour (TPB) (Ajzen, 1985), Technology Acceptance Model (TAM) (Davis, 1985), and the Decomposed Theory of Planned Behaviour (DTPB) (Taylor & Todd, 1995b). All these theories focus on individual behaviour, because a user's acceptance is affected by particular factors which influence individual behaviour. This chapter will illustrate these models in order to identify the factors and investigate them in the domain of E-assessment in Saudi universities.

3.1 Theory of Reasoned Action (TRA)

Fishbein introduced Theory of Reasoned Action (TRA), which is based on the behavioural intention of the individual (Fishbein & Ajzen, 1975). This model aims to clarify why an individual chooses to perform or not perform particular behaviour (Ejaz, 2014). According to TRA, individual behavioural intention consists of two constructs: attitude towards the behaviour and the subjective norm (Figure 3-1). Attitude towards the behaviour means feeling positively or negatively towards performing certain behaviour, while the subjective norm is the individual's view towards performing or not to performing specific behaviour (Fishbein & Ajzen, 1975). Many researchers have used this theory in a wide range of domains (Davis et al., 1989). However, some authors criticise this model because it proposes just two determinations to measure behavioural intention, while other studies have added other determinations such as self-identity (Conner & Armitage, 1998).

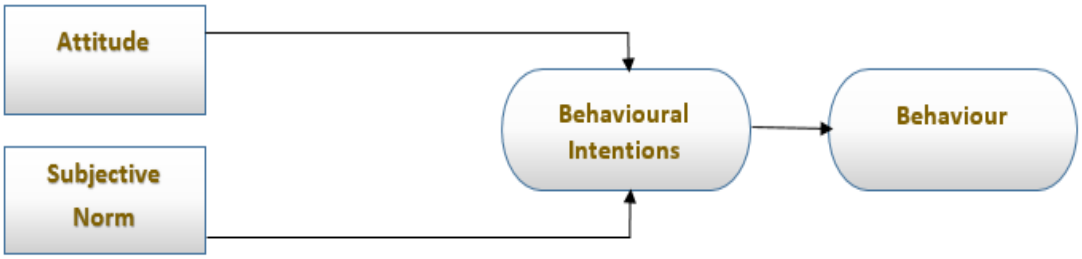


Figure 3-1 Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975)

3.2 Theory of Planned Behaviour (TPB)

Ajzen (1991) developed the Theory of Planned Behaviour, which is an extension of TRA, to address the limitations of TRA. He added "perceived behavioural control" as another predictor of behavioural intention (Figure 3-2). This predictor identifies human perception of how easy or difficult it is to perform certain behaviour. In other words, it is " the sense of self-efficacy or ability to perform the behaviour of interest" (Ajzen, 2005a). This theory attracted much research and it became one of the most citied models for identifying human behaviour (Ajzen, 2011). However, some researchers have criticized TPB model, such as Taylor and Todd (1995), who indicated that the model does not explain how the individual can decide to engage in particular behaviour.

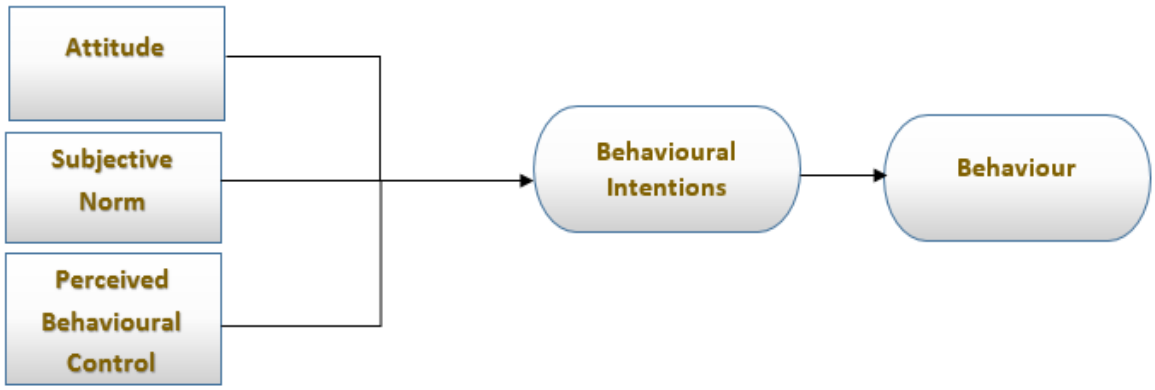


Figure 3-2 Theory of Planned Behaviour (TPB) (Ajzen, 1991)

3.3 Technology Acceptance Model (TAM)

The TAM model is adopted from TRA and developed by Davis (1989) to predict human acceptance and behaviour of information technology. TAM, like TRA, attempts to determine individual behavioural intention, but it does not include subjective norms as a prediction of behavioural intention (Ejaz, 2014). Davis (1989) suggested that TRA has theoretical problems in conceptualising subjective norms and that extra research was required to clarify its effect on usage behaviour. Moreover, Davis developed TAM model to identify user acceptance of ICT with the impact of other indirect variables. In this model, the behavioural intention depends on individual attitude, which is based on two determinations: 'perceived usefulness' and 'perceived ease of use' (Davis, 1989) (Figure 3-3). Perceived usefulness means the degree to which the individual believes that using a certain system will enhance his/her work performance (Davis, 1989), and perceived ease of use is defined as the degree to which the individual believes that using a specific system will not require additional effort (Davis, 1989).

A large number of studies have used TAM to predict and explain user behaviour towards using technology (Ejaz, 2014), such as using mobile learning in university (Park et al., 2012), and it has been the most used technology acceptance model in E-learning studies (Šumak et al., 2011). However, Legris et al. (2003) criticise the model, on the grounds that the factors in TAM are insufficient to predict the user acceptance of technology. For example, Venkatesh et al. (2000) developed TAM2 from TAM by adding social factors.

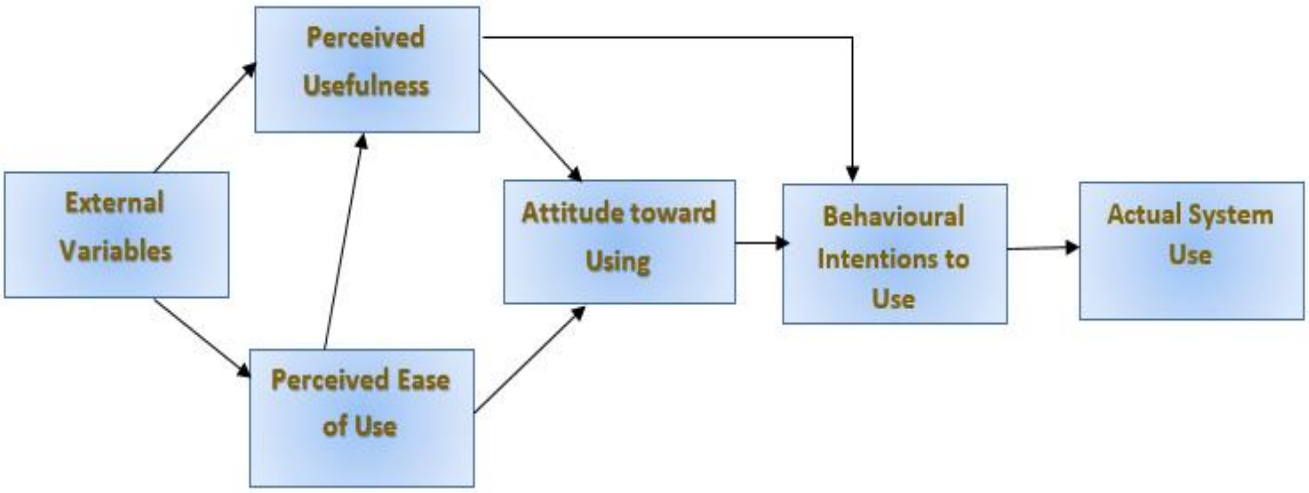


Figure 3-3 Technology Acceptance Model (TAM) (Davis et al., 1989)

3.4 Decomposed Theory of Planned Behaviour (DTPB)

DTPB is similar to TAM; it is used for predicting user intentional behaviour towards accepting and using technology. DTPB is created from TPB and was introduced by Taylor & Todd (1995b) to address the weakness of TPB. DTPB identifies salient beliefs that may affect adoption and use of technology, which can be used across different settings (Taylor & Todd, 1995b; Ejaz, 2014). In this model Taylor & Todd (1995b) keep the three determinations of behavioural intention in TPB: attitude, subjective norm and perceived behavioural control (Figure 3-4). They decompose the determination 'attitude' into three elements: perceived usefulness, perceived ease of use and compatibility. They use the same factors that Davis et al. (1989) identified in their model (TAM), together with another factor, 'compatibility'. Compatibility is defined as the degree to which a system matches with their past experience, existing values and individual requirements (Moore & Benbasat, 1991).

Additionally, Taylor & Todd (1995b) decompose subjective norm into: 'peer influence' and 'superiors influence' (Figure 3-4). They justify this on the grounds that peers and superiors may influence an individual's decision to use a certain system.

Moreover, they divide perceived behaviour control in to: 'self-efficacy', 'resource facilitating conditions' and 'technology facilitating'. They identify two elements of resource facilitating conditions (time and money) and technology issues. If facilitating conditions are available and fit with individual needs, and are combined with a high level of self-efficacy, the individual will have high levels of intention to do certain behaviour (Ejaz, 2014).

Many research and studies have applied DTPB in different fields, including: finance, business and education (Ejaz, 2014). In the education domain, Chien et al. (2014) used the DTPB model to investigate teachers' intention to use technology-based assessments and their actual use. They found that the DTPB model with its determinations can describe and predict the actual usage of a system. Sadaf et al. (2012a); also; explored teachers' intentions to use Web 2.0 technology in their classrooms, and found that the three constructs (attitude, subjective norm and perceived behavioural control) had a significant impact on the teachers' intentions. A comparison between TAM, TPB and DTPB was applied in a previous study to investigate which model is the best one to predicate and explain the employees' behavioural intention to use information system, and they found that DTPB is the best model to explain the behavioural intention (Huh et al., 2009). This model is a combination of the best elements of TAM and TPB (Mathieson et al., 2001). Furthermore, the decomposition of these beliefs within one model (DTPB) make it able to predict the behaviour under investigation and also have the power to provide explanations (Shih & Fang, 2004). As a result, the model becomes more valuable, understandable and applicable (Ejaz, 2014).

Nevertheless, some studies have criticised DTPB model, as they found that the relationship between subjective norms and behavioural intention is weak, and some studies discovered that the influence of subjective norms is low (Chau & Hu, 2001; Lin, 2007). However, other studies have found a strong relationship between subjective norms and behavioural intention, such as in acceptance of web-based learning (Lee, 2010) and acceptance of mobile learning in higher education (Cheon et al., 2012).

It can be concluded that the DTBP model includes the most significant factors that can affect user behavioural intention towards accept and use ICT. DTPB also, provides a complete picture to understand user behavioural intention to accept and use ICT. Figure 3-5 illustrates the three models (TAM, TPB, DTPB) and how DTPB contains all the important factors from the TAM and TPB models (Chien et al., 2014). In addition, Table 3-1 shows the factors in each model,

in order to select the significant factors that have an impact on the acceptance of E-assessment by lecturers in Saudi universities.

3.5 Chapter Summary:

This chapter has considered the main theories for users accepting and using technology, including the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975), the Theory of Planned Behaviour (TPB) (Ajzen, 1985), the Technology Acceptance Model (TAM) (Davis, 1985), and the Decomposed Theory of Planned Behaviour (DTPB) (Taylor & Todd, 1995b). From this review, it can be concluded that DTPB has all the significant factors, which can be used to create the Model of acceptance of E-assessment (MAE) in Saudi universities.

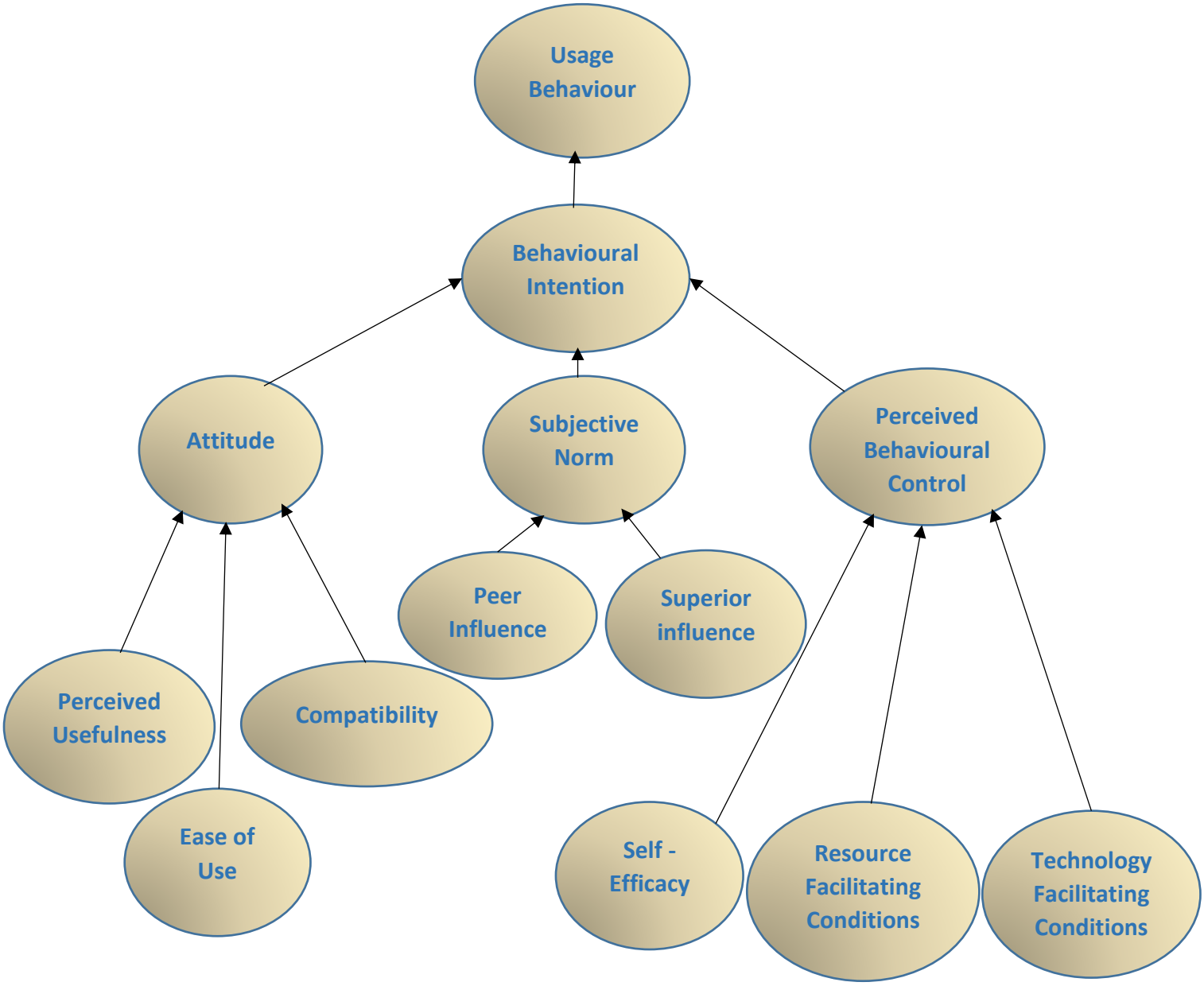


Figure 3-4 Decomposed Theory of Planned Behaviour (DTPB) (Taylor & Todd, 1995)

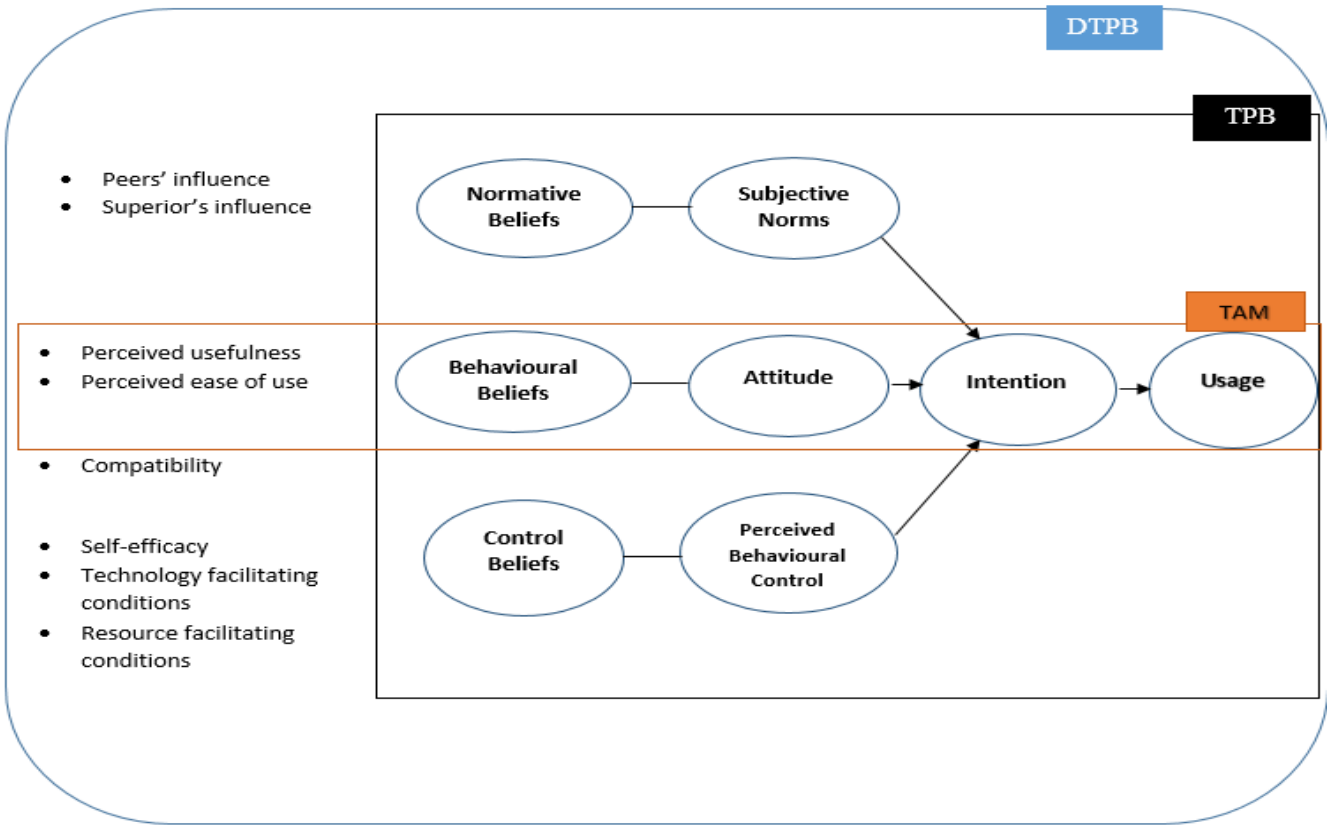


Figure 3-5 TAM, TPB and DTPB (Chien et al., 2014)

Table 3-1 Factors in each model

Models/ factors	**Subjective Norms (SN)**			**Attitude**				**Perceived Behavioural Control(PBC)**			
	SN	Peer influence	Superior influence	Attitude	Perceived usefulness	Ease of use	Compatibility	PBC	Self-Efficacy	Resource facilitating	Technology facilitating
TAM	×	×	×	√	√	√	×	×	×	×	×
TPB	√	×	×	√	×	×	×	√	×	×	×
DTPB	√	√	√	√	√	√	√	√	√	√	√

Chapter 4: The Proposed Model of the Current Research

Chapter 3 presented and discussed the models and theories related to user accepting and using technology. From these models and theories the proposed model of this study is built. This chapter will present the proposed model of this research and its factors, with supporting references and studies to investigate the impact of factors that may affect the Saudi academic's intention to accept E-assessment.

4.1 The Model of Acceptance of E-assessment:

As E-assessment is identified as end-to-end electronic assessment process where ICT is used for the whole assessment process (JISC, 2007), so E-assessment is a process completed by the use of technology. Consequently, the factors that may affect academics acceptance of E- assessment can be predicted from the models and the theories that investigate user acceptance of ICT. The model of this research is built by combining those factors which have the greatest effect on accepting E-assessment from the theories described in the previous chapter and from other studies discussed in the current chapter. Table 4-1 includes the factors of The Model of Acceptance of E-assessment, which is derived from models of user acceptance of ICT and other literature reviews.

Table 4-1 Factors in The Model of Acceptance E-assessment

Factor and Sub-factor	Definition	References
Perceived Ease of Use	The degree to which the person believes using a specific system will not require an effort.	Davis, 1989; Taylor & Todd, 1995; Ghorab, 1997; Anandarajan et al., 2002
Perceived Usefulness	The degree to which the person believes that using a specific system will enhance his/her performance.	Davis, 1989; Taylor & Todd, 1995; Ghorab, 1997; Anandarajan et al., 2002; Park, 2009
Compatibility	The degree to which the current system matches past experience and current requirements of the user.	Tornatzky & Klein, 1982; Rogers, 1995; Taylor & Todd, 1995; Ajjan & Hartshorne 2008;
Attitude	The positive or negative evaluation indicated by the individual to undertake certain behaviour.	Fishbein & Ajzen, 1975; Davis, 1989; Ajzen, 1991; Taylor & Todd, 1995;

		Armitage & Conner, 2001; Ajjan & Hartshorne, 2008
Superior Influence	The influence on the user exerted by his/her supervisor.	Taylor & Todd, 1995
Peer Influence	The effect of family, friends and peers in individual intention to perform certain behaviour.	Taylor & Todd, 1995
Subjective Norm	The individual perception, which is influence by other people, towards performing particular behaviour.	Fishbein & Ajzen, 1975; Ajzen, 1991; Taylor & Todd, 1995; Armitage & Conner, 2001; Venkatesh et al., 2003**;** Paver et al., 2014
Self-Efficacy	The degree to which the individual has the ability to perform specific behaviour.	Taylor & Todd, 1995; Moore & Benasat, 1996**;** Compeau et al., 1999; Ajjan & Hartshorne, 2008; Park et al., 2012
Resource facilitating conditions	This influence includes the external factors (money, time and technology) that affect a user's decision to perform particular behaviour.	Taylor & Todd, 1995; Ajjan & Hartshorne, 2008; Eljinini & Alsamarai, 2012; Way, 2012;
IT Support	This is defined as the presence of supportive IT staff, who help lecturers to use a system and design flexible applications.	Taylor & Todd, 1995; Sitthiworachart et al., 2008; Eljinini & Alsamarai, 2012; Way, 2012
Perceived Behavioural Control	The user should have control over the influences that may affect performing certain behaviour.	Ajzen, 1991; Taylor & Todd, 1995; Armitage & Conner, 2001; Ajjan & Hartshorne, 2008
Behavioural Intention	The degree to which the individual intends to perform or not perform certain behaviour.	Fishbein & Ajzen, 1975; Davis, 1989; Ajzen, 1991; Taylor & Todd, 1995; Armitage & Conner, 2001
Moderating factors		
Age	The age of an individual has a moderating effect on the relationship between attitude, subjective norm and perceived behavioural control with behavioural intention.	Venkatesh & Morris, 2000; Venkatesh et al., 2003; Wang et al., 2009
Gender	The individual's gender has a moderating effect on the relationship between attitude, subjective norm and perceived behavioural control with behavioural intention.	Minton & Schneider, 1980; Venkatesh & Morris, 2000; Venkatesh et al., 2003; Nysveen et al., 2005; Wang et al., 2009

This section presents the Model of Acceptance of E-assessment (MAE), designed to examine the degree of acceptance of E-assessment by academic staff in Saudi universities. This research will be informed by the factors from the models discussed in Chapter 3 and other studies that

have examined these factors, to predict lecturers' behavioural intention to accept E-assessment in Saudi universities. This model includes the attitude factor and its related sub-factors: perceived ease of use, perceived usefulness, and compatibility. To investigate the social influence the subjective norm factor is added, with two determinants: peer influence and superior influence. The perceived behavioural control factor is also included with its related sub-factors: self-efficacy, resource facilitating conditions, and IT support. Technology facilitating conditions are included with the resource facilitating conditions sub-factor. This is because technology is considered as one of the facilitating resources (Taylor & Todd, 1995) . IT support is added as a factor under perceived behavioural control, because some studies have emphasised on the importance of the availability of IT staff to support lecturers and students when using E-assessment (Sitthiworachart et al., 2008; Eljinini & Alsamarai, 2012; Way, 2012). Age and gender are considered in this study as moderating factors, because some studies have provided evidence that age and gender impact the relationships of attitude, subjective norm and perceived behavioural control with behavioural intention (Venkatesh et al., 2000; Morris & Venkatesh, 2000; Venkatesh et al., 2003). The conceptual model is shown in Figure 4-1. It consists of the constructs described in the following sub-sections.

4.1.1 Behavioural Intention

This is the degree to which the individual intends to perform or not perform a certain behaviour (Fishbein & Ajzen, 1975). Moore and Benbasat (1991) argue that behavioural intention can be used to measure the user's acceptance of new technology, and many researchers have used behavioural intention in their models to investigate user acceptance of technology (Fishbein & Ajzen, 1975; Davis et al., 1989; Ajzen, 1991; Taylor & Todd, 1995a). All these theories and models are based on the behaviour intention factor (Venkatesh et al., 2003; Shih & Fang, 2004), which indicates that an individual's beliefs influence their behaviour (Ajzen, 1991). Moore and Benbasat (1991) point out that technology acceptance can be measured by users' intention and different studies have used behavioural intention to measure the acceptance of new technology (Chau & Hu, 2001; Lee, 2010; Terzis & Economides, 2011; Cheon et al., 2012). In the development of MAE, behavioural intention is therefore used as an indicator of an academic's acceptance of E-assessment. It is divided into three determinants: attitude, subjective norm and perceived behavioural control.

1. **Attitude:** This means the positive or negative evaluation indicated by the individual regarding undertaking certain behaviour (Ajzen, 2005). Most of the studies that investigate the user's acceptance of ICT include attitude as a factor in their models

(Fishbein & Ajzen, 1975; Davis et al., 1989; Ajzen, 1991; Taylor & Todd, 1995a). Ajjan & Hartshorne (2008) found that attitude was a significant factor that affected the acceptance of Web 2.0, referring to the new generation of tools, applications and approaches, where the user are driving content to build personal relationships (Parise & Guinan, 2008). It is decomposed into three sub-factors:

i. **Perceived usefulness**: This is the degree to which the person believes that using a specific system will enhance his/her performance (Davis, 1989). Perceived usefulness is an important factor that can identify a user's intention to accept technology (Ghorab, 1997; Anandarajan et al., 2002). It has been confirmed that perceived usefulness is a factor that has a strong impact on E-learning success (Park, 2009). In this study it means the belief that using E-assessment for a member of the academic staff will enhance the performance.

ii. **Perceived ease of use**: This is defined as the degree to which using a specific system will not need an effort (Davis, 1989). Davis (1989) stresses the importance of this factor in user acceptance of technology. Other studies have indicated that perceived ease of use plays a key role in users' intention to accept new technology (Ghorab, 1997; Anandarajan et al., 2002). In the current study, it means that if E-assessment does not need additional effort and it is easy to use, the member of staff is likely to accept it.

iii. **Compatibility**: This is the degree to which the current system matches the past experience and current requirements of the user (Moore & Benbasat, 1991). This means that to motivate them to use E-assessment, it should fit the lecturers' needs and their past experience. Tornatzky & Klein (1982) stress that individuals like to adopt and use a system that is compatible with their existing needs and values. Another study found that perceived usefulness, ease of use and compatibility each have a significant effect on attitudes towards using Web 2.0 (Ajjan & Hartshorne, 2008). Rogers (1995) added the compatibility factor in his model (Diffusion of Innovations Theory) to describe user acceptance of the new technology.

2. **Subjective norm**: This is defined as the individual's perception, which is influenced by other people, towards performing particular behaviour (Fishbein & Ajzen, 1975). The subjective norm was added to the TRA, TBP, and DTPB models to examine its social effect (Fishbein & Ajzen, 1975; Ajzen, 1991; Taylor & Todd, 1995a). Venkatesh et al. (2003) also used the subjective norm in the Unified theory of Acceptance and Use

of Technology (UTAUT) to investigate the social influences. The subjective norm addresses the impact of social influences in this study. It consists of two sub-factors:

i. **Peer influence:** This is defined as the effect of family, friends and peers on individual intention to perform certain behaviour (Ajzen & Fishbein, 1980)**.** In this study, peer influence means the impact of the others' opinions on lecturers in accepting E-assessment.

ii. **Supervisor's influence:** This means the influence of the supervisor such as the head of school, in encouraging lecturers to accept E-assessment.

3. **Perceived behavioural control:** According to Ajzen (1991) perceived behavioural control " refers to people's perception of the ease or difficulty of performing the behaviour of interest". In other words, the user should have control over the influences that may affect performance of certain behaviour. Ajjan & Hartshorne (2008) found that perceived behavioural control is a significant factor that influenced the use of Web 2.0 This construct is decomposed into three sub-factors:

i. **Self-efficacy:** This is defined as the degree to which the individual has the ability to perform specific behaviour (Taylor & Todd, 1995). Some studies have highlighted the effectiveness of self-efficacy in users accepting technology (Taylor & Todd, 1995a; Moore & Benasat, 1996; Compeauet et al., 1999) . Park et al. (2012) also considered self-efficacy in their model to investigate user acceptance of m-learning (mobile learning). Furthermore, Ajjan & Hartshorne (2008) found that self-efficacy has an influence on perceived behavioural control. It is important that lecturers feel that they have the ability to use E- assessment and are confident to deal with it.

ii. **Resource facilitating conditions:** This influence includes the external factors that affect a user's decision to perform particular behaviour (Ejaz, 2014). Taylor & Todd (1995) explain that resource facilitating conditions including sufficient time, money and technology. If one of these resources is inadequate or absent that will impact the users' technology acceptance. Lecturers should have adequate time to use E-assessment, and have the money and technology to use E-assessment. Eljinini & Alsamarai (2012) concludes that the availability of infrastructure impacts the success of E-assessment implementation. Way (2012) also highlights the importance of the infrastructure factor in establishing an E-assessment system.

iii. **IT support:** This is defined as the presence of supportive IT staff who help lecturers to use E-assessment and design flexible E-assessment applications. The successful implementation of E-assessment depends on supporting IT staff to provide training courses (Sitthiworachart et al., 2008) and to implement the system correctly (Eljinini & Alsamarai, 2012; Way, 2012).

Regarding the relationships between the factors, some studies have indicated that there are relationships between attitude, subjective norm, and perceived behavioural control. Cheon et al. (2012) found significant relationships between these three factors. Other studies have identified a strong influence of all these three factors on user intention (Armitage & Conner, 2001; Sadaf et al., 2012b; Paver et al., 2014), and a positive relationship has been found between subjective norm and behavioural intention (Taylor & Todd, 1995b; Huh et al., 2009; Lee, 2010; Cheon et al., 2012; Paver et al., 2014).

Different studies have confirmed that perceived ease of use and perceived usefulness are direct determinants of attitude (Davis, 1989; Taylor & Todd, 1995b; Venkatesh et al., 2000), and a significant effect of perceived ease of use on attitude has been found (Huang & Chuang, 2007; Lin, 2007).

Several studies in different areas have found a strong relationship between perceived behavioural control and behavioural intention, including studies on web-based learning (Lee, 2010), mobile learning (Cheon et al., 2012), computer resource centres (Taylor & Todd, 1995b), and Web 2.0 (Ajjan & Hartshorne, 2008). Ajzen (1991) mentions that self-efficacy is positively correlated to perceived behavioural control. Moreover, researchers have found a positive relationship between resource facilitating conditions and perceived behavioural control (Ajjan & Hartshorne, 2008; Huh et al., 2009; Chun-Hua & Kai-Yu, 2014).

4.1.2 Moderating Factors in MAE:

Gender and age have been found to be factors affecting the relations between behavioural intention, subjective norm and perceived behavioural control and behavioural intention (Venkatesh & Morris, 2000; Venkatesh et al., 2003).

4.1.2.1 Gender

The individual's gender can affect attitude, subjective norm and perceived behavioural control (Venkatesh & Morris, 2000; Venkatesh et al., 2003). Researchers have pointed out that there are differences between males and females, and males tend to be more highly task-oriented (Minton & Schneider, 1980). In the Unified Theory of Acceptance and Use of Technology

(UTAUT) Venkatesh et al. (2003) investigate the differences in attitude between males and females. Moreover, the effect of subjective norm and perceived behavioural control among females was found to be more noticeable than in males (Venkatesh et al., 2003). A study conducted on the usage of a mobile chat service found that gender impacts attitude towards its use, and proposed this factor as a moderating factor (Nysveen et al., 2005). Another study investigated mobile learning also has found that age and gender have moderating effects on the subjective norms (Wang et al., 2009). A further study observed significant gender differences in relation to the effects on behavioural intention (Wang & Wang, 2010). Consequently, this research has added gender as moderating factor, which influences the relationships of attitude, subjective norm and perceived behavioural control and behavioural intention (Figure 4-1).

4.1.2.2 Age

The age of an individual has an influence on attitude, subjective norm and perceived behavioural control (Morris & Venkatesh, 2000; Venkatesh et al., 2003). Morris & Venkatesh (2000) point out that its effect on attitude is more noticeable for younger users, whereas the effect on perceived behavioural control is more noticeable for older users. Furthermore, the effect on the subjective norm is more noticeable for older females (Venkatesh et al., 2003). Moreover, Wang et al. (2009) found in their study of mobile learning that both age and gender have an impact on subjective norms. As a result, this research will examine the moderation of age on attitude, subjective norm and perceived behavioural control (Figure 4-1). Table 4-2 shows the factors in each model, including the Model of Acceptance of E-assessment (MAE).

4.2 Chapter Summary:

The proposed model of acceptance of E-assessment includes factors derived from different models, which examine users' acceptance and use of ICT, and from other related studies. These factors are attitude (perceived ease of use, perceived usefulness, and compatibility), subjective norm (peer influence and superior influence) and perceived behavioural control (self-efficacy, resource facilitating conditions, and IT support). Furthermore, gender and age are added as moderating factors that influence attitude, subjective norm and perceived behavioural control relationships with behavioural intention.

