The Effect of IT Facilities Resources, IT Training Programs, and The Audit Firm's Management on Using CAATTs

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Abstract:

Purpose **–** Computer-assisted auditing tools and techniques (CAATTs) have become increasingly prevalent in the field of auditing, enabling auditors to enhance the efficiency and effectiveness of their work. This research demonstrates a theoretical background on computer-assisted auditing tools and techniques (CAATTs), IT facilities resources, IT training programs, and the role of audit firm's management in using CAATTs. This study examines the effect of IT facilities resources, IT training programs, the perception of audit firm's management, and the audit firm size on using CAATTs.

Design/methodology/approach **–** The analysis is based on survey data from 349 respondents and the survey was conducted on big and non-big audit firms in Egypt.

Findings **–** The results show that the availability and quality of IT facilities resources, as well as IT training programs, play a crucial role in the successful implementation and utilization of CAATTs. Besides, the audit firm size and the perceptions of audit firm's management have a positive effect on using CAATs. Furthermore, the results reveal that both IT facilities resources and IT training programs have indirect effect in the relationship between audit firm size and using CAATs as well as the relationship between the perception of audit firm's management and using CAATTs.

Originality/value **–** The study produces both theoretical and practical contributions, consequently this research provides valuable insights and implications for professionals, specially audit firm's management, and professional bodies as well as researchers.

Keywords: Audit firm's management – Audit firm size - Computer - assisted auditing tools and techniques (CAATTs) – External auditors - IT facilities resources - IT training programs.

الخلاصة:

الهـدف: أصـبحت أدوات وتقنيـات االمراجعـة بمسـاعدة الكمبيـوتر(CAATTs) منتشـرة بشـكل متزايـد فـي مجـال المراجعـة، ممـا يتـيح للمـراجعين تعزيـز كفـاءة وفعاليـة عملهـم، يقـدم هـذا البحـث فـى البدايـة خلفيـة نظريـة عـن أدوات وتقنيـات االمراجعــة بمســاعدة الكمبيــوتر(CAATTs)، ومــوارد تكنولوجيــا المعلومــات اللازمــة، وبــرامج التــدريب علــى تكنولوجيــا المعلومــات، ودور إدارة مكتــب

المراجعة في استخدام أدوات وتقنيات المراجعة بمساعدة الكمبيوتر (CAATTs)، يلى ذلك دراسة تأثير موارد تكنولوجيا المعلومات، وبرامج تدريب تكنولوجيا المعلومات، وإدراك إدارة مكتب المراجعة، وحجم مكتب المراجعة على استخدام أدوات وتقنيات المراجعة بمساعدة الكمبيوتر.

التصميم/المنهجية: تم تجميع البيانات من خلال توزيع استمارة استقصاء على مكاتب المراجعة الكبيرة وغير الكبيرة (Big and non-big) فى مصر، وتم استجابة عدد ٣٤٩ مراجعاً والتى تم الإعتماد عليها فى التحليل والوصول للنتائج.

النتائج: توصلت النتائج الى أن توافر وجودة موارد تكنولوجيا المعلومات، وكذلك توافر برامج تدريب تكنولوجيا المعلومات تلعب دورًا حاسمًا في التنفيذ الناجح والاستفادة من أدوات وتقنيات االمراجعة بمساعدة الكمبيوتر (CAATTs)، أضف الى ذلك فإن حجم مكتب المراجعة ومدى ادراك إدارة المكتب لها تأثير إيجابي على استخدام تلك الأدوات، كما أشارت النتائج أيضاً الى أن كلاً من موارد تكنولوجيا المعلومات وبرامج التدريب على تكنولوجيا المعلومات لها تأثير غير مباشر على العلاقة بين حجم مكتب المراجعة واستخدام أدوات وتقنيات االمراجعة بمساعدة الكمبيوتر (CAATTs) ، وكذلك العلاقة بين ادراك إدارة مكتب المراجعة واستخدام أدوات وتقنيات االمراجعة بمساعدة الكمبيوتر (CAATTs).

الأصالة/القيمة: يقدم البحث مساهمات على كلاً من المستويين الأكاديمى والمهنى، وبالتالي يوفر رؤى وتأثيرات قيمة للمهنيين- وخاصة إدارة مكاتب المراجعة والهيئات المهنية - وكذلك الباحثين.

الكلمات المفتاحية: إدارة مكتب المراجعة – حجم مكتب المراجعة – أدوات وتقنيات االمراجعة بمساعدة الكمبيوتر (CAATTs) – االمراجعون الخارجيون – موارد تكنولوجيا المعلومات – برامج التدريب على تكنولوجيا المعلومات.

1. Introduction:

The development of information technology has significantly impacted the business environment and consequently the auditing profession (Pedrosa, *et al.*, 2020; Eissa, 2023 August). Although, the challenge of changing from manual, traditional auditing to auditing using IT applications (Gray, *et al.*, 2014), it is no longer practical for auditors to continuously use solely traditional auditing techniques and it becomes essential for audit firms to take action for technology adoption as well as modern auditing software tools must start to be incorporated into the auditing process by auditors (Baxter and Berente, 2010; Mahzan and Veerankutty, 2011).

