



Factors Affecting the Intention to Fully Adopt the Computer Assisted Audit Tools and Techniques (CAATTs) Among External Auditors in Jordan

by

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LIST OF ABBREVIATIONS

ACFE	Association of Certified Fraud Examiners.
ACL	Audit Command Language.
AICPA	American Institute of Certified Public Accountants.
AIS	Accounting Information Systems.
AUASB	Auditing and Assurance Standards Board.
AVE	Average Variance Extracted.
BI	Behavior Intention.
CAATs	Computer-Assisted Audit Techniques.
CAATTs	Computer Assisted Audit Tools and Techniques.
CB- SEM	Covariance-Based Structural Equation Modeling.
CPA	Certified Public Accountants.
C-TAM-TPB	Combined Model of TAM and TPB.
DOI	Diffusion of Innovation.
EE	Effort Expectancy.
EDP	Electronic Data Processing.
FC	Facilitating Conditions.
GAS	Generalized Audit Software.
IAASB	International Auditing and Assurance Standard Board.
IAPS	International Auditing Practice Statement.
ICT	Information and Communication Technology.
IDEA	Interactive Data Extraction and Analysis.
IFAC	International Federation of Accountants.
IFRS	International Financial Reporting Standards.
ISACA	Information Systems Audit and Control Association.

ISA	International Standard on Auditing.
IS	Information System.
ITF	Integrated Test Facility.
JACPA	Jordanian Association of Certified Public Accountants.
MM	Motivational Model.
MPCU	Model of Pc Utilization.
PCAOB	Public Company Accounting Oversight Board.
PCA	Principal Component Analysis.
PEOU	Perceived Ease-Of-Use.
PE	Performance Expectancy.
PLS	Partial Least Squares.
PS	Parallel Simulation.
PU	Perceived Usefulness.
SAS	Statement on Auditing Standards.
SCT	Social Cognitive Theory.
SEM	Method to Structural Equation.
SMPs	Small and Medium Practices.
SI	Social Influence.
TAM	Technology Acceptance Model.
TOE	Technology, Organisation and Environment.
TPB	Theory of Planned Behavior.
TRA	Theory of Reasoned Action.
TT	Trust in Technology.
UTAUT	Unified Theory Acceptance and Use Technology.
VOIP	Voice-Over Internet Protocol.

Faktor-faktor yang Mempengaruhi Keinginan untuk Menggunakan Peralatan dan Teknik Pengauditan Berbantuan Komputer Sepenuhnya dalam kalangan Juruaudit Luar di Jordan

