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Predictors of Auditors' Usage of CAATs: The Role of Top Management Support and Trust

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Abstract: Current businesses are shifting towards e-business and adopting computerized accounting information systems. These changes affected the audit profession's performance in IT audit, financial reports by auditing, and tracing e-source documents. Usage of Computer Assisted Audit Techniques (CAATs) is dominated by developed countries among large-scale companies. Few studies examined the adoption among small auditing public firms. Therefore, this study developed and proposed a new adoption framework based on a unified theory of acceptance and use technology (UTAUT) and social exchange theory (SET) to examine the factors that influence the adoption of CAATs in the context of Jordanian public firms. The study obtains data from 173 auditors working in Jordanian audit firms. This study analyzes the data using AMOS. The results show that performance expectancy (PE), effort expectancy (EE), social influence (SI), facilitating condition (FC), and trust all positively influence the auditors' use of CAATs (AUC). The auditors' use of CAAT positively influences perceived audit performance. Top management support moderated the effect of PE, EE, SI, FC, and trust on AUC. Auditing courses should pay attention to the usage of technology in this profession.

Keywords: CAATs, Auditing, UTAUT, Social Exchange Theory, Top management support.

1 Introduction

The business world increasingly employs electronic techniques and gets rid of paper-based methods, so it is important for auditors to shift toward audit techniques that are more suitable [1]. In this regard, audits should begin focusing more on technology-based detection and prevention [2]. Several technological tools have been developed to help auditors in their auditing tasks; for instance, CAATs have been proposed to help auditors to do work on computerized accountancy data, while General Audit Software (GAS) has been developed to assist auditors in analyzing and auditing through the use of extracted data from different applications [3]. GAS covers tools that allow data extraction from the system of the client after which data is analyzed through statistical analysis and audit expert systems [4]. In addition to the services of GAS, CAATs offer various potential uses, primarily among which is an audit tool to enhance auditing effectiveness and efficiency [2], [5], [6].

CAATs are deemed to be current technologies that assist both internal and external auditors in auditing performance, tests, and tasks as evidenced in prior studies [3], [7], [8]. The systems range from simple processes (e-working papers) and statistical analysis software to artificial intelligence tools that foresee breaches or failures in financial statements [9], [10]. Despite the benefits of CAATs, few of the small companies in public auditing firms are using the software [1], [11]. The perspective of auditors' adoption of CAATs has been examined in limited studies [12], [13], [14]. In addition, few studies examined the adoption of CAATs in developing countries [2].

In Jordan, the corporate community is progressively embracing ICT. As a result, the government has built a legislative framework supporting IFRS and ISAs [15]. Nevertheless, notwithstanding the initiatives that have been brought to boost the Jordanian auditors' use of the latest audit methods, such as CAAT, several reports concerning world trends showed minimal CAATs adoption among auditing firms in Jordan [16]. Owing to the potential advantages of CAATs and public demand for quality auditing processes, it becomes pertinent to shed light on the CAAT's acceptance and adoption drivers. This is because such understanding has specific implications on the accounting education and profession in Jordan that are desirous to improve audit effectiveness and efficiency [13], [14], [17].

There are several adoption theories that can explain the adoption of CAATs. However, one of the highest explanatory powers is UTAUT, which was developed by [18]. UTAUT includes four main concepts of user intentions to use an information system (IS). Those concepts are PE, EE, SI, and FC, and expected these variables to have a significant

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effect on the auditors' use of CAATs (AUC). UTAUT is applicable at the individual rather than firm-level [19]. Along with UTAUT, the Social Exchange Theory (SET) indicates that trust is critical for any adoption [20]. However, limited studies combined UTAUT and SET and included trust as a variable [19]. Using a survey method, previous studies on CAATs [4], [21], [22] find that auditors lack trust in utilizing CAATs while being aware of the potential advantages, and that auditors lack technical competence when confronted with technological obstacles.