Table 4-2 Factors in each model including MAE

Models/ factors	**Subjective Norms (SN)**			**Attitude**				**Perceived Behavioural Control(PBC)**					**Age**	**Gender**
	SN	Peer influence	Superior influence	Attitude	Perceived usefulness	Ease of use	Compatibility	PBC	Self-Efficacy	Resource facilitating Conditions	Technology facilitating	IT Support		
TAM	×	×	×	√	√	√	×	×	×	×	×	×	×	×
TPB	√	×	×	√	×	×	×	√	×	×	×	×	×	×
DTPB	√	√	√	√	√	√	√	√	√	√	√	×	×	×
MAE	√	√	√	√	√	√	√	√	√	√	√ (under resource facilitating Conditions)	√	√	√

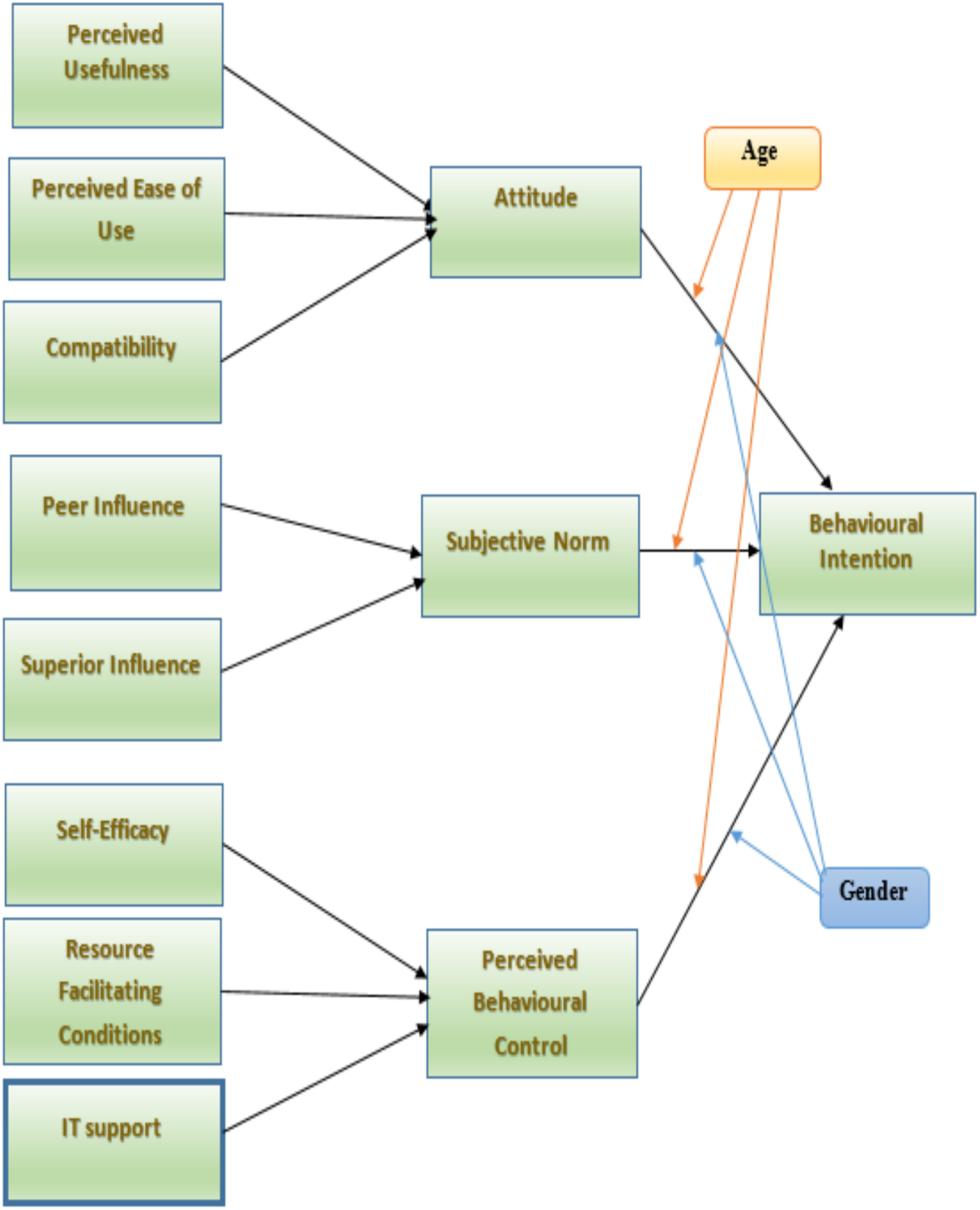


Figure 4-1 Model of Acceptance of E-assessment (MAE)

Chapter 5: Research Methodology

In order to investigate the factors (in MAE) that influence academic's intention to accept E- assessment, appropriate research methods and techniques need to be used. A careful consideration in choosing the research methods is important to obtain accurate and valuable results. This chapter explains the research methods and techniques, and the chosen research methods for this study.

5.1 Research Methods

There are three common research methods used by researchers to validate their studies, which are: quantitative, qualitative, and mixed-methods. The quantitative method collects numeric data to observe, predict and control phenomena (Gay, 1996). It can also be used to measure variables linked to views, attitudes and beliefs and numerical analysis of the data collected can be carried out through different approaches (Mack et al., 2005). The quantitative method often uses closed questions, where the participant has to choose from specific selections (Creswell & Clark, 2007).

The qualitative method aims to explain human opinions, attitudes, actions and decisions (Creswell & Clark, 2007). This approach can involve different methods of collecting data, such as interviews, observation and open-ended questions (Taylor, 2005). The difference between quantitative and qualitative methods is that quantitative research is related to the measurement while qualitative research is concerned with meaning (Katsirikou & Skiadas, 2010).

The mixed-method approach is a combination of quantitative and qualitative methods (Lister, 2005). It involves using both open-ended and closed-ended questions (Creswell, 2003). The qualitative method is used to clarify the meaning of the results provided by the quantitative method. This helps the researcher to have a better understanding of the implications and reasons behind the quantitative data (Mack et al., 2005). The aim of mixing data collection methods is to give the researcher a clearer and broader picture (Caracelli & Greene, 1993; Sandelowski, 2000). According to Sandelowski (2000), using mixed-methods is an active choice to enlarge the range and improve the logical power of the study. This combination can guarantee obtaining more accurate results.

The use of sequential mixed methods is considered as another research approach, in which the research is conducted sequentially in different phases (Creswell, 2013) . Each phase is

dependent on the results of the previous phase (Creswell, 2013). This approach has different types, depending on the nature of the research and the order of conducting each research method (Creswell, 2013):

- **Explanatory sequential mixed methods approach:** starts with a quantitative phase then qualitative phase.
- **Exploratory sequential mixed methods approach:** starts by exploring with qualitative data and analysis first, followed by the quantitative phase.
- **Embedded sequential mixed methods approach:** contains one or more form of data, using quantitative or qualitative methods, or both, with-in a large design.
- **Transformative sequential mixed approach:** consists of two phases, quantitative or qualitative, regardless of their order; it has a theoretical lens that guides a directional research question aimed to explore the problem.
- **Multiphase mixed methods approach:** involves a number of phases, and is used in long-term projects.

Rogers et al. (2011) suggest five key steps to success full gather either quantitative or qualitative data:

1. **Setting goals**: The data should be gathered for a specific goal or purpose. Thus, clarifying the goal before gathering the data is essential.
2. **Identifying participants**: The population who will participate in the research should be specified.
3. **Relationship with participants**: Building a clear relationship with the participants helps to create an understanding of the nature of the study. To make the relationship clear, the participants are asked to sign the consent form, which states the purpose of the study, and their signatures will confirm their willingness to share in the study.
4. **Triangulation method**: This is used to investigates a phenomenon using at least two different perspectives (Rogers et al., 2011). Triangulation is used to increase accuracy in empirical research (Runeson & Höst, 2009). The aim of using it in a study is to guarantee the validity and credibility of the results (Cohen et al., 2000; Altricher et al., 2008). It is used in both qualitative and quantitative methods. This method is employed by many researchers to validate their studies, and provides a broader picture for the study (Runeson & Höst, 2009). There are four types of triangulation method (Denzin, 1970):

- Data triangulation: involving different times, social situations, and a variety of people.
- Investigator triangulation: using multiple researchers in a study.
- Theory triangulation: using more than one theoretical scheme in the interpretation of data.
- Methodological triangulation: using more than one method for collecting data, such as interviews and questionnaires.

5. **Pilot study**: This means running a small trial of the main study which is used in order to ensure that the method used (e.g. a questionnaire) is clear and understandable before being delivered to the participants.

There are different tools to collect the data, including self-administered questionnaires, interviews, structured observation, and structured recorded reviews. The next sections will provide a brief information about each type of data collection tool.

5.1.1 Self-administered Questionnaire

Questionnaires are used to collect demographic data and participants' opinions about specific subjects (Rogers et al., 2011). This needs effort and skill to frame the questions in the right way to ensure that the questionnaire obtains accurate information (Rogers et al., 2011). Additionally, to guarantee obtaining the right data, the questionnaire should be validated before delivering it to the participants to guarantee obtaining the right data (Faulkner, 1998; Rogers et al., 2011). The self-administered questionnaire allows the participant to complete the questionnaire by him or herself, while the responses of participants in an interview-administered questionnaire are recorded by the researcher (Bourque & Eve, 2003). The questions can be open-ended, which gives the participant freedom to answer, and enables the researcher to collect more in-depth information (Faulkner, 1998). The other type of question is the closed-ended question, which forces the participant to select one of the choices in a list (Faulkner, 1998). The questionnaires can be distributed either on paper or via online tools (e.g. e-mail, social network) (Rogers et al., 2011).

5.1.2 Interview

An interview is a conversation with purpose (Kahn & Charles, 1957; Rogers et al., 2011). It should include at least two individuals, one of them asking the questions and the other answering them (Fink, 2003a). There are four types of interview (Rogers et al., 2011):

1**. Unstructured interviews**: include open ended questions. The interview structure is more like a conversation between the interviewer and the interviewee. This type of interview can explore different opinions about the topic.

2. **Structured interviews**: consist of close-ended questions. These questions are short and clearly expressed. For all participants, the same identically phrased questions and the same order has to be adopted.

3. **Semi-structured interviews:** a combination of both closed-ended and open-ended questions, where structured and un-structured interview techniques are mixed. Questions are prepared before the interview and the interviewer can explain in detail about the questions at the interview.

4. **Focus groups:** this method is used for interviewing a group of people together. The group mainly consists of three to a maximum of 14 people, and the discussion is led by researcher. Individual ideas about the topic are discussed in focus groups. This method is used to explain the findings of a previous method. According to Kitzinger (1994), the focus group method is the perfect method to use for e

xplaining the survey results, and it is possible to combine this method with other research method techniques.

5.1.3 Structured Observation

Observation is used to gather the data visually, and it guides the researcher to focus on the object of the study (Fink, 2003b). This type of data collection is used in the development stage of a product or system (Rogers et al., 2011). Observation can be direct observation in the field, direct observation in a controlled environment or indirect observation (Rogers et al., 2011).

5.1.4 Structured Record Reviews

The structured record review is a survey, which is created in a special form to help the surveyor to control the data collection from records, including financial, medical and school records (Fink, 2003b). It can be in the form of electronic, written or filmed documents (Fink, 2003b).

5.2 Research Methods in this Study

In order to ensure that the existing factors in the Model of Acceptance of E-assessment do have an influence on lecturers' behaviour intention, and to assess the relationships between factors in MAE, this study adopted the mixed methods approach to investigate the proposed model. A combination of quantitative and qualitative approaches was used to evaluate the MAE. Using a quantitative or qualitative method alone, would not give the researcher as deep an understanding and as accurate results as using a combination of both methods. Therefore, the mixed method approach is used in this study. Different research techniques have been used in the current study (interview, questionnaire and focus group discussion), in the form of a multiphase mixed sequential methods approach, since there are a number of phases and each phase is built from the results and findings of the previous one (Figure 5-1).

The first phase was developing the MAE from literature reviews, using the user acceptance and use of ICT models and factors examined in related studies. The second phase was conducting interviews with experts to refine the factors in MAE. This phase included both open-ended and closed-ended questions. The open-ended questions were used to identify the current usage of E- assessment, to explore the reasons behind experts' answers for the closed-ended questions, and to help in suggesting new factors that did not exist in the proposed model. In the same phase, a questionnaire was also utilized to confirm the results of the interviews with the experts. The third phase involved distributing an online questionnaire to all academics in Saudi Universities, including closed-ended questions. The questionnaire results were subjected to Structural Equation Modelling (SEM) analysis to investigate the relationships between factors and assess the hypotheses of the model. SEM also helped to check the validity and reliability of the constructs and was used to examine the Goodness of Fit of the model. The last step involved establishing focus group discussions to obtain a deeper understanding of the SEM results and explain these based on the academics' views.

5.3 Chapter Summary

This chapter has illustrated the different research methods that can be used in this type of research, and presented the key steps to success full gather data by each method. It has also provided a summary explaining the available data collection tools. The research methodology selected for this study has been explained in detail. Mixed methods (both quantitative and qualitative) were employed in the study. Interviews with experts were conducted, including both open-ended and closed-ended questions to refine the factors. Later, a questionnaire was

distributed by e-mail to academics in Saudi universities to evaluate the factors and to examine the relationships between them using Structural Equation Modelling. Finally, this study conducted focus group discussions consisting of Saudi academics, to clarify the questionnaires' results.

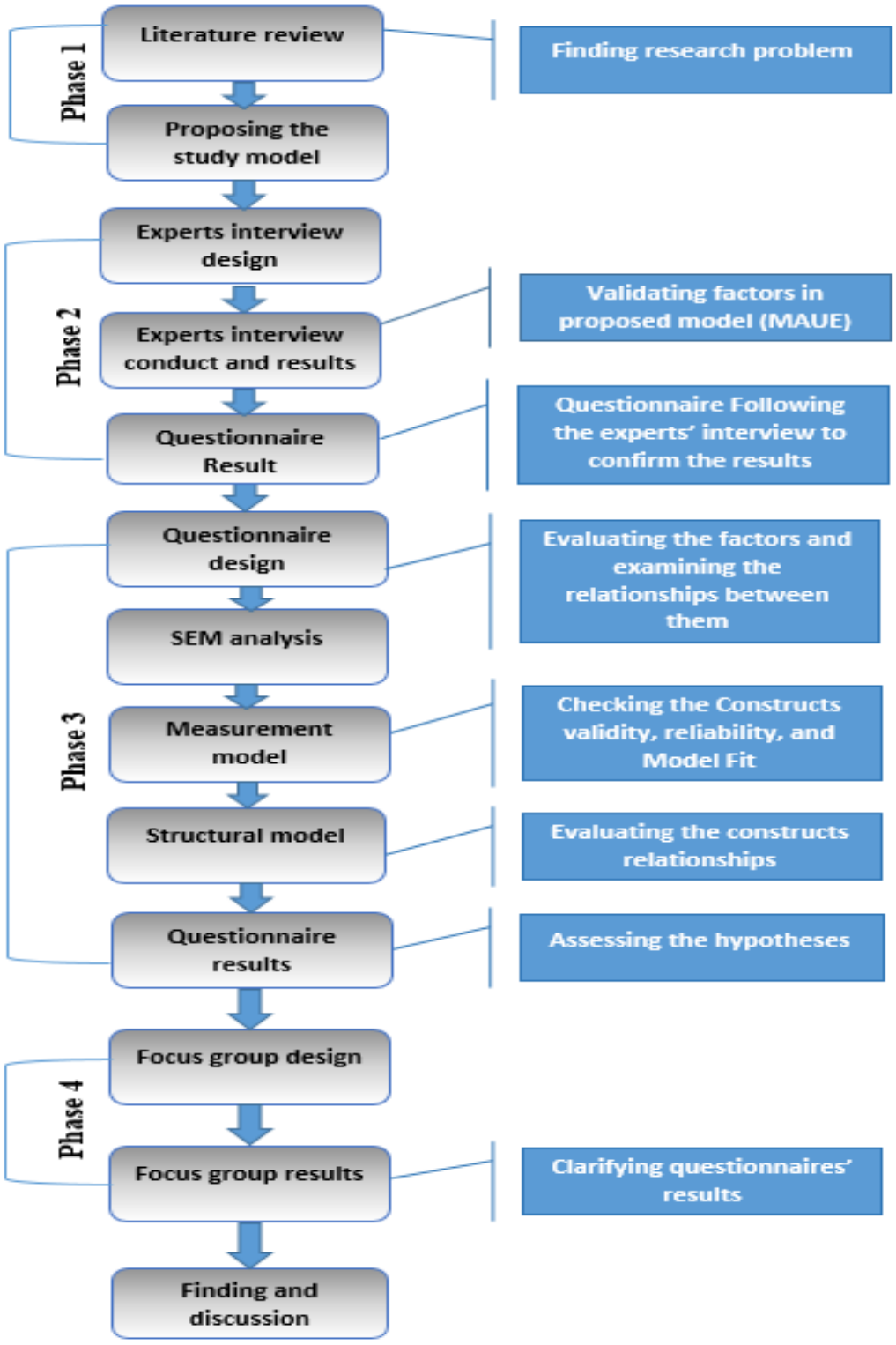


Figure 5-1 Research phases

Chapter 6: Experts Interview Design and Results

In order to validate the existing factors in the Model of Acceptance E-assessment (MAE) and check if there are any other factors that may affect lecturers' intention to accept E-assessment, this study interviewed 15 experts from Saudi universities. This chapter discusses the experts' interview design, sample size, procedures, and finally presents the results. A questionnaire was send to Saudi academics to confirm the expert's interview result, which is discussed in this chapter.

6.1 Identifying Experts

The target experts in this study are the individuals who work with lecturers and at the same time supervise the E-learning in Saudi Universities. In every Saudi University there is a Deanship of E-learning and distance learning, including E-assessment under this Deanship. Therefore, this study aimed to interview the Deans or Deputy Deans of E-learning and distance learning in Saudi Universities from different regions in the kingdom to obtain different views and opinions. In this study the researcher has interviewed 15 experts from 10 different universities in Saudi Arabia King Saud University, King Abdul Aziz University, Aljouf University, Taif University, Prince Nora University, Taibah University, King Faisal University, Saudi Electronic University, Shaqra University and Tabuk University. The study also covered different cities in Saudi Arabia particularly Riyadh, Jeddah, Madinah, Taif, Aljouf, Tabuk, Shaqra, and Hofuf.

6.2 Interview Design

The aim of the interviews was to explore the extent of use of E-assessment by academic staff in Saudi Universities, and to confirm the existing factors in the Model of Acceptance E- assessment. It was also intended to identify other factors, which are not included in the Model of Acceptance E-assessment. Therefore, the study used a semi-structured interview which included both open and closed questions.

According to Foddy (1993), shorter scales such as five-point scales are desirable in cases where a decision is required. Therefore, a Likert Scale with five-point (strongly disagree, disagree, neutral, agree strongly disagree) was used in this study for the closed-ended questions to

confirm the current factors in the model (Likert, 1932). This was also to ensure the validity of the experts' responses and give them choices to select. The mean intervals in the Likert Scale helped to determine the factors which affect the use and acceptance of E-assessment. The intervals range from 1 to 5. The mean factor which is ≠ 3.0 is accepted, otherwise the factor is rejected.

The interview questions were assessed by two research students and one of the experts. They gave valuable comments which helped to make the questions clearer and more understandable. They did not suggest major changes, just editing of some unclear statements. The interviews were conducted in the Arabic language, and the transcripts were translated from Arabic into English. The researcher subsequently of this study asked Arabic researchers at the University of Southampton to confirm accuracy of the translation for both the interview questions and interview transcripts.

6.3 Ethics Approval

Ethical Approval was needed before starting the interviews. The ethical form for this research has been approved by Ethics Committee at the University of Southampton (research ethics number FoPSE/ 15714).

6.4 Interview Procedures

The experts received an e-mail asking them to participate in this research. This e-mail included a brief explanation about the research and its goals, and requested the expert to determine a date and time for the interview (see Appendix A). The experts took part in a face-to-face interview with the investigator or was interviewed by phone. Each participant was asked to read the participant information sheet and sign the consent form at the beginning of the interview.

After that, the participant was shown the Model of Acceptance of E-assessment in Saudi Arabia universities and give the opportunity to ask for clarification. This took about 15 minutes. They were asked if the academics in their university use E-assessment? Next, 16 closed-ended questions were asked to refine the factors and explain the reasons behind their answers. The final open-ended part of the interview consisted of questions about improving the model and if they think there are other factors that affect lecturers in Saudi Arabian universities to accept E- assessment. This took about 25 minutes. The total time for the interview was less than 45 minutes. The interviews were recorded.

Some of the experts preferred the interview to be carried out by phone, also, for the experts living in other cities, the phone was used to facilitate the interviews. Consequently, the consent form, information sheet and the model sheet were sent to the experts by e-mail before the time of the interview.

6.5 The Sample Size of the Interview

It is important to interview the right number of experts to obtain significant results. In this stage, determining the minimum sample size is crucial to produce reliable and accurate results (Banerjeeet et al., 2009). There is no agreed number of experts for an interview in a content validity study; however, most research suggests a panel from 3 to 20 experts (Lynn, 1985; Grant & Davis, 1997). One of the authors suggests using the saturation method (Marshall et al., 2013). Data saturation in qualitative research means gathering data until reaching a point of redundancy when no new data is being added (Bowen, 2008). Guest et al. (2006) interviewed 60 women for their study and they found after analysed the first 12 interviews they obtain similar results when they completed to 60 interviews, and they conclude that the saturation is occurred in interview number 12. The researcher in this study reached redundancy in data gathering during the expert interviews at expert number 15. Consequently, in this study interviews were conducted from 15 experts from different Saudi Universities.

6.6 Analysis of Interviews

The interview questions included both open-ended and closed-ended questions. Open questions were used to obtain an explanation regarding the experts' choices in the closed-ended questions, to identify new factors, and to find out the usage of E-assessment in Saudi Universities.

As the information from closed-ended questions is considered as quantitative data, the experts' responses were collected and entered into SPSS software to analyse the data statistically. The One Sample T-test was used to analyse as a statistical test the results of the quantitative data. This test helps in comparing the mean of a population (μ) with a hypothesised value (μ_0). The hypothesised mean (μ_0) = 3, which indicates neutral on the five point Likert-type scales. The hypotheses for testing each factor are as follows:

- H_0: If the mean rating of the proposed factor is ≠ 3.0, accept the null hypotheses, that the factor is statically significant, and it affects the use of E-assessment.

- H_1: If the mean rating of the proposed factor is = 3.0, accept the alternative hypotheses, that the factor is not statically significant, and it does not affect the use of E-assessment.

To avoid the possibility of observing at least one significant result, finding many spurious positives and to protect collected data against the bias of frequent hypothesis testing effects, the p-value requires to be adjusted to compute the number of comparisons being performed (Altman & Bland, 1995). Therefore, the Bonferroni correction was used in the analysis of this research, which is a simple method for correcting multiple comparisons, used when dependent or independent statistical tests are being performed together on a single data test (Altman & Bland, 1995). Using the Bonferroni correction means that the null hypothesis (H_0) is only rejected if the probability (p-value) $\geq \frac{a}{n} = \frac{0.05}{19} = 0.002$, which is the probability that the difference is due to chance, where *n* is the number of questions included in the interview. The factor is statistically significant if the p-value < 0.002; otherwise the factor is not statistically significant.

6.7 Interview Results

The interview was designed to investigate the current use of E-assessment, validate the existing factors in the MAE and identify new factors.

6.7.1 The use of E-assessment by Academics in Saudi Universities:

To find out to what extent the academics use E-assessment in Saudi universities, experts were asked: *Do the academics in your university use E-assessment?*

Seven of the experts said "Yes" and eight of them said "No". Asking for reasons to their answers, some experts who answered "Yes" explained that not all the academics in all their university schools were using E-assessment, most of the academics in mathematics and medical schools were interested in using E-assessment.

"Yes, the health schools more interested using E-assessment compared with the English and Arabic schools" Expert 3.

Another expert explained that there had been an unsuccessful experiment in using E- assessment, because the agent (the company who is establishing the E-assessment system in the university and keep maintenance it) was ineffective.

"There was an experiment with first year students in some schools like English and maths, and it was not 100% successful, because the executing agency was not effective" Expert 6.

Expert 2 clarified one of the obstacles of using E-assessment, which is the security problem or the possibility of cheating if the exam was done at home:

"The lecturers do not use E-assessment unless it is done in the university labs"

Another expert answered "Yes" but with low usage. The lecturers in his university used E- assessment only for short exams:

"*Yes, but very few. The distance learning students about 10 thousand, all of them use E- assessment in short tests such as quizzes, but the final exams are still on paper."* Expert 8.

Others clarified that E-assessment system is part of the Blackboard system, and it is used by many academics in different schools

"Yes, the E-assessment system is included with the Blackboard system and there are many lecturers use it." Expert 11.

"Yes, the E-assessment system is included with the Blackboard system. All the lecturers in each school cooperate to write the questions and build a question bank. There are many lecturers who use E-assessment system and like its benefits." Expert 13.

The above quotations show that there is a use of E-assessment in Saudi Universities, but in some schools and there are still some problems, such as the agents' efficiency and the security problem, that hinder the acceptance and use of E-assessment.

The experts who answered "No" also gave reasons. One of them explained that the E-learning Deanship was only recently established.

"Because the deanship of E-learning was established just over year and half." Expert 2.

"The E-learning Deanship is emerging, it was established just over few months ago." Expert4.

Another attributed the lack of use of E-assessment by problems in the E-assessment system or the Chancellor's lack of encouragement towards academics using the E-assessment.

"Because the new Chancellor does not encourage them to use E-assessment. Few of the lecturers use Blackboard and there are some problems in the system." Expert 4.

"No, the problem is the lecturers do not accept using E-assessment. Because, the Chancellor policies, they did not encourage the lecturers" Expert 9.

Another expert explained that the rules of the university included 25% of the marks for attending the exams.

"No, because we use blended learning and there are 25% for attending the tests." Expert 7.

Another important reason provided by one of the experts is that E-assessment is not available for all the academics.

"Not all the lecturers can access the system and assess the student using E-assessment. They have to obtain permission from the Chancellor." Expert 14.

6.7.2 Validate Existing Factors in the Model of Acceptance E-assessment

The experts were asked questions to investigate the significance of each factor. The interview questions are listed in Table 6-1, which also shows the statistical results of the experts' interview responses.

Table 6-1 Experts interview stastical results

Factor	Question	Mean	P-value	Statically Significant
Perceived Usefulness	1- Using E-assessment will help lecturers to accomplish tasks quickly? Can you explain?	4.93	<0.002	Yes
	2- Using E-assessment will help lecturers to improve their performance? Can you explain?	4.67	<0.002	Yes
Perceived Ease of Use	3- Lecturers are willing to use E-assessment if the system is easy to use? Can you explain?	4.87	<0.002	Yes
	4- Lecturers are willing to use E-assessment if the system does not require more effort to use compared with paper-test? Can you explain?	4.33	<0.002	Yes
Compatibility	5- Using E-assessment is time saving for lecturers? Can you explain?	4.93	<0.002	Yes
	6- Lack of familiarity with using technology tools inhibits using E-assessment? Can you explain?	4.93	<0.002	Yes
	7- E-assessment meets the lecturer's requirements to assess students? Can you explain?	4.47	<0.002	Yes
Peer Influence	8- Lecturers may influence others to use E-assessment? Can you explain?	4.67	<0.002	Yes
Superior Influence	9- University Chancellors are influencing lecturers to use E-assessment? Can you explain?	4.73	<0.002	Yes
Self-Efficacy	10- Lecturers do not use E-assessment unless they have the ability to use E-assessment tools? Can you explain?	4.93	<0.002	Yes
Resource facilitating conditions	11- A reward encourages lecturers to use E-assessment? Can you explain?	4.80	<0.002	Yes

	12- Lecturers will use E-assessment if there are no technical problems with accessing it? Can you explain?	4.73	<0.002	Yes
	13- Academics use E-assessment if it is counted as working hours? Can you explain?	3.80	<0.002	Yes
IT Support	14- IT support is essential to help lecturers in using E-assessment? Can you explain?	4.93	<0.002	Yes
Attitude	15- Does the academic's attitude has an effect on the acceptance of E-assessment? Can you explain?	4.93	<0.002	Yes
Subjective Norm	16- Are the people around the academic and the society can influence the academic to accept E-assessment? Can you explain?	4.65	<0.002	Yes
Perceived Behavioural Control	17- Does the academic's ability to control the use of E-assessment has an effect on academic to accept E-assessment? Can you explain?	4.68	<0.002	Yes
Gender	18- There is a difference between males and females in accepting and using E-assessment? Can you explain?	2.80	0.595	No
Age	19- There is a difference between old lecturers and young lecturers in accepting and using E-assessment? Can you explain?	3.80	0.061	Yes

6.7.2.1 Attitude Factor:

Attitude is assessed through Q15, the One-Sample t-test result shows the mean is 4.9 > 3.0 and p-value < 0.002 (Table 6-1). Therefore, H_0 is accepted and H_1 is rejected, that indicates that attitude is statistically significant factor that effect the acceptance of E-assessment.

All the experts were agree that attitude is an important factor.

"Yes, absolutely. It is an important factor." Expert 8.

"Yes, it is very important factor" Expert 6.

This factor includes three sub-factors: perceived usefulness, perceived ease of use and compatibility. All these factors have an impact on academics to accept E-assessment, as discussed in following sections.

6.7.2.1.1 Perceived Usefulness:

This section discusses the quantitative and qualitative analysis for the perceived usefulness sub-factor. To validate the perceived usefulness sub-factor, the expert were asked to evaluate two questions Q1: *Using E-assessment will help lecturers to accomplish tasks quickly* and Q2: *Using E-assessment will help lecturers to improve their performance.*

Analysing the quantitative response to Q1, the One-Sample t-test result shows the mean is 4.93 which is higher than $\mu_0 = 3.0$ (see Table 6-1); also, the p-value < 0.002 (Table 6-1); which means H_0 is accepted and H_1 is rejected.

Regarding Q2, the quantitative analysis shows that the mean = 4.67 > 3.0 (Table 6-1), and p- value < 0.002 (Table 6-1), therefore $H_0$is accepted and H_1 is rejected.

Regarding the qualitative analysis for Q1 and Q2, most of the experts answered: "*Yes, absolutely" for Q1 and Q2.* Expert 1 said E-assessment can improve academic performance with regard to the research ability and to assessing students:

"Yes, absolutely, for both research and assess students."
Expert (6) said:

"Yes, it is improving the lecturer's ability to use technology"
Experts 8, 10, 11 and 12 confirmed that using E-assessment helps an academic to accomplish the tasks quickly:

"Yes, absolutely. For example, the result is released automatically which is faster than manual correction."
Expert 15 confirmed that:

"The lecturer writes the exam questions in the system and determines the time and date of the exam, and when the exam is finished the result is released automatically with a graph of results for the lecturer. Also, an E-assessment system is linked with the admission system department in the university."
Additionally, other experts said the E-assessment helps the academics to discover the mistakes in an exam before it is released:

"If there is a mistake in writing and putting the question in the system, the system can help to discover that" Experts 8, 10 and 12.
Expert 8 explained that:

"*The lectures should build a bank of questions, and put in about 500 questions. This is to provide different questions for each student to avoid cheating. In order to ensure that the test is fair, the lecturer should put similar questions and divided the questions in levels depending on its difficulty. For example, 20% of questions are difficult, 25% less difficulty, 25% moderate, and 30% of questions are easy. Then the system collects 10% from difficult questions, 40% from easy questions, and 50% from moderate questions. This will increase the ability of the lecturer in writing and sorting the questions."*

From the quantitative and qualitative results above, and as H_0 is accepted for Q1 and Q2, this means the perceived usefulness sub-factor is significant.

6.7.2.1.2 Perceived Ease of Use

This section will present the quantitative analysis and discuss the qualitative analysis for the perceived ease of use sub-factor. Q3 and Q4 were answered and explained by the experts to validate the perceived ease of use sub-factor. The quantitative results of Q3 are: mean 4.87 > 3.0 and the p-value < 0.002 (see Table 6-1). For Q4, the mean 4.33 > 3.0 and the p- value < 0.002 (see Table 6-1); therefore, H_0 is accepted and H_1 is rejected. Perceived ease of use is thus considered statistically significant.

The experts confirmed the importance of the perceived ease of use sub-factor, by endorsing Q3 and Q4:

"Yes, absolutely."

One of the expert commented that E-assessment provides automatic corrections which saves lecturers effort:

"*It saves the lecturer's effort because it offers automatic correction."* Expert 2.

Other experts explained that although academics need to build a questions bank at the beginning, which will require their effort, later it will save their time and effort;

"*At the beginning it will need effort to sort a number of questions to create a questions bank, after that the lecturer will save his time and effort."* Expert 6 and 7.

Other experts compared using a paper-test and using E-assessment:

"Yes, absolutely. In a paper test the lecturer needs to write the questions, copy it, attend the exam, collect the paper, correct the exam, and put the results in the system. But using E- assessment he just needs to write and put the questions in the system." Expert7 and 11.

Expert 13 commented that E-assessment helps to design questions and sorts them in different levels of difficulty:

"Yes, it needs less effort than a paper test. Because the system helps the lecturer to design the questions and categorise them in different levels of difficulty and the questions should cover all the course. This will help to save the lecturer's time and effort."

The quantitative and qualitative results clarify that the perceived ease of use sub-factor is significant and it should be considered.

6.7.2.1.3 Compatibility

The compatibility sub-factor was validated using quantitative and qualitative analysis for Q5, Q6 and Q7. The quantitative analysis for Q5, Q6 and Q7 shows that the mean > 3, and the

p- value < 0.002 (see Table 6-1). Therefore, $H_0$is accepted and H_1 is rejected. So, compatibility is considered as a significant sub-factor.

Most of the experts commented on their answers for Q5:

"Yes, absolutely it saves time."

Some of them gave a reason for their answers, in that the test will be corrected and the results appear automatically and this what the lecturer needs.

One of the expert answered from his experience of using E-assessment:

"I tried using E-assessment for 4 terms, and I discovered it was saving my time. Because in a paper-test the lecturer needs to attend the exam and correct the paper which takes a long time; even if he used the electronic correction, he needs to list the results in the system and that what I need, especially if I have a large number of students" Expert 8.