Abstrak

Peralatan dan Teknik Pengauditan Berbantuan Komputer atau *Computer-Assisted Audit Tools and Techniques* (CAATTs) ialah alat-alat dan teknik-teknik berbantuan komputer dalam pengauditan yang membolehkan para juruaudit mengautomasikan kerja-kerja pengauditan yang merangkumi taksiran risiko klien, analisis data, dan pengesanan fraud bagi tujuan meningkatkan kualiti audit. Namun begitu, syarikat-syarikat di Jordan didapati masih terlibat dengan amalan fraud seperti pengelakan cukai, salah nyata fraud dan manipulasi penyata kewangan khususnya dalam usaha untuk mendapatkan pembiayaan daripada pihak bank. Sungguhpun penggunaan CAATTs memberi kelebihan dalam amalan audit, akan tetapi tidak banyak bukti yang menunjukkan bahawa alat-alat dan teknik-teknik berbantuan komputer dalam pengauditan digunakan di Jordan. Oleh yang demikian, kajian ini bertujuan mengisi ruang yang kosong bagi merapatkan jurang yang wujud ini. Ia bertujuan meninjau penggunaan CAATTs pada masa kini dan seterusnya meneliti faktor-faktor yang mempengaruhi keinginan untuk menggunakan alat-alat dan teknik-teknik berbantuan komputer sepenuhnya dalam kalangan juruaudit luaran di pelbagai firma audit kebangsaan, antarabangsa dan juga empat syarikat gergasi dunia atau the Big 4 di Jordan. Penyelidikan ini mengguna pakai teori *Unified Theory of Acceptance and Use of Technology* (UTAUT) untuk mengenal pasti faktor-faktor tersebut yang merangkumi jangkaan prestasi (*performance expectancy*), jangkaan usaha (*effort expectancy*), pengaruh sosial (*social influence*), keadaan-keadaan yang memudahkan (*facilitating conditions*), dan amanah (*trust*) sebagai faktor luaran. Tinjauan secara dalam talian telah dilakukan dengan mengedarkan borang soal selidik kepada 181 orang juruaudit luaran di Jordan yang menghasilkan kadar sambutan sebanyak 54.14%. Keputusan kajian menunjukkan bahawa jangkaan prestasi, jangkaan usaha dan pengaruh sosial kesemuanya mempunyai hubungan yang positif dengan keinginan juruaudit untuk menggunakan CAATTs sepenuhnya. Malah, amanah juga didapati mempunyai hubungan yang positif dengan jangkaan prestasi dan jangkaan usaha. Namun begitu, keadaan-keadaan yang mendorong kepada penggunaan CAATTs sepenuhnya dan amanah didapati tidak berkait secara positif dengan keinginan untuk menggunakan CAATTs. Dapatan daripada kajian tinjauan ini juga menunjukkan hanya sebilangan kecil, iaitu 8 orang responden dalam kalangan para juruaudit luaran di Jordan telah benar-benar menggunakan CAATTs sepenuhnya. Dalam hal ini, kebanyakan firma audit di Jordan menghadapi halangan-halangan seperti kekurangan pengetahuan dan latihan yang berkaitan dengan penggunaan CAATTs. Oleh itu, kajian ini menyarankan agar pihak badan profesional perakaunan di Jordan sewajarnya membantu para juruaudit di negara ini untuk menggunakan CAATTs dengan cara membangunkan program latihan dan menganjurkan persidangan bagi menyebarkan ilmu pengetahuan tentang kepentingan menggunakan CAATTs kepada semua juruaudit. Walau bagaimanapun, kajian ini turut mengambil maklum bahawa tempoh kutipan data tinjauan yang dilakukan dari bulan Disember hingga bulan Januari mungkin tidak sesuai kerana para juruaudit sedang sibuk menyiapkan laporan audit dalam tempoh ini. Maka, penyelidikan pada masa akan datang disarankan agar mengkaji penggunaan perisian *Generalized Audit Software* (GAS) oleh juruaudit dalaman atau juruaudit teknologi maklumat dengan mengguna pakai kerangka Teknologi-Organisasi-Persekitaran atau *Technology-Organization-Environment* (TOE).

Factors Affecting the Intention to Fully Adopt Computer-Assisted Audit Tools and Techniques (CAATTs) among External Auditors in Jordan

Abstract

Computer-Assisted Audit Tools and Techniques (CAATTs) are the tools and techniques that enable auditors to automate tasks including client risk assessment, analysis of data, and detection of fraud in order to increase audit quality. Nevertheless, it has been evident that Jordanian companies are still involved in frauds such as tax evasion, fraud and manipulation of financial statements especially in obtaining financing from banks. Despite the advantages of adopting CAATTs in auditing practices, there is little evidence about their adoption among external auditors in the Jordanian context. Hence, this study aimed to fill this gap. The primary aims of this study were to explore the current usage of CAATTs and further examine factors affecting the intention to fully adopt CAATTs among Jordanian external auditors working in various national, international, and the world's Big 4 audit firms. The present study employed the Unified Theory of Acceptance and Use of Technology (UTAUT) to identify factors affecting the intention to fully adopt CAATTs. These factors included performance expectancy, effort expectancy, social influence, facilitating conditions, and trust as an external factor. Online survey was conducted in which a questionnaire was sent to 181 Jordanian external auditors that yielded 54.14% response rate. Results have shown that performance expectancy, effort expectancy and social influence were all positively related to the intention to fully adopt CAATTs. Moreover, trust was positively related to performance expectancy and effort expectancy. However, facilitating conditions and trust were not positively related to the intention to fully adopt CAATTs. The findings have also indicated that a limited number of only 8 respondents among the Jordanian external auditors surveyed had fully adopted CAATTs. In this regard, most of the Jordanian audit firms were facing many obstacles such as the lack of knowledge and training related to the usage of CAATTs. Thus, it is recommended that the Jordanian professional accounting body should help the auditors in Jordan to adopt CAATTs by developing training programs and organising conferences to disseminate knowledge among all auditors about importance of adopting CAATTs. Nonetheless, it should be noted that the survey was conducted between December and January which may have not been an appropriate time to collect data from the auditors because they would be busy preparing audit reports during this period. For future research, it is suggested that the use of Generalized Audit Software (GAS) among internal auditors or information technology auditors is examined by using the Technology-Organization-Environment (TOE) framework.

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter provides an overview of the study. It begins by presenting the background of the study which later leads to the problem statement. This is then followed by the research objectives, the research questions, and the significance of the study. Finally, the scope of the study explains the boundaries or limitations which helped the present research to remain focused on its main aims.