Therefore, despite several past studies on the CAATs use among auditors, there are still some gaps that need to be filled. Studies in literature largely focused on major accounting firms that possess ample resources that complement CAATs [23], [24]. There are a few studies focused on small public accounting firms [2]. In Jordan, a limited number of public firms are using CAATs. In addition, prior literature focused on a different set of factors such as cost, training, and technical factors while behavioral factors such as those in UTAUT have been examined by few studies [17], [22], [24].

The impact of innovation usage on perceived audit performance (PAP) reveals conflicting results [25], [26]. Thus, more investigation on innovation usage and its impact on the PAP is necessary in order to gain more understanding of CAATs usage in audit firms. This study is conducted in Jordan because developing countries such as the Arab world have neglected issues on AUC and its impacts on PAP [27]. Furthermore, previous studies also have given very limited attention to the possible improvement of PAP as a result of AUC. This research presents a new framework that incorporates individual context. The study adapts the UTAUT framework and SET as the underpinning theory. The independent variables include PE, EE, FC, SI, and trust. Moreover, based on past studies [28], top management support (TMS) moderates the relationship between variables of UTAUT and AUC. The present study investigates the role of TMS as the moderator on the relationships between UTAUT factors and AUC. It has been challenging to grasp the impact of the many elements affecting the AUC due to the inconsistencies in the findings of prior research. This theme has led scholars to explore factors that potentially explain such inconsistencies [29], [30], [31], [32]. Therefore, the exploration of the moderating role of TMS may help resolve the inconsistency in previous studies.

Individual context is taken into account in this study's new approach. The research uses the UTAUT framework and the SET theory as its foundation. PE, EE, FC, SI, and trust are independent factors. The association between UTAUT characteristics and AUC is moderated by TMS, according to previous research [18]. In the next section, the literature is reviewed, and the methodology is discussed. The findings followed by the discussion and implications as well as the conclusion are elaborated.

2 Literature Review

2.1 Adoption of CAATs

Studies in the field of CAATs' adoption focused on establishing a link between ease of use and adoption [23], [24]. Studies focusing on internal audit departments among the companies to adopt audit software [1], [12], [17]. Studies also covered the Big 4 and non-Big 4 [33], [34]. The unit of analysis in all of the studies was the individual with the exception of some studies which focused on the organization level in the audit firms [5], [6]. In most of the studies, a single respondent, such as audit partners, audit managers, or supervisors, was used to fill in the instruments on behalf of the whole audit firm. Audit standards strongly recommend the use of CAATs [1], [2], [8], [17] because of the difficulties posed by the fast development of client technology. But new studies show that CAAT use is quite modest [2]. UTAUT framework provides a strong base for the study of Information Systems Usage. Evidence shows that AUC is influenced by UTAUT factors [17], [22], [24]. This study will extend the UTAUT factors and include the trust and TMS to better explain the AUC.

2.2 Theoretical framework

The determinants of auditor CAAT utilization are examined in this research. A thorough model that takes into consideration the adoption of IS systems is the UTAUT model. In order to forecast a user's behavioral intention and use behavior, UTAUT uses four variables: (i) PE, (ii) EE, (iii) SI, and (iv) FC [18]. Additionally, according to [18], age, gender, voluntariness, and experience are the four main characteristics that modify the correlations between these categories, behavior intention, and behavior of use [18]. Studies using UTAUT managed to explain around 70% of the variance in behavioral intention toward technology use and around 50% of the variance in actual technology use. Past studies' evidence of validity and reliability when it comes to employees' technology acceptance has urged studies to apply the models to consumer behavior [17]. In a related study, [35] incorporated three new constructs to the UTAUT model namely, hedonic motivation, price value, and habit. This addition was motivated by the consumer's inclination to enjoy (hedonic), sensitivity towards price, and habit – all of which are drivers of their decision-making process [36]. The modified result, UTAUT2, successfully explains consumer behavioral intent. In comparison, UTAUT is specified for technology users' adoption. Thus, this study deploys the UTAUT. Additionally, early research and CAATs literature

suggested that there are a number of important variables that affect auditors. These variables relate to system characteristics like TMS or organizations like TMS [17], [22], [24]. These variables can be explained by the SET. Therefore, this study combines UTAUT and SET.