Expert 15 also supported his answer, commenting:

"Not just for the lecturer, but also for schools and the university. Because paper-test exams cost the university money and effort. If the paper test needs writing the questions on paper copying it, monitoring the exam, collecting the paper, correcting it, and releasing the results. This wastes the lecturer's effort and time, but E-assessment just needs to write the questions in the system, and the result will be released automatically. Most of the universities looking for technique that assess the students in short time and at the same time reduce the cost."

For Q6, all of the experts agreed that the background technology is a very important factor that affects the use of E-assessment by academics.

"*Yes, absolutely. Some of the lecturers refused to use E-assessment because they don't have the ability to use technology"* Expert 15, 12 and 13.

"Yes, absolutely, this is the most important factor because lecturers who are not familiar with technology see it is a complex task to do it" Expert 1.

"Yes, absolutely. Sometimes, if the lecturer does not have any technology background, he cannot use the E-assessment" Expert 7.

Regarding Q7, the experts agreed that E-assessment is compatible with academics tasks to assess students.

"Yes, absolutely. The E-assessment provides different types of questions. Also, it offers the ability for a lecturer to compare students' answers" Expert 3.

"Yes, absolutely. Very much there is a free availability of sorting the questions using E- assessment and there are different properties in the system, for example: it can be used in an essay questions (explain, compare, identify), short answers, multiple answers. But the Chancellor decided that all the lecturers should use objective questions" Expert 8.

"Yes, the system helps the lecturer to design the questions and categories them in different levels of difficulties and to analyse the question " Expert 13

"Yes, most of the question types are available in E-assessment" Expert 11.

However, one of the experts commented that it is hard to sort and correct long answer questions, and technical questions using E-assessment.

"*Yes, but not that much, because there are some problems in technical support, especially for open questions, but for quizzes E-assessment is very good"* Expert 4.

"*Yes, maybe. Because E-assessment is limited to objective questions such as multiple choice. But some courses need technical assessment, so, it needs time to create and prepare. If there is no time the test will not assess the students as the lecturer aims"* Expert 7.

Both the qualitative and quantitative analysis show that compatibility is a significant sub-factor.

6.7.2.2 Subjective Norm Factor:

Subjective norm is assessed using Q16, the One-Sample t-test result shows the mean is 4.65 > 3.0 and p-value < 0.002 (Table 6-1). Therefore, H_0 is accepted and H_1 is rejected, hence this indicates that subjective norm is statistically significant factor that impact the acceptance of E-assessment.

12 of the experts 'strongly agree' and 3 were 'agree' that people can influence the academic to accept E-assessment.

"Yes, absolutely. The society has a strong impact on academic to accept E-assessment" Expert 12.

"Yes, absolutely. It is an important factor " Expert 10.

"Yes, absolutely. In Saudi society people opinions have a strong effect on the individual's decision" Expert 7.

The subjective norm is decomposed into two sub-factors: peer influence and superior influence. These two sub-factors were tested, and the results indicated that both of these sub-factors have effect on academics to accept E-assessment.

6.7.2.2 .1 Peer Influence:

This subsection discusses the quantitative and qualitative analysis for the peer influence sub- factor, using Q8. The Q8 p-value < 0.002 (Table 6-1), and the mean for 4.67 > 3.0 (Table 6-1). From the statistical results, $H_0$is accepted and $H_1$is rejected. The peer influence is considered as an important sub-factor.

In the responses for the peer influence sub-factor, 10 of the experts strongly agreed it was important and 5 agreed. They answered Q8 by: "*Yes, absolutely".*

Also, the experts commented that academics can learn how to use E-assessment from each other.

"It will encourage the other lecturers to be as their colleagues. Also, the lecturers who used the E-assessment will teach the others and tell them about E-assessment benefits" Expert 7.

"Yes, maybe. Especially if the lecturer who has used E-assessment is a special lecturer, he will encourage the other lecturers to use the system. Also, the lecturers who used E-assessment will teach the others and tell them its benefits" Expert 8.

One of experts suggested collecting the active academics from each school and giving them training courses in using E-assessment. These academics will influence and help to encourage their colleagues in the same school.

"This is possible by collecting some of lecturers from each school and giving them extensive training courses, then they will encourage their colleagues and increase the awareness of E- assessment. Also, they can help the other lecturers to use E-assessment" Expert 13.

6.7.2.2.2 Superior Influence

The superior influence sub-factor was validated using Q9. The quantitative analysis shows that Q9 p-value < 0.002 (Table 6-1), and the mean for Q9 = 4.73 > 3.0 (Table 6-1). As a result, H_0 is accepted and $H_1$is rejected. The superior influence sub-factor is considered as a significant sub-factor.

The qualitative analysis for Q9 illustrates that all the experts were agree, 12 of experts answered Q9 by: "*Yes, absolutely",* and the other answered *"Yes".*

"The Chancellor has a huge impact to encouraging lecturers to use E-assessment" Experts 9,10 and 15.

"In one of Tabuk University's schools, the head was very active and interested to use the system and she encouraged the lecturers in the same school to use the system" Expert 15.

"Some schools are very active in using E-assessment because the Chancellor encourages the members of this school to use it" Expert 3.

Expert 11 suggested that the Chancellor should offer rewards for active academics who use E- assessment.

"The Chancellor has a huge impact to encourage lecturers in using E-assessment. They should offer rewards to lecturers who use E-assessment, such as having a course outside the country, or attending a conference."

6.7.2.3 Perceived Behavioural Control

Perceived behavioural control means the user should have a control over the influences that may affect performance of certain behaviour. This factor is assessed through Q17, the One- Sample t-test result shows the mean is 4.68 > 3.0 and < 0.002 (Table 6-1). Therefore, H_0 is accepted and H_1 is rejected, that indicates that perceived behavioural control is statistically significant factor that influence the acceptance of E-assessment.

10 of the experts 'strongly agree' and 5 only 'agree' that having the ability to control the use of E-assessment is important factor.

"Yes, absolutely. It is very important" Expert 13.

"Yes, absolutely. It is an important factor" Expert 10.

One of the experts commented that having the ability to control the use of E-assessment give the academic the confident to accept and use E-assessment.

"*If the academic has a technology background and the required resources to use E-assessment that will give him/her the confident to control the use of E-assessment*" Expert 11.

Perceived behavioural control consists of three factors: self-efficacy, resource facilitating conditions, and IT support. These sub-factors were validated and the results show that they have an influence in academic's acceptance of E-assessment.

6.7.2.3.1 Self-efficacy

The experts were asked Q10 to validate the self-efficacy sub-factor. The quantitative analysis shows that the self-efficacy sub-factor is significant. The p-value < 0.002 (Table 6-1), and mean 4.93 > 3.0 (Table 6-1). As a result, H_0 is accepted and H_1 is rejected. Self-efficacy is statistically an important sub-factor.

All the experts strongly agreed that having the ability to use E-assessment is essential and providing training courses for academics is crucial to encourage them to undertake E- assessment.

"Yes, absolutely. It is very important" Expert 12.

"Yes, absolutely. For that, we offer training courses especially for adding the questions in the E-assessment system. The training courses are very short-take about half hour and very easy" Expert 8.

"Tabuk University provided a training course for 700 lecturers in the university, to teach them how to use the Blackboard system. For example, how to send and receive the homework, upload the course material, and upload the exams. We cannot ask the lecturer to use the system before

he had this training course. And when he passes the course he will get a license called the "electronic teacher license". If the teacher does not have this licence, he cannot use the Blackboard system, specifically the E-assessment system. This is to avoid any problem they may have during the exam period" Expert 15.

6.7.2.3.2 Resource Facilitating Conditions

The resource facilitating conditions includes: money, time, and technology. Therefore, experts were asked questions regarding each resource: Q11 for money, Q12 for technology, and Q13 for time. The quantitative analysis for the three questions Q11, 12 and 13 shows that the p- value < 0.002 (Table 6-1), also, the means for all questions are higher than 3.0 (Table 6-1). Consequently, H_0 is accepted and H_1 is rejected. Resource facilitating conditions are considered as a significant sub-factor.

The exports confirmed that offering a financial reward will encourage academics to accept E- assessment.

"Yes, absolutely the reward's so important" Expert 1.

"Yes, absolutely. They should offer rewards to lecturers who use E-assessment, such as having a course outside the country, or attending a conference" Expert 11.

Regarding time, some of the experts agreed that using E-assessment should be counted as part of the working hours and should be mandatory.

However, some experts suggested that using rewards would be a solution to encourage academics to accept E-assessment, rather than forcing them.

"It is very difficult to enforce the lecturers to use E-assessment, but if there are rewards that will encourage lecturer to use E-assessment. For example, some universities put financial rewards of about 20% if the lecturers use Blackboard and update their webpage. But cutting an amount from a lecturer's salary to enforce them to use E-assessment is impossible in Saudi universities" Expert 9.

"Enforcing the lecturers to use E-assessment will be unacceptable, but if there are rewards that motivate the academics to use E-assessment" Expert 10.

However, other experts commented that it would be difficult to force the academics to use E- assessment.

"Enforcing the lecturers difficult, but it depends on the university if it is considering the quality of learning, it should put using E-assessment as a condition in the lecturer's job contract. Anyway, there is no contract system for careers in Saudi universities" Expert 1.

"It will be difficult to enforce the lecturers, the chancellor should encourage them especially by the money" Expert 6.

All the experts confirmed that providing the required technology for using E-assessment is crucial to encourage the academics to accept and use E-assessment.

"Yes, it is very important"

"*Technical problems such as system crashes, will discourage and limit using E-assessment"* Expert7.

"Yes. Absolutely. Because the technical problems will waste the lecturer's time and embarrass him" Expert 12.

6.7.2.3.3 IT Support

This subsection discusses the quantitative and qualitative results of Q14 to validate the IT support sub-factor. The Q14 p-value < 0.002 (Table 6-1), and the mean 4.93 > 3.0 (Table 6-1). So, $H_0$is accepted and $H_1$is rejected. IT support is considered as an important sub-factor.

All the experts confirmed that IT support is essential to encourage the academics to use and accept E-assessment, by selecting the "strongly agree" choice.

"Yes, absolutely. They are the facilitators of using E-assessment" Expert 6.

"Yes, absolutely. It is important" Expert 7.

"Yes, absolutely. It is very important" Expert 12.

The experts commented that IT support is the reason behind the successful projects, and it guarantees continued use of E-assessment:

"Yes, absolutely. The technical support is the secret of system or project success, and it should be immediate and continuous support" Expert 10.

"It is very important, because it ensure the continuity to use E-assessment" Expert 13.

6.7.2.4 Moderating Factors

The Model of Acceptance E-assessment (MAE) included two moderating factors: age and gender. This section discusses the quantitative and qualitative analysis of age and gender moderation factors.

6.7.2.4.1 Age

Some studies have discovered that age affect attitude, subjective norm, and perceived behavioural control (Venkatesh & Morris, 2000; Venkatesh et al., 2003). Therefore, this factor was validated using quantitative and qualitative analysis of the responses to Q18. The results exhibit that the p-value > 0.002 (Table 6-1). However, the mean = 3.80 > 3.0 (Table 6-1).

Moreover, seven of the experts strongly agreed and two agreed that age influences the acceptance of E-assessment by academics. Therefore, this factor is accepted, and it is considered as a significant moderating factor.

Some of the experts agreed that age can affect the acceptance of E-assessment:

"Yes. Most of the older lecturers refused to use technology" Expert 15.

"Yes, in general the younger lecturers are more interested to use E-assessment" Expert 4.

"Yes, absolutely. The younger lecturers are more interested to use E-assessment" Expert 5.

"*Yes, absolutely. All the lecturers over 40 years old refused to use E-learning and E- assessment"* Expert 9.

However, other experts did not agree that age can impact the acceptance of E-assessment:

"No, some of the lectures very old and they are interested to use E-assessment" Expert 3.

"*No, some of the lectures are very old and they are interested to in using E-assessment. The technology background is the important*" Expert 6.

Although, there were some experts who believed that age does not affect the acceptance of E- assessment, the other experts confirmed that age impacts the accept of E-assessment and the results show that age is a significant factor that can impact the acceptance of E- assessment in Saudi Universities.

6.7.2.4.2 Gender

Some researchers have highlighted that there are differences between males and females in accepting and using technology (Minton & Schneider, 1980). For, this study the gender factor is validated using quantitative and qualitative analysis (Q19). The statistical results show that the p-value > 0.002 (Table 6-1), and mean = 2.80 < 3.0 (Table 6-1). Consequently, H_0 is rejected and $H_1$is accepted. The gender moderating factor is considered not significant.

11 of the experts refused to consider gender as a factor that can affect the acceptance of E- assessment by academics in Saudi Universities.

"No, there are no differences between male and female" Experts 4,7 and 8.

"No different" Experts10 and 12.

Both quantitative and qualitative results confirmed that gender has no effect on academics to accept E-assessment. Baker et al. (2007) found that there is no effect of gender on attitude, subjective norm and perceived behavioural control (using TPB model) on Saudi workers to use new technology. Therefore, gender moderate factor is removed from the model.

6.7.3 Suggested Factors

The researcher asked the experts if they were aware of other factors, which were not included in the MAE, and could affect the acceptance of E-assessment. Some of the experts did not add any factors, but two factors were suggested by 9 experts:

1- Awareness of E-assessment and its benefits.
2- Confidence in E-assessment (in terms of security).

The most important new factor, which nine of the experts recommended to be added to the model, was "E-assessment awareness". They pointed out that awareness of E-assessment has a beneficial effect on academic's attitude towards accepting the system. Awareness, in the context of acceptance of ICT, is defined as *"the extent to which a target population is conscious of an innovation and formulates a general perception of what it entails"*(Dinev & Hu, 2007). Dinev and Hu (2007) added awareness to their model to examine the users' attitude toward using and accepting proactive technology; they found that awareness has a significant effect on users' attitude. Therefore, E-assessment awareness becomes a sub-factor under the attitude factor.

Some experts mentioned that academics do not use E-assessment because they do not trust the security system. They believed that the university should provide a secure system to encourage lecturers to accept it, and to avoid cheating in exams. Therefore, system security is added under the resource facilitating conditions sub-factor. Apampa, Wills and Argles (2010) suggested adding a bimodal biometric technique such as the combination of fingerprint and face recognition as a solution for the authentication. Similarly, Al-Saleem and Ullah (2014) discussed the importance of having a strong security system during online exams, and they suggested some ideas to test authentication. They recommend adding fingerprint or eye-pattern recognition together with the user ID and password to check their identification, and limiting access to one machine over the internet by allocating a specific IP address. They also proposed a new method to check the student identity, using user ID and password with palm-based biometrics to prevent cheating. A new study also recommended considering fingerprint and face recognition authentication technologies in conjunction with e-learning environments to curb unethical conduct during e-learning exam taking (Abdelrahman & Sabir, 2017).

6.8 Questionnaire to Confirm the Experts Interview Results

A questionnaire was sent to Saudi academics in different universities. The purpose of this questionnaire was to confirm the proposed factors in the MAE, these were the factors that were developed from other models, from previous studies and from the expert reviews of this study. The online questionnaire was carried out over a period of two month between 1 November and 31 December 2015 and 165 responses were received.

The results confirmed the expert interview findings. All the factors in MAE were found to have an effect on Saudi academic's acceptance of E-assessment, including the new factors that were added by the experts. This questionnaire's design, sample size, processes and reliability of questionnaire's statements are provided in Appendix B.

The questionnaire involved demographic questions and closed-ended questions using a five- point Likert Scale. The demographic section included questions about the name of the university, years of experience in teaching, age, the estimated daily time spent on the internet, and use of the an E-assessment system. The results from demographic questions in the questionnaire show that 32% of the participants had more than 10 years' experience in teaching, and 43% of them were aged between 41 and 50 years. Most of the academics used the internet for more than two hours per day (71%), while 25% of the participants estimated they spent between one to two hours per day using the internet, and less than 3% reported that they used the internet for less than one hour.

Significantly, more than half (63%) of the academics responded that they had not used an E- assessment systems before. These results suggested that the use of E-assessment is uncommon between academics in Saudi Universities. If the participants selected 'Yes' for using E-assessment, then three more questions appeared. These questions asked which system they used, how many years they had been using E-assessment, and what was the estimated daily average of time spent on the E-assessment system. According to the responses, 60% of participants had used the E-assessment system which exists in the Blackboard system, and 12% had used the Quiz Creator E-assessment system. Half of the participants had been using the E-assessment for less than two years. 56 % had been using E-assessment for less than two years. However, 30% of academic participants had started using E-assessment more than two to five years ago. The answers to the next question revealed that 64% of academics, who used E-assessment, the average amount of time that spent on E-assessment was less than one hour in

a week; 43% spent between 30 to 60 minutes and 20% spent less than 30 minutes. This indicates that E-assessment is easy to use.

The closed-ended questions were intended to refine the factors in the model after incorporating the results from interviews with the experts. The closed-ended questions in this section include 48 statements, where three to four were expressed about each factor. A five-point Likert Scale (strongly disagree, disagree, neutral, agree, strongly disagree) was used (Likert, 1932). The measure of questionnaire responses was the same as that for the responses to the closed-ended questions in the interviews.

The responses to the statements were entered into SPSS software to analyse the data statistically. The One Sample T-test was used to analyse the results of the quantitative data as a statistical test, to compare the mean of the population (μ) with a hypothesised value (μ_0). The hypothesised mean (μ_0) = 3. The hypotheses for testing each factor are as follows:

- H_0: If the mean rating of the proposed factor is ≠ 3.0, then accept the null hypotheses, then the factor is statically significant, and it does affect the acceptance of E- assessment.

- H_1: If the mean rating of the proposed factor is = 3.0, accept the alternative hypotheses, that the factor is not statically significant, and it does not affect the acceptance of E- assessment.

The Bonferroni correction is used to test the significant of questionnaire statements. The Bonferroni correction means that the null hypothesis (H_0) is only rejected if the probability (p- value) $\geq \frac{a}{n} = \frac{0.05}{48} = 0.001$, which is the probability that the difference is due to chance, where *n* is the number of statements included in the questionnaire. The factor (in this case the statements) is statistically significant if the p-value < 0.001; otherwise the factor is not statistically significant.

The Table 6-2 illustrates the results of the questionnaire in each factor and its related sub- factors. From the table, it can be seen that the attitude factor and the sub-factors awareness, perceived ease of use, perceived usefulness and compatibility are all significant in affecting academic's acceptance of E-assessment. All the results of the statements show a mean greater than μ_0 = 3.0 and p-value < 0.001, so H_0 is accepted and $H_1$is rejected.

As for the subjective norm factor and the sub-factors superior influence and peer influence, these were each expressed by three to four statements. For some of the statements' results,

highlighted in the table, the means are less than μ_0 = 3.0 and the p-value of the others > 0.001, while the other results show means greater than μ_0 = 3.0 and p-value < 0.001. The statements' results where the means < 3.0 are close to 3 (2.8, 2.6, 2.7 and 2.9) and the p-value < 0.001. However, these sub-factors and the superior influence factor will be accepted and considered as factors affecting the acceptance of E-assessment, because the mean is close to 3.0 and further from 2, which represents disagree, while the p-value for some of these statements is < 0.001. Additionally, the results of the experts' interviews indicated that the means for social factors were high (4.6 and 4.7) and the p-value < 0.001. Moreover, 10 of the experts strongly agreed and 5 of them agreed that the peer influence factor can affect academics use of E-assessment, and 12 strongly agreed that superior influence is important sub-factor. As a result, the subjective norm factor and its related sub-factors are considered as significant factors that influence academics behaviour in using E-assessment.

Regarding the perceived behavioural control factor and its included sub-factors (self-efficacy, IT support and resource facilitating conditions), all the means for this constructs are greater than μ_0 = 3.0, and the p-values < 0.001 except for some statements in the IT support and resource facilitating conditions sub-factors. However, this factor and its related sub-factors are considered significant, because the mean greater than μ_0 = 3.0 and also all the experts emphasised that availability of IT support is important to encourage academics to use E- assessment. Moreover, in the results of the expert's interview was the mean 4.3 and the p- value < 0.001. Therefore, perceived behavioural control and its sub-factors are considered as significant factors, which impact academics behaviour in using E-assessment.

Lastly, the results of the behavioural intention factor show that the means for all the statements represented were > 3.0 and p-value < 0.001. Consequently, $H_0$is accepted and this factor considered as a significant factor that affects academics acceptance of E-assessment in Saudi Universities. The MAE (after validating by experts interview and questionnaire) is shown in Figure 6-1.

Table 6-2 Questionnaire Result

Factors and Sub-factors	reference	Statements	Mean	P-value
Awareness	AW1	I confident about what E-assessment means.	3.76	<0.001
	AW2	I understand the benefits of E-assessment.	3.90	<0.001

	AW3	I know the features that E-assessment offers.	3.93	<0.001
	AW4	I know how to use E-assessment system.	3.40	<0.001
Perceived Ease to Use	PEU1	Learning to use the E-assessment is easy for me.	3.90	<0.001
	PEU2	My interaction with E-assessment is clear and understandable.	3.71	<0.001
	PEU3	It is easy for me to become skilful at using E-assessment.	4.19	<0.001
	PEU4	I find E-assessment easy to use.	3.75	<0.001
Perceived Usefulness	PU1	I believe that using E-assessment would enhance my professional development.	3.75	<0.001
	PU2	Using E-assessment would increase my academic productivity.	3.75	<0.001
	PU3	I believe that using E-assessment would make it easy for me to achieve my academic and professional goals.	3.68	<0.001
	PU4	I find using E-assessment useful.	3.97	<0.001
Compatibility	C1	Using E-assessment is compatible with my work.	3.84	<0.001
	C2	Using E-assessment fits well with my academic development needs.	3.68	<0.001
	C3	E-assessment is compatible with my education goals	3.76	<0.001
	C4	E-assessment is compatible with the nature of the curriculum, which I am teaching.	3.61	<0.001
Attitude	A1	I have a generally favourable attitude toward using E-assessment.	4.03	<0.001
	A2	It is a good idea to use E-assessment for academic development.	4.06	<0.001
	A3	Overall, I am satisfied with using E-assessment.	3.71	<0.001
Superior Influence	SI1	My manager encourages me to use E-assessment.	2.80	<0.001

	SI2	I want to use E-assessment because my manager requires it.	2.65	<0.001
	SI3	The opinion of my manager is important to me.	3.29	<0.001
	SI4	University Chancellor encourages lecturers to use E-assessment.	3.10	0.215
Peer Influence	PI1	My friends would think that I should use E-assessment.	2.79	<0.001
	PI2	My colleagues, who use E-assessment, encourage me to use it.	3.17	<0.001
	PI3	My colleagues would think that I should use E-assessment.	2.91	0.187
	PI4	The opinion of my friends and colleagues is important to me.	3.28	<0.001
Subjective Norm	SN1	People who are important to me would think that I should use E-assessment.	3.07	0.312
	SN2	People who influence my behaviour would think that I should use E-assessment.	3.01	0.934
	SN3	People who have an influence in my work would think that I should use E-assessment.	2.96	0.554
Resource facilitating conditions	FC1	The equipment (computer hardware, software and communication network) is available to me to work on E-assessment.	3.35	<0.001
	FC2	The resources (e.g. time and money) are available to me to work on E-assessment.	3.17	0.067
	FC3	E-assessment system is compatible with the computers and applications I already use in my work.	3.79	<0.001
	FC4	The E-assessment system includes a security system to check the identification of the student to avoid cheating in exams.	3.15	0.061
	FC5	The E-assessment system includes a security system, which prevents copying the exam questions to avoid cheating in exams.	3.07	0.385

IT Support	ITS1	E-assessment training courses are available for all academics.	3.17	0.065
	ITS2	Support staff are available to help me at any time to use E-assessment.	3.08	0.386
	ITS3	E-assessment training courses is clear and understandable.	3.14	0.077
Self-Efficacy	SE1	I would feel comfortable using E-assessment on my own.	3.56	<0.001
	SE2	There is no gap between my existing skills and knowledge and those required to work on E-assessment.	3.56	<0.001
	SE3	I have knowledge and ability to make use of E-assessment.	3.84	<0.001
Perceived Behavioural Control	PBC1	Using E-assessment is entirely within my control.	3.73	<0.001
	PBC2	I have the knowledge and ability to use E-assessment.	3.70	<0.001
	PBC3	I would be able to use E-assessment.	4..06	<0.001
	PBC4	I have the resources to use the E-assessment.	3.48	<0.001
Behavioural Intention	BI1	I intend to use E-assessment in the future.	4.15	<0.001
	BI2	I plan to use E-assessment for academic development.	4.02	<0.001
	BI3	I predict that I will use E-assessment during my work.	4.13	<0.001

6.9 Chapter Summary

This chapter has investigated the validity of the existing factors that were included in the Model of Acceptance E-assessment, and the extent to which E-assessment is currently used in Saudi Universities. Experts were interviewed to examine the factors. Both quantitative and qualitative methods were used to ensure the validity of the factors. The results from the interviews with experts' show that attitude, subjective norm and perceived behavioural control are significant factors that have an impact on Saudi academics to accept E-assessment. The experts also believed that age may impact academics acceptance of E-assessment, but gender does not have

this influence. Moreover, they suggested including 'awareness' as a sub-factor affecting the academic's attitude, and "security system" under resource facilitating conditions.

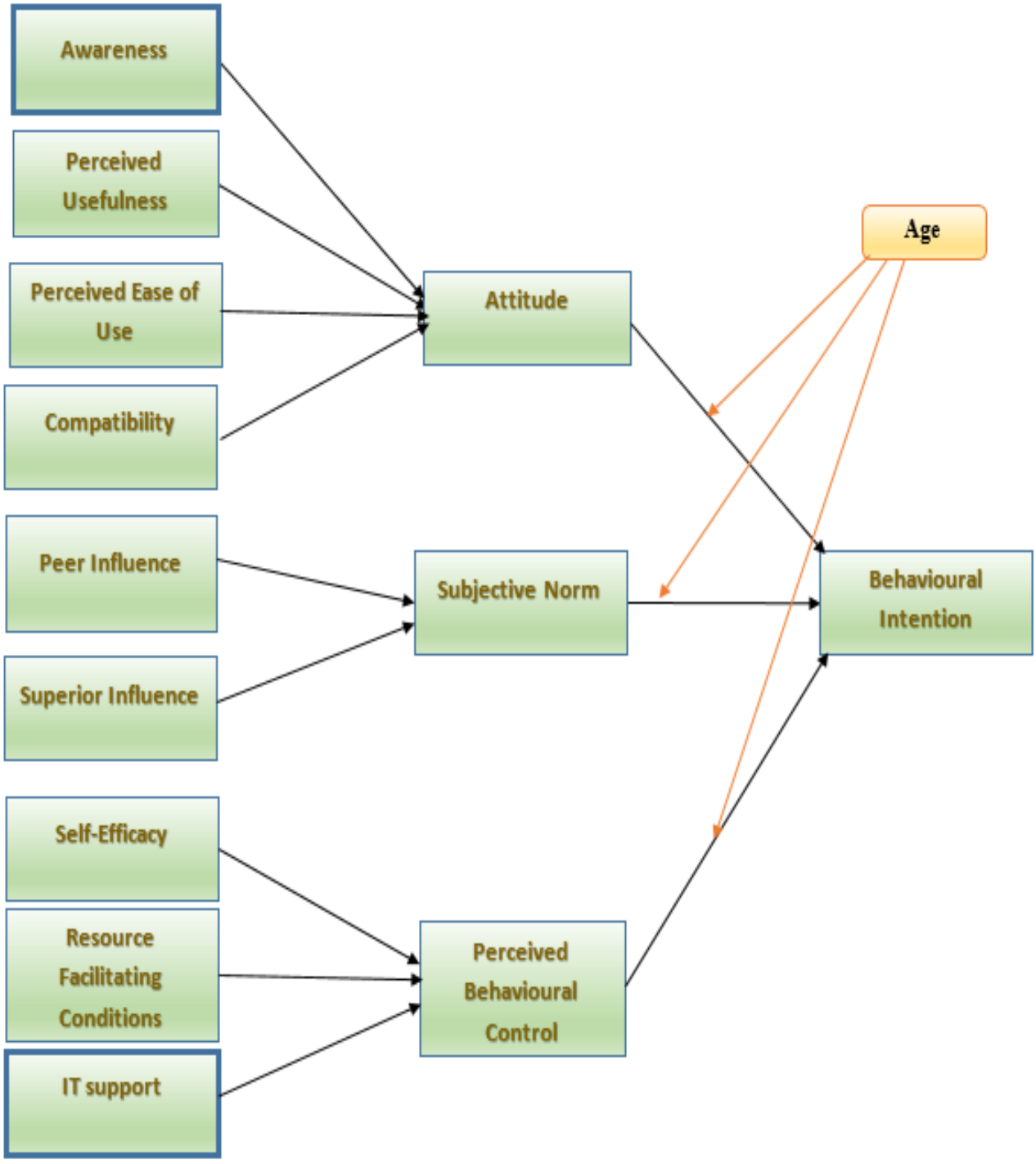


Figure 6-1 includes all the factors in MAE (in Figure 4-1) except Gender moderate factor, which is removed depend on the experts' suggestion. Also, Awareness of E-assessment is added to MAE.

Figure 6 -1 The Model of Acceptance of E-assessment (MAE) after experts' interview phase

Chapter 7: Questionnaire Design and Analysis Approach

This chapter will examine the path of relationships between the factors in MAE towards answering the research question: "***What is an appropriate model for the acceptance of E- assessment amongst academics in Saudi universities?"*** This stage will start from covering the research design, which enables the researchers to collect the data that can help to address the research question (Sekaran & Bougie, 2010). From the literature review of research methodologies in Chapter 5, the questionnaire strategy is considered the most appropriate method to collect the data in this stage. This chapter will explain the development and design of the questionnaire, the sample size, and the data analysis approach used in this stage.

7.1 Questionnaire Development and Design

This study required data to be collected from large number of participants. Rea and Parker (2012) recommend the survey method to collect a large number of responses, and Zikmund (2003) suggests questionnaire to collect the respondents' opinions and thoughts, particularly their attitudes and beliefs about a phenomenon. As this study requires gathering a large number of attitudes and beliefs from different respondents, a self-administered questionnaire was considered appropriate to collect data in this stage. Thus, a self-administered questionnaire was designed to help in accepting or rejecting the hypotheses in order to answer the research question (Taylor, 2005). The statements of the questionnaire designed to validate the study were adopted based on a literature review of models of user acceptance and use of ICT (Fishbein & Ajzen, 1975; Davis et al., 1989; Ajzen, 1991; Taylor & Todd, 1995a), and previous relevant research (Moore & Benbasat, 1991; Venkatesh et al., 2000; Huang & Chuang, 2007). The questionnaire statements are shown in Appendix C.

The questionnaire consists of five pages, starting with a covering letter. The covering letter includes three parts: a welcome statement, the description of E-assessment and consent information. The other four pages covered different parts of the study: demographic questions, questions regarding the use of E-assessment, and statements designed to evaluate the relationships between factors in MAE.

Demographic Questions: In this part general questions were asked regarding the university the participant was working in, and the participant's age, years of experience, and use of the internet. This section was important to obtain general information about the sample distribution, and enable comparison between age groups, and how often different groups of academics use the internet.

E-assessment usage: This section aimed to discover the percentage of academics using E- assessment, which type of software they were using, and for how many years they had been using it, as well as the estimated time spent on using E-assessment. This section was important to obtain general information about E-assessment use in Saudi universities.

Evaluation of the relationships between factors in the MAE: The proposed MAE consists of 13 latent constructs. Byrne (2016) defined the latent constructs as phenomena that cannot be measured using a single item. Instead, it should be measured with a set of observed variables (Schumacker & Richard, 2010). Each factor should be measured using at least three statements, particularly if the other factors in the same construct have more than three statements (Hair et.al, 2006). Therefore, statements were designed with consideration of at least three statements for each factors.

The observed variables, also known as indicators of latent constructs, are observable behaviours presented in the form of statements in the questionnaire.
This part of questionnaire comprised of four sections, depending on the constructs. The first section included 20 observed variables concerning attitudinal beliefs. The second section was about normative beliefs, with 12 observed variables. The third section included 15 observed variables to examine controlled beliefs, while the fourth section included 4 observed variables to examine the behavioural intention. Each latent construct was represented by three to five observed variables: for example, Compatibility was measured by four observed variables. Table 7-1 shows each latent construct and their observed variables.

Table7-1 Latent constructs and observed variables

Latent Constructs	Constructs' Code	Observed variables
Awareness	AW	AW1, AW2, AW3, AW4
Perceived Ease of Use	PEU	PEU1, PEU2, PEU3, PEU4
Perceived Usefulness	PU	PU1, PU2, PU3, PU4
Compatibility	COM	COM1, COM2, COM3, COM4

Attitude	ATU	ATU1, ATU2, ATU3
Superior Influence	SI	SI1, SI2, SI3, SI4
Peer Influence	PI	PI1, PI2, PI3, PI4
Subjective Norm	SN	SN1, SN2, SN3
Resource facilitating conditions	FC	FC1, FC2, FC3, FC4, FC5
IT Support	ITS	ITS1, ITS2, ITS3
Self-Efficacy	SE	SE1, SE2, SE3
Perceived Behavioural Control	PBC	PBC1, PBC2, PBC3, PBC4
Behavioural Intention	BI	BI1, BI2, BI3

The questionnaire was presented in both English and Arabic. iSurvey software was used to generate English and Arabic versions of the questionnaire, with a five-level Likert scale implemented for all statements, with the following ratings: Completely agree = 5; agree = 4; neutral =3; disagree =2 and Completely disagree = 1 (Likert, 1932). An online questionnaire was distributed electronically by e-mails and posted on Twitter. Both Arabic and English versions were reviewed and validated by four academics at the University of Southampton to confirm that the questionnaire was understandable and clear.

7.2 Population of Sample Size

As mentioned before, the target population of this study is all the academics in Saudi Universities. This study required a quick, inexpensive and easy technique to manage the time and resources. Therefore, a convenience sample or accidental sample was chosen as a technique to select the sample. This technique was considered as non-probability sampling, where the responses of the participants are based on their willingness and availability (Gravetter & Forzano, 2015). This technique is commonly used to collect samples in behavioural science research (Gravetter & Forzano, 2015). The questionnaire was sent to all academics in Saudi Universities, for who electronic mails were available in their websites. Responses were received from academics in 23 different universities in Saudi Arabia located in different cities.