1.2 Background of The Study

In a dynamic business world, there is an increasing pressure on organizations to become more effective and efficient to continue to grow and perform well in their present competitive environment. In this regard, Information System (IS) has been identified as one of the mechanisms that can be employed to increase the competitiveness of organizations vis-à-vis providing information needed for timely decision-making processes (Kornkaew, 2012). Consequently, many organizations adopt sophisticated Information Technologies (IT) for developing, supporting and strengthening their business operations (Ramamoorti & Weidenmier, 2004), owing to the fact that business growth have become unprecedented over time, and that the call for investments in information systems cannot be over-emphasized (Laudon, 2016).

Novel trends in global economic and business activities of organizations have necessitated the adoption and use of novel IT for running organizations such as recording

and processing business transactions and improving customer service (Arens, Elder, & Beasley, 2012). Notably, the digital universe doubles every two years (Gantz & Reinsel, 2012) and the increase of data volume, variety and complexity of the audit clients events has led to severe difficulties and challenges to the auditors' work (Khorwatt, 2015). Inevitably, business risks comes with attendant specific risks that may have to be faced by accounting information systems (Ahmi, 2012). Some of these risks are data errors caused by computer usage in preparing financial and accounting reports, fraud, and violation of internal control systems (Abu-Musa, 2004). Auditing is a means which is needed and used to ensure that accounting documents do not contain errors, misstatements as well as possible irregularities. Therefore, by computer assisted audit tools and techniques (CAATTs) are expected to enhance the efficiency and effectiveness of the auditing operations (Ahmi & Kent, 2013).

In response to the challenges of the rapid progress in the use of IT in auditing, the International Audit Standards persuade auditors to adopt the CAATTs to improve audit quality (Janvrin, Lowe, & Bierstaker, 2008). This is because, the usage of CAATTs become a fruitful choice for some businesses and important part of modern-day auditing processes (Asgari, Soleimanian & Goli, 2013). Meanwhile, even though it has been described as a computer-based tool and related technique needed for audit procedures (Singleton & Flesher, 2003), little of auditors known about the benefits of the use of the CAATTs (Mahzan & Lymer, 2008). Interestingly, apart from reducing auditing costs, CAATTs can also assist auditors to concentrate on business undertakings that can be considered as highly risky (Braun & Davis, 2003; Debreceeny et al., 2005). Additionally, CAATTs make auditing more efficient and effective by the transformation of manual auditing into automated auditing (Banker, Chang & Kao, 2002; Rosli, Yeow & Siew,

2012).

With regards to the benefits of using IT-based audit systems as against manual audit systems, it is posited that manual audit systems cannot immediately recognize important discrepancies as can be easily done by IT-based systems (Chang, Wu, & Chang, 2008). In addition, the time consumed in performing audit tasks manually may affect the efficiency and effectiveness of the auditors, thus making their work look monotonous (Bierstaker, Burnaby & Thibodeau, 2001). Therefore, using CAATTs ensures the early completion of the large numbers of transactions in time as CAATTs have the capability to analyze substantial volumes of data with attendant ability to identify errors (Ciprian, 2014; Mahzan & Lymer, 2008).

For efficient and effective delivery of audit services, auditors are compelled by recent audit standards to utilize CAATTs in performing their audit functions (SAS No. 99; PCAOB, 2010; AICPA, 2006). This is because companies are moving towards IT-based business transactions, and the need to perform audit functions that are IT-based cannot be over-emphasized; hence, there is a need for automated accounting information systems.

IT-based audit systems have become a critical issue in the audit profession, which indeed needs to adopt and use the CAATTs for auditing purposes (Rosli et al., 2012). Additionally, the use of computers has influenced the way accounting transactions are processed, ranging from the absence of input documentation to the lack of visible (hard copy) transactions (Pangcoga, 2012). By eliminating the traditional paper version of the audit trail, new accounting technology has created the need for new audit techniques to ensure the integrity of computer-based accounting systems; thus, CAATTs have been created to address this (Al-Farah, 2011; Lala, Gupta, & Sharman, 2014).

In view of the quest and need for continuous technological improvements, it has been noted that the CAATTs have aided accountants all over the world in conducting audit functions (Pedrosa, 2015). The users have also noted that the CAATTs are easy to use as they usually come with guide books (Vit, 2014). In fact, the invention of CAATTs was the most significant event in the history of auditing (Singleton, 2010). However, the stage of adoption of CAATTs and their uses are negligible and have not been used widely by many public account auditors at the firms (Curtis & Payne, 2008; Ahmi, 2012; Widuri, 2014; Mahzan and Lymer, 2014; Zainol et al., 2017). This could be due to the budget constraints of most organizations (Curtis & Payne, 2008) as there are huge expenses and challenges related to the adoption and implementation of the CAATTs such as software licensing cost, training cost, hardware cost, time and support from management, usage difficulty, required technical knowledge about generalised audit software (Ahmi, 2012).