2.3 The Research Model of the Study

This section presents the study’s overall research model based on the high-level model mentioned in the first chapter. This study deployed UTAUT and SET. Accordingly, the study proposes that PE, EE, SI, and FC from UTAUT will have a significant effect on AUC. Trust from SET is expected to affect positively the AUC. Further, the AUC is expected to affect the PAP. The effect of PE, EE, SI, FC, and trust on AUC is expected to be moderated by PAP. Figure 1 presents the conceptual framework of this study.

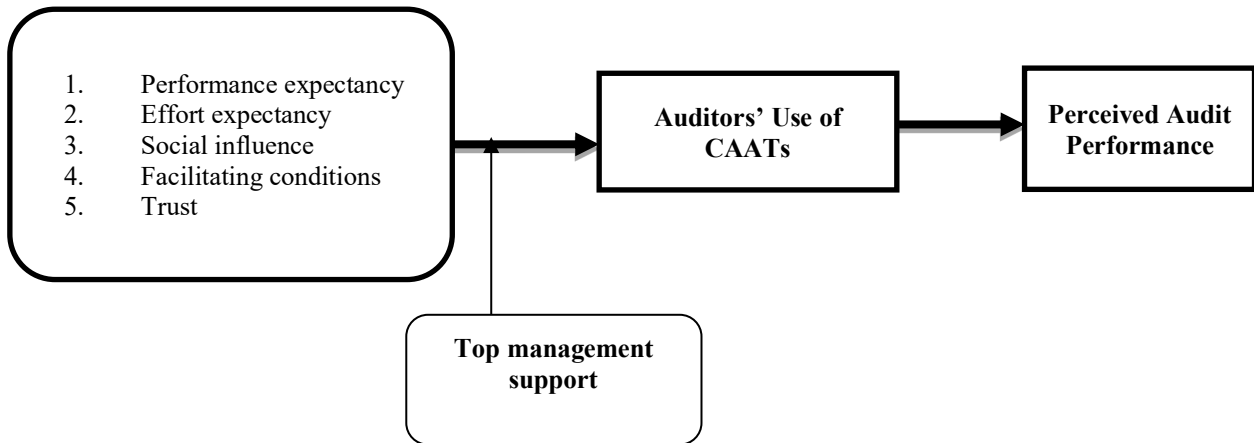


Fig. 1: Conceptual Framework

2.3.1 PE and AUC

Venkatesh et al. [18] referred to PE as the level to which an individual is convinced that using a certain tool can assist in achieving job performance gains. In the context of auditing, auditors who are convinced that CAAT adoption may improve their productivity in auditing and the quality of audit work will have a positive attitude towards adopting it [8]. In major audit firms, CAATs usage minimizes audit time required for preparing working papers [36]. Such use also improves the profession’s decision-making process as electronic presentation of accounting data is used [36]. Along the same line of benefits, auditors’ conviction that CAATs use will enhance the audit tests of controls and substantive testing efficiency is more likely to lead to increased CAATs use [37]. Moreover, the PE construct is described as the level of conviction of the user that CAATs use will assist in enhancing the audit job performance. With the increase of the PE of the auditor, his use of CAATs will also increase [38]. Based on the above, it is proposed that Jordanian external auditors’ perceptions of the PE of CAATs will positively influence AUC, it is hypothesized that:

H1. PE has a positive significant relationship with AUC.

2.3.2 EE and AUC

The level of ease related to the tool use is known as EE [39]. In UTAUT, EE is assumed to positively influence usage or adoption [39]. In auditing, the complexity and difficulty faced when using CAATs may negatively affect their adoption among auditors [14]. On the contrary, the complexity of the new technology system may adversely affect its adoption among IS auditors, necessitating relevant training to be provided to the same to resolve the difficulties [24]. E-presentation of accounting information via CAATs assists auditors in reaching decisions [3] and hence, this study thus proposes the following hypothesis.