It is essential to have a sufficient sample size, in order to produce reliable results. This study used Structural Equation Modelling (SEM) for data analysis, for which different recommendations have been provided for sample size. Hair (2010) recommended 100 cases or more to obtain credible results, whereas Kline (2015) suggested about 200 cases as the

adequate sample size. There is no agreement about the sample size, but 200 cases can be considered as a general rule of thumb (Kline, 2015). Hence, this study aimed to collect at least 200 responses. The researcher sent the questionnaire to largest possible number of academics in Saudi universities, in order to obtain more than 200 responses. The sample size collected in this study was 306 cases.

7.3 Missing Data

Missing data is one of the problems that may face the researchers who use a questionnaire method for data collection. This can cause data analysis difficulties, especially if the study uses SEM for data analysis, where missing data will prevent achieving the model fit. Thus resolving the missing data problem is important before starting to analyse the data.

There are two solutions to resolve the missing data: removing the case that has missing data, which is called full information maximum likelihood, or add a value to the missing data case (multiple imputation). Deleting the missing data cases, will affect the sample size and decrease the power of the results (King et al., 1998). In this study there were 11 incomplete cases. The researcher decided to add value 3 to the missing data cases, which is equivalent to "Neutral" choice.

7.4 Goodness of Instrument

It is important to be sure that the instruments measure the factors correctly. This can be achieved using reliability and validity tests to help to produce credible results (Sekaran, 2003). Therefore, the validity and reliability of the instrument were checked in this study.

7.4.1 Validity of Instrument

Validity of instrument help to assess if the instrument measure what it was design to measure (Pallant, 2011). It is essential to ensure that the instrument measures the factors under investigation. Thus in order to answer the research question and reach the research objectives, the instrument used in this research was assessed for content and construct validity.

7.4.1.1 Content Validity

Content validity should be established after designing the questionnaire and before sending it to the participants to measure if the instruments represent the construct correctly. Litwin (2003) defined content validity as *"how appropriate items or scales seem to a set of reviewers who have some knowledge of the subject matter"*. This is an important step to check the construct

validity (Garver & Mentzer, 1999). The content validity can be assessed by a literature review, expert review and empirical assessment (Straub et al., 2004). In this study all these three approaches were used to measure the content validity.

The statements used in this questionnaire were previously validated and used in similar models. These statements derived from previous questionnaires regarding user acceptance and use of ICT models (Fishbein & Ajzen, 1975; Davis et al., 1989; Ajzen, 1991; Taylor & Todd, 1995a), and other relevant research (Moore & Benbasat, 1991; Venkatesh et al., 2000; Huang & Chuang, 2007). Using the same statements as those used in previous studies, is the preferred way, rather than developing new questionnaire statements (Straub et al., 2004).

The second approach is conducting an expert review of the questionnaire. In this study, the questionnaire statements were printed, and appointments with four academic researchers were arranged to validate the questionnaire. These researchers were working in the field of this study, and all of them were able to review the questionnaire in both languages (English and Arabic). As the questionnaire was built from previous related models and studies, no major comments were received from the research reviewers. There were some suggestions to clarify the questionnaire and make it more understandable, which were considered.

Before conducting the study and sending it to the academics, an empirical assessment was carried out. An empirical assessment involves pre-testing the questionnaire statements by a small group of the sample, to ensure that the statements are clear and comprehensible (Saunders et al., 2009). A link to the questionnaire was sent to a group of four academics from Saudi Arabia, and they were asked to answer the questions. Again, no major change was made in this stage, but a few small changes were considered.

7.4.1.2 Construct Validity

Construct validity tests the statements to see if they measure what they are supposed to measure. In other words, construct validity is testing how well the statements reflect the theoretical latent construct those statements are designed to measure (Hair et al., 2010). According to Sekaran (2003) construct validity is "*testifies to how well the results obtained from the use of the measure fit the theories around which the test is designed"*. This is a primary step in SEM, to assess the reasonability of the statements, with their correlation to build the construct, as proposed by the theory. In SEM there are three different forms of

construct validity test: convergent validity, discriminant validity and nomological validity (Hair et al., 2010). All these tests were conducted, and the results are presented in the next chapter.

7.4.2 Reliability of Instrument

The reliability is to ensure that the multiple statements are consistent in the same construct and the results of the study can be repeated and reliable (Bryman & Cramer, 2011). The reliability in technology acceptance models means the degree which the statements are stable and consistent with what they are assume to measure (Singleton & Straits, 2004). Reliability tests help the researcher to examine the goodness of an instrument and it accuracy (Sekaran & Bougie, 2010).

There are two types of reliability test: internal consistency and temporal stability (Pallant, 2011). Internal consistency is the degree which the statements in the instrument measure the same construct consistently (Litwin, 2003), while the temporal stability is the degree to which the instrument provides the same results when administrated to the same sample again (Oppenheim, 1992). The internal consistency is used in this study to examine the instrument's reliability.

The most common method to test the instrument's internal consistency is Cronbach's alpha coefficient (Cronbach, 1951; Sekaran, 2003). This method helps to examine how well interrelated statements measure a single construct (Ejaz, 2014). Reliability tests become important when using Likert scales in the instruments (Eagly & Chaiken, 1993). Thus, this is the best method that can be applied for this study. The measurement range of Cronbach's alpha is from 0 to one. Reliability which is close to 1 indicates higher internal consistency (Pallant, 2011). Table 7-2 shows the reliability score range (Andrews & Robinson, 1991; Hair et al., 2010; Sekaran, 2003).

In the study the reliability test was conducted after collecting all the data. In the data analysis using SEM (see Chapter 8 section 8.1.4), two additional approaches were applied to establish the reliability of the constructs, the composite reliability and the average variance extracted. Both techniques required results at the Structural Equation Modelling (SEM) analysis stage. All these approaches are explained in the next chapter together with the results.

Table 7-2 Cronbach's alpha reliability score

Cronbach's alpha score range	Level of internal consistency
α >= 0.8	Very Good
0.6 =< α <= 0.7	Good
α < 0.6	Poor

7.5 Structural Equation Modelling (SEM)

Structural Equation Modelling (SEM), is considered to be a complex approach, which is used to examine hypotheses concerning the inter-relationships between multiple variables (Pallant, 2011). SEM also helps to test if the data collected reflect the proposed hypotheses (Hair et al., 2010). Moreover, SEM can explain the relationship among the factors (Byrne, 2013). SEM is different from other statistical analysis approaches, in that it can produce a confirmatory relationship and assist in understanding the nature and strength of the relationship (Zain et al., 2005).

This can help in the current study to answer the research question "***What are the relationships between the factors that affect academics' intention to accept E-assessment?",*** and to test the theoretical model proposed after editing by experts in Chapter 6. Therefore, SEM was considered as the appropriate approach to analyse the data for this study and examine the hypotheses.

Through SEM, the structural interrelationships are expressed by a set of equations indicating all the relationships among the construct variables. Construct variables or latent variables refer to all the unobserved factors in the model. These factors have multi-variables, also known as indicator variables, and measured variables that comprise any variables that are indirectly observed (Schumacker & Richard, 2010). Using SEM, the first step is for the researcher to identify the relationships among variables, depending on theory, prior experience and the research aims (Hair et al., 2010). The researcher should decide which variables are the independent and dependent. The proposed relationship is then translated into a model, where it is represented in a path diagram knowns as path analysis. This is represented by a straight arrow showing the influence of one variable (independent) to another (dependent) (see Figure 8-1 in Chapter 8). In this study, behavioural intention and all the influencing factors were

represented in the model as latent variables, which were measured using observed variables or statements (See Figure 8-1 in Chapter 8).

SEM has the ability to analyse a series of dependent relationships at the same time, while other analytic techniques, such as multiple regression and discriminant analysis are limited to measuring a single relationship among variables at a time (Hair et al., 2010). According to Byrne (2016) SEM is considered as a complex form of factor analysis and multiple regression that can examine the fit of the proposed model to the collected data. Moreover, SEM has a mechanism that considers measurement error in the indicator variables, which means the analysis of the relationship among variables is free of measurement error (Schumacker & Richard, 2010). Moreover, both direct and indirect effects of variables can be analysis using SEM (Byrne, 2013). These properties of SEM can help to produce a high quality of results.

This study used SEM in two stages: the measurement and structural stages. In the measurement stage, the relationships among latent constructs and observed variables were tested. The construct validity and reliability were also examined. In SEM the measurement model should be tested first, and if the reliability and validity of the constructs are accepted, the structural model can be evaluated. The structural model assesses the logical meaningful relationships between latent constructs based on the research hypotheses.

Not only the relationships between latent variables and their indicators should be examined, but also the relationships among latent variables have to be tested. Therefore, the Goodness of Fit (GoF) should be used, to examine how the hypothesised model is fit with the collected data (Byrne, 2013). All these tests and stages will be discussed in detail in the next chapter.

7.6 Ethics Approval

Ethical Approval is essential before distributing the questionnaire. The ethical forms were applied for the questionnaire and approved by the Ethics Committee at the University of Southampton (Research Ethics Number FoPSE/18518).

7.7 Chapter Summary

This chapter has discussed in detail the methods used to collect the data in this phase of study, and the methods used to analyse the data. Based on the literature review discussion, the questionnaire approach was considered as the most appropriate method to collect the data. The

chapter also provided suggestions from different studies about the adequate sample size and the appropriate sample size chosen for this study was 200 cases and above; this study collected 306 cases. Other sections in this chapter discussed the goodness of the instrument, including the instrument validity and reliability. The internal consistency reliability is used in this study to examine instrument reliability, and the study validation is verified by content validity and construct validity. Content validity was checked before sending the questionnaire to the participants, to ensure that the statements measure the factors correctly.

The next section discussed the best method for data analysis and examining the hypotheses. This study adopted the SEM technique to evaluate the relationship between constructs and their measures. This section explained the meaning of SEM, and provided the reasons behind choosing it as an analysis technique.

Ethical approvals were obtained, before conducting the questionnaire, from Ethics Committee at the University of Southampton. The next chapter will present the details of the data analysis and the results obtained.

Chapter 8: Questionnaire Results and Analysis

There are 300 participants responded to the questionnaire. SEM was employed to analyse the questionnaire data, as the most appropriate widely-used technique to examine the relationships among the factors in the MAE and also to find the strongest influencing factors on acceptance of E-assessment among Saudi academics. This chapter presents the questionnaire results and assesses the hypotheses of this study.

8.1 Questionnaire Analysis

The aim of the questionnaire was to answer the research question:

RQ: What is an appropriate model for the acceptance of E-assessment amongst academics in Saudi Arabian universities?

The following sections present the results that answer the research question of this study. The first section will present the demographic results, then the next section exhibits the result for the E-assessment usage questions. The subsequent sections present the analysis of the normality, reliability and validity of the instruments.

SPSS and iSurvey softwares were used to produce the percentages and frequencies of demographic data and E-assessment usage. AMOS software was used to measure the model fit in the measurement model and to analyse the results of the structural model.

8.1.1 Demographic data Results

The questionnaire was sent to 28 universities in Saudi Arabia, and received 306 responses from 23 universities in different regions and cities in the Kingdom. Most of the questionnaire participants were from King Saud University and Princess Nora University in Riyadh, where the population is higher than other cities, and these two universities, together with King Abdul- Aziz University are the largest and oldest universities in Saudi Arabia. Appendix C illustrates the distribution of the questionnaires' responses.

Most of the participants in the questionnaire had teaching experience of more than 10 years. 118 of the respondents were aged between 31 and 40. 70% of the academic participants

reported using the internet for more than two hours every day. See the Appendix C for more details of the demographic data obtain from the questionnaire.

8.1.2 E-assessment Usage Results

It was important to discover the percentage of the academics, who were using E-assessment, in order to know the extent of use of E-assessment among academics in Saudi universities. Therefore, the questionnaire included the question: "*Have you used E-assessment?*". The majority of respondents answered "*No*"; 60% of the academics, and 40% participants answer "*Yes*".

This section of the questionnaire consisted of three further questions about E-assessment for the 40% participants, who had answered "*Yes*". The next question was: "*Which E-assessment systems did you use?*". The E-assessment system in Blackboard was the popular system utilized by most of the academic users. They were also asked "*How many years have you been using the E-assessment system?*. 36 from 120 of academics have started using the E-assessment less than two years ago, while 41 of them has used E-assessment for more than two years ago. The participants were also asked to estimate the daily average time that they spent using E- assessment. About half of the respondents spent about 30 minutes to one hour every day using E-assessment. Table 8-1 shows the detailed results of E-assessment usage.

Table 8-1 E-assessment usage results

Question	Choices	Number of Respondents
Did you use an E-assessment system?	Yes	120
	No	186
Which E-assessment systems did you use?	E-assessment system in Blackboard system	65
	E-assessment system in MS system	6
	Quiz Creator	14
	Articulate Quiz-maker	2
	Other	33
How many years you have been using the E-assessment system?	Just started	26
	Less than 2 years	36
	2-5 years	41
	6-10 years	11

	More than 10 years	6
How do you estimate the daily average amount of time you spend on the E-assessment system?	Less than 30 minutes	24
	30- 60 minutes	50
	1-2 hours	24
	Over 2 hours	22

8.1.3 Normality

The data should be normally distributed. In SEM, the nature of data distribution for each variable and the combinations of the variables should be normal (Hair et al., 2010). Normality can be assessed statistically using kurtosis and skewness tests (Kline, 2015). The skewness means that the higher distribution is the above or below the mean (Gravetter & Wallnau, 2016), while, kurtosis represents the distribution by the peakedness of the distribution (Tabachnick & Fidell, 2001). The skewed distribution can be positive or negative based on whether the scores are at the lower or upper end of the distribution (Field, 2005). The commonly used score range of kurtosis and skewness is between -2.58 and +2.58, which indicates normal distribution (Hair et al., 2010). The variables in this study are examined for normality, using SPSS to calculate kurtosis and skewness scores. The results show that all the variables are in the recommended range (-2.58 and +2.58) so it can be concluded that the collected data is normally distributed (See Appendix C).

8.1.4 Instrument Reliability

Assessing the reliability of variables is important, especially when there are multiple variables for each construct. The reliability measurement is the degree to which the variables used are consistent in their measurement (Eagly & Chaiken, 1993; Hair et al., 2010). According to Sekaran & Bougie (2010) conducting a reliability test for variables helps the study to test the goodness and accuracy of these variables. Cronbach's alpha test was used to measure the reliability of the variables in the MAE. Table 8-2 presents the reliability test results for each construct.

Table 8-2 Reliability results for constructs

Construct	Number of observed Variables	Cronbach's Alpha	Reliability results
Awareness	4	0.89	Very Good
Perceived Ease of Use	4	0.85	Very Good

Perceived Usefulness	4	0.91	Very Good
Compatibility	4	0.92	Very Good
Attitude	3	0.88	Very Good
Superior Influence	4	0.77	Good
Peer Influence	4	0.82	Very Good
Subjective Norm	3	0.76	Good
Resource facilitating conditions	5	0.80	Very Good
IT Support	3	0.88	Very Good
Self-Efficacy	3	0.69	Moderate
Perceived Behavioural Control	4	0.84	Very Good
Behavioural Intention	3	0.92	Very Good

As shown in the above table, most of the reliability results for the constructs were above 0.8, which is considered very good internal consistency of variables. The superior influence and peer influence latent constructs have 0.77 and 0.76 reliability results, which indicates a good internal consistency of their variables, while the result for the self-efficacy latent construct is just below 0.7 (0.69), but this is still an acceptable result as it is above 0.6. The reliability result is rejected and considered poor if it less than 0.6 (Andrews & Robinson, 1991; Sekaran, 2003).

8.2 Structural Equation Modelling (SEM)

To determine whether the proposed model of acceptance of E-assessment is the appropriate model to predict the academic's behaviour towards accepting E-assessment, it was examined using Structural Equation Modelling (SEM), which is a confirmatory analysis technique to test the model based on hypotheses (Recker, 2012) .

The MAE was examined using SEM, in two steps. The first step is the measurement model that tests the inter-relationships between latent constructs and observed variables. The structural model was used in the second step to evaluate the logical meaning of the relationships between latent constructs based on the hypotheses. Both steps are discussed in detail in the following sections.

8.2.1 Analysis of Structural Model

In SEM the model begins with exogenous constructs and end to endogenous constructs. Exogenous latent variables means the variables that are not predicted by any other latent variables in the model, whereas, endogenous variables are explained by exogenous latent variables (Byrne, 2013). AW, PEU, PU, COM, PI, SI, SE, FC and ITS are exogenous constructs, where ATU, SN, PBC and BI are endogenous constructs.

Every latent variable (latent construct) is measured by observed variables. Figure 8-1 represents the model with the observed variables to clarify the relationships between them and the latent variable. For example, AW1, AW2, AW3, and AW4 are the observed variables of the awareness factor (AW) (latent variable) and as shown in Figure 8-1 there are arrows between awareness and it observed variables, similarly, with other factors (Figure 8-1). The arrows in the model between the latent variables (or latent constructs) (ex: AW and ATU) represent the relationship path between them (Figure 8-1).

8.2.2 Measurement Level Analysis

To ensure that the instruments are good, the reliability and validity tests were used in the measurement level analysis. This level of analysis is essential before conducting any other type of analysis. According to Kline (2015) the study may produce meaningless results if the measurement analysis has not been conducted. The measurement level was performed using 13 latent constructs and 48 observed variables as shown in Table 7-1and discussed in Chapter 7.

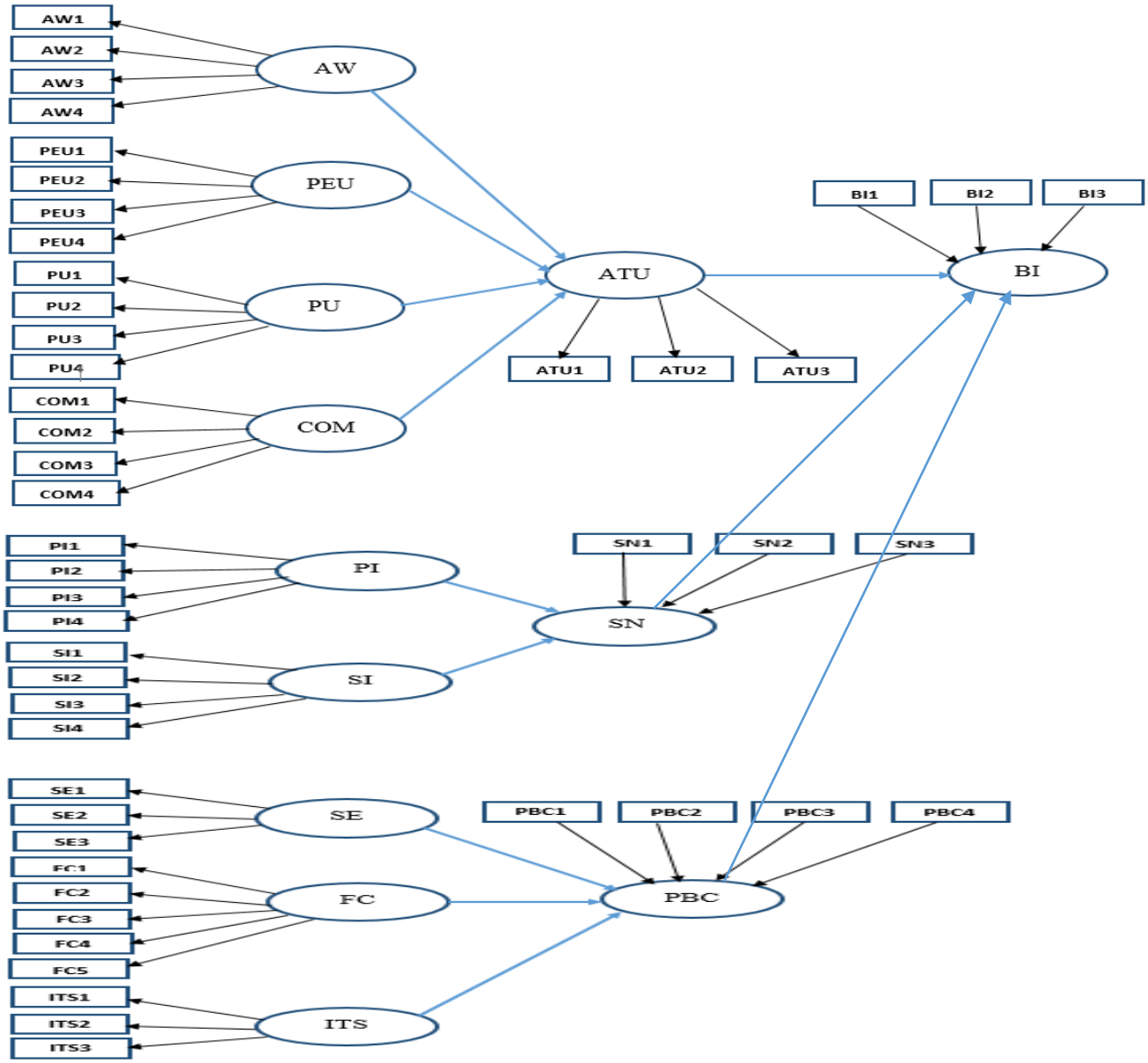


Figure 8-1 The MAE with the variables and relationships

8.2.2.1 Composite Reliability

Composite reliability is usually used to examine the reliability of the constructs in SEM. Hair et al. (2010) defined composite reliability as measuring "*reliability and internal consistency of the measured variables representing a latent construct*". Bentler (2007) points out that the study may be misleading if the composite reliability test is not conducted. The following formula is recommended to calculate the composite reliability (Hair et al., 2010):

$$\textbf{Composite Reliability} = \frac{(\sum_{i=1}^{n} L_i)^2}{(\sum_{i=1}^{n} L_i)^2 + (\sum_{i=1}^{n} e_i)^2} \quad \textbf{(1)}$$

*In formula (**1**) L_i is standardised factor loading, **n** is the number of items and e_i error variance terms for a construct*

The CR is calculated using Cronbach's alpha (α). A reliability result between 0.6 and 0.7 is acceptable, but a good reliability is higher than 0.7, and with high reliability the internal consistency also increases (Hair et al., 2010). Table 8-3 shows the reliability scores for each latent construct. All the reliability scores are above 0.7, which indicates that all the constructs are reliable. Only the self-efficacy latent construct has a score slightly less than 0.7 (0.689), but this is still considered reliable.

Table 8-3 Latent constructs' reliability

Construct	Composite Reliability (CR)
Awareness	0.903
Perceived Ease of Use	0.847
Perceived Usefulness	0.919
Compatibility	0.918
Attitude	0.732
Superior Influence	0.786
Peer Influence	0.829
Subjective Norm	0.760
Resource Facilitating Conditions	0.820
IT Support	0.881
Self-Efficacy	0.689
Perceived Behavioural Control	0.847
Behavioural Intention	0.774

8.2.2.2 Construct Validity

Testing the construct validity is a step which comes after examining the reliability, and it is a prime step in SEM to measure the reasonability of the items that represent the constructs, based on the theory. The construct validity is defined by Hair et al. (2010) as "*the extent to which a set of measured items actually represent the theoretical latent construct those items are*

designed to measure". Straub et al. (2004) recommended to assess the construct validity using three tests: convergent validity, discriminant validity and nomological validity.

8.2.2.3 Convergent Validity

Convergent validity examines if the item correlates with other items on the same construct (Pallant, 2011). The items can be said to measure their constructs if the correlation is high (Hair et al., 2010). A construct's factor loading, average variance extracted (AVE), and construct reliability are used to test the convergent validity (Hair et al., 2010). Average Variance Extracted (AVE) is calculated using the following formula (Hair et al., 2010):

$$\textbf{\textit{Average Variance Extracted (AVE)}} = \frac{\sum_{i=1}^{n} L_i^2}{n} \qquad \textbf{(2)}$$

In formula (2) L_i *is standardised factor loading, and* n *is the number of items*

Hair et al. (2010) suggest an AVE score of 0.5 or above, and factor loading scores ranging from 0.5 and above; 0.7 indicates the ideal score for factor loading (2010). The composite reliability (CR) was presented in section 8.2.2.1.

Table 8-4 Convergent validity for latent constructs

Latent construct	Observed variable	Standardised factor loading	AVE	AVE after deleting variables
Awareness	AW1	0.808	0.701	0.753
	AW2	0.901		
	AW3	0.893		
	AW4	0.817		
Perceived Ease of Use	PEU1	0.757	0.581	0.636
	PEU2	0.847		
	PEU3	0.738		

	PEU4	0.814		
Perceived Usefulness	PU1	0.917	0.739	0.875
	PU2	0.941		
	PU3	0.937		
	PU4	0.865		
Compatibility	COM1	0.905	0.737	0.795
	COM2	0.934		
	COM3	0.919		
	COM4	0.852		
Attitude	ATU1	0.932	0.603	0.794
	ATU2	0.914		
	ATU3	0.832		
Superior Influence	SI1	0.866	0.486 < 0.5	0.616
	SI2	0.750		
	SI3	0.579		
	SI4	0.749		
Peer Influence	PI1	0.833	0.551	0.551
	PI2	0.799		
	PI3	0.894		
	PI4	0.691		
Subjective Norm	SN1	0.948	0.580	0.906
	SN2	0.960		
	SN3	0.858		
Resource facilitating conditions	FC1	0.756	0.452 < 0.5	0.602
	FC2	0.722		
	FC3	0.695		
	FC4	0.695		
	FC5	0.646		
IT Support	ITS1	0.822	0.711	0.737
	ITS2	0.840		
	ITS3	0.910		
Self-Efficacy	SE1	0.673	0.431 < 0.5	0.511

	SE2	0.565		
	SE3	0.805		
Perceived Behavioural Control	PBC1	0.832	0.583	0.775
	PBC2	0.896		
	PBC3	0.699		
	PBC4	0.701		
Behavioural Intention	BI1	0.921	0.652	0.841
	BI2	0.939		
	BI3	0.893		

As presented in Table 8-4, all the observed variables' factor loadings are above 0.5, which are acceptable, and most of them have ideal scores (above 0.7). Although, the AVE for superior influence, resource facilitating conditions and self-efficacy latent constructs are lower than 0.5. Hair et al. (2010) suggested removing the variables with low factor loading to improve the AVE. Therefore, some of the variables were deleted to improve the AVE for latent constructs. For example, SI3 the lowest variable factor loading in superior influence was deleted, and AVE increased from 0.486 to 0.616, and FC4 and FC5; were also removed, to raise the AVE to 0.602. Other variables were deleted to improve the AVE generally for the constructs. Table 8- 4 presents the AVE results for each latent construct before and after removing some variables from the measurement model.

8.2.2.4 Discriminant Validity

Discriminant validity is defined by Hair et al. (2010) as "*extent to which a construct is truly distinct from other constructs both in terms of how much it correlates with other constructs and how distinctly measured variables represent only this single construct*". In other words, it means to what extent that measure is different from the other measures (Mitchell & Jolley, 2012). The conclusions drawn from the results' regarding the relationships between constructs may be incorrect, if the discriminant validity not examined (Farrell, 2010). Discriminant validity can be examined by comparing the square root of AVE with construct correlations (Hair et al., 2010). In this study, the constructs did not pass the discriminant validity test unless the peer influence latent construct was removed. The peer influence latent construct was cross- loaded with the subjective norm construct. The result for the subjective norm was 0.755, which is below that for peer influences' (0.851) (See Appendix C illustrates the Discriminant

validity before removing SI from the MAE). Hair et al. (2010) explain that if the independent variables are correlated, they share some of their predictive power over constructs. Farrell (2010) suggests solutions for lack of discriminant validity, one of them is removing the item that is cross-loaded on the others. For example, Chien et al. (2014) removed the peer influence factor from the model investigating the teacher beliefs' and use of technology-based assessment, because they found that only 5% of teachers considered peer opinions. Therefore, the peer influence latent construct was removed from the model, and the constructs in the model then pass the discriminant validity test. Table 8-5 shows the results of the discriminant validity test after deleting SI from MAE.

Table 8-5 Discriminant validity test results

	AW	PEU	PU	COM	ATU	SI	PBC	FC	ITS	SN	BI	SE
AW	**0.868**											
PEU	0.821	**0.797**										
PU	0.447	0.648	**0.935**									
COM	0.496	0.660	0.853	**0.892**								
ATU	0.499	0.718	0.813	0.866	**0.891**							
SI	0.420	0.480	0.522	0.486	0.458	**0.784**						
PBC	0.651	0.681	0.430	0.444	0.445	0.368	**0.881**					
FC	0.492	0.434	0.384	0.407	0.419	0.462	0.416	**0.776**				
ITS	0.552	0.514	0.380	0.379	0.408	0.537	0.453	0.637	**0.858**			
SN	0.359	0.470	0.720	0.636	0.627	0.701	0.391	0.381	0.440	**0.952**		
BI	0.351	0.550	0.766	0.772	0.808	0.451	0.382	0.420	0.368	0.600	**0.917**	
SE	0.595	0.714	0.648	0.630	0.629	0.480	0.697	0.466	0.519	0.516	0.608	**0.715**

8.2.2.5 Nomological Validity

Nomological validity examines whether the correlations between latent constructs are supported by the theory (Hair et al., 2010). To establish nomological validity, the relationships between the constructs should follow a theoretical model. In other words, when the relationships between the constructs in the study conform to a theoretical framework, it means that nomological validity is achieved. This study has hypothesised all relationships built from the existing literature, therefore, theoretically they should make sense. However, all hypothesised relationships will be assessed later in the structural model.

8.2.3 Structural Level Analysis

After checking the reliability and validity of constructs, the examination of the relationships between latent constructs should be established. The structural model in SEM was used to assess the hypotheses that proposed the relationships between latent constructs. Table 8-6 and Figure 8-2 present the hypotheses of the latent constructs' relationships.

Table 8-6 Hypotheses to be assessed in the structural model

Construct	Hypotheses	Hypothesised relationships
Attitude (ATU)	H1	ATU → *BI*
Attitude (ATU) & Age	H1a	ATU(age) → *BI*
Awareness (AW)	H2	AW → *ATU*
Perceived Ease of Use (PEU)	H3	PEU → *ATU*
Perceived Usefulness (PU)	H4	PU → *ATU*
Compatibility (COM)	H5	COM → *ATU*
Subjective Norm (SN)	H6	SN → *BI*
Subjective Norm (SN) & Age	H6a	SN (age) → *BI*
Superior Influence (SI)	H7	SI → *SN*
Perceived Behavioural Control (PBC)	H8	PBC → *BI*
Perceived Behavioural Control (PBC) & Age	H8a	PBC (age) → *BI*
Self-Efficacy (SE)	H9	SE → *PBC*
Resource facilitating conditions (FC)	H10	FC → *PBC*
IT Support (ITS)	H11	ITS → *PBC*
Note: Behavioural Intention (BI)		

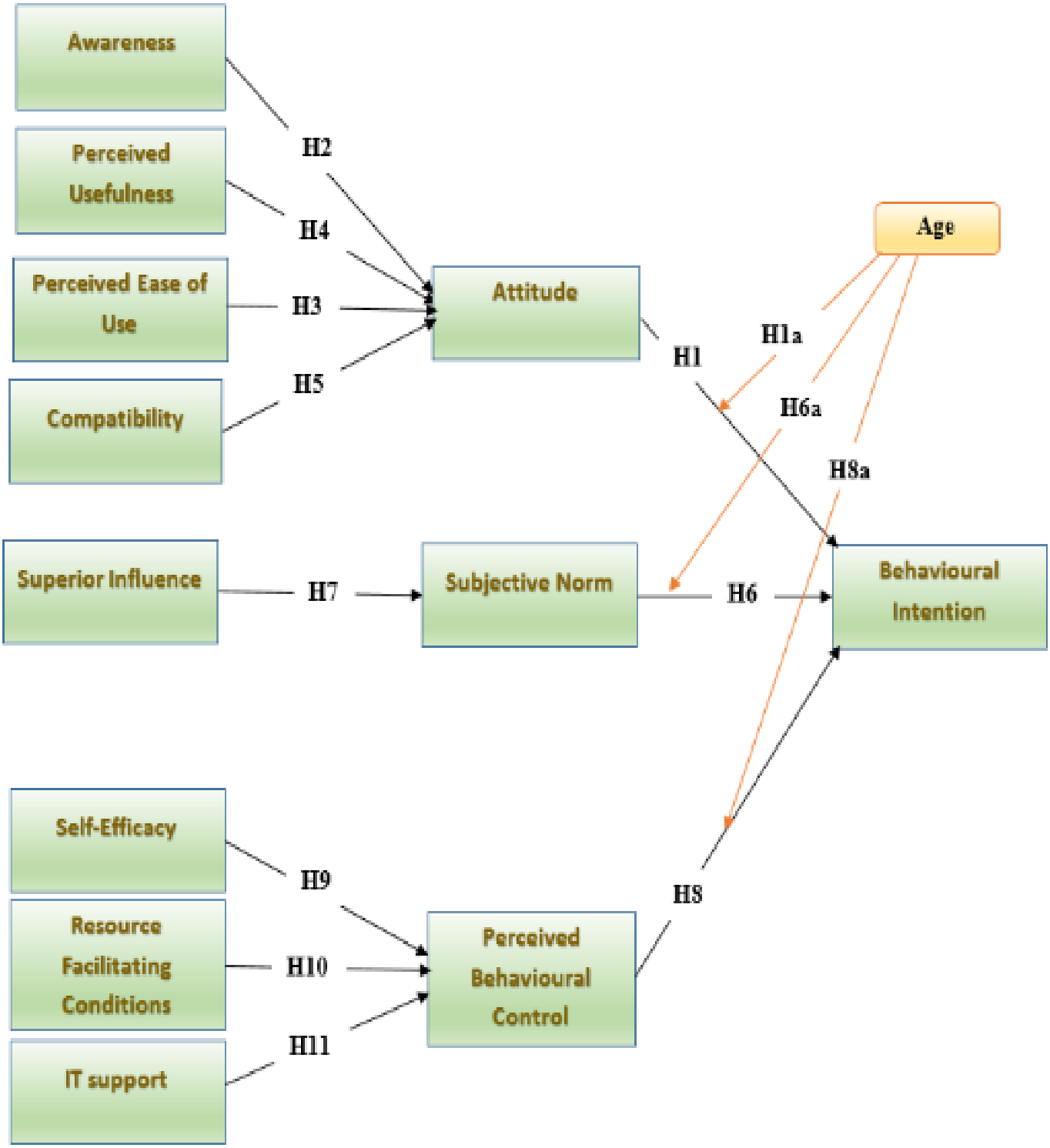


Figure 8-2 Hypotheses to be assessed in the structural model

8.2.3.1 Structural Model Goodness Fit (GoF)

The first step in a structural model is examine the Goodness of Fit, which means how well the proposed model fits with the real data. That means the hypotheses model should fit with the collected data (Byrne, 2013). The GoF results are obtained from comparing the covariance matrix (data collected) with the hypotheses proposed. There are different measures to test the GoF.