It has been evident that the adoption and implementation of CAATTs have not been easy. For example, the Jordanian audit firms have faced obstacles in the adoption and usage of CAATTs. Some of these obstacles are exemplified by the current state of auditing education and training, perceived technical and financial challenges, inept professional bodies and commercial laws related problems, and auditing market environment related obstacles (Al-Farah, 2011). In addition, there is also a lack of knowledge about CAATTs among Jordanian auditors as they perceive that the usage of CAATTs is not easy (Mansur, 2016).

1.3 Problem Statement

Auditors around the world have been exposed to a myriad of litigations owing to financial scandals which have led some large companies being declared bankrupt. Interestingly, most of these scandals were caused by shortfalls in the inability of auditors

to detect misstatements and fraud, and also the inability of the auditors to give a fair and accurate description of the financial statement about the accounts of the companies they audited (Rajapakse, 2015). It is noted that financial statements are sometimes not a true reflection of the state of affairs of the companies; hence they are characterized by suspicion (Al-Materneh, 2011).

Presently, Jordan is witnessing gradual positive actions toward readiness to embrace information and communication technology (Al-Shboul & Alsmadi, 2010). Many initiatives have been established with efforts towards implementing computer-based accounting information systems (AIS) among Jordanian business organizations, e- business, developing legal support and engagement with International Standards on Auditing (ISAs) and International Financial Reporting Standards (IFRS) (Al-Farah & Al-Shaar, 2015). In spite of such actions that should give Jordanian auditors the motivation to use these modern auditing methods, such initiatives have not been able to promote CAATTs among Jordanian auditors. Hence, from general observation, it can be said that most Jordanian auditors have yet to fully embrace the use of CAATTs (Al-Farah, 2011).

In recent years, fraud emerged as one of the reasons causing the loss of billions of dollars for most companies (Lala, Gupta & Sharman, 2014). Thus, audit environment increased the responsibility and workload of auditors, including the responsibility in detecting fraud through the implementation of the audit process as required by SAS No. 99 and ISA No. 240 (Sarwoko & Agoes, 2014; Aobdia, Lin & Petacchi, 2015). Interestingly, many Jordanian companies are still involved in the practices of fraud such as tax evasion, fraud and manipulation of financial statements, obtaining financing from banks and reduction of dividends to shareholders in their accounting operations which harm the interests of the users of accounting information (Abbadi, 2015). Therefore, almost all auditors agree that a key tool in conducting audits, especially fraud and IT

audits, calls for the use of CAATTs (Singleton, 2010; Giles, 2013; Olasanmi, 2013).

Although the benefits of CAATTs in the auditing process, audit standards encourage the use of technology-aided up-to-date auditing techniques in the auditing companies as previous studies have shown that auditors rarely utilize CAATTs (Janvrin, Bierstaker & Lowe, 2009; Ahmi & Kent, 2013; Omonuk, 2015; Curtis & Payne, 2014; Zainol et al., 2017). In addition, a limited numbers of academic studies conducted sought to aid a more thorough understanding of the issues of the adoption of CAATTs. These studies were conducted within the context of the developed countries (Bierstaker, Janvrin & Lowe, 2014; Ramhit, Jugurnath & Ramen, 2015). Review of literature of CAATTs has consistently suggested the importance of the Unified Theory of Acceptance and Use of Technology (UTAUT) as a key determinant in the adoption or usage of CAATTs (Zainol et al., 2017). Prior studies have revealed inconsistent results of this relationship (Tumi, 2013; Mansour, 2016; Curtis & Payne, 2014; Mahzan & Lymer, 2014; Janvrin, Lowe & Bierstaker, 2008; Pedrosa, 2015; Zainol et al., 2017). Therefore, it is crucial that further investigations should be carried out to explore the most critical factors which have led to these inconsistencies (Hameed & Counsell, 2012).

With regard to the role of trust, UTAUT was criticized for failing to include this factor in its conceptualization (Wu, 2011; Alharbi et al., 2014). The adoption of CAATTs still faces various challenges. Trust has an important role in the adoption of a new technology, and lack of it can become a serious block for acceptance of any technology (Ketkar et al., 2012). Nevertheless, it has not been addressed in relation to the adoption of CAATTs despite numerous studies focusing mostly on how to increase trust in the adoption of technology. Therefore, the present study aimed to propose a revision of UTAUT within the gamut of CAATTs by incorporating trust into the conceptual framework of the study.