H2. EE has a positive significant relationship with AUC.

2.3.3 SI and AUC

SI refers to the level to which an individual considers that those important to him think that he should make use of the new tool [39]. In auditing, the auditors’ level of perception of their supervisors’ appreciation and motivation towards CAATs use may influence their adoption of it or otherwise. A positive relationship was also found between social management encouragement and tool use [14], [32]. Management positively responds to problems and quantified opportunities with CAATs as it allows information system auditors to quantify audit evidence on issues highlighted during the auditing process [1], [14]. Auditors have been evidenced to be more inclined towards new audit technology

use (e.g., CAATs) if the partner of the firm is positive about its use [17], [21], [22]. Hence, this study proposes the following hypothesis.

H3: SI has a positive significant relationship with AUC.

2.3.4 FC and AUC

The extent to which a person feels that an organizational and technological infrastructure exists to facilitate the usage of the system is how FC is defined [18]. In auditing, audit firms that offer effective and sufficient CAAT resources, technical support, and guidelines for usage to their employees boost their employees' use of CAATs. The positive link between FC and AUC was found in previous studies [17], [22], [24], [40]. Thus, it is hypothesized that:

H4: FC has a positive significant relationship with AUC.

2.3.5 Trust and AUC

In a scenario marked by dependency and risk, trust is described as "one individual's readiness to tolerate vulnerability on the basis of positive expectations about the conduct of another [41]. Trust, therefore, plays a key role in technology use among users, but trust has been found to differ from one nation to the next and from one technology type to another. Noteworthy, the UTAUT has been extended by including other factors such as trust, in order to provide a fuller picture of the adoption of CAATs [38]. Financial and non-financial decision-makers alike put their trust in the expertise of auditing companies to provide them with the information they need to make informed choices [42]. Furthermore, the existence of trust between auditors allows a potential adopter to adopt CAATs into the adoption process. This is because auditors are full of confidence in CAATs [38]. This leads to the formulation of the following hypothesis:

H5: Trust has a positive significant relationship with AUC.

2.3.6 PAP and AUC

IT has permeated the audit work performance, leading to the development of sophisticated tools like CAATs. Several vocational standards created for instructing, guiding, and organizing the methods of system handling while auditing in IT have been proposed. Indubitably, technology-based auditing enhances the external audit processes' efficiency and capability. In such processes, the time required is reduced for the performance of missions, audit costs are mitigated, the quality of audit services is enhanced, risks are minimized, and profitability is increased among audit offices along with market shares [43]. The degree to which an auditor thinks that applying the CAATs helps him or her to achieve increases in work performance may be used to characterize an auditor's performance in terms of UTAUT criteria. This makes the perceived audit performance more effective. Utilizing IT is crucial since audit technologies have the potential to enhance PAP [6], [25]. Therefore, the best AUC occurs when audit firms use current technology, which eventually raises their PAP. As a result, it is anticipated that AUC would positively affect PAP. This suggests the following idea:

H6: AUC has a positive effect on PAP.

2.3.7 The Moderating Role of Top Management Support

The top management of a company has the authority to encourage the coordination and communication necessary for the planning and adoption of technology among their staff [38]. TMS is basically top management's participation in and role in supporting the implementation of CAATs. It has been discovered that top management involvement in an ICT project at a public accounting firm improves the decision-making process for purchasing and deploying technology [4], [23], [24]. [44] investigates the moderating impact of TMS on the link between internal audit effectiveness and information technology use. The results showed that TMS had a moderating effect. This research thus anticipates that TMS will mitigate the impact of PE, EE, SI, FC, and trust on the AUC of Jordanian auditing companies. Therefore, it is assumed that:

H7: TMS moderates the effect of PE on AUC.