A chi-square (x^2) was used in this study, which is a primary statistical test in SEM that assesses the difference between the sample covariance matrix and the predicted model covariance matrix (Kline, 2015). Chi-square is affected by the sample size (Kline, 2015); it increases with a large sample size. Thus, the normed chi-square and degree of freedom (*df*) were reported. Normed chi-square helps to reduce the effect of sample size on x^2, which is computed as $\frac{x^2}{df}$ degrees of freedom (Kline, 2015), depending on the number of measured variables in the model, and it ranges from 1 to 3 (Hair et al., 2010). Most of the studies recommend that chi- square and normed chi-square are adequate to examine the GoF of the model, and some of them suggest adding two or three fit indices with the chi-square (Hair et al., 2010). Hair et al. (2010) suggest the indices that should be used to assess GoF and their ranges, based on the sample size and the number of the items in the proposed model. This study used the widely recommended GoF indices, which follow the Hair et al. (2010) guidelines to evaluate the model fit with collected data.

Root Mean Square Error of Approximation (RMSEA) is defined by Hair et al. (2010) as "*attempts to correct for the tendency of* x^2, *the goodness of fit test statistic, to reject models with a large sample or large number of observed variables*". This measure is widely used and popular for complex models, which include large sample sizes and a large number of items: the model indicates a fit if the RMSEA result is between 0 and 0.08 (Hair et al., 2010).

Root Mean Square Residual (RMR) and Standardised Root Mean Square Residual (SRMR). Hooper et al. (2008) states that **"***The RMR and the SRMR are the square root of the difference between the residuals of the sample covariance matrix and the hypothesised covariance model*". The RMR is calculated based on the scale of each item, and may difficult to establish if the questionnaire has different levels of scale, thus the SRMR is used to solve this problem (Hooper et al., 2008). RMR ranges from 0 to 0.1, and indicates a well-fitting model if the SRMR is close to 0, while the SRMR should be less than 0.08 (Kline, 2015).

Comparative Fit Index (CFI) The CFI is the proportion of differences in the sample covariance matrix and this model, assuming that all the items are uncorrelated (Hooper et al., 2008)**.** It ranges from 0 to 1 (Schermelleh-Engel et al., 2003; Hair et al., 2010), and will fit the model when the CFI is equal to or above 0.97 (Schermelleh-Engel et al., 2003).

The Maximum Likelihood (ML) estimation technique was used to calculate the GoF indices using AMOS (version 20.0). Hair et al. (2010) provide guideline to use these indices (RMSEA, RMR, SRMR, CFI) depending of the size of the sample and the number of observed variables (items). This study has a sample size of 306 and 48 observed variables. Hair et al. (2010) suggest that for sample > 250 and observed variables >= 30, the CFI should be above 0.90, a Normed chi-square of between 1 to 3, RMSEA less than 0.07, and SRMR 0.08 or less.
All the indices in the proposed model of this study are in the ranges that Hair et al. (2010) recommended, which indicates that the proposed model fits with the collected data. Table 8-7 shows the results of the indices of GoF for the structural model.

Table 8-7 The indices of GoF

Chi-square $x2$ =745.211, p < .001	The proposed model fit	Model fit indices for sample size > 250 (Hair et al. 2010)
df	418	
Normed chi-square *X2/df*	1.78	< 3.0
RMSEA	0.051	< 0.07
CFI	0.951	> 0.90
RMR	0.062	< 0.1
SRMR	0.066	≥ 0.08

8.2.3.2 Examination of Latent Constructs Relationships

After assessing the GoF of the proposed model, the hypothesised relationships between the latent constructs should be tested. The standardised path coefficient or regression coefficient (β), Critical Ratio (CR), p-value and squared multiple correlations (SMC or R^2) were assessed to evaluate the relationships among latent constructs.

p-value is used to evaluate how statistically significant the relationship is between measured variables and latent variables at the level 0.05. The standardised path coefficient (β) means the path that represents a causal relationship between two constructs (Hair et al., 2010). It is used

to evaluate the effect size of different variables in the model. Their values are assessed using the Critical Ratio (CR). The CR can be calculated by dividing the regression coefficient (β) by the standard error (SE), and it is considered significant at the 0.05 level, if the CR is equal to or above 1.96 (Hair et al., 2010).

In this study, causal paths were analysed using the p-value, path estimation and critical ratio. The results are presented in Table 8-8, and the shaded rows represent not statically significant results. Most the hypotheses are significant, except H2, H8, H10, and H11. The paths estimated for hypotheses H1,H3, H5, H7 and H9 are positive and statistically significant and exogenous variables have strong relationships with endogenous variables. In addition, the path estimated for H4 and H6 is significant and positive, and the relationship between PU and ATU (H4) is moderate, while the relationship between SN and BI (H6) is weak.

The p-values of H2, H8, H10 and H11 are greater than 0.05, which indicates that these relationships are not statistically significant. The p-value of H2 is 0.066 > 0.05, which means that there is no effect of awareness on academic attitudes towards accepting E-assessment. The same is true for H10 and H11, as they have p-values of 0.980 and 0.726, respectively. This indicates that there are no relationships between facilitating conditions and perceived behavioural control, nor between IT support and perceived behavioural control. Surprisingly, H8 is not statistically significant, which shows that there is no effect of perceived behavioural control on behavioural intention to accept E-assessment. See Appendix C for the correlations between latent constructs in the model.

Table 8-8 Hypotheses analysis

Hypothesised Path	β (>=0.1)	CR (>=1.96)	P (<0.05)
H1: ATU → BI	**0.702**	**11.107**	**<0.001**
H2: AW → ATU	**-0.166**	**-1.837**	**0.066**
H3: PEU → ATU	**0.361**	**3.340**	**<0.001**
H4: PU → ATU	**0.164**	**2.207**	**<0.001**
H5: COM → ATU	**0.556**	**6.925**	**<0.001**
H6: SN → BI	**0.092**	**1.982**	**<0.001**
H7: SI → SN	**0.612**	**8.599**	**<0.001**
H8: PBC → BI	**0.045**	**0.937**	**0.349**
H9: SE → PBC	**0.978**	**7.981**	**<0.001**

H10: FC → PBC	**-0.002**	**-0.025**	**0.980**
H11: ITS → PBC	**-0.032**	**-0.346**	**0.726**

8.2.3.3 Examination of Moderating Relations

After assessing the latent constructs' relationships, the effect of moderating variables on some constructs should be evaluated. In MAE, age is proposed as moderating factor that affects the relations between attitude, subjective norm, perceived behavioural control and behavioural intention. Using multi-groups in SEM, the effect of age on these constructs is assessed. As shown in Table 8-9, age has a positive and significant impact on the relation between attitude and behavioural intention. The respondents' age also has positive and significant effects on the relation of subjective norm to behavioural intention in the younger group (20 to 40), while an insignificant effect for the older group (41 to over 50) was found on subjective norm (β =0.029 and P =0.723). There is no effect of age on perceived behavioural control, as the statistical result was not significant.

Table 8-9 Analysis of age effects on constructs

Age/Hypothesised	Group age (20- 40)			Group age (41- over 50)		
Hypothesised Path	**β (>=0.1)**	**CR**	**P (<0.05)**	**β (>=0.1)**	**CR**	**P (<0.05)**
H1a: ATU → BI	**0.639**	**6.991**	**<0.001**	**0.892**	**8.465**	**<0.001**
H6a: SN → BI	**0.109**	**2.156**	**<0.001**	**0.029**	**0.354**	**0.723**
H8a: PBC → BI	**0.052**	**0.863**	**0.388**	**0.018**	**0.204**	**0.838**

8.3 Assessment of Hypotheses

The hypothesised relationships in the proposed model (MAE) were examined through path analysis using standardised path coefficients (Figure 8-3). Each arrow comes from latent variables and point to other latent variables, representing the relationship between these two variables and the hypotheses. All these relationships were assessed. This section will illustrate each hypotheses and discuss the result of the analysis.

H1: Attitude towards E-assessment acceptance has a positive influence on academic's Behavioural Intention to use E-assessment.

Attitude is one of three factors that affect behavioural intention. From the results in Table 8-8, attitude is the most affecting factor among the three factors that influence behavioural intention. The standardised regression weight is β= 0.702, CR= 11.107 and the p-value < 0.001, which indicates that relationship between attitude and behavioural intention is statistically significant. Moreover, as the result was positive that means the attitude positively affects the academic's behavioural intention to accept E-assessment. This result supports the hypotheses H1 which is proposed in MAE.

Attitude towards behaviour (ATU) is influenced by four factors: Awareness (AW), Perceived Ease of Use (PEU), Perceived Usefulness (PU) and Compatibility (COM). In the following sections, the influences of these four factors on ATU will be analysed and the influence of age on the relationship between ATU and BI will be assessed.

H1a: Age moderates the relationship between Attitude and Behavioural Intention.

There is a significant and positive interaction between age and attitude in the effect on behavioural intention to accept E-assessment, and the results for the group aged between 41 and over 50 showed a stronger effect (β=0.892) on attitude than the group aged between 20 and 40 (β=0.639). Therefore, the hypothesis H1a was confirmed.

H2: Awareness has a positive influence on the academic's Attitude to accept E-assessment.

Awareness was found to have no direct effect on behavioural intention to accept E-assessment, at level of p-value =0.066 > 0.05. Thus, hypotheses H2 was not supported.

H3: Perceived Ease of Use has a positive influence on the academic's Attitude to accept E- assessment.

The results of this latent variable support the hypothesis H3. Perceived Ease of Use has a significant and positive relationship with attitude, with p-value < 0.001. The standardised regression weight is β= 0.361 and CR =3.340, which indicates a positive and strong relationship between these two factors. This confirms that, perceived ease of use has a positive and strong effect on attitude, which supports hypothesis H3 in the proposed model. Moreover, the results show that perceived ease of use is the second most affecting factor, after compatibility, among the four factors that influence Saudi academic's attitude to accepting E-assessment.

H4: Perceived Usefulness has a positive influence on the academic's Attitude to accept E- assessment.

Perceived Usefulness was found to have a significant and positive effect on academic's attitude; p-value was < 0.001. This factor considered the less influencing factor on attitude comparing with compatibility and perceived ease of use, the standardised regression weight is β= 0.164 and CR =2.207. This result supports the hypotheses (H4) for MAE.

H5: Compatibility has a positive influence on the academic's Attitude to accept E-assessment.

Compatibility was found to have a significant strong and positive effect on attitude. The standardised regression weight is β= 0.556, CR= 6.925 and p-value < 0.001, which indicate a positive and strong relationship between compatibility and attitude. The results also show that compatibility is the most affecting factor among the four factors influencing academic's attitude. The results strongly support the hypotheses (H5), proposed in MAU.

H6: Subjective Norm has a positive influence on academic's Behavioural Intention to accept E-assessment.

The results show that there is a positive effect of subjective norm on academic's behavioural intention at p-value < 0.001. However, the influence of subjective norm on behavioural intention is low, with β = 0.092 and CR= 1.982, although, the results support hypothesis (H6), which proposes that subjective norm has a positive influence on academic's behavioural intention. The effect of superior influence on subjective norm is assessed with the influence of age in the following sections.

H6a: Age moderates the relationship between Subjective Norm and Behavioural Intention.

There is an interaction between age and subjective norm in the effect on behavioural intention. A significant and positive effect was shown by the younger group on subjective norm (β=0.109 and p<0.05), while an insignificant effect of the older group was found on subjective norm (β=0.029 and p=0.723). Thus, the hypothesis H6a was approved.

H7: Superior Influence has a positive effect on the Subjective Norms towards acceptance of E- assessment by academics.

The standardised regression weight of superior influence is 0.612 with a critical ratio of 8.599. This means that the path between SI and SN is statistically significant at the $p < 0.001$ level, and there is a positive and strong relationship between superior influence and subjective norm on academic's intention towards accepting E-assessment. These results support hypothesis (H7).

H8: Perceived Behavioural Control has a positive influence on academic's Behavioural Intention to accept E-assessment.

Perceived behavioural control was found to have no direct effect on behavioural intention to accept E-assessment among academics in Saudi universities. The p-value was $0.349 > 0.05$ and the standardised regression weight < 0.1. As a result, the hypothesis H8 was not supported.

Perceived behavioural control (PBC) is influenced by three factors: Self-efficacy (SE), Resource Facilitating Conditions (FC) and IT support (ITS). In the following sections, the influences of these three factors on PBC will be analysed and the influence of age on the relationship between PBC and BI will be assessed.

H8a: Age moderates the relationship between Perceived Behavioural Control and Behavioural Intention.

Since there is no effect of perceived behavioural control on behavioural intention, consequently, there is no effect of age between these two latent variables. The p-value was greater than 0.05 for two age groups'. H8a was not supported.

H9: Self-efficacy has a positive influence on Perceived Behavioural Control towards academic's Intentions to accept E-assessment.

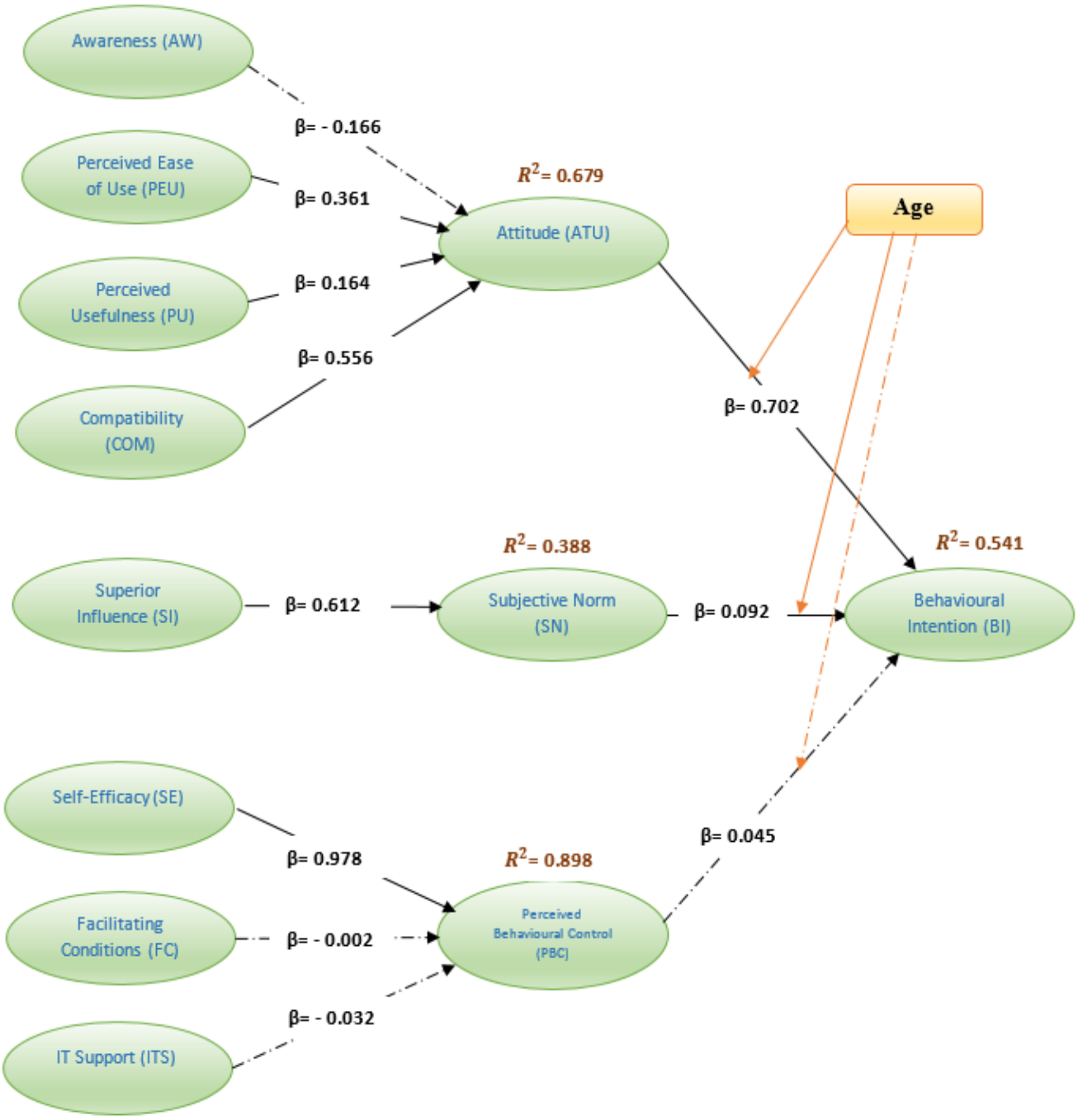
Self-efficacy is one of three factors (the other two are FC and ITS) that influence perceived behavioural control. The results indicate a significant strong and positive path between self- efficacy and perceived behavioural control at the level of p-value < 0.001. The standardised regression weight is $\beta = 0.978$ and CR $=7.981$. Self-Efficacy is the only factor of the three which affects perceived behavioural control. Thus, it can be concluded that this result supports hypothesis (H9) proposed in the model.

H10: Resource Facilitating Conditions has a positive influence on Perceived Behavioural Control towards academic's Intention to accept E-assessment.

Resource facilitating conditions was found to have no direct effect on perceived behavioural control, at the level of p-value = 0.980 > 0.05. Therefore, the hypothesis H10 was not supported.

H11: IT Support has a positive influence on Perceived Behavioural Control towards academic's Intention to accept E-assessment.

IT support was found to have no direct effect on perceived behavioural control. The p-value was 0.726 > 0.05, and the standardised regression weight < 0.1. As a result, the hypotheses H11 was not supported.



Path Coefficients:

Significant relationship — β= standardised coefficients

Not significant relationship — R_2 = squared correlations

Figure 8-3 Path diagram for the proposed structural model

Table 8-10 Assessment of Hypotheses

Hypotheses	β	P-value	Supported
H1: ATU → BI	0.702	<0.001	Yes
H1a: ATU (age 20-40) → BI	0.639	<0.001	Yes
H1a: ATU (age 40 – over 50) → BI	0.892	<0.001	Yes
H2: AW → ATU	-0.166	0.066	No
H3: PEU → ATU	0.361	<0.001	Yes
H4: PU → ATU	0.164	<0.001	Yes
H5: COM → ATU	0.556	<0.001	Yes
H6: SN → BI	0.092	<0.001	Yes
H6a: SN (age 20-40) → BI	0.109	<0.001	Yes
H6a: SN (age 40- over 50) → BI	0.029	0.723	No
H7: SI → SN	0.612	<0.001	Yes
H8: PBC → BI	0.045	0.349	No
H8a: PBC (age 20-40) → BI	0.052	0.388	No
H8a: PBC (age 40- over 50) → BI	0.018	0.838	No
H9: SE → PBC	0.978	<0.001	Yes
H10: FC → PBC	-0.002	0.980	No
H11: ITS → PBC	-0.032	0.726	No

8.4 Chapter Summary

This chapter has provided the results of the questionnaire. These outcomes were presented in three stages: demographic data results, measurement model, and structural model.

Questionnaire responses were received from 23 different universities in different cities in Saudi Arabia, and the majority of the responses were from King Saud University and Princess Nora University in Riyadh. Most of the participants had long teaching experience, and they used the internet more than two hours daily. Significantly, 60% of the academics participants did not use E-assessment. Only 126 participants answered "Yes", and most of them used E-assessment in the Blackboard system. Half of the respondents reported spending about 30 minutes to one hour every day using E-assessment.

This chapter then reported how the data was examined to test if it was distributed normally. The results confirmed that the collected data passed the normality test. Cronbach's alpha was utilized to test the reliability of the variables, to be sure that variables used are consistent in their measurements. The results showed that all the variables are reliable.

Structural Equation Modelling (SEM) was chosen for the data analysis. The proposed model was tested using a two-step approach. In the first step (measurement model), construct reliability (composite reliability) and validity (convergent, discriminant and nomological validity) were established to examine the measures used to test the model. The proposed model passed the reliability and validity tests. In the second step of SEM, the structural model was analysed. The Goodness of Fit was tested, to check if the proposed model fitted with the collected data. The recommended GoF indices (CFI, RMR, SRMR, RMSEA, and Normed chi- square) were used to examine the model's fit. All the indices results were in the ranges that were suggested. Hypothesised relationships among latent constructs were then analysed. The results supported all the hypotheses, expect for H2, H8, H8a, H10, and H11. The results indicate that ATU is the most influencer factor on BI, followed by SN, and that PBC has no effect on BI. The next chapter will report and discuss the views of focus group members regarding the results of the questionnaire.

Chapter 9: Focus Group Design and Results

This chapter describes the design, procedures and results of the last phase in this research, which is the focus groups. Creswell (2009) points out that in the sequential explanatory approach the qualitative study follows the quantitative one, to gain a better understanding of quantitative results. Therefore, the focus groups approach (qualitative) in this study followed questionnaire approach (quantitative). This phase aims to gain a clear interpretation and better understanding of the questionnaire results. The following sections will discuss the design, sample size, procedures, analysis and results of the last approach in this research.

9.1 Focus Group Design

Focus groups help to collect information regarding a group of individuals' views and explain the meaning behind these views (Gill et al. , 2008). This also assists in obtaining a richer understanding of group members' experiences and beliefs (Morgan, 1997). Moreover, one of the criteria recommended for using focus group is to explain, extend, qualify or test data collected through other methods (Bloor et al., 2001), and according to Merton & Kendall (1946) focus group discussion helps to verify that a questionnaire result is accurate. Therefore, this method is considered as the appropriate method to clarify the SEM results, and understand the MAE. Many researchers combine the focus group method with other research methods such as, interviews or surveys (Billson, 1996). Kitzinger (1994) also explains how the focus group method can ideally be used for explaining survey results, and how this method can be combined with other research method techniques.

After analysing the MAE constructs and the relationship between them, using SEM, the focus group approach was used. This was carried out to explain the SEM results, and obtain insights and understanding of the MAE. Using focus group to elicit Saudi academic's views was considered to be able to provide a deeper understanding of the SEM results and help to comprehend the MAE.

The questions that were asked to the participants in focus group are presented in Table 9-1. These questions were ordered to promote discussion of the relationship between the constructs in MAE. In the discussion the researcher focused on the unexpected results of relationships between constructs. The questions were written in both English and Arabic (Appendix D), in

case there was any difficulty in understanding the English language, but all participants were able to read and speak English and for this reason, the discussion was conducted in English.

Table 9-1 Focus group questions

Construct relationships	Questions
ATU⟶BI	To what extent you think that an academic's attitude can affect the academic's behavioural intention to accept E-assessment in the future? Why?
ATU (age)⟶BI	To what extent you think that academic's age can affect academic's attitude toward accepting E-assessment in future? Why?
AW → ATU	To what extent you think that there is an effect of the awareness of E-assessment and its benefits on academic's attitude toward accepting E-assessment?
PU ⟶ATU	To what extent you think that benefits of E-assessment affect the Saudi academic's attitude toward accepting E-assessment? Why?
PEU⟶ATU	To what extent you think ease of use of E-assessment can affect the Saudi academic's attitude toward accepting E-assessment? Why?
COM⟶ATU	To what extent you think if E-assessment is compatible with an academic's work and his/her needs, this will affect the Saudi academic's attitude toward accepting E-assessment? Why?
SN⟶BI	To what extent you think that an academic's social influence (people around the academic) can affect the academic's behavioural intention towards accepting E-assessment in the future? Why?
SN (age)⟶BI	To what extent you think that an academic's age can affect the academic's social influence (people around the academic) to accept E-assessment in future? Why?
SI⟶SN	To what extent you think that the manager or the supervisor of the academic can have an impact on the academic's social behaviour toward accept E-assessment? Or the manager can be one of the people that may have influence on an academic's willingness to accept E-assessment? Why?
PBC⟶BI	To what extent you think that an academic's ability to control the use of E-assessment can affect that academic's behavioural intention to accept E-assessment in the future? Why?

PBC (age)⟶BI	To what extent you think that an academic's age can affect the academic's ability to control the use of E-assessment in future? Why?
SE⟶PBC	If E-assessment matches the academic's knowledge and skills, to what extent you think this can affect the academic's ability to control E-assessment use? Why?
FC⟶PBC	To what extent do you think the availability of resources that the academic needs to use E-assessment (e.g. computers, internet connection, time, money), has an effect on the academic's ability to use E-assessment? Why?
ITS⟶PBC	To what extent you think the availability of E-assessment training courses and staff support to use E-assessment has an effect on the academic's ability to use the E-assessment? Why?

9.2 Focus Group Sample Size

It is essential to consider the adequate group size for a focus group discussion. Stewart and Shamdasani (2014) suggest that the researcher should be careful of having a large group, which may lead to an unsatisfactory discussion. Gill et al. (2008) propose that the appropriate number of participants in a focus group is between six to eight participants; however they suggest that a focus group can successfully conducted with at least three participants and a maximum of 14 participants. In the focus group method, using a small group may limit the range of the discussion, while using a large group means it will be hard to manage the discussion and it may limit the opportunities for some participants to share their views (Bloor et al., 2001). This study used two focus groups, one comprised of six participants and the other contained of four academics, to avoid the risk of misleading the discussion and give opportunities for each group member to speak and share his/her view. To obtain an adequate range of views and have a rich discussion, the members of the focus groups were from different universities in different regions of Saudi Arabia.

9.3 Focus Group Procedures

The members of the focus groups were asked to participate by e-mail or phone and the researcher proposed dates and times for focus groups meetings. After obtaining approval of participating in focus groups from six Saudi academics for the first group and four academics for the second group, the researcher allocated a quiet room for the focus group discussions. At

the beginning of the focus group meeting the researcher gave the participants a written overview of the research aims and methods, then gave them a consent form to sign, in which to confirm that they agree to participate in this discussion. The model, the MAE, and the results from the SEM (Appendix D) were handed-out to each participant. Meanwhile, the researcher gave the opportunity for the participants to ask any question about the research or the model and answered them. The members asked some questions about the results and some of them were looking for details, such as the standardised regression weight between two constructs. The researcher was well-prepared for this discussion, and all the results had been printed out and illustrated for the focus group members, which answered their questions. After clarifying all the misunderstandings of the model by answering the members' questions, the researcher started asking their opinions about each relationship between factors. The discussion took about an hour and half for the first group and an hour for the second group. Both sessions were recorded and each focus group's discussion was later transcribed.

9.4 Focus Group Ethics Approval

Ethical Approval was needed before starting to arrange for the focus groups discussions. The ethical form of this research has been approved by the Ethics Committee at the University of Southampton (Research Ethics Number FoPSE/25155).

9.5 Focus Group Results

The aim of the focus group discussions was to shed light on the results obtain from SEM, in order to have a deep understanding of these results and to elicit the reasons behind these results. Therefore, the researcher explained the model carefully, after it was edited using the SEM results, for focus groups members. Later, the researcher started asking the participants the focus group questions shown in Table 9-1 above. The following sections will present the focus group members' views about each factor and it relationships.

Attitude → Behavioural intention: The first question asked to academic member in focus groups was whether "*the attitude of an academic can affect the academic's behavioural intention to accept E-assessment in future?*". All of the academics agreed that attitude has strong impact on academic's behavioural intention to accept E-assessment in Saudi universities. They expressed that by answered such as, "*Yes, it is very important factor*", or "*It has a strong effect on academic's behavioural intention*".

From the academic member views, the academic's attitude has a strong effect on academic's behavioural intention to accept E-assessment in Saudi Universities.

Attitude (age) → Behavioural intention: Second question was "*To what extent you think that academic's age can affect academic attitude toward accepting E-assessment in future? Why?*". One of the members said "*There is an effect of age on the relation between academic's attitude and academic's behavioural intention to accept E-assessment*". All the members also agreed that the attitude of younger academics has more influence on behavioural intention compare with older academics. One of the groups justified the answer by explaining "*The younger academics more flexible for change and they like to adopt the new technology more than older academics*". Another said, "*Older academic does not like to change his/her method of teaching or assessing the student*", while, one of the members explained, "*I agree with the results that you* (the researcher) *have, the older academic has a routine and specific way to assess students and he/she does not like to change it*". Member M in second group provided an example, "*My mother was lecturer and she decided to retire when the computer and technology were emerged in her university*".

Thus the members' views confirm that age has an influence on the relation between attitude and behavioural intention of academics to accept E-assessment. The attitude of younger academics can have more positive affect on their behavioural intention to accept E-assessment compare with older academics, which has less influence. This is due to older academics not accepting change, and preferring to use their traditional way to assess students, while younger academics are more accepting towards adopting new technology.

Awareness → Attitude: The focus group members were asked if they thought that awareness of E-assessment and its benefits can affect their attitude to accepting E-assessment. Four members from the first group and two from the second group argued that "*awareness does not have an effect on attitude*". However, they provided different justifications for this. Member N in first group said, "*The E-assessment now is known by most of the academics, so this factor does not affect the attitude".* Another member said *"Even if I know the E-assessment I prefer to assess the students in the university and use the paper-test method*". A similar answer was obtained from member M in the second group: "*Even I have the awareness of E-assessment I do not like to change my way of assessment to test students*". Member AG in the first group explained a significant experience in her university: she said, "*King Khalid University was the first university that applied E-learning and E-assessment in Saudi Arabia, and it provides fully*

equipped labs, training courses, IT support staff and awareness of E-assessment. Also, it offers bonuses and awards for academics who use E-assessment. However, few academics now in my university use E-assessment, and I think this is because they do not have the desire to use E- assessment". Moreover, Member AM in the first group explained that the awareness depends on the school in the university; if it adopts and encourages the use of E-assessment, academics will increase their awareness, which may affect their attitudes.

In contrast, other members confirmed the importance of awareness in influencing the academic's attitudes. Member AN in first group said, "*it is important, and we need awareness of new technology systems in our Universities*". Member T in the second group justified her answer, saying: "*The awareness may important if there are training courses accompanied with it*". Member MM said, "*The awareness may have influence in academic's attitude if the universities prove that E-assessment useful for academic's tasks or for student*".

From the academic views in the focus groups, it seems the awareness does not have an effect on attitude for different reasons, as E-assessment is already known about by most of the academics, yet only a few of them use it. However, some respondents believed that the academic's desire and the ability to change the traditional method of testing the students are very crucial to accept E-assessment. Moreover, it was believed that if the awareness is accompanied by training courses, this may affect the academic's attitude.

Perceived usefulness → Attitude: The focus group members were asked if the perceived usefulness had an influence in academic's attitude towards accepting E-assessment. Two members confirmed the effect of perceived usefulness on academic's attitude, saying that if the E-assessment was useful this would affect their attitude and increase their desire to use it. Another member in the same group said, "*It is very important factor that affect my attitude*".

Another member said that perceived usefulness and perceived ease of use are the most important factors that influence the academic's attitude: "*The benefits and simplicity of E- assessment use are the most important factors that influence the academic's attitude*". One member also linked the influence of perceived usefulness with perceived ease of use, she said, "*The benefits of E-assessment is relation to how it easy to use it, if it easy to use this will affect my attitude and increase my desire to use E-assessment*". Member AN in first group said, "*Even I have all the facilities and the important equipment to use E-assessment, I will not use it if it is not useful and easy to use*".

From the academic's views, it is clear that perceived usefulness has an effect on Saudi academic's attitude to accept E-assessment. Some also said, it was very important factor together with the ease of use factor. It appears that there is relation between the perceived usefulness and perceived ease of use, and that these two factors together have a strong effect on academic's attitude towards accepting E-assessment in Saudi universities.

Perceived ease of use → Attitude: The members of focus groups were asked whether if the E-assessment is ease to use, this might affect their attitude. All the ten members in each groups confirmed that perceived ease of use would strongly influence the academic's attitude. They expressed that saying, "It is very important factor" or "It is the most important factor that can affect academic's attitude". Member AG in first group said, "*If the E-assessment difficult to use I will not use it*". Another member linked perceived ease of use with perceived usefulness; she said, "*These two factors are the most important factors that can affect academic's attitude to use E-assessment*".

We can conclude from this discussions that perceived ease of use has a strong influence on Saudi academic's attitude to accepting E-assessment. This factor is considered the most influential factor in the academic's attitude, compared with other factors in MAE. Moreover, as we mentioned in the previous section, there is a relation between perceived ease to use and perceived usefulness. These two factors together create a strong impact on Saudi academic's attitude.

Compatibility → Attitude: The academic members in the focus groups discussed how important the compatibility of E-assessment with academic tasks was in influencing attitudes. Eight members from both groups agreed that E-assessment should be compatible with the nature of the course that the academics were teaching. For example, one member said, "*It is important that E-assessment be compatible with the course type that academic teach it, some of the courses are difficult to sort questions to assess students using E-assessment*". Another said "*E-assessment should match the questions type that teacher use to assess students*". One member believed that E-assessment should be used in test quizzes not in the final test. Member AM in the first group said, "*E-assessment should be compatible with the type of exam, for example quiz exam can be compatible with E-assessment, because in quiz the teacher usually used multiple choices question or short answer question, but in final exam it should be at least one or two long explanation questions, which will be hard and not very accurate to assess it*

using E-assessment. Also, there is the risk of having a final exam using E-assessment, may be the internet is suddenly cut off, or one of the students PC is break down".

The compatibility of E-assessment with academic tasks has an influence in academic's attitude towards accepting E-assessment. More than half of the focus groups' members confirmed that compatibility of E-assessment with the type of the course being taught teaching is essential. Furthermore, E-assessment should match with type of questions in the exam. The compatibility of E-assessment with the type of exam is important; for example, a quiz can be compatible with E-assessment, because most of the questions can be multiple choices or short answer questions. Moreover, in these academic's views, using E-assessment for a final exam carries risks.

Subjective norm→ Behavioural intention: The focus groups asked if the other people's opinions can affect the academic's behavioural intention to accept E-assessment in future. All the focus groups' members agreed that there is a strong influence of subjective norm on academic's behavioural intention. Confirmed this by saying that society has a very strong effect on academics. One of the members justified her answer saying, "*If most of the school teachers use E-assessment, this will affect the others and encourage them to use E-assessment*". Member N in the first group said "*In our society (Saudi society) the individual strongly influence by the others opinions, so the subjective norm has a strong impact on academic's behavioural intention to accept E-assessment*". Member A provided an explanation for his answer, "*If the other universities use E-assessment this will affect the head of the university and he/she will encourage the academics in all the university schools to use it*".