1.4 Research Questions

The present research aimed to investigate the extent of the full adoption of CAATTs among external auditors and the current state of the adoption of CAATTs in Jordan. Specifically, the study sought to address the following research questions:

1. What is the current state of CAATTs adoption among Jordanian external auditors?
2. Are there a relationship between facilitating conditions, performance expectancy, trust, effort expectancy, and social influence with intention to adopt CAATTs?
3. Are there a relationship between trust with performance expectancy and effort expectancy?

1.5 Research Objectives

The main aim of this study was to examine the factors affecting the intention to fully adopt CAATTs among external auditors and the current state of adoption of CAATTs in Jordan. To achieve this, the study sought to:

1. Explore the existing adoption of CAATTs among Jordanian external auditors.
2. To examine the relationship between facilitating conditions, performance expectancy, trust, effort expectancy, and social influence with intention to adopt CAATTs.
3. To examine the relationship between trust with performance expectancy and effort expectancy.

1.6 Significance of the Study

The present study is significant especially within the context of Jordanian auditing practices. This is because firstly, this study explored the current state of adoption the Computer assisted Audit Tools and Techniques (CAATTs) among external auditors working in national, international, and the Big 4 audit firms in Jordan. The present study was conducted as a result of the lack of research on the level of adoption of CAATTs in Jordan. To date, only two studies examined the adoption and usage of CAATTs within the context of Jordanian auditing practices. The first one had been conducted by Al-Farah (2011) who studied the use of CAATTs among the audit managers working in 26 audit firms in Jordan. The second study was conducted by Mansur (2016) who studied statutory auditors in Jordan. Undeniably, there is a scarcity of information about the adoption of CAATTs among Jordanian external auditors. Therefore, the present study sought to explore the actual level of adoption of CAATTs and identify the types of CAATTs adopted among Jordanian auditors. This would be important for future research which aims to study related adoption of CAATTs in the context of Jordanian auditing practices.

Second, over the past 10 years, fraud have caused great losses to the economy throughout the world. According to an investigation conducted by the Association of Certified Fraud Examiners (ACFE) in 2010, global enterprise losses resulting from fraud amounted to more than US\$2.9 trillion dollars. However, at the time the present study was conducted, Jordanian companies were still involved in fraud practices. Thus, the present study would encourage the Jordanian external auditors to adopt CAATTs which would enable external auditors to concentrate on business undertakings that are highly risky, fraud detection, and enhance audit quality.

Third, the study explored factors affecting the intention of Jordanian external auditors to adopt of CAATTs. The study conceptualized a framework which could help

explain the attitude of auditors about their intention to adopt of CAATTs based on the UTAUT theory that included the following factors: (1) performance expectancy; (2) effort expectancy; (3) social influence; and, (4) facilitating condition. In addition, there was the addition of trust as a new factor in the context of AIS and CAATTs. This would significantly add new knowledge to the literature. In other words, this empirically informed framework would extend the body of knowledge of the adoption of CAATTs.

1.7 Scope of The Study

The primary focus of the present research was to determine the constructs affecting the intention to fully adopt CAATTs. The study concentrated on external auditors in Jordan. The factors examined were performance expectancy, effort expectancy, social influence, facilitating conditions, and trust. Furthermore, the study was limited to Jordanian external auditors (98) working in the Big 4, international, and national firms in the north, middle, and south of Jordan. These locations were selected for the present study because of the high number of auditors working in these areas especially in the middle region where the capital city of Jordan is located.

1.8 Definitions of Terms

Performance expectancy: is the degree to which an individual believes that using the system will help him or her to attain gains in a job (Venkatesh et al., 2003).

Effort expectancy: is the degree of ease associated with the use of the system (Venkatesh et al., 2003).

Social influence: is the degree to which an individual perceives that significant others believe he or she should use the new system (Venkatesh et al., 2003).

Facilitating conditions: is the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system (Venkatesh et al., 2003).

Trust in technology: a user's belief that the technology has attributes beneficial to the user, will have in a dependable manner and in the interests of the user, and will perform according to the user's expectation (McKnight, Choudhury, & Kacma, 2002).

Computer Assisted Audit Tools and Techniques: CAATs are computer tools that extract and analyze data to assist auditors in the completion of an audit, it including five types, test data, parallel simulation, integrated test facilities, embedded audit module, generalised audit software (Braun & Davis, 2003).

Intention to adopt: as a set of influences namely technological, organizational, professional, personal and external, those being composed of individual attitudes toward to perform certain behaviour and prediction of future behaviour.