H8: TMS moderates the effect of EE on AUC.

H9: TMS moderates the effect of SI on AUC.

H10: TMS moderates the effect of FC on AUC.

H11: TMS moderates the effect of trust on AUC.

3 Methodology

This study focuses on predicting the factors that significantly account for variance in auditors' use CAATs. The population of this study is auditors from 194 non-Big4 in the capital of Jordan i.e., "Amman". According to the records

of the Jordanian Association of Certified Public Accountants (JACPA). The majority of Jordanian audit firms are located in Amman. For the purpose of this study, the samples include the population. This approach is adopted because of the small population size of 194 non-Big4. The JACPA provides addresses for all active audit and non-active audit firms in Jordan [45], [46], [47], [48]. The data was collected using a questionnaire. The measurement of PE, EE, SI, and FC was adopted from [49] These variables were measured using a five-Likert scale where one refers to strongly disagree and five refers to strongly agree.

TMS was adopted from [38], and trust was adopted from [20], [48]. AUC was adopted from [49] while PAP was adopted from [50]. All the variables were measured using five points Likert scale which ranged between one and five and represent strongly disagree to strongly agree respectively. The study validated the instrument, and a pilot study was conducted. All the Cronbach's Alpha of the variables is greater than 0.70. The field data collection was conducted by sending emails to auditors. A total of 194 were sent. In total, 178 responses were collected after following up. This study uses SPSS and Smart PLS for data analysis. The missing values were checked. There is no missing data and is this because the required function was deployed. In addition, the outliers were checked, and five responses were identified as outliers. This has made the complete responses account for 173. If the Skewness and Kurtosis values are less than 1, as recommended by [51], then the data have a normal distribution. Due to the fact that the tolerance is more than 0.20 and the VIF is less than 10, there is also no multicollinearity problem.

4 Findings

This section discusses the background of the respondents and the assessment of the SMART PLS.

4.1 Profile of the Respondents

This research included responses from 173 participants in total. There are male responses (90.5%) with ages between 26-35 (68.6%), and education of bachelor's degree (95.1%). The largest percentage of the respondents have experienced between five to 10 years (55.3%) working as supervisors (60.6%) or audit managers (32.7%). All the respondents have a professional qualification such as CPA, ACPA, JCPA, and CMA and work for non-big 4 auditing companies in Jordan.

4.2 Measurement Model

Evaluating a measurement model includes looking at things like factor loading, Cronbach's alpha, composite reliability, average variance extracted, and discriminant validity. Due to poor factor loading, several items were eliminated. Table 1 demonstrates that the CA and CR are more than 0.70. The average extracted variance (AVE) is higher than 0.50, achieving convergent validity. The discriminant validity is also attained since, as indicated in Table 1, the root square of AVE is greater than the cross-loading.

Table 1: Assessment of Measurement Model

Variables	CA>0.70	CR>0.70	AVE>0.50								
FC	0.91	0.91	0.72	0.87							
PE	0.92	0.92	0.76	0.15	0.690						
AUC	0.72	0.73	0.57	0.59	0.070	0.87					
EE	0.93	0.93	0.77	0.49	0.090	0.35	0.77				
T	0.87	0.87	0.59	0.43	0.033	0.42	0.32	0.85			
SI	0.90	0.90	0.70	0.35	0.058	0.41	0.38	0.38	0.84		
TMS	0.88	0.88	0.66	0.31	0.183	0.33	0.23	0.21	0.21	0.81	
PAP	0.93	0.94	0.78	0.09	0.001	0.05	0.05	0.06	0.03	0.06	0.88

Note: FC: Facilitating condition, PE: performance expectancy, AUC: Auditors' use of CAATs, EE: Effort expectancy, T: trust, SI: Social Influence, TMS: top management support, PAP: Perceived Audit Performance.

Therefore, the measurement model is valid, and the next section discusses the structural model.