All the focus group participants confirmed that subjective norm has a strong influence in academic's behavioural intention to accept E-assessment. This is because Saudi society has a strong influence on individuals, which confirms that in this context the subjective norm has a strong impact on academic's behavioural intention. The competition among the universities can also increase the acceptance of E-assessment. The head of the university can be influenced if the other universities use E-assessment, and this will affect the academics intention to accept and use E-assessment.

Subjective norm (age) → Behavioural intention: To investigate if age affects the relationship between subjective norm and behavioural intention, focus groups members asked, "*To what extent you think that academic's age can affect academic's social influence (people around academic) to accept E-assessment in future? Why?*". All the 10 members confirmed that age has an effect on the relation between subjective norm and behavioural intention. One of the

members said "*There is an effect of age, and the results is correct. The younger academic can affect more by the others view, than older academic. Because the older academics avoid the change and do not accept the new methods for teaching like the younger academic*". Another member justified his answer by saying, "*The older academics has less influence by the others, because they have along experience, and they feel that they do not need to consider the others opinion. The older academics think that they should influence the others by their experience*".

Thus age has an effect on the relation between subjective norm and behavioural intention to accept E-assessment. The younger academics are affected by the others' opinions more than older academics. This is because the younger academics are more acceptable towards change and considering innovations. On the other hand, the older academics do not accept change, and feel that they have adequate experience and the others should be influenced by them.

Superior influence → Subjective norm: This section aimed to investigate if the superior influence has an effect on subjective norm. The focus groups members were asked if they thought that the academic can be influenced by his/ her manager or school head. All 10 members agreed that the academic's manager has strong social influence on them, and particularly in influencing them to accept E-assessment. One of the members said, "*It happened with me before, my boss asked me to use specific software and I used it; if he did not ask me I will not use this software*".

We can conclude that superior influence has a strong effect on subjective norm to accept E- assessment in Saudi universities.

Perceived behavioural control → Behavioural intention: focus group members were asked if the ability to control the use of E-assessment can affect academic's behavioural intention to accept E-assessment in the future. Four members from the first group and two from the second group disagreed that perceived behavioural control has an influence on academic's behavioural intention to accept E-assessment. They provided different reasons for this view. Member A said "*I have all the facilities that I need, but I do not have the desire to use E-assessment*". Another member gave a similar answer: "*Even if I have the ability to use E-assessment, I do not have the desire to use it, because I do not want to change my assessment method*". Member N from the first group justified her answer by saying, "*The most important factors are the usefulness and ease of use of E-assessment, even if I have all other facilities I will not use E- assessment if it is not useful or not ease to use*".

However, other members agreed that the ability to control the use of E-assessment can affect the academic's behavioural intention to accept E-assessment. One of these members explained that: "*If I have the ability to control the use of E-assessment and I have an experience and skills to use it, this will affect my intention towards to accept E-assessment*".

Overall, from the members view, it appears that perceived behavioural control does not greatly affect the academic's behavioural intention to accept E-assessment in Saudi universities. The ease of use and usefulness of E-assessment are important more than the ability to control the use of E-assessment. The academic's desire is the factor that determines the acceptance of E- assessment, even if all the facilities are provided for him or her.

Perceived behavioural control (age) → Behavioural intention: This section aimed to check if age can affect the relationship between perceived behavioural control and behavioural intention. The focus groups members confirmed the results, that there is no effect of age on the relationship between perceived behavioural control and behavioural intention. One of them said "*There is no influence of age on this relationship*". Another member said "*If the academic has the ability to control the use of E-assessment, the academics age will not affect if he/she young or old*". Member N said "*As there is no relationship between perceived behavioural control and behavioural intention, so there is no effect of age on this relation*".

To conclude, there appears to be no effect of age as a moderating factor on the relationship between perceived behavioural control and behavioural intention.

Self-efficacy → Perceived behavioural control: To examine the relationship between self- efficacy and perceived behavioural control, the focus groups were asked their opinion about this relationship. All the members agreed that there is a strong influence of self-efficacy on perceived behavioural control to accept E-assessment. Member N from the first group said, "*Yes, there is a strong effect, because if I have the skills and the ability to use E-assessment, so I will have the ability to control the use of E-assessment*". Another member said "*It is very important to have the skills and experience to control the use of E-assessment"*. Member M justified her answer by saying, "*The self-efficacy gives the academic the confidence to use and control E-assessment*".

Self-efficacy has a strong impact on perceived behavioural control towards accepting E- assessment in Saudi universities. Self-efficacy can increase the academic's confidence to use and control E-assessment. Thus it is important to have the ability and skills to control the use of E-assessment.

Resource facilitating conditions → Perceived behavioural control: The academic members in focus groups were asked their view about the relationship between resource facilitating conditions and perceived behavioural control. Four of the members from both groups agreed that there is an effect of these factors on perceived behavioural control, some of them linked this to IT support. For example, one of them said, "*It is important to provide all the facilities that academics need to use E-assessment, but it is also important to have training courses and IT support staff to help them when they need*".

However, other members did not agree with the relation between resource facilitating conditions and perceived behavioural control. Member T said "*Even I have all the facilities that I need to use E-assessment, I do not use it because I do not have the desire to change my way*". Another member justified her answered by explaining that the currently available resources in the universities are low quality with poor conditions which discourages the academics from accepting E-assessment. Others explained that some academics avoid change and they do not like to adopt new technology.

We can conclude that there are different opinions about the relationship between resource facilitating conditions and perceived behavioural control. Four members confirmed this relation, whereas the other six members had different opinions. Some members disagree with this relationship, explaining that academics do not have the desire to use E-assessment, even if the resources are available. The academics prefer to use their existing methods to assess the students. The low quality of resources that are currently available may discourage the academics from accepting E-assessment.

IT support → Perceived behavioural control: To investigate the relationship between IT support and perceived behavioural control, the group members were asked this question: "*To what extent you think the availability of E-assessment training courses and staff support to use E-assessment, has an effect on academic's ability to use E-assessment? Why?*". Three of the members said that it was an important factor that affects academic behavioural control and thus willingness to accept E-assessment. One member explained, "*If there is no IT support I will not use E-assessment, especially during the exam period, I need one or two of IT support staff to help me in case of any problem arise*". Member T explained her answer by saying, "*The availability of IT support is more important than the availability of resource, because I can bring my laptop and internet connection to use E-assessment, but I cannot use it if there is no IT support and training courses*".

However, other focus groups members clarified that IT support does not have a relation with perceived behavioural control in accepting E-assessment. Member M justified his answer by saying, "*The availability of IT support it not important for me, even if I have all the facilities and the support, I do not have the desire to use E-assessment and change my method to assess students*". A similar answer was obtained from another member "*I have everything I need it including IT support to use E-assessment, but I do not like to change my way to test the students*". Member AG explained her answer by providing an example from her university, as quoted above, that although her university was the first to apply E-learning and E-assessment in Saudi Arabia, and it provided a high level of support and even rewards, few of the academics were using E-assessment, presumably because they had no desire to use it. Another member clarified his answer by saying, "*The currently available IT support staffs are with low experience and there is no enough staff for each school*". Moreover, Member M justified her answer by "*For me it is not important to have IT support, because I have a good background in using technology and I can solve any problem that I face*".

In this discussion, the academic members had different views about the IT support factor and its relation with perceived behavioural control. Few of them agreed that there is a relationship between the availability of IT support with academic's ability to control the use of E- assessment. Those who agreed explained that the availability of IT support staff is important specifically during the exam time. Some of them confirmed that they cannot use E-assessment if there is no training courses and IT support staff. However, the other seven members disagreed, saying that there is no relationship between IT support and academic's behavioural control in influencing acceptance of E-assessment. They clarified their opinions by explaining that they had a strong technology background and did not need any training courses or assistance to use E-assessment. Some of them explained that they have all the resources, training courses and IT support staff, but did not have the desire to use E-assessment and preferred to use their own methods to test students. Moreover, they explained that academics do not use E-assessment because the current IT support staff have a low level of experience and there is not an adequate number of support staff in each faculty.

9.6 Chapter Summary

Focus group helps to gain people views about specific subject. It was used as a combination of other research techniques, and it assists to obtain rich understanding of the results obtained from other methods such as a questionnaire. This study used focus group discussion to explain

the SEM results and to achieve a deeper understanding of the proposed model after analysis of the SEM results. Based on recommendations in the literature in regard to the focus groups preferred size, the study used two focus groups, with 6 members for the first group and 4 members in the second group. Before arranging for the focus group discussion, ethical approval was obtained from the Ethics Committee at the University of Southampton. The researcher contacted the members and arranged a time, date and comfortable place for meeting. During the meeting, the researcher explained the aim of the research, the model and SEM results. Later, the questions were asked to the members about each factor and its relationship with other factors. The focus groups discussion took one hour to hour and half. The academic members answered all the questions and provided justifications for their opinions. This chapter discussed the views of the academics in the focus groups regarding each factor and the relationships between the factors. Overall it was found that most of the members broadly agreed with SEM results, while a few disagreed. The focus group members were agreed that attitude is the most influencing factor on academic's behavioural intention and PU, PEU and COM have strong effect on academic's attitude. They mentioned that PU and PEU together can have high impact on academic's attitude. Subjective norm has an influence on academic's behavioural intention and SI has a strong impact on subjective norm. Moreover, perceived behavioural control has no effect on academic's behavioural intention.

Chapter 10: Discussion of Findings

The findings and results of this research are discussed in this chapter. The discussion links the results together and provides supporting references for the study's results and also offers possible reasons for each finding. This chapter will describe the results for each factor in separate sections, followed by a chapter summary.

10.1 Discussions and Analysis

The MAE was informed by previous ICT theories and models, as explained in Chapter 4. A mixed method approach was used in this study to evaluate the MAE, which involved first interviewing experts in the same field, then sending a questionnaire to Saudi academics in different Saudi universities to confirm experts' view, another questionnaire was distributed to Saudi academics, using SEM for analysis of the results, and subsequently arranging focus group discussions. All these approaches were undertaken to investigate and evaluate the MAE. The following sections discuss the results of these approaches, and support the interpretation by reference to relevant theories and findings of other studies.

10.1.1 Attitude

Attitude (ATU) means the subject's positive or negative evaluation regarding the acceptance of E-assessment. The questionnaire results found that ATU was a significant factor that influences BI ($\beta = 0.702$), and the hypothesis H1 in Chapter 8 was supported. It was also the most influential factor compared with SN and PBC. In other words, Saudi academic's attitude towards E-assessment determines their acceptance of E-assessment more than these other two factors. That means a more positive evaluation towards E-assessment usage, will increase Saudi academic's intention to accept E-assessment.

The focus groups finding supports the questionnaire results. All the focus group members agreed that Saudi academic's attitude has a strong effect towards accepting E-assessment, explaining this by "*Yes, it is very important factor*".

Other studies have examined the users' behavioural intention towards technology in different domains and also found that attitude has a significant effect on users' behavioural intention (BI). Ajzen (2005a) conducted a meta-analysis of a wide range of users' behaviours, and found

that the mean correlations between ATU and BI ranged from 0.45 to 0.60, which is to imply that ATU is the most important predictor of BI. Another study, conducted in Saudi Universities examined faculty members' attitudes towards using a learning management system (Jusur) revealed that faculty members had a positive attitude towards using Jusur, with average scores of 84.1% (Hussein, 2011). Another previous study investigated teacher intention to use Web 2.0 technology in the classroom and discovered that ATU has the strongest effect on BI (Sadaf et al., 2012a). Huh et al. (2009) found that ATU in TBP and DTPB models was a significant predicator of employees' behavioural intention towards the use of a hotel information system. More studies in various fields support this result (Fishbein & Ajzen, 1975; Taylor & Todd, 1995b; Armitage & Conner, 2001; Huang & Chuang, 2007; Yousafzai et al., 2007; McEachan et al., 2011; Paver et al., 2014). From the findings and results of the questionnaire and focus groups, together with those of the supporting studies, we can conclude that ATU has the strongest influence on Saudi academic's behavioural intention to the acceptance of E-assessment.

There are four factors that determine the ATU: Awareness (AW), Perceived Ease of Use (PEU), Perceived Usefulness (PU) and Compatibility (COM). All these factors, except AW, explain ATU significantly (70%). The results of three factors, PEU, PU and COM were statistically significant with different path coefficients. The questionnaire results show that COM is the strongest factor ($\beta = 0.556$) that can determine ATU, followed by PEU ($\beta = 0.361$) and PU ($\beta = 0.164$). All these determinations will be discussed in detail in the next sections.

10.1.1.1 Awareness

The concept of awareness of new technology appears in the Innovation Diffusion Theory (IDT) in the initial phase of the diffusion process model (Rogers, 1995). It refers to the awareness of both the institution adopting new technology and the user who will use the new technology. According to Dinev and Hu (2007) awareness is *"the extent to which a target population is conscious of an innovation and formulates a general perception of what it entails"*. In the awareness stage of IDT, the institution and user obtain information about new technology, and how it functions and what are its benefits (Dinev & Hu, 2007). Awareness (AW) in this study means the Saudi academic's consciousness of what E-assessment is, and its benefits. The questionnaire results revealed that AW has no significant correlation (p-value < 0.05) with ATU towards acceptance of E-assessment among Saudi academics. Thus, hypotheses H2 in

Chapter 8 was not supported. Six members out of ten from the focus groups were agreed that AW has no influence on Saudi academic's attitude toward accepting E-assessment. They substantiated their answers by providing different reasons. They explained that most Saudi academics already have an awareness of E-assessment, although few of them use it. One of the focus groups members provided an example from her university (King Khaled University). She pointed out that King Khaled University was the first Saudi university to adopt and implement E-learning and E-assessment, and although it provides awareness and training courses to encourage academics to use E-assessment, few of the academic staff currently use E-assessment. Moreover, they believed that the major reason behind this results is absence of the academic's desire to accept E-assessment and to change their way of examining students. AlMulhem's (2014) study revealed that most of academic staff in King Faisal University were aware of E-learning and it benefits and that the majority of participants had the knowledge to use E-learning and the learning management system, but few of them used it.

A study of the effect of awareness in the use of digital resources in the same university (King Faisal University) among students revealed that the 70% of the students were aware of the digital resources, but less than half of them used these resources (Asemi & Riyahiniya, 2007). Another study that investigated the students' awareness of m-learning (mobile learning) services in university found that students had adequate knowledge to use m-learning, but other barriers limited this use, such as slow data exchange within networks, and the concern regarding confidentiality of personal information (Alzaza & Yaakub, 2011). The results of the questionnaire and the findings of focus groups revealed that AW has no effect of Saudi academic's attitude towards accepting E-assessment.

10.1.1.2 Perceived Ease of Use

Perceived ease of use (PEU) in this study means that E-assessment more likely to accepted by academics if it is perceived to be easier to use. The questionnaire results show that PEU is the second determiner that can explain ATU (β =0.361). The hypothesis H3 was supported in Chapter 8. That means academic's attitude towards E-assessment acceptance is influenced by the ease of use of the system. In other words, if E-assessment is easy to use the academic's attitude will be influenced towards accepting it.

In the results of the last phase of this study (focus groups), all the participants agreed that PEU is an important factor that impacts the academic's attitude towards accepting E-assessment. They expressed that by "*It is the most important factor that can affect academic's attitude*".

Other studies which investigated the effect of PEU on users' attitude confirm the results of this study. Schepers and Wetzels (2007) found that both PEU and PU have a significant effect on attitude and behavioural intention. Another study on the use of Web 0.2, showed that PEU positively affected users' attitude towards the use of Web 2.0 (Ajjan & Hartshorne, 2008). Moreover, (Sadaf et al., 2012a) found that PEU can significantly predict teachers' attitudes to use Web 2.0 (Using the DTPB model). The results of the present study are consistent with most studies that used PEU to predict users' attitude and behavioural intention (Davis, 1989; Huang & Chuang, 2007; Lin, 2007; Park et al., 2012; Paver et al., 2014). This discussion confirms that PEU is an affecting factor that can determine Saudi academic's attitude towards accepting E- assessment.

10.1.1.3 Perceived Usefulness

Perceived usefulness is defined as the degree of users' belief that using a certain system will enhance his or her job performance (Davis, 1989). In this study it was hypothesised that if using E-assessment will enhance the academic's job performance this will influence his or her attitude towards accepting E-assessment. The questionnaire results revealed that PU has a slight influence ($\beta = 0.164$) on academic's attitude towards accepting E-assessment. H4 was supported in the SEM analysis in Chapter 8, with PU coming after COM and PEU in its effect on academic's attitude. That means if E-assessment is useful but is not compatible with an academic's job or not easy to use, the academic may not accept it.

The focus groups' results support these findings, the groups' members confirmed the influence of PU on academic's attitude. However, they bound the importance of PU with PEU. They explained that PEU has more effect on academic's attitude, and PEU together with PU exert a strong influence on Saudi academic's attitudes towards acceptance of E-assessment.

Most of the studies that examined the PU as a factor in users' attitude and behavioural intention support this study's results. The influence of PU was reported in different domains (Davis, 1989; Huang & Chuang, 2007; Lin, 2007; Park et al., 2012; Paver et al., 2014). We can conclude that PU has a slight effect on Saudi academic's attitude. However, the COM and PEU factors have a stronger effect, and the combined effects of these three factors have a strong influence on academic's attitude towards accepting E-assessment.

10.1.1.4 Compatibility

Compatibility is defined as the degree to which a new information system is matched to the current values, past experiences and user needs (Moore & Benbasat, 1991; Rogers, 2003). In this study, the E-assessment should be consistent with Saudi academic's needs and values. The questionnaire results revealed that the compatibility factor has strong effect on Saudi academic's attitudes towards accepting E-assessment, and hypotheses H5 was supported in Chapter 8. COM is considered the strongest factor among the other three factors (AW, PEU, PU) that have an influence on academic's attitude, with path coefficient ($\beta = 0.556$). This means academic's attitude towards E-assessment acceptance is greatly influenced by its compatibility, followed by ease of use, then perceived usefulness.

In the focus group phase, 8 out of 10 participants agreed that compatibility is important and it affects Saudi academic's attitude. They said that E-assessment should be compatible with the course type that the academic delivers. Moreover, E-assessment should match the type and questions of the exam.

In different studies the compatibility was found to be strong factor that can affect user attitude or behavioural intention to accept and use a new information system. In Saudi Arabia a study of the factors that influence the adoption and usage of online services found that compatibility has an impact on users to adopt and use e-services (Al-Ghaith et al., 2010). Huh et al. (2009) found that COM had more effect on employees' attitude than PEU and PU towards use of a hotel information system. Another study, which investigated the factors affecting the teachers' intention to use Web 2.0 found that COM had an influence on the teachers' intention to use Web 2.0 (Sadaf et al., 2012a). There are further studies supporting the results of present study (Taylor & Todd, 1995a; Huang & Chuang, 2007; Lin, 2007; Ajjan & Hartshorne, 2008; Paver et al., 2014).

10.1.2 Subjective Norm

This factor represents the social influence that can affect the user's acceptance of a new technology. In this study the influence of the others opinions on Saudi academic's behavioural intention has been examined through the subjective norm (SN) factor. The questionnaire results show that SN has an effect on behavioural intention (BI). However, the influence of SN on BI is low, with path coefficient $\beta = 0.092$. Thus, the opinions of others appear to have only a slight effect on Saudi academic's intention to accept E-assessment.

However, in the discussions with the two focus groups, all 10 participants agreed that Saudi academic's intention can be influenced by others' opinions towards accepting E-assessment. They explained that Saudi society has an impact on individuals, therefore the SN can influence academic's intention to use E-assessment. Furthermore, they mentioned that competition between the universities can affect the head of the school, and as a result, the head will encourage the academics to use E-assessment.

Several studies investigated the effect of SN on users' BIs in different domains, and found that SN can influence the users' intention (Morris & Venkatesh, 2000; Al-Gahtani et al., 2007; Huh et al., 2009; Lee et al., 2010). However, other studies found that SN not a strong predictor of BI (Davis, 1989; Ajjan & Hartshorne, 2008). Venkatesh and Davis (2000) found that SN had no direct influence on BI. Similarly, Ajjan & Hartshorne (2008) found that there was no significant effect of SN on BI in relation to usage of Web 2.0.

After discussing the questionnaire and focus group results, and supporting references, it can be concluded that SN does have an effect on Saudi academic's behavioural intention, but this effect is low. SN is predicted by one factor, which is superior influence (SI). The questionnaire results revealed that SI explained 38% variance of SN, with path coefficient ($\beta = 0.612$). These results also can clarify the finding from the focus groups, because most of the participants insisted on the effect of the head of the school on academic intention to accept E-assessment. That means, the most influence of SN comes from the effect of SI on Saudi academic's intentions. The next section will discuss the results and findings for SI.

10.1.2.1 Superior Influence

This factor concerns the effect of the manager on the user's attitude towards accepting and using a new technology. In this study, superior influence (SI) was used to examine the influence of the head of school on Saudi academics in accepting E-assessment. The questionnaire results support the hypotheses H7 in Chapter 8, and SI was found to have a significant effect on SN. The path coefficient of SI is $\beta = 0.612$, which means SI has a strong effect on SN, and it considered as a strong predictor of SN.

The focus groups phase confirmed the effect of SI on SN; all the members in both groups agreed that the head of school has strong influence on Saudi academics towards acceptance of E-assessment.

Different studies support this finding, such as those by Sadaf et al. (2012a) in exploring the teachers' intention to use Web 2.0, Huang & Chuang (2007) in employees' behavioural intention to use an information system, Paver et al. (2014) in integration of the technology, and Ejaz (2014) in factors affecting students' behavioural intention to use e-portfolios. To conclude, the SI has been found to have a strong influence on SN towards acceptance of E- assessment.

10.1.3 Perceived Behavioural Control

Perceived behavioural control (PBC) is defined as the user's perception of whether it is easy or difficult to perform specific behaviour (Ajzen, 1991). PBC means, in the context of this study, the Saudi academic's perception, with the possession of required resources and skills, of how easy or difficult it is to use E-assessment. The result of the questionnaire revealed that PBC had no influence on these Saudi academic's behavioural intention to accept E-assessment. The results showed that there was no significant relationship between PBC and BI. The p-value was (0.349 > 0.05); thus the hypothesis H8 was not supported. Compared with the other factors (ATU, SN), PBC is the only factor that was found to have no correlation with BI. Probably, having the resources and the support to use E-assessment is not that serious concern compared with the other factors.

The focus groups discussion findings support the questionnaire results. More than half of the participants agreed that PBC does not influence Saudi academic's intention to accept E- assessment. They gave similar answers, for example "*Even if I have the ability to use E- assessment, I do not have the desire to use it, because I do not want to change my assessment method*". One of the members explained that ATU sub factors' (PEU and PU) were more important than PBC: "*The most important factors are the usefulness and ease of use of E- assessment, even if I have all other facilities I will not use E-assessment if it is not useful or not easy to use*".

Similarly to this study, other studies have found the relationship between PBC and BI to be not significant or weak. Huang & Chuang (2007) study to investigate employees' behavioural intention to use an information system revealed that PBC has insignificant effect on BI. A weak correlation between PBC and BI was also found in meta-analytic study (Armitage & Conner, 2001), and in the students' perception of using an e-portfolio (Ejaz, 2014). Paver et al. (2014) found that PBC is a less effective predictor of BI compared to ATU and SN.

PBC has three predictors: self-efficacy (SE), resource facilitating conditions (FC), and IT support (ITS). The questionnaire results show that only SE can predict PBC; the other two factors have no correlations with PBC. Also, SE was found to have a very strong influence on PBC, with path coefficient β =0.978. From the discussion and findings, the PBC has no influence on Saudi academic's behavioural intention to accept E-assessment, and SE is the only determination that can predict PBC.

10.1.3.1 Self-efficacy

Self-efficacy (SE) is the degree to which an individual believes that he/she able to do a certain behaviour (Taylor & Todd, 1995a). If the academic has the ability and skills to use E- assessment this will increase the intention to accept E-assessment. In chapter 8 the hypotheses H9 was supported, and the results revealed that SE has a strong effect on PBC. The path coefficient was high β =0.978, and SE is the only factor that has correlation with PBC. Thus PBC can be predict only by SE.

The discussions in focus groups found that all the members of groups confirmed the relation between SE and PBC. They said there is a strong impact of SE on PBC: "*It is very important to have the skills and experience to control the use of E-assessment* ". They justified their answers by explaining that possess the skills and the ability to use E-assessment give the academic the confident to control the use of E-assessment.

Other study results consistent with the finding of this study revealed that SE has impact on PBC (Ajjan & Hartshorne, 2008; Huh et al., 2009). Also, other studies found that SE has an influence on PBC and FC has a negative effect on PBC (Taylor & Todd, 1995b; Shih & Fang, 2004; Sadaf et al., 2012a; Paver et al., 2014). Therefore, SE can be considered as strong determination of PBC.

10.1.3.2 Resource Facilitating Conditions

Resource facilitating conditions (FC) includes all the resources that academic need to use E- assessment: technology, money and time. The statistical results of questionnaire show that FC is not significantly affect PBC as the p-value (0.980 > 0.05). Therefore, the hypotheses H10 was not supported.

The findings of focus groups support the questionnaire's results. More than half of focus groups members agree that FC does not affect PBC, they explained that by "*Even I have all the facilities that I need to use E-assessment, I do not use it because I do not have the desire to*

change my way". Some of the participants gave reasons for their answers. Some of them admitted they do not have the desire to use E-assessment and change their method to assess students, while others refer that current available resources is poor and with low quality and it disheartened the academic to accept E-assessment.

Al-Gahtani et al. (2007) found that FC has a week and negative effect in the use of IT in Saudi Arabia. Other study examined the behaviour intention of undergraduate student to use e- textbook revealed that FC cannot predict the students' intention to use e-textbook (Chun-Hua & Kai-Yu, 2014). Different other research support the results of this study in different domains (Taylor & Todd, 1995b; Shih & Fang, 2004; Huang & Chuang, 2007; Lin, 2007; Ajjan & Hartshorne, 2008; Huh et al., 2009; Sadaf et al., 2012a; Paver et al., 2014). Thus, FC cannot be considered as factor influencing PBC towards accept E-assessment.

10.1.3.3 IT Support

IT support (ITS) means the availability of IT support staff when the academic need a help to use E-assessment, also, it includes offering training courses to teach academics how to use E- assessment. The hypotheses H11 in chapter 8 was not approved, because the relationship between ITS and PBC was insignificant and negative (p-value = 0.726 > 0.05).

The participants in focus group had different opinions about the relation between ITS and PBC. Just three participants think that ITS is important and it can affect the academic behaviour control to accept E-assessment. However, the other seven members did not agree that ITS has an influence on PBC. They justified their answers by explaining that they already had the skills to use E-assessment and did not need IT support, but they did not have the desire to use E- assessment and they preferred not to change their way of testing students. One of participants explained that although her university (King Khaled University), which was the first university to implement E-learning in Saudi Arabia provided all the facilities technology, training courses, IT support staff and awareness of E-assessment, only a few of the academic staff were using E-learning and E-assessment. Moreover, another participant explained that the availability of current IT support is weak and with a low level of experience.

Some studies support this finding, for example a study to examine student behavioural intention to adopt an e-textbook found that students did not need technical support to use the e-textbook (Chun-Hua & Kai-Yu, 2014). Another study found that not all training courses can be beneficial, and that the style of the training courses should be considered (Jones, 2004). A case

study on barriers that face the teacher in trying to use ICT in their classrooms, found that the quality of the training programme is important (Unal & Ozturk, 2012). A study in a Saudi university concluded that IT support and training courses are available for academic staff to use E- learning, but are not sufficient and below the quality that academics required (AlMulhem, 2014). This cause supports the focus group members' opinion.

From the questionnaire results and focus groups discussions, it can be concluded that ITS does not have an effect on PBC. Focus group members justified that by pointing out that the absence of academic's desire to use E-assessment or unwillingness to change their methods for examining students is the major reasons, even if all facilities they need and IT support staff are available. In addition, the current low levels of experience of IT support staff and inadequate staff numbers in each faculty discourage academics from using E-assessment. Moreover, the style of training courses may be ineffective to motivate the academics to attend these courses and use E-assessment.

10.1.4 Behavioural Intention

Behavioural intention (BI) it refers to an individual conscious plan to perform a specific behaviour (Eagly & Chaiken, 1993). According to Ajzen (2005a) BI can predict tendencies of individuals to perform certain behaviour. In the present study, BI represented the Saudi academic's acceptance behaviour for E-assessment. Different studies have used BI to examine the user acceptance of different information systems, for example, computer based assessment (Terzis & Economides, 2011) ,E-learning (Lee et al., 2010), mobile learning (Cheon et al., 2012), acceptance of IT in Saudi Arabia (Al-Gahtani et al., 2007), and they all found that BI can predict the users' acceptance of Information Systems.

There are three predictors of BI: ATU, SN and PBC. The results show that ATU is the strongest determinant of BI (($\beta = 0.702$), followed by SN ($\beta = 0.092$), which has very low influence on BI. However, PBC has no effect on BI; the results show that the relationship between these two factors is insignificant (p-value < 0.05). Thus, BI can be predicted by ATU and SN only, and ATU has the highest effect. Similarly to this study, other studies found that ATU is the most effective factor on BI (Fishbein & Ajzen, 1975; Taylor & Todd, 1995b; Armitage & Conner, 2001; Huang & Chuang, 2007; Yousafzai et al., 2007; McEachan et al., 2011; Paver et al., 2014).

10.1.5 Moderating Factor (Age)

Age was examined as a moderating factor affecting the relationships between BI and its predictors (ATU, SN and PBC). The moderated effect of age has been supported in other studies (Morris & Venkatesh, 2000; Venkatesh et al., 2003).

Attitude (age) → Behavioural intention: The section discusses whether age has an influence on the relationship between ATU and BI. The questionnaire results reveal that there is a positive and direct interaction of age with the relationship between ATU and BI. The group aged between 41 and over 50 show a stronger effect (β=0.892) of age on attitude than the group aged between 20 and 40 (β=0.639). Thus, hypothesis H1a was supported in Chapter 8. Huang and Chuang (2007) found that the younger and older group ages had an effect on the relationship between ATU and BI. Further, age was found to moderate the effect of ATU on BI of employees to adopt new technology (Morris et al., 2005). The focus groups findings support the H1a, but the participants believed that being in the younger group has more influence on ATU than belonging to the older group. They explained that young academics are more flexible towards adopting new technology and that older academics prefer to use their own method to assess students. Thus, we can confirm that age can moderate the influence of SN on BI.

Subjective norm (age) → Behavioural intention: The effect of age on SN was confirmed by the questionnaire results, but only for the younger group. A significant and positive effect was shown of the younger group on subjective norm (β=0.109 and $p<0.05$), while an insignificant effect of the older group was found on subjective norm (β=0.029 and p=0.723). Thus, the hypothesis H6a was accepted for younger group. However, the effect of the younger group on SN is weak (path coefficient β=0.109). Al-Gahtani et al. (2007) found that increasing age also results in a decreased effect of age on the relationship between SN and BI to use IT in Saudi Arabia. Similarly, a study in consumer acceptance of mobile wallets indicated that the younger group age can moderate the effect of SN on BI more than the older group (Shin, 2009). However, another study found that the age did not moderate the influence of SN on BI in the implementation of new technology in Saudi Arabia (Baker et al, 2007).

The focus group discussions confirmed the questionnaire results: all the group's members agreed that younger academics can be affected by other views more than older academic: for example, a participant said "*The older academics has less influence by the others, because they have along experience, and they feel that they do not need to consider the others opinion. The*

older academics think that they should influence the others by their experience". Therefore, age can be considered as moderating factor that can affect SN for the younger group only.

Perceived behavioural control (age) → Behavioural intention: The discussion of PBC in the previous section and the results of questionnaire (in Chapter 8) revealed that there is no relationship between PBC and BI. As a result, age has no moderating effect between PBC and BI. The questionnaire results show an insignificant effect of age (p-value <0.05), for both age groups, on the relationship between PBC and BI. In the study that examined the employees' behavioural intention to use information system, Huang and Chuang (2007), the researchers found that the old and new employees' groups had a non-significant effect on the relation of PBC to BI. Baker et al. (2007) discovered that there is no moderating effect of age and gender on the correlation between PBC and BI to implement new technology in Saudi Arabia. The focus group results confirmed the questionnaire finding; as one the participant said: "*If the academic has the ability to control the use of E-assessment, the academic's age will not affect if he/she young or old*". As the PBC has no influence on BI, age cannot moderate this relationship. Thus, there is no effect of age on PBC to BI.

The figure 10-1 illustrates the Model of Acceptance of E-assessment that results from this study.

10.2 Chapter Summary

This chapter has summarised and discussed the results and findings of present study. In each section the results were summarised and explained for each factor supported by reference to other studies and literature reviews. The discussion has concluded that BI can predict Saudi academic's acceptance of E-assessment. The BI in the proposed model has three determinants: ATU, SN and PBC. However, the results and discussion found that only ATU and SN can predict BI, and that ATU has a very strong effect on BI, while SN has a weak influence on BI.

ATU proposed to be predicted by four factors: AW, PEU, PU and COM. The discussion and findings concluded that ATU can be determined by three factors: PEU, PU and COM. The most effective factor on ATU is COM ($\beta = 0.556$), followed by PEU ($\beta = 0.361$) and PU ($\beta = 0.164$). In addition, SN can be predicted by SI, with a high path coefficient ($\beta = 0.612$). Moreover, PBC in the proposed model was decomposed into three factors: SE, FC and ITS.

However, only SE has an effect on PBC, and the other two factors have no correlations with PBC. Age was examined as a moderating factor that influences ATU, SN and PBC. The results and discussion revealed that age has effect on ATU for both age groups, and on SN for the younger group, while there is no influence of age on PBC.