4.3 Structural Model

For assessing the structural model, the R-square was examined. The R square shows that the variables are able to explain 43% of the variance in the AUC. The predicting relevance or the Q-square is greater than zero. The path coefficient which is the hypotheses testing is examined and shown in Table 2. For the F-square, the effect size is shown

in Table 2. This study proposed direct effect hypotheses and moderating hypotheses. This section discusses the hypotheses.

Table 2: Result of hypotheses testing

	IV	β	Std.	T	P	f^2	Label
1	PE	.120	.055	2.158	.031	0.05	Supported
2	EE	.141	.047	2.999	.003	0.07	Supported
3	SI	.307	.052	5.942	.001	0.08	Supported
4	FC	.122	.050	2.421	.015	0.07	Supported
5	T	.102	.052	1.976	.048	0.04	Supported
6	AUC	.416	.071	5.854	.000	0.16	Supported

The study's first hypothesis asserted that PE had a favorable impact on AUC. The results in Table 2 demonstrated that PE has a favorable and substantial impact on AUC ($\beta = 0.120$, $T=2.158$, $P<0.05$). As a result, the first hypothesis is correct. According to the analysis's results ($\beta = 0.141$, $T=2.999$, $P<0.05$), EE has a favorable and substantial impact on auditors' usage of CAAT. H2 is thus supported. SI had a beneficial impact on H3's AUC, as indicated in Table 2 ($\beta = 0.307$, $T=5.942$, $P<0.05$). H3 is thus supported. FC significantly and positively affects the AUC ($\beta = 0.122$, $T=2.421$, $P<0.05$). H4 is thus supported. Trust significantly affects AUC, according to the results in Table 2 ($\beta = 0.102$, $T=1.976$, $P<0.05$). This suggests that trust is a significant factor that affects the AUC. According to Table 2, the impact of AUC on PAP for H6 is favorable and significant. H6 is thus supported.

In this research, five moderating hypotheses were put out. The moderating impact was produced by multiplying the indicators of TMS by the indicators of the variables using the product indicator approach. Five moderating effects were developed to assess the moderating impact of TMS, as indicated in Table 3.

Table 3: Result of Moderating Effect Hypotheses

Hypothesis	Independent Variable	β	Std	T-value	P-value	Label
H7	TMSxPE	.151	.050	7.809	.018	Supported
H8	TMSxEE	.133	.040	3.206	.035	Supported
H9	TMSxSI	.214	.049	4.421	.000	Supported
H10	TMCSxFC	.137	.052	2.683	.045	Supported
H11	TMSxT	.110	.044	2.503	.012	Supported

TMS moderated the effect of PE on AUC because the moderating effect of TMS*PE is significant ($\beta=0.151$, $T=7.809$, $P<0.05$). Thus, H7 is supported as shown in Table 3. For H8, the effect of EE on AUC was moderated by TMS ($\beta=0.133$, $T=3.206$, $P<0.05$). Thus, H8 is supported. For H9, H10, and H11, the effect of SI, FC, and T on AUC was moderated by TMS. This led to the conclusion that TMS moderated the effect of SI, FC, and T on AUC, and H9, H10, and H11 are supported.

5 Discussion

AUC was analyzed in relation to PE, EE, SI, FC, and T. According to the results, AUC is significantly affected. The results show that an increase in PE, EE, SI, FC, and T will result in a rise in AUC. These results are consistent with those of another research [17], [22], and [24], which found that PE, EE, SI, and FC all increased AUC. The purpose of this analysis was to identify the effect of AUC on PAP. Therefore, the data analysis supports the idea that AUC has a beneficial impact on PAP. This suggests that a rise in AUC will also improve how well an audit is thought to have been conducted.

Multiple empirical research has shown similar findings; therefore, this is a solid conclusion [19]. This sort of variable allows the influence of an independent variable to be transmitted to a dependent variable, thereby elucidating the links between the two [8]. Many studies [14], [22–24], [52] have shown that technology users have an impact on user behavior, which may be associated with heavy use. All respondents believed that CAATs have had a good influence on the PAP of audits, suggesting that the AUC increases the efficacy and performance of the audit function. Furthermore, the findings of this research highlight the importance of the fact that the quality of work affects the use of CAATs.