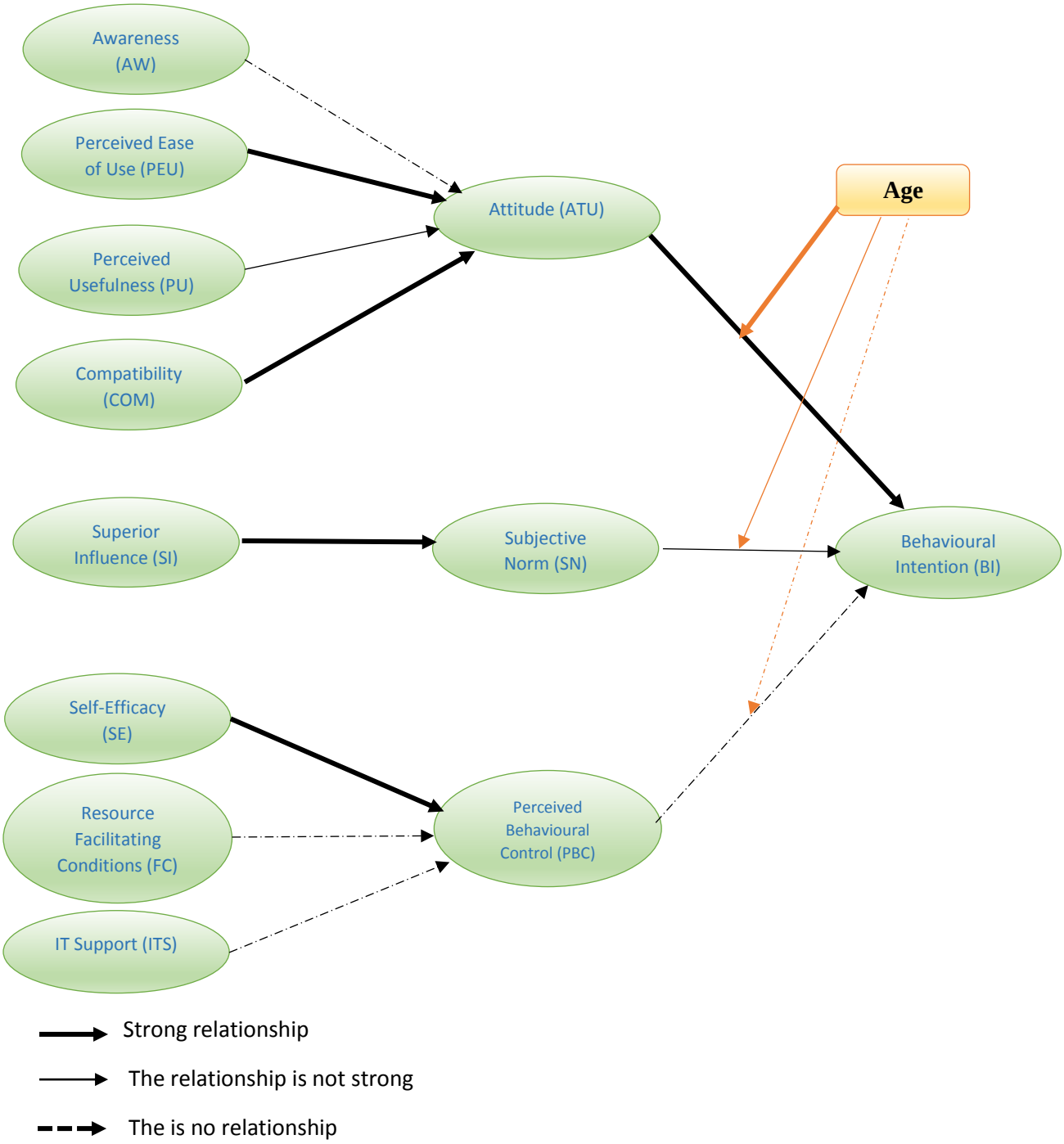


Figure 10-1 The Model of Acceptance of E-assessment (MAE)

Chapter 11: Conclusion and Future Work

This chapter presents an overview of the work undertaken and address the main concept of the research. The research questions and contribution will be discussed, and then the limitations of the study will be indicated. Finally, recommendations for future work will be included.

11.1 Research Overview

E-assessment is an electronic assessment in which the whole process from designing and delivering the exam to releasing the results is carried out electronically (using ICT). Saudi higher education is the focus area of this research, where integrated E-learning and E- assessment systems have been provided to academics to use in their teaching. However, few of the Saudi academics use E-assessment. There have been limited studies, in the field of E-assessment in Saudi Arabia. Thus, this research investigated the factors that affect the acceptance of E-assessment in Saudi universities among academics staff. This is aimed to help to successfully implement E-assessment in Saudi universities and encourage academics to use it.

At the beginning of this study, in clarifying the meaning of E-assessment, the clearest definition found was the JISC definition. This states that E-assessment is the end-to-end electronic assessment process, and that ICT (Information Communication Technology) is used for the whole assessment processes from the presentation of questions to the saving of the learners' responses. The E-assessment process and cycles were then illustrated in Chapter 2, to have a clear picture about how E-assessment works to assess the students. In the same chapter the advantages and challenges of E-assessment in different fields were identified and discussed.

In order to find the factors that influence academics to accept E-assessment, the models and theories of user acceptance of ICT were presents and discussed in Chapter 3. At the end of this chapter the most significant factors were highlighted, which are included in the majority of theories of user acceptance of ICT. Chapter 4 explained the proposed model to investigate the factors that influence the academics acceptance of E-assessment in Saudi universities. All the factors in the proposed model, which is called Model of acceptance of E-assessment (MAE), were discussed in detail and linked to previous studies in the same or similar fields.

To investigate the factors in the MAE, suitable research methods and techniques were chosen. Chapter 5 presented the most commonly used research methods and techniques used. In this

research qualitative and quantitative methods were used together to gain accurate results and clear meaning of these results. A multiphase mixed sequential methods approach was applied in this study, in which there are a number of phases and each phase depends on the results and findings of the previous one. Different types of techniques to collect the data have been used: interviews, a questionnaire and focus group discussions.

First, fifteen experts in field of E-assessment were interviewed. These experts were from ten different universities in Saudi Arabia, and they occupied Deans (or Deputy Deans) of E- learning and distance learning positions. They were asked different questions to assess the factors in MAE. All the factors were confirmed by the experts, except the gender moderating factor, and they also recommended adding awareness of E-assessment as a factor affecting the academic's attitude, and the availability of a strong security system under the resource facilitating conditions. Followed the experts' interview, a questionnaire was send to all academics, and the results confirmed the experts' views. The details of the expert interviews and questionnaire were explained in Chapter 6.

The factors were validated at this stage, but the relationships between the factors were not tested. Therefore, a questionnaire was distributed to all the academics in different Saudi universities. Chapter 7 covered the design, sample size and procedures of the questionnaire. The questionnaire had three sections: demographic questions, E-assessment usage questions and statements to evaluate the relationship between the factors in MAE. This study received 306 responses from 21 Saudi universities. The reliability and validity of the statements were examined, and the results showed that all the statement were reliable and valid.

Structured Equation Modelling (SEM) was used as the analytic approach to check the reliability, validity, and model fit for the MAE. The results showed that the data fitted the model very well. SEM also helps to assess the relationships between the factors. Chapter 8 presented the SEM results and compared them with the hypotheses. Most of hypotheses were accepted; however, some were rejected, such as H2 and H8.

In order to clarify the SEM analysis results, focus groups were conducted with two groups of Saudi academics. This technique is usually used after a questionnaire to obtain a deeper better understanding of the implications and reasons behind the quantitative data. Ten academics participated in focus group discussions (Chapter 10), and they provided different reasons underlying the questionnaire results. The Chapter 10 combines all the results from the different phases and connect these results with related studies.

11.2 Research Questions

This research has addressed the following research question through the different methods that were used in this research:

RQ: What is an appropriate model for the acceptance of E-assessment among academics in Saudi universities?

To answer the main research question, the ***RQ*** was divided into five sub-questions. Answering the sub-questions help to build up the answer to the main research questions. All these sub- questions were answered in this research. The following sections discuss the answers obtained for each sub-question, and Table 11-2 summaries the research sub-questions and it findings.

Q1: To what extent the Saudi academics currently use E-assessment?

The aim of this question was to explore the academics' attitudes toward using E-assessment and to find out if they currently use E-assessment. This question was answered through conducting interviews with experts and a questionnaire distributed to academics. The results revealed that just over 60 % of the academics had not used E-assessment before**.** However, the questionnaire results also showed that 82% of these academics intended to use E-assessment in the future, indicating that there is a generally positive attitude towards accepting and using E-assessment among academics.

The total number of E-assessment users was 127 from 306 responses, and the E-assessment system included in the Blackboard system was reported to be the most popular one: 65 of users were use it. 62 of respondents used E-assessment for less than two years and only 41 had been using E-assessment for more than two years. Most of the participants who used E-assessment spent less than one hour every day, which suggested that E-assessment is easy to use.

Q2: What are the factors affecting the acceptance of E-assessment among academic staff in Saudi universities?

This question was designed to find and investigate the factors influencing Saudi academics to accept E-assessment. The most influential factors that may affect academics' acceptance of E- assessment were first collected from reviewing the literature review. The models and theories of user acceptance of ICT were used as base to extract the factors and build the proposed model (MAE). The MAE contains the attitude factor (including perceived usefulness, perceived ease of use and compatibility), the subjective norm factor (which includes peer

influence and superior influence), and the perceived behavioural control factor (which includes self-efficacy, resource facilitating conditions, and IT support). In addition, moderating factors, which are age and gender, were added to the MAE.

Interviews with experts in the same field were conducted later, to confirm the factors in MAE. The experts agreed with all the factors in the proposed model, except the gender moderating factor; they recommended removing it. Moreover, the experts suggested adding two other factors: awareness of E-assessment, under attitude, and a strong security system, under resource facilitating conditions. Later, a questionnaire was sent to all Saudi academics, and 165 responses were received. The questionnaire results show that all the factors, including the new ones (suggested by experts) were confirmed.

Q3: What are the relationships between the factors that affect Saudi academics' intention to accept E-assessment?

A questionnaire was distributed, and 306 responses were received to answer this question. SEM was also used as an analytic tool to test the relationships between factors. The results are displayed in Table 11-1. ATU has a strong positive and direct relationship with BI, also has the same relationship with its sub-factors, except AW (a negative and indirect relationship). The relationship between SN and BI is positive and direct, but it is very weak. However, SI has a strong positive and direct relationship with SN. PBC has no direct effect on BI, and the priority is low. The FC and ITS sub-factors have negative and indirect effects on PBC, but SE has a strong positive and direct effect on PBC.

Table 11-1 Summary result of the factors' relationships

Relationships	β	P-value	Findings	Priority
ATU → BI	0.702	<0.001	Positive direct effect	High priority
ATU (age 20-40) → BI	0.639	<0.001	Positive direct effect	High priority
ATU (age 40 – over 50) → BI	0.892	<0.001	Positive direct effect	High priority
AW → ATU	-0.166	0.066	Negative indirect effect	Low priority
PEU → ATU	0.361	<0.001	Positive direct effect	High priority
PU → ATU	0.164	<0.001	Positive direct effect	Mid priority
COM → ATU	0.556	<0.001	Positive direct effect	High priority
SN → BI	0.092	<0.001	Positive direct effect	Low priority

SN (age 20-40) → BI	0.109	<0.001	Positive direct effect	Mid priority
SN (age 40- over 50) → BI	0.029	0.723	Positive indirect effect	Low priority
SI → SN	0.612	<0.001	Positive direct effect	High priority
PBC → BI	0.045	0.349	Positive indirect effect	Low priority
PBC (age 20-40) → BI	0.052	0.388	Positive indirect effect	Low priority
PBC (age 40- over 50) → BI	0.018	0.838	Positive indirect effect	Low priority
SE → PBC	0.978	<0.001	Positive direct effect	High priority
FC → PBC	-0.002	0.980	Negative indirect effect	Low priority
ITS → PBC	-0.032	0.726	Negative indirect effect	Low priority

Q4: What are the significant factors that can increase the acceptance of E-assessment amongst academic in Saudi universities?

This question has been answered from the questionnaire results and SEM analysis (see Table 11-1). The ATU (attitude) is the most affecting factor that has an impact on academic's behavioural intention to accept E-assessment. The results show high standardised regression weight β= 0.702, CR= 11.107, which indicates a strong effect on BI. COM has the most impact on ATU, among the other three factors, followed by PEU then PU. SN has a low influence on BI, and PBC has no effect on BI.

Q5: Do gender and age moderate relationships between the observed factor and behavioural intention?

The aim of this question was to find out if age differences and gender can have an effect on academic's acceptance of E-assessment. Other studies have found that age and gender can moderate the effect of relationships between ATU, SN, and PBC and the user's behavioural intention (BI) to accept ICT (Chapter 5), therefore, age and gender were added to the proposed model (MAE). However, during the second phase, the experts recommended deleting gender from the model, as they said there is no difference between males and females in accepting E- assessment. The results of questionnaire revealed that in both groups age had a positive and direct effect on the relationship between ATU and BI, and in the group aged between 40 and 50 it had slightly more effect (Table 11-1). For the group aged between 20 and 40 years, age was found to have a low influence on the relationship of SN and BI, while for the group aged 40 to 50 and over, age was found to have an indirect effect on the same relationship. There was

no direct effect between PBC and BI, consequently, it was concluded that age has no effect on the relationship between PBC and BI as shown in Table 11-1.

Table 11-2 Summary of research questions and the findings

Research questions	Methods	Findings
1. To what extent the Saudi academics currently use E-assessment?	Interviews with experts and questionnaire distributed to the academics in Saudi universities.	Over 60 % of the academics had not used E-assessment before. But, 82% of these academics intended to use E-assessment in the future
2. What are the factors affecting the acceptance of E-assessment among academic staff in Saudi universities?	1. Partially Models of user acceptance of ICT and review previous studies.	Developing the proposed model (MAE).
	2. Interviews with 15 experts in Saudi universities.	The experts agreed with all the factors in the MAE, except the gender moderating factor, and awareness of E-assessment and availability of a strong security system were suggested.
	3.Online questionnaire to 165 academics in Saudi universities.	Confirmed all the factors that identified from interviews.
3. What are the relationships between the factors that affect Saudi academics' intention to accept E-assessment?	Online questionnaire to 306 academics in Saudi universities, SEM analysis technique used and two focus group discussions.	Attitude has an influence on BI, and all it sub-factors, except AW have an effect on ATU. SN has slight effect on BI, and SI has strong influence on SN. PBC has no effect on BI, and only SE has influence on PBC.
4. What are the significant factors that can increase the acceptance of E-assessment amongst academic in Saudi universities?	Online questionnaire to 306 academics in Saudi universities, SEM analysis technique used and two focus group discussions.	ATU has the strongest effect on BI, followed by SN and PBC has no effect on BI. COM has the most impact on ATU, followed by PEU then PU. SI has strong influence on SN, and only SE has effect on PBC among the other two factors (FC and ITS).

5. Do gender and age moderate relationships between the observed factor and behavioural intention?	Interviews with 15 experts in Saudi universities, online questionnaire to 306 academics in Saudi universities analysed using SEM technique and two focus group discussions.	The gender has no effect on ATU, SN and PBC according to the experts. Age has positive and direct effect on the relationship between ATU and BI in both groups age. A low effect found for young group in SN and BI relationship and indirect effect for the old group age. Age has no influence on PBC and BI.

11.3 Research Contribution

This research fills the gap in existing literature on E-assessment acceptance, specifically in Saudi Arabia. This research is important for the successful implementation of E-assessment in higher education. This research started from scanning the literature regrading in E-assessment and user's acceptance of technology. According to Williams et al. (2009), reviewing existing literature on technology acceptance helps in identifying un-explored areas and assists in developing new theories and models. As a result, the findings of this study contribute to the existing literature by providing new measures to assess E-assessment acceptance.

The main contribution of the research is the model contribution; this study was seeking to find an appropriate model for the acceptance of E-assessment amongst academics in Saudi Arabian universities. The Model of Acceptance of E-assessment (MAE) was developed to examine the acceptance of E-assessment in Saudi universities. The model was constructed from the literature review on technology acceptance, and also, during interviews, the relevant factors were identified and then confirmed through the questionnaire. In the third and fourth phases of this research the relationships between factors were assessed. Answering the research question: *What is an appropriate model for the acceptance of E-assessment among academics in Saudi Arabian universities?* resulted in the Model of Acceptance of E-assessment. The results of this research study should be beneficial to higher education institutions where E-assessments are being used. The identified factors are important for E-assessment acceptance and the way they influence acceptance can be vital for educational institutions where decisions are being made to consider E-assessment for academic courses. Recognising these factors and their impact on

adoption can increase the acceptance of E-assessment, which is important for academics, students and institutions.

In addition, it can assist educational institutions to become more aware of the more influential factors that encourage academics to use E-assessment. The academic's attitude is the most influential factor that affect academic's behavioural intention to accept E-assessment. Compatibility of the system with an academic's tasks also has a strong impact on academic's attitude to accepting E-assessment, together with its flexibility and ease of use and its benefits of use. The development of the MAE can help the educational developers to consider the factors that can affect academic's acceptance and usage of E-assessment. For example, they would be aware that they should design a friendly and easy to use E-assessment system to encourage academics to accept it.

To conclude, the research has examined the factors in MAE in relation to E-assessment acceptance in Saudi Arabian higher education. It provides a validated instrument to test E- assessment acceptance. This study has also provided an in-depth understanding of academic's beliefs regarding acceptance of E-assessment, which educational developers should be considered to enhance the E-assessment implementation and development process.

11.4 Limitations of the Research

Despite the fact that this research was drawn from a comprehensive theoretical standpoints and the results gained were valuable, the study suffered from some limitations. The questionnaire responses were received from 23 public universities in Saudi Arabia but there are 5 other public universities, which are not included in the questionnaire responses. The private education institutions, which include 8 universities and one college, also did not share in this study.
In the focus group phase, the researcher conducted two groups, but with different sample sizes. In the first group there were 6 participants and in the second group only 4 participants. It would be better if the groups had equal numbers of participants.

Another limitation of the research is in the translation. The questionnaire and interview introductions and questions were written in English then translated into Arabic; the translations were verified by Saudi researchers who were students in the University of Southampton in the UK. This process resulted in a few misunderstanding questions, and these questions were removed from the study.

11.5 Future Work

The MAE model can be applied on Saudi universities and in other Arab countries, because Arabic countries have similar cultures and educational atmosphere. However, other countries with different cultures were not examined in this research. This study can be extended to investigate the factors affecting academics acceptance of E-assessment, using the MAE, in different cultures, such as European and Asian cultures. Furthermore, a comparison between this study's results and other studies in the E-assessment field in different cultures could help to raise awareness of culture differences in accepting E-assessment.

The MAE was applied in this study specifically for E-assessment. Future studies can use the same model in different educational technologies, such as E-learning or E-portfolios. As the research model investigated the academic's intention to accept E-assessment, future research can investigate the students' intention to accept and use E-assessment.

For future work, researchers can include more factors that specifically affect the student, such as the accessibility of E-assessment for student. The educational goals can also be investigated and incorporated with the model's factors.

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Appendix

Appendix A (Interview questions and results)

The Electronic Mail Sent to the Experts Ask Them to Participate (English & Arabic Versions)

Arabic Version:

السلام عليكم ورحمة الله

انا اقوم بإجراء دراسة بعنوان ((العوامل المؤثرة على تقبل استخدام التقييم الالكتروني من قبل أعضاء هيئة التدريس في الجامعات بالمملكة العربية السعودية)) وذلك استكمالاً لمتطلبات الحصول على درجة دكتوراه الفلسفة/ تخصص علوم الحاسب من كلية علوم الحاسب والهندسة في جامعة ساوثهامتون في بريطانيا. حيث هدفت الدراسة إلى استكشاف العوامل المؤثرة على تقبل استخدام التقييم الالكتروني في الجامعات السعودية ولإيجاد حلول للمعوقات لاستخدامه ولتشجيع أعضاء هيئة التدريس لاستخدام التقييم الالكتروني.

ولتحقيق أهداف الدراسة فقد قمت بتطوير استبانة ، كونكم من أهل الخبرة والاختصاص ولما لوجهة نظركم من أهمية بالغة في نجاح هذا البحث اطمح من سعادتكم

الموافقة على التواصل معكم من خلال الهاتف في الوقت المناسب لكم لأخذ بعض التفاصيل المتعلقة بالأسئلة المتضمنة الاستبانة وسوف يكون الوقت المقدر للمكالمة والاجابة عن الاسئلة اقل من ربع ساعة

آمل منكم التكرم بالموافقة بالتواصل معكم في اقرب فرصة مناسبة لكم الأمر الذي سيسهم – بإذن الله تعالى – في تحقيق أهداف الدراسة

علماً بأن ما سوف تدلون به من اجابات سوف يحظى بالسرية التامة ، ولن يستخدم إلا لأغراض البحث العلمي

شاكرة لكم تعاونكم

ومقدرة لكم الوقت الثمين

وفقكم الله

الباحثة: نهى الرويس

English Version:

Good morning,

I am a PhD student in University of Southampton in school of Electronics and Computer Science. My research about the factors that impact the academics to accept E-assessment in Saudi universities. The aim of my research is to find and investigate these factor in order to encourage the academics to use E- assessment. To reach the research goals I need your approval to participate in this research as you one of the experts in this area. I need to have an interview with you face to face or by phone, this may take 15 minutes. If you are agree please let me know the appropriate time for you.

Your participation is important for this research. The information and data that you provide will remain confidential, and will be use just for this research.

Thank you

I appreciate your time.

Nuha Alruwais

Interview questions:

Table A-1 Interview Questions

To what extent do you agree that the following factors influence lecturers	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1- Using E-assessment will help lecturers to accomplish tasks quickly? Can you explain?					
2- Using E-assessment will help lecturers to improve their performance? Can you explain?					
3- Lecturers are willing to use E-assessment if the system is easy to use? Can you explain?					
4- Lecturers are willing to use E-assessment if the system does not require more efforts to use comparing with paper-test? Can you explain?					
5- Using E-assessment is time saving for lecturers? Can you explain?					
6- Lack of familiarity with using technology tools inhibits using E-assessment? Can you explain?					
7- E-assessment meet the lecturer's requirements to assess students? Can you explain?					
8- University Chancellor are influencing lecturer for using E-assessment? Can you explain?					
9- Lecturers do not use E-assessment unless they have the ability to use E-assessment tools? Can you explain?					
10- Lecturers may influence others to use E-assessment? Can you explain?					
11- A reward encourages Lecturers to use E-assessment? Can you explain?					
12- Lecturers will use E-assessment if there are no technical problems with accessing it? Can you explain?					
13- IT support is essential to help lecturers in using E-assessment? Can you explain?					
14- Academics use E-assessment if it is counted as working hours? Can you explain?					
15- Does the academic's attitude has an effect on the acceptance of E-assessment? Can you explain?					
16- Are the people around the academic and the society can influence the academic to accept E-assessment? Can you explain?					
17- Does the academic's ability to control the use of E-assessment has an effect on academic to accept E-assessment? Can you explain?					
18- There is difference between male and female for accepting and using E-assessment? Can you explain?					
19- There is difference between old lecturer and young lecturer for accepting and using E-assessment? Can you explain?					

UNIVERSITY OF Southampton

Participant Information Sheet for interview

Study Title: The Factors Impacting the acceptance of E-assessment by Academics in Saudi Universities

Researcher: Nuha Alruwais

Ethics number: 15714

Please read this information carefully before deciding to take part in this research.

What is the research about?

This research is about using E-assessment in Saudi universities. The aim of this study is to investigate the factors that influence Saudi academic's behaviour toward accept E-assessment. In order to encourage the lecturers to use E-assessment in Saudi universities. This research is under direction of the School of Electronic and Computer Science, University of Southampton, UK.

Why have I been chosen?

You invited to participate in this study focus in academics behaviour toward accepting E-assessment. Your opinion will help in improving the constructed model for E-assessment.

What will happen to me if I take part?

I will send you questions, consent form and The Model of Acceptance of E-assessment, and you have to sign on the consent form, and arrange a date and time for the interview.

Are there any benefits in my taking part?

This research is not designed to help you personally, but your feedback will help me gather academics opinions on the development efforts.

Are there any risks involved?

No.

Will my participation be confidential?

Yes. Your information will be stored and used on secure systems and will be used for this study purpose only and your responses are voluntary and will be confidential. Individual responses will not be identified. All responses will be compiled together and analysed as a group.

What happens if I change my mind?

You have the right to terminate your participation in the research, at any stage, you do not need to give any reasons, and without your legal rights being affected. Your data will be deleted directly if you decide to withdraw at any time.

What happens if something goes wrong?

In the unlikely case of concern or complaint, please contact Research Governance Manager (02380 595058, rgoinfo@soton.ac.uk).

Where can I get more information?

For further details, please contact either myself or my study supervisor, Dr Gary Wills and Proof Mike Wald

Nuha Alruwais: nma1g14@ecs. soton.ac.uk

Gary Wills: gbw@ecs.soton.ac.uk

Mike Wald: mw@ecs.soton.ac.uk

Would you like to take part in this research?

☐ Yes, I agree to take part in this research and I understand my participation is voluntary and I may withdraw at any time without my legal rights being affected.

☐ No, I disagree

The Statistical Results of Experts Interview for Each Factor:

Table One-sample t-test for Attitude

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Q15	15	4.93	.258	.067

Table One-sample t-test for Attitude

One-Sample Test

	Test Value = 3					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Q15	29.000	14	.000	1.933	1.79	2.08

Table One-sample t-test for Perceived usefulness

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Q1	15	4.93	.258	.067
Q2	15	4.67	.617	.159

Table One-sample t-test for Perceived usefulness

One-Sample Test

	Test Value = 3					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Q1	29.000	14	.000	1.933	1.79	2.08
Q2	10.458	14	.000	1.667	1.32	2.01

Table One-sample t-test for Perceived Ease of Use

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Q3	15	4.87	.352	.091
Q4	15	4.33	.617	.159

Table One-sample t-test for Perceived Ease of Use

One-Sample Test

	Test Value = 3					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Q3	20.546	14	.000	1.867	1.67	2.06
Q4	8.367	14	.000	1.333	.99	1.68

Table One-sample t-test for Compatibility

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Q5	15	4.93	.258	.067
Q6	15	4.93	.258	.067
Q7	15	4.47	.743	.192

Table One-sample t-test for Compatibility

One-Sample Test

	Test Value = 3					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Q5	29.000	14	.000	1.933	1.79	2.08
Q6	29.000	14	.000	1.933	1.79	2.08
Q7	7.643	14	.000	1.467	1.06	1.88

Table One-sample t-test for Subjective Norm

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Q16	15	4.65	.488	.126

Table One-sample t-test for Subjective Norm

One-Sample Test

	Test Value = 3					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Q16	13.229	14	.000	1.667	1.40	1.94

Table One-sample t-test for Peer Influence

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Q8	15	4.67	.488	.126

Table One-sample t-test for Peer Influence

One-Sample Test

	Test Value = 3					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Q8	13.229	14	.000	1.667	1.40	1.94

Table One-sample t-test for Superior Influence

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Q9	15	4.73	.594	.153

Table One-sample t-test for Superior Influence

One-Sample Test

	Test Value = 3					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Q9	11.309	14	.000	1.733	1.40	2.06

Table One-sample t-test for Perceived Behavioural Control

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean

Q17	15	4.68	.488	.126

Table One-sample t-test for Perceived Behavioural Control

One-Sample Test

	Test Value = 3					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Q17	13.229	14	.000	1.667	1.40	1.94

Table One-sample t-test for Self-efficacy

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Q10	15	4.93	.258	.067

Table One-sample t-test for Self-efficacy

One-Sample Test

	Test Value = 3					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Q10	29.000	14	.000	1.933	1.79	2.08

Table One-sample t-test for Resource Facilitating Conditions

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Q11	15	4.80	.775	.200
Q13	15	3.80	1.265	.327
Q12	15	4.73	.458	.118

Table One-sample t-test for Resource Facilitating Conditions

One-Sample Test

	Test Value = 3					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Q11	9.000	14	.000	1.800	1.37	2.23
Q13	2.449	14	.028	.800	.10	1.50
Q12	14.666	14	.000	1.733	1.48	1.99

Table One-sample t-test for IT Support

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Q14	15	4.93	.258	.067

Table One-sample t-test for IT Support

One-Sample Test

	Test Value = 3					
					95% Confidence Interval of the Difference	
	T	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Q14	29.000	14	.000	1.933	1.79	2.08

Table One-sample t-test for Age

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Q18	15	3.80	1.521	.393

Table One-sample t-test for Age

One-Sample Test

	Test Value = 3					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Q18	2.037	14	.061	.800	-.04	1.64

Table One-sample t-test for Gender

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Q19	15	2.80	1.424	.368

Table One-sample t-test for Gender

One-Sample Test

	Test Value = 3					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Q19	-.544	14	.595	-.200	-.99	.59

Appendix B (Questionnaire Follow the Interviews (Design, processes and Results))

Questionnaire

After interviewing the experts, and after editing according to expert review results, the questionnaire was distributed to all academics in Saudi universities, to confirm the factors in the Model of Acceptance of E-assessment (MAE).

B.1 Identifying Participants

The aim of this study is to investigate the factors that affect Saudi academic's intention to accept E-assessment. Thus, the participants in the questionnaire of this study should include all the academics in Saudi universities. The questionnaire was sent to all the academics in Saudi universities to obtain a high number of participants, in order to have a robust results. This study received responses from academics in 15 different universities in 13 cities in Saudi Arabia, including King Saud University in Riyadh, King Abdul-Aziz University in Jeddah, and King Khalid University in Abha.

B.2 Questionnaire Design

A self-administered on-line questionnaire was chosen in this research. The self-administered questionnaire enabled the respondent to answer the questions independently without the presence of the researcher. The questionnaire was sent by e-mail to the academic staff in Saudi universities. A high level of care should be taken while developing, piloting and defining the questionnaire (Cohen, 2011). The questionnaire started with a few demographic questions (university participants work in, their age, years of experience, use of the internet. Following the demographic questions respondents were asked questions about using E-assessment (if they used it, which E-assessment system they have used, for how many years they have been using it and the estimated time spent on using E-assessment). The statements to validate the factors were then asked. There were 48 statements designed to refine the factors, and it was divided into sections depending on the constructs. The first section was on attitudinal beliefs and their constructs; the second section was on normative beliefs and their constructs; the third section was on controlled beliefs and their constructs, and the fourth section was on behavioural intention. All items for each construct were measured via a five-point scale, using a format proposed by Likert (1932).

The factors in the MAE were driven from models that examine the user acceptance of ICT that discussed in chapter 3 and other studies, and these models have been used and tested in different studies. Thus, the statements used in this research were based on existing validated measures

from these models (Fishbein & Ajzen, 1975; Davis et al., 1989; Ajzen, 1991; Taylor & Todd, 1995a), and previous relevant research (Moore & Benbasat, 1991; Venkatesh et al., 2000; Huang & Chuang, 2007). This is considered a preferred method rather than developing new statements (Hair et al, 2003). However, the statements were edited to match with the existing research. More statements were added to measure the new factors which the experts suggested. These new statements were sorted depending on the experts' explanations of why these new factors may affect lecturers' behaviour in accepting E-assessment.

The questionnaire should be clear and understandable to obtain accurate results. Therefore, utmost effort was made to keep the statements clear and understandable and to reduce the chances of misleading questions, as recommended by Marczyk et al. (2005). In addition, the researcher piloted the study by giving it to 3 researchers and 2 experts in the University of Southampton, to ensure it was clear and understandable. The researchers provided some comments on the statements, and the questionnaire was edited according to these comments. The questionnaire was written in both English and Arabic, to make it understandable for non- English speakers. Therefore, the questionnaire in the Arabic language was reviewed by two Arabic researchers in the University of Southampton to check accuracy of the translation.

B.3 Ethics Approval

Ethical Approval is needed before starting to distribute the questionnaire. The ethical form of this research has been approved by the Ethics Committee at the University of Southampton (research ethics number FoPSE/18518).

B.4 Questionnaire Procedures

An email was sent to the academics in Saudi universities, to explain the research aims and requesting their participation. The email included a link to the questionnaire; if they agreed to answer the questions, they could open the link. The first page of the questionnaire explained more about the research and its goals, and asked them if they agreed to take a part in this research; if so, they should check the box and press the button to proceed to the next page to answer the questions.

B.5 The Sample Size of the Questionnaire

An adequate sample size is important for a reliable result and it is also essential to generalise the results in the related context and obtain an in-depth analysis (Saunders et al., 2012). There are different opinions regarding the sample size for a questionnaire. Some studies restrict the sample size to at least 100 participants (Arrindell & Ende, 1985; MacCallum & Hong, 1999). Other authors recommend that the number of participants should depend on the number of

factors that will be examine. These authors suggest that the number of respondents should be 10 times larger than the number of factors, they set up a rule of at least 10 cases for each factor under investigation (Everitt, 1975; Kunce et al., 1975; Arrindell & Ende, 1985; Velicer et.al, 1998). The current study has 14 factors, so it would need at least 140 participants to response. Therefore, this study aimed to collect 140 responses, and it received 165 responses from academics in different universities in Saudi Arabia. This is intended to guarantee a reliable result and enable in-depth analysis.

B.6 Reliability of Questionnaire

It is important to measure the quality of the statements in a questionnaire, which is called reliability, specially, when there are multiple statements for one factor or sub-factor (Bryman & Cramer, 2011). The reliability measurement is the degree to which the statements used are consistent in their measurement (Eagly & Chaiken, 1993; Hair et al., 2010). This helps to ensure that the statements can measure consistently, even when the research is repeated. Unreliable statements can produce useless information. The reliability test for statements helps the study to examine the goodness and accuracy of these statements (Sekaran & Bougie, 2010). It is most appropriate to examine reliability when Likert scales are used with statements (Eagly & Chaiken, 1993). Therefore, this study examined the reliability of the factors' statements using the Cronbach's alpha Coefficient (Cronbach's α), which is the most popular method to conduct a test of the reliability (Sekaran, 2003; Stangor, 2010). Cronbach's alpha tests how well interrelated statements measure a single factor. The range of Cronbach's alpha to measure reliability is from 0 to 1. Reliability scores closer to 1 indicate that this statement has high internal consistency reliability (Takona, 2002; Pallant, 2011). If the reliability score is less than 0.6, it is considered poor, moderate if it is around 0.6, good if around 0.7 and very good at 0.8 or above (Andrews, 1991; Sekaran, 2003). This method was used in this study to ensure that the statements are consistent and can measure the factors. SPSS was used to carry out Cronbach's alpha test. Table B-1 shows the reliability results for each factor and sub-factor. The questionnaire reliability test shows that all the statements for each factor and sub-factor are reliable, and all of the results are above 0.69, which is considered moderate.

Table B-1 Questionnaire Reliability Results

Factors	Number of statements	Cronbach's Alpha	Reliability results
Awareness	4	0.90	Very Good
Perceived Ease of Use	4	0.85	Very Good
Perceived Usefulness	4	0.91	Very Good
Compatibility	4	0.91	Very Good
Attitude	3	0.89	Very Good
Superior Influence	4	0.75	Good
Peer Influence	4	0.83	Very Good
Subjective Norm	3	0.88	Very Good
Resource facilitating conditions	5	0.73	Good
IT Support	3	0.85	Very Good
Self-Efficacy	3	0.69	Moderate
Perceived Behavioural Control	4	0.84	Very Good
Behavioural Intention	3	0.92	Very Good

Appendix C (Questionnaire Questions and Results)

The Electronic Mail sent to the Academics Ask Them to Participate (English & Arabic Versions)

Arabic Version:

السلام عليكم ورحمة الله وبركاته
سعادة عضو/عضوة هيئة التدريس بجامعة الملك سعود حفظكم الله
مقدماً أحب أن أشكر لكم حسن التعاون في إتمام هذه الدراسة العلمية

والتي تركز على العوامل المؤثرة ه في تقبل استخدام أعضاء هيئة التدريس بالجامعات السعودية للامتحانات الالكترونية

ويقصد بالامتحانات الالكترونية هي الامتحانات التي تقدم للطالب والطالبة الكترونياً عن طريق نظام البلاك بورد أو أي انظمة آخرى مستخدمة في الجامعة، بدلاً من استخدام الامتحانات الورقية

مع العلم بأن مدة الإجابة على الاسئلة تستغرق حوالي 5 دقائق، نأمل مساعدتكم في جمع البيانات والمعلومات اللازمة لإتمام هذه الدراسة

سوف تحظى المعلومات بالسرية التامة، وسوف تستخدم فقط لغرض البحث

في نهاية الاستبانة يمكنك وضع بريدك الالكتروني حيث سوف تكون لديك ***الفرصة للفوز بقسيمة شرائية من موقع أمازون،***

بقيمة **50 جنيه استرليني،** حيث سوف يتم السحب على **قسيمتين شرائيتين** ،

في حال فوزك سوف يتم التواصل معك عن طريق بريدك الالكتروني

وسوف يتم حذف جميع المعلومات عند الانتهاء من السحب علماً بأن البريد الالكتروني لن يربط بإجابتك نهائياً،

رابط الاستبانة:

https://www.isurvey.soton.ac.uk/17993

وجزاكم الله خيراً

نهى الرويس

English Version:

Dear academics in King Saud University,

In advance I would like to thank you for your cooperation in this research.

This research about the factors that affect academics to accept E-assessment in Saudi universities.

E-assessment is the system that academic use to assess students using Information and communication Technology, instead of paper test. Some of E-assessment system included in Blackboard system which is used in university.

I hope that you can help me to accomplish this study successfully by answering the questions in this survey. You need just 5 minutes to answer this survey. The information and data that you provide will remain confidential.

If you wish you will be entered in a prize draw, where you have the opportunity to win one of two £50 amazon.co.uk vouchers as an appreciation for your time. If you wish to take part you will need to

provide your email address at the end of the study. This will be kept separately to the answers to your questions so there will be no way of linking your email address to your answers and you will be contacted by email if you win.

Below is the link of the survey:

https://www.isurvey.soton.ac.uk/17993

Thank you

Nuha Alruwais

Questionnaire (Engli3sh & Arabic versions)

مقدمة

العوامل المؤثرة على تقبل استخدام الامتحانات الالكترونية من قبل أعضاء هيئة التدريس في الجامعات السعودية

هيئة التدريس في يجرى هذا البحث من أجل دراسة العوامل التي تؤثر على تقبل استخدام الامتحانات الالكترونية من قبل أعضاء الجامعات
ويقصد بالامتحانات الالكترونية هي الامتحانات التي تُقَدم للطالب عن طريق نظام بلاك بورد أو أي أنظمة أخرى وذلك لتقييم الطالب الكترونياً بدلاً من استخدام الامتحانات الورقية. وللتعرف أكثر على الامتحانات الالكترونية وكيفية إنشاء أرجو الضغط على الرابط أدناه
https://www.youtube.com/watch?v=1JIuQU1oqiA

هذا البحث سوف يشمل العوامل الشخصية والاجتماعية والمصادر الخارجية التي تؤثر على استخدام الامتحانات الالكترونية. الهدف من هذا البحث هو تقديم التوصيات التي يمكن أن تزيد من اعتماد الامتحانات الالكترونية من قِبل أعضاء هيئة التدريس في الجامعات السعودية. ومشاركتكم سوف تساهم في تحديد الإتجاهات المستقبلية للامتحانات الالكترونية في جامعات المملكة العربية السعودية. بالإضافة الى أنها سوف تساعد الباحثين والمهتمين في هذا المجال

مشاركتكم في تعبئة الاستبانة لهذا المشروع البحثي هي مشاركة تطوعية وسيتم التعامل مع جميع الإجابات بسرية تامة بحيث لا تشير
الى هوية المشارك واستخدامها سيكون لغرض البحث فقط
سوف تستغرق هذه الاستبانة الالكترونية خمس دقائق لإتمامها

في نهاية الاستبانة يمكنك وضع بريدك الالكتروني حيث سوف تكون لديك الفرصة للفوز بقسيمة شرائية من موقع أمازون Amazon.co.uk *بقيمة 50 جنيه استرليني* حيث سيتم السحب على *قسيمتين شرائيتين*

لاثنين من المشاركين بشكل عشوائي. وسوف يتم التواصل معك عن طريق البريد

علماً بأن البريد الالكتروني لن يربط بإجابتك نهائياً وسوف يتم حذف جميع المعلومات بعد الانتهاء من السحب

إذا كان لديكم أي استفسار حول هذا البحث، فلا تتردد في مراسلة الباحثة على الايميل : نهى الرويس nma1g14@soton.ac.uk
المشرفون: Dr. Gary Wills gbw@ecs.soton.ac.uk - Prof. Mike Wald mw@ecs.soton.ac.uk

Introduction

The Factors Impacting the acceptance of E-assessment by Academics in the Saudi Universities

The project is being conducted in order to examine the factors effecting the acceptance of E-assessment among academic staff in Saudi Arabian. E-assessment allows the lecturer to assess the students using information and communication technology.
To have more information about E-assessment and how to create an electronic exam please follow the link below:
https://www.youtube.com/watch?v=1JIuQU1oqiA
This study will investigate the personal, social and external resources factors that influence using E-assessment. The aim of the research is provide recommendations that could increase E-assessment adoption by academic staff in Saudi Arabian universities.

Your participation may help the future directions of E-assessment in Kingdom of Saudi Arabia, and may inform research/publications that may be of assistance to other providers and researchers.

Your participation in this research project is voluntary. All responses remain confidential.

This web-based survey should take 5 minutes to complete.

If you wish you will be entered in a prize draw, where you have the opportunity to win one of two £50 amazon.co.uk vouchers as an appreciation for your time. If you wish to take part you will need to provide your email address at the end of the study. This will be kept separately to the answers to your questions so there will be no way of linking your email address to your answers and you will be contacted by email if you win.

For further details, please contact either myself or my study supervisor, Dr Gary Wills and Proof Mike Wald
Nuha Alruwais: nma1g14@ecs. soton.ac.uk
Gary Wills: gbw@ecs.soton.ac.uk
Mike Wald: mw@ecs.soton.ac.uk

☐ Please tick (check) this box to indicate that you consent to taking part in this survey يُرجى وضع علامة (صح) في المربع عند الموافقة على تعبئة الاستبانة

Questions:

1. What university do you work in?
   ماهي الجامعة التي تعمل بها حاليا؟

2. Work experience in academic teaching
   كم عدد سنوات خبرتك في التدريس؟

   ○ Less than 2 years أقل من سنتين

   ○ 2-5 years من 2-5 سنوات

- 6-10 years من 6-10 سنوات
- More than 10 years أكثر من 10 سنوات

3. Your Age
ما هو عمرك؟

- 20-30
- 31-40
- 41-50
- Over 50 أكثر من

How do you estimate the daily average amount of time spent on the Internet?

كم تقدر معدل استخدامك اليومي للإنترنت؟

- Less than 30 minutes أقل من 30 دقيقة
- 30 minutes- 60 minutes ما بين 30-60 دقيقة
- 1 hour- 2 hours ما بين 1-2 ساعة
- Over 2 hours أكثر من ساعتين

Did you use E-assessment?

هل استخدمت الامتحانات الالكترونية سابقاً؟

- Yes نعم
- No لا

Which an E-assessment system did you use?

أي من أنظمة الامتحانات الالكترونية استخدمت؟

- E-assessment system in Blackboard system
نظام الامتحانات الالكترونية الموجود في نظام البلاك بورد

- E-assessment system in MS system
  نظام الامتحانات الالكترونية الموجود في نظام أم أس
- Quiz Creator
- Articulate Quizmaker
- Other أخرى

How many years you have been using the E-assessment?

منذ متى وأنت تستخدم الامتحانات الالكترونية؟

- Just started مبتدئ
- Less than 2 years أقل من سنتين
- 2-5 years من 2-5 سنوات
- 6-10 years من 6-10 سنوات
- More than 10 years أكثر من 10 سنوات

How do you estimate the daily average amount of time you spend on E-assessment?

كم تقدر معدل الوقت الذي تقضيه في استخدام الامتحانات الالكترونية ؟

- Less than 30 minutes أقل من 30 دقيقة
- 30 minutes- 60 minutes ما بين 30-60 دقيقة
- 1 hour- 2 hours ما بين 1-2 ساعة
- Over 2 hours أكثر من ساعتين

Part III: E-assessment information

To what extent do you agree with the following statements?

إلى أي مدى توافق أو لا توافق على العبارات التالية؟

Table C-1 Questionnaire statements

Sub- factor	reference	Statement	Completely Disagree	Disagree	Neutral	Agree	Completely Agree
Awareness	AW1	I confident about what E-assessment means. لدي المعرفة الكافية عن ماهية الامتحانات الالكترونية					
	AW2	I understand the benefits of E-assessment.					

		لدي الإدراك لفوائد الامتحانات الالكترونية					
	AW3	I know the features that E-assessment offers. لدي الإدراك للمزايا التي تقدمها الامتحانات الالكترونية					
	AW4	I know how to use E-assessment. لدي المعرفة عن كيفية استخدام نظام الامتحانات الالكترونية					
Perceived Ease to Use	PEU1	Learning to use E-assessment is easy for me. تعلم استخدام نظام الامتحانات الالكترونية سهل بالنسبة لي					
	PEU2	My interaction with E-assessment is clear and understandable. التفاعل مع نظام الامتحانات الالكترونية مفهوم بالنسبة لي					
	PEU3	It is easy for me to become skilful at using E-assessment. أشعر بأنه من السهل علي أن أطور مهارتي في استخدام نظام الامتحانات الالكترونية					
	PEU4	I find E-assessment easy to use. أجد أن نظام الامتحانات الالكترونية سهل الاستخدام					
Perceived Usefulness	PU1	I believe that using E-assessment would enhance my professional development. أشعر أن استخدام نظام الامتحانات الالكترونية سوف يحسن من أدائي الوظيفي					
	PU2	Using E-assessment would increase my academic productivity. استخدام نظام الامتحانات الالكترونية سوف يزيد من إنتاجي الاكاديمي					
	PU3	I believe that using E-assessment would make it easy for me to achieve my academic and professional goals. أشعر أن استخدام نظام الامتحانات الالكترونية سوف يساعدني لتحقيق أهدافي الأكاديمية					
	PU4	I find using E-assessment useful. أجد أن استخدام نظام الامتحانات الالكترونية مفيد					
Compatibility	C1	Using E-assessment is compatible with my work. استخدام نظام الامتحانات الالكترونية يتوافق مع عملي					
	C2	Using E-assessment fits well with my academic development needs. استخدام نظام الامتحانات الالكترونية يتماشى مع احتياجاتي الأكاديمية					
	C3	E-assessment compatible with my education goals. نظام الامتحانات الالكترونية يتوافق مع أهدافي التعليمية					
	C4	E-assessment compatible with the nature of the curriculum, which I teaching it. نظام الامتحانات الالكترونية يتوافق مع طبيعة المناهج التي أدرسها					

Attitude	A1	I have a generally favourable attitude toward using E-assessment. بشكل عام أنا لدي موقف إيجابي تجاه استخدام نظام الامتحانات الالكترونية					
	A2	It is a good idea to use E-assessment for academic development. أعتبر استخدام نظام الامتحانات الالكترونية في المجال الأكاديمي فكرة جيدة					
	A3	Overall, I am satisfied with using E-assessment. بشكل عام أنا راضي عن استخدام نظام الامتحانات الالكترونية					
Superior Influence	SI1	My manager encourages me to use E-assessment. رئيسي في العمل يشجعني على استخدام نظام الامتحانات الالكترونية					
	SI2	I want to use E-assessment because my manager requires it. أريد استخدام نظام الامتحانات الالكترونية لأن رئيسي في العمل يطلب مني ذلك					
	SI3	The opinion of my manager is important to me. رأي رئيسي في العمل مهم بالنسبة لي					
	SI4	University Chancellor encourages lecturers to use E-assessment. مدير الجامعة يشجع اعضاء هيئة التدريس على استخدام الامتحانات الالكترونية					
Peer Influence	PI1	My friends would think that I should use the E-assessment. أصدقائي يعتقدون أنه يجب أن أستخدم نظام الامتحانات الالكترونية					
	PI2	My colleagues, who use E-assessment, encourage me to use it. زملائي الذين استخدموا الامتحانات الالكترونية يشجعونني على استخدامها					
	PI3	My colleagues would think that I should use E-assessment. زملائي في العمل يعتقدون أنه يجب أن أستخدم نظام الامتحانات الالكترونية					
	PI4	The opinion of my friends and colleagues is important to me. أعتبر رأي أصدقائي وزملائي مهم بالنسبة لي					
Subjective Norm	SN1	People who are important to me would think that I should use E-assessment. الأشخاص الذين يهمني رأيهم يعتقدون بأنه يجب أن أستخدم نظام الامتحانات الالكترونية					
	SN2	People who influence my behaviour would think that I should use E-assessment. الأشخاص الذين لهم تأثير علي يعتقدون بأنه يجب أن أستخدم نظام الامتحانات الالكترونية					

	SN4	People who have an influence in my work would think that I should use E-assessment. الأشخاص الذين لهم تأثير على عملي يعتقدون بأنه يجب أن أستخدم نظام الامتحانات الالكترونية					
Facilitating Conditions	FC1	The equipment (computer hardware, software and communication network) is available to me to work on E-assessment. البنية التحتية (أجهزة، برامج، شبكة اتصالات) متوفرة لي لتسهيل استخدام نظام الامتحانات الالكترونية					
	FC2	The resources (ex: time and money) are available to me to work on E-assessment. المصادر (مثل الوقت والمال) متوفرة لدي لاستخدام نظام الامتحانات الالكترونية					
	FC3	E-assessment is compatible with the computers and application I already use in my work. نظام الامتحانات الالكترونية يتوافق مع جهاز الحاسب الخاص بي وتطبيقاته					
	FC4	E-assessment includes a security system to check the identification of the student to avoid cheating in exams. يتضمن نظام الامتحانات الالكترونية نظام حماية للتأكد من هوية الطالب منعاً للغش					
	FC5	E-assessment includes a security system, which prevent coping the exam questions to avoid cheating in exams. يتضمن نظام الامتحانات الالكترونية نظام حماية يمنع من نسخ اسئلة الامتحانات وذلك منعاً للغش					
IT Support	ITS1	E-assessment training courses are available for all academics. تتوفر دورات تدريبية على نظام الامتحانات الالكترونية لجميع أعضاء هيئة التدريس					
	ITS2	Support staff is available to help me at any time to use E-assessment. الدعم الفني متوفر لي في أي وقت لمساعدتي في استخدام نظام الامتحانات الالكترونية					
	ITS3	E-assessment training courses is clear and understandable. الدورات التدريبية على نظام الامتحانات الالكترونية واضحه ومفهومه					
Self-Efficacy	SE1	I would feel comfortable using E-assessment on my own. أشعر بالارتياح عند استخدام نظام الامتحانات الالكترونية بمفردي					
	SE2	There is no gap between my existing skills and knowledge and those required to work on E-assessment. لا يوجد اختلاف بين مهاراتي الحالية والمهارات المتطلبة لاستخدام الامتحانات الالكترونية					

	SE3	I have knowledge and ability to make use of E-assessment. لدي المعرفة والقدرة للاستفادة من نظام الامتحانات الالكترونية					
Perceived Behavioural Control	PBC1	Using E-assessment is entirely within my control. لدي الإرادة والتحكم التام لاستخدام نظام الامتحانات الالكترونية					
	PBC2	I have the knowledge and ability to use E-assessment. لدي المعرفة والقدرة لاستخدام نظام الامتحانات الالكترونية					
	PBC3	I would be able to use E-assessment. سوف أكون قادر على استخدام نظام الامتحانات الالكترونية					
	PBC4	I have the resources to use E-assessment. لدي المصادر لاستخدام نظام الامتحانات الالكترونية					
Behavioural Intention	BI1	I intend to use E-assessment in the future. أنوي استخدام نظام الامتحانات الالكترونية في المستقبل					
	BI2	I plan to use E-assessment for academic development. أخطط لاستخدام نظام الامتحانات الالكترونية لتطويري الأكاديمي					
	BI3	I predict to use E-assessment during my work. أتوقع أن أستخدم نظام الامتحانات الالكترونية في عملي					

The Demographic Questionnaire Results:

Table C- 2 Demographic questionnaire results

Saudi Universities	Response Count
King Saud University	72
Princess Nora University	26
Umm Al-Qura University	6
King Faisal University	7
King Abdul-Aziz University	20
Taibah University	23
King Khalid University	21
Imam Mohammed ibn Saud University	8
King Abdullah University	0
Saudi Electronic University	0
Taif University	5
University of Dammam	2

Jazan University	0
University of Tabuk	12
Qassim University	6
Islamic University of Madinah	0
Prince Sattam bin Abdul-Aziz University	10
University of Hail	10
Al Baha University	1
Majmaah University	12
Al Jouf University	4
Najran University	11
Northern Borders University	0
Shaqra University	18
Alfaisal University	0
Jubail University College	0
King Fahd University of Petroleum & Minerals	3
Other	10

The participants teaching experience	Response Count
Just started	24
Less than 2 years	37
2-5 years 2-5	68
6-10 years 6-10	67
More than 10 years 10	109

The participants age	Response Count
20-30	69
31-40	118
41-50	86
Over 50	33

The participants internet usage	Response Count
Less than 30 minutes 30	2
30 minutes- 60 minutes 30-60	12
1 hour- 2 hours 1-2	75
Over 2 hours	217

Questionnaire Normality Results:

Table C- 3 Questionnaire normality results

Latent construct	Observed variable	Skewness	Kurtosis
Awareness	AW1	-0.829	0.038
	AW2	-0.28	1.327
	AW3	-1.095	1.278
	AW4	-0.459	-0.719
Perceived Ease of Use	PEU1	-0.746	0.188
	PEU2	-0.680	0.110
	PEU3	-1.126	1.602
	PEU4	-0.420	0.193
Perceived Usefulness	PU1	-0.578	-0.202
	PU2	-0.703	0.055
	PU3	-0.515	-0.260
	PU4	-1.014	1.534
Compatibility	COM1	-0.758	0.405
	COM2	-0.574	-0.059
	COM3	-0.814	0.574
	COM4	-0.585	-0.112
Attitude	ATU1	-1.167	1.713
	ATU2	-1.272	2.258
	ATU3	-0.808	0.776
Superior Influence	SI1	0.063	-0.656
	SI2	0.595	-0.202
	SI3	-0.640	0.007
	SI4	-0.136	0.059
Peer Influence	PI1	-0.186	-0.029
	PI2	-0.238	0.452
	PI3	-0.216	0.401
	PI4	-0.808	0.415
Subjective Norm	SN1	-0.349	0.452

	SN2	-0.190	0.425
	SN3	0.223	0.006
Resource facilitating conditions	FC1	-0.349	-1.006
	FC2	-0.190	-0.961
	FC3	-0.671	0.072
	FC4	-0.231	-0.190
	FC5	-0.193	-0.031
IT Support	ITS1	-0.066	-0.858
	ITS2	0.025	-0.796
	ITS3	-0.167	-0.322
Self-Efficacy	SE1	-0.445	0.230
	SE2	-0.315	-0.262
	SE3	-0.817	1.009
Perceived Behavioural Control	PBC1	-0.701	0.617
	PBC2	-0.643	0.227
	PBC3	-1.017	2.185
	PBC4	-0.419	-0.293
Behavioural Intention	BI1	-1.036	1.093
	BI2	-0.735	0.190
	BI3	-0.931	1.069

Discriminant Validity Test Results Before Deleting Peer Influence Latent Construct:

Table C-4 Discriminant Validity test results before deleting peer influence latent construct

	SN	AW	PEU	PU	COM	ATU	SI	PI	PBC	FC	ITS	SE	BI
SN	**0.755**												
AW	0.204	**0.835**											
PEU	0.176	0.779	**0.768**										
PU	0.279	0.487	0.514	**0.938**									
COM	0.329	0.526	0.525	0.723	**0.867**								
ATU	-0.307	-0.546	-0.588	-0.753	-0.803	**0.783**							
SI	0.630	0.292	0.291	0.145	0.232	-0.182	**0.746**						
PI	0.851	0.239	0.180	0.263	0.304	-0.334	0.676	**0.740**					
PBC	0.173	0.635	0.732	0.403	0.449	-0.482	0.247	0.201	**0.773**				
FC	0.393	0.294	0.296	0.251	0.203	-0.313	0.366	0.383	0.305	**0.748**			

ITS	0.255	0.446	0.452	0.213	0.235	-0.293	0.440	0.266	0.399	0.507	**0.827**		
SE	0.195	0.622	0.840	0.445	0.520	-0.581	0.330	0.224	1.032	0.331	0.460	**0.677**	
BI	0.240	0.329	0.378	0.562	0.650	-0.713	0.140	0.243	0.377	0.293	0.226	0.482	**0.788**

Correlations Between Latent Constructs in the Model:

Table C- 5 Latent constructs' correlations

Latent constructs			Estimate
AW	<-->	PEU	.797
AW	<-->	PU	.333
AW	<-->	COM	.402
AW	<-->	SI	.319
AW	<-->	FC	.432
AW	<-->	ITS	.495
AW	<-->	SE	.599
PEU	<-->	PU	.533
PEU	<-->	COM	.556
PEU	<-->	SI	.341
PEU	<-->	FC	.363
PEU	<-->	ITS	.442
PEU	<-->	SE	.661
PU	<-->	COM	.767
PU	<-->	SI	.321
PU	<-->	FC	.255
PU	<-->	ITS	.224
PU	<-->	SE	.402
COM	<-->	SI	.313
COM	<-->	FC	.306
COM	<-->	ITS	.251
COM	<-->	SE	.417
SI	<-->	FC	.385
SI	<-->	ITS	.473
SI	<-->	SE	.318
ITS	<-->	FC	.596
FC	<-->	SE	.389
ITS	<-->	SE	.440

Appendix D (Focus groups questions)

Participant Information Sheet

Study Title: The Factors Impacting the acceptance of E-assessment by Academics in Saudi Universities

Researcher: Nuha Alruwais

Ethics number:

Please read this information carefully before deciding to take part in this research.

What is the research about?

This research is about using E-assessment system in Saudi universities. The aim of this study is to investigate the factors that influence Saudi academic's behaviour toward accepting E-assessment. In order to encourage the lecturers to use E-assessment system in Saudi universities. This research is under direction of the School of Electronic and Computer Science, University of Southampton, UK.

Why have I been chosen?

You invited to participate in this study focus in academics behaviour toward accepting E-assessment. Your opinion will help in improving the constructed model for E-assessment.

What will happen to me if I take part?

We will organize appropriate meeting time with other participants to discuss a few questions related to the research. The meeting will take from 30 to 40 minutes.

Are there any benefits in my taking part?

This research is not designed to help you personally, but your feedback will help me gather academics opinions on the development efforts.

Are there any risks involved?

No.

Will my participation be confidential?

Yes. Your information will be stored and used on secure systems and will be used for this study purpose only and will be deleted at the end of this research. Your responses are voluntary and will be confidential. Individual responses will not be identified. All responses will be compiled together and analysed as a group.

What happens if I change my mind?

You have the right to terminate your participation in the research, at any stage, you do not need to give any reasons, and without your legal rights being affected. Your data will be deleted directly if you decide to withdraw at any time.

What happens if something goes wrong?

In the unlikely case of concern or complaint, please contact Research Governance Manager (02380 595058, rgoinfo@soton.ac.uk).

Where can I get more information?

For further details, please contact either myself or my study supervisor, Dr Gary Wills and Proof Mike Wald

Nuha Alruwais: nma1g14@ecs. soton.ac.uk

Gary Wills: gbw@ecs.soton.ac.uk

Mike Wald: mw@ecs.soton.ac.uk

Would you like to take part in this research?

☐ Yes, I agree to take part in this research and I understand my participation is voluntary and I may withdraw at any time without my legal rights being affected.

☐ No, I disagree

CONSENT FORM (Version 6.3)

Study title: The Factors Impacting the Acceptance of E-assessment by Academics in Saudi Universities

Researcher name: Nuha Alruwais

Supervisors: Gary Wills and Mike Wald

Ethics reference:

Please initial the box(es) if you agree with the statement(s):

I have read and understood the information sheet and have had the opportunity to ask questions about the study ☐

I agree to take part in this research project and agree for my data to be used for the purpose of this study ☐

I understand my participation is voluntary and I may withdraw at any time without consequence and my data will be deleted if I withdraw at any time ☐

I agree to record my voice during my participation in this study ☐

Data Protection

I understand that information collected about me during my participation in this study will be stored on a password protected computer and that this information will only be used for the purpose of this study. All files containing any personal data will be made anonymous.

Name of participant (print name)…… …….

Signature of participant…….

Name of Researcher (print name): Nuha Alruwais

Signature of Researcher…… ……

Date……..

Focus Group Questions in Arabic and English Languages:

Q1: To what extent you think that academic's attitude can affect academic's behavioural intention towards to accept E-assessment in the future? Why?

س-1: إلى أي درجة تعتقد بأن موقف الاكاديمي تجاه الامتحانات الالكترونية ممكن ان يؤثرعلى اهتمامه باستخدامها مستقبلا؟ ولماذا؟

Q2: To what extent you think that academic's age can affect academic attitude toward accepting E-assessment in future? Why?

س-2: بإعتقادك إلى أي درجة يؤثر عمر الاكاديمي على موقفه من استخدام الامتحانات الالكترونية مستقبلا؟ ولماذا؟

Q3: To what extent you think that there is an effect of the awareness of E-assessment and its benefits on academic's attitude toward accepting E-assessment?

س-3:إلى اي درجة تعتقد ان الوعي بماهية الامتحانات الالكترونية وفوائدها يؤثر على سلوك الاكاديمي في استخدامها ؟ لماذا؟

Q4: To what extent you think that benefits of E-assessment is affect the Saudi academic attitude to accepting E-assessment? Why?

س-4: إلى أي درجة تعتقد بأن فائدة الامتحانات الالكترونية تؤثر على سلوك الاكاديمي في استخدامها ؟ و لماذا؟

Q5: To what extent you think ease of use of E-assessment can affect the Saudi academic's attitude toward accepting E-assessment? Why?

س-5: إلى اي درجة تعتقد بأن سهولة استخدام الامتحانات الالكترونية يؤثر على سلوك الاكاديمي في استخدامها ؟و لماذا؟

Q6: To what extent you think if E-assessment is compatible with academics work and his/her needs, this will affect the Saudi academic attitude toward accepting E-assessment? Why?

س-6: إذا كان استخدام الامتحانات الالكترونية يتوافق مع متطلبات الاكاديمي العملية واحتياجاته , إلى أي درجة تعتقد ان ذلك سوف يؤثر على سلوكه في استخدامها ؟ و لماذا؟

Q7: To what extent you think that academic's social influence (people around academic) can affect academic's behavioural intention towards accepting E-assessment in the future? Why?

س-7: إلى أي درجة تعتقد بأن اهتمام الاكاديمي بأراء من حوله ,ممكن ان يؤثرعلى اهتمامه باستخدام الامتحانات الالكترونية مستقبلا؟ ولماذا؟

Q8: To what extent you think that academic's age can affect academic's social influence (people around academic) to accept E-assessment in future? Why?

س-8: بإعتقادك إلى أي درجة يؤثر عمر الاكاديمي على اهتمامه بأراء من حوله حول استخدام الامتحانات الالكترونية مستقبلا؟ ولماذا؟

Q9: To what extent you think that the manger or the supervisor of the academic can has an impact on academic's social behaviour to accept E-assessment? Or the manger can be one of the people that may has influence on academic to accept E-assessment? Why?

س-9 : إلى أي درجة تعتقد ان المدير او الرئيس قد يكون من الاشخاص الذين لهم تأثير على الاكاديمي في استخدام الامتحانات الالكترونية؟ و لماذا؟

Q10: To what extent you think that academic's ability to control the use of E-assessment can affect academic's behavioural intention to accept E-assessment in the future? Why?

س-10: إلى أي درجة تعتقد بأن شعور الاكاديمي بقدرته على التحكم بالامتحانات الالكترونية يؤثر على اهتمامه بإستخدامها مستقبلا؟ ولماذا؟

Q11: To what extent you think that academic's age can affect academic's ability to control the use of E-assessment in future? Why?

س-11: بإعتقادك إلى أي درجة يؤثر عمر الاكاديمي على شعوره بالتحكم باستخدام الامتحانات الالكترونية مستقبلا؟ ولماذا؟

Q12: If E-assessment match the academics knowledge and skills, to what extent you think this can affect the academic's ability to control the E-assessment use? Why?

س-12: في حال كانت الامتحانات الالكترونية تتوافق مع معرفة ومهارات الاكاديمي, إلى أي درجة تعتقد أن هذا سوف يؤثر على قدرته بالتحكم في استخدامها؟ و لماذا؟

Q13: To what extent you think the availability of resources that academic needs to use E-assessment (ex: computers, internet connection, money, time), does has an effect on academic ability to use the E-assessment? Why?

س-13: إلى أي درجة تعتقد ان توفر المصادر التي يحتاجها الاكاديمي لأستخدام الامتحانات الالكترونية (الاجهزة والانترنت و الوقت والمال) يؤثر على قدرته في التحكم في استخدامها؟ ولماذا؟

Q14: To what extent you think the availability of E-assessment training courses and staff support to use E-assessment, does has an effect on academic ability to use the E-assessment? Why?

س-14: إلى أي درجة تعتقد ان توفر الدورات التدريبية والدعم الفني لاستخدام الامتحانات الالكترونية يؤثر على قدرة الاكاديمي في تحكمه باستخدامها؟ ولماذا؟

Model Presented to Focus Group Members

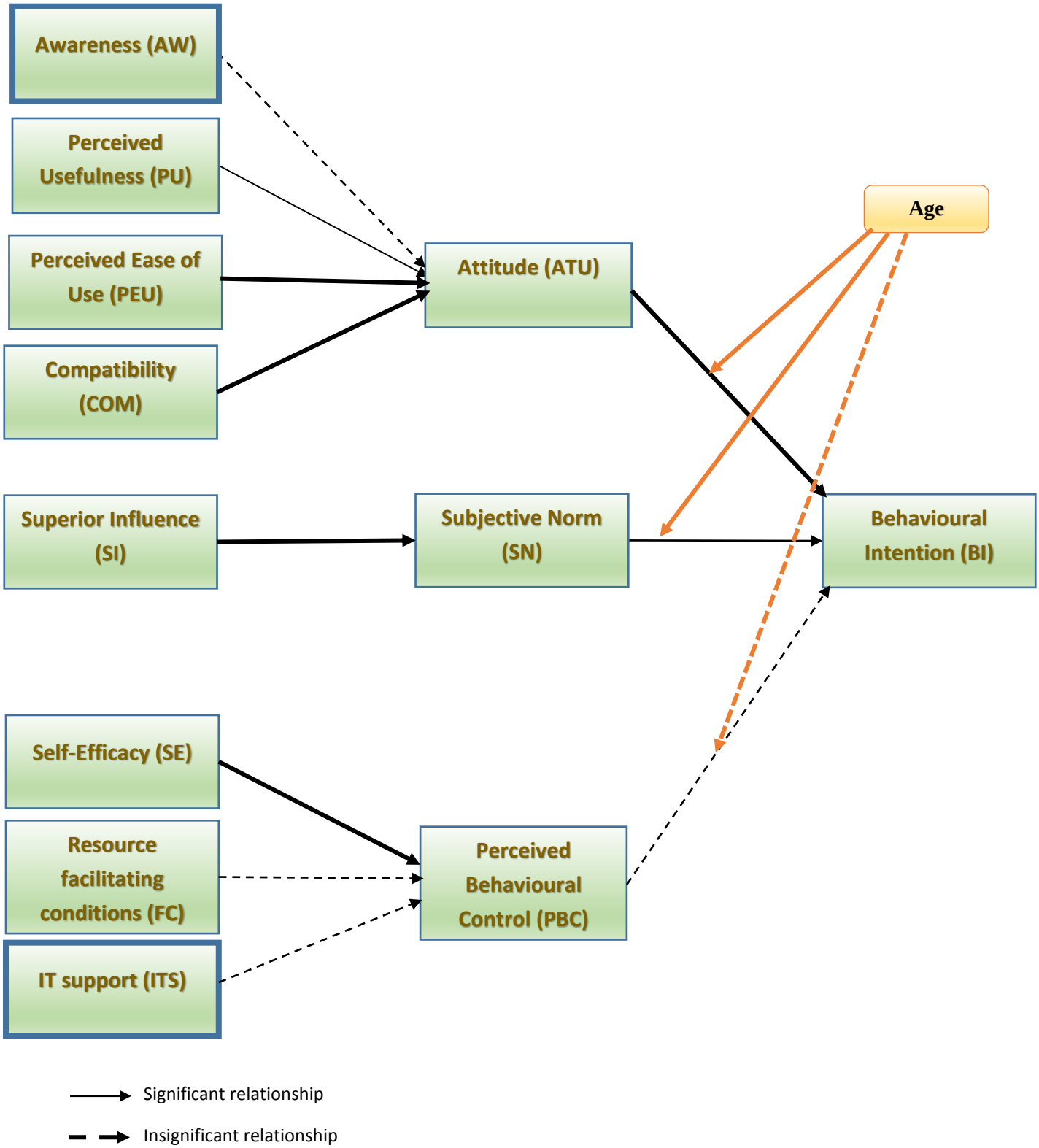

Figure D-1 MAE presented to focus group members