Potentially useful information might be gained by investigating similar justifications in further studies. CAATs provide cost savings and an intuitive interface, making them a viable option for individual auditors who want to streamline their auditing processes.

TMS was also shown to favorably moderate the influence of PE, EE, SI, FC, and Trust on AUC. Due to the moderator's presence, we know that when the moderator's level (TMS) rises, the beneficial influence of PE, EE, SI, FC, and T on AUC will rise as well. This moderating impact of TMS is consistent with previous research showing that the presence of TMS may moderate the relationship between the UTAUT factors and behavioral intentions [25], [46]. It has been observed that high levels of TMS provide an environment that is conducive to PE success. Similar results have been seen in prior research [44].

6 Implications

The knowledge base on AUC was expanded by this research. The research verified that the UTAUT model is useful for software sales professionals in the commercial world. Using UTAUT to explain the AUC was shown to be valid, as shown by the results of this research. Almost half of the variance in AUC could be accounted for by combining UTAUT and SET, and both models were valid. As a result of this research, the UTAUT hypothesis was expanded to include additional factors like TMS and Trust. A trust variable was added to the preexisting UTAUT model when it was discovered in the literature study that earlier researchers had ignored the impact of trust. From this, we may deduce that trust is essentially a valuation of one's trustworthiness. An increase in AUC may be achieved via the cultivation of trust.

The inclusion of TMS as a moderator in the association between (PE, EE, SI, FC, T) and AUC is another theoretical advance made by this research. This research also added to the body of knowledge by stating that successful auditors may establish a reputation via PAP because clients like auditors with a good standing while simultaneously hoping to establish a solid reputation through effective auditing. On the other hand, empirical evidence proved that AUC strengthened the significance of PAP. This study made a contribution by providing insights and understanding of audits' CAATs use. It has extended the literature on CAATs, particularly from the point of view of practicing auditors. In comparison to the present technology, it appears that the use of CAATs has remained low, with audit firms slow to adopt new technology although it has been developed particularly for them. This is a surprising result considering the notable increase in IT use in day-to-day life aspects.

From a practical perspective, decision-makers are advised to use CAATs in order to achieve effective and efficient audits. TMS is critical for improving the usage of CAATs which in turn can play a critical role in improving PAP. Therefore, decision-makers have to encourage the support of management for the usage of CAATs. Education should be provided in light of practical training on CAATs to such auditors. However, rather than integrating the course into the present accounting curriculum, it is crucial to introduce practical courses. Decision-makers can make use of the study to evaluate new technology acceptance from PE, EE, SI, FC, and T as well as TMS. Spreading positive word of mouth about the benefits of CAATs will encourage more auditors to use the technology.

7 Conclusion

This study examined the predictors of using CAATs by auditors in Jordan. The study collected adequate responses and presented the findings which showed that PE, EE, SI, FC, and T are critical for the usage of CAATs by auditors. The study also found that TMS is an important moderator between PE, EE, SI, FC, T, and the AUC. These findings are limited to external auditors in Jordan thus, generalization of the findings must be only on the auditors' population in Jordan. Information technology (IT) expertise and its relationship to adoption behavior was not a data collection priority for this study. It is hypothesized that one's level of IT expertise may influence the effects of other motivating factors. One may argue that the readiness of the other party's CAAT is a prerequisite for a company's adoption of this technology when it is driven to utilize CAATs in audit companies. Without making any comparisons to other countries, this paper examines the setting in which Jordan operates. This comparison has the potential to provide light on the usage of CAATs and their influence on PAPA, therefore enhancing the auditing process, and should be the subject of future research.

Conflict of interest

The authors declare that there is no conflict regarding the publication of this paper.

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