Features of technology are important when they involve helping users perform tasks (Harrison and Datta, 2007) that change the behavior of the users towards the technology (Griffith, 1999; Harrison and Datta, 2007). Then, with CAATTs, auditors have a great opportunity to use new technological advancements to gather huge amounts of audit-relevant data in real time, automate procedures, and produce a thorough, accurate, and fast guarantee (Xuan and Hoang, 2023).

Furthermore, because the use of technology in auditing is seen as an essential aspect in increasing the efficiency and effectiveness of auditing work, several research on acceptance technology have been conducted during the previous fifteen years (Pedrosa *et al.*, 2020).

1.1 Research gap:

Several previous studies have published and emphasized the factors affecting computer-assisted auditing tools and techniques which investigate the business environment factors, the organizational factors, and the individual factors that influence using CAATs. However, there is a lack of research related to the motivations for the successful applying of CAATs. In other words, studies on the effect of IT facilities resources, IT training programs, and the support of audit firm's management on using CAATTs are rarely available, despite its importance not only to accept advanced technology but also to encourage the actual use of it. Consequently, it is still required to conduct more in-depth research related to the motivations for successful usage of computer-assisted auditing tools and techniques, especially in developing countries. In particular, expectations of audit performance are positively impacted by the auditors' usage of CAAT (Daoud, 2023).

On the other side, some studies investigate the training programs as part of facilities resources (Janvrin *et al.*, 2009; Abdul Ghani, *et al.*, 2023), to add value, this study distinguishes between these two variables. The discrimination between IT facilities resources and IT training programs may lead to different findings. Besides, the main responsibility of top management of audit firms is to provide the facilities and training programs (Eissa, 2023 August).

1.2 Objective of the study:

IT adoption and using CAATTs by both audit firms' management and auditors depend on the awareness of its importance in improving the auditors' performance (Mansour, 2016; Handoko *et al.,* 2018). Likewise, Eissa (2023 August) has referred that using technology developments by auditors requires IT awareness and sufficient knowledge and skills. Furthermore, the study of Allami, et al. (2024) has concluded that IT proficiency mediates the influence of IT awareness on IT adoption, as well as IT confidence mediates the effect of IT proficiency on IT adoption. According to Allami, et al. (2023), IT proficiency is the level of skills and knowledge required to carry out IT audit tasks competently, while IT confidence refers to the level of certainty and trust that an auditor has in their ability to effectively use information technology tools and software in their work. In other words, ITresources and knowledge and skills are fundamental requirements to use technologyin the auditing profession (Xuan and Hoang, 2023, May).

Because of providing training programs, that improve the auditors' knowledge and skills, and IT facilities, that are needed to enhance using ACCTTs and support IT confidence, is the main responsibility of the audit firm's top management (Eissa, 2023 August), then the main objective of this study is to determine the significance of IT facilities, IT training programs, and the support of audit firm's top management in driving auditor to use CAATTs successfully.

1.3 Significance of the study:

The auditing profession, especially financial auditing, is a principal activity in all economic sectors (Pedrosa *et al.,* 2020). The business environment in which audit firms operate is becoming more competitive (Kuruppu and Oyelere, 2017). According to Eissa (2023 December), the client, competitors, and professional bodies are three variables in the business environment that either directly or indirectly affect the audit firm's philosophy and values as well as the auditors' attitudes and opinions.

The audit clients' data amount, diversity, and complexity have increased dramatically during the past few years which creates significant problems and difficulties for the auditors' work, furthermore, the relevance of IT and CAATs is suggested by regulatory agencies and professional bodies (Pedrosa *et al.,* 2020). Because of using computer-assisted auditing tools and techniques in auditors' work may help to improve the audit's effectiveness and efficiency (Curtis and Payne, 2008; Byrnes et al., 2012; Purnamasari *et al.,* 2022; Thottoli &Thomas, 2022), and audit firm’s digital transformation journey is not the same (Austin *et al.,* 2021), so, it is valuable to spot on the factors that encourage and support auditors to use CAATTs. In particular, most research has focused on the determinants of adoption and implementation of CAATTs and little has consideration on the factors necessary for the successful application of CAATTs.

Additionally, although CAATTs have grown to be an important part of many auditing approaches (Nasrah *et al.,* 2023) and there are many new tools released (Pedrosa, *et al.,*2020), There is a lack of knowledge about these tools and techniques (Nasrah *et al.,* 2023). Then, the main motivation for this study is to improve knowledge of the fundamental role of IT facilities resources, IT training programs, and the audit firm's management that mitigate the difficulties and resistances which may affect using CAATTs.

This research provides a perfect understanding of the factors that support and enhance using CAATTs .The results of the study will also encourage the audit firm's management to invest in IT resources facilities and IT training programs as well as take action to develop the policy of the audit firm and its procedures that spread awareness of the importance of using CAATTs. The results of the study may be used to influence future decisions to use CAATTs by audit firms as well as, professional bodies that enhance the successful use of CAATTs.

The following sections follow this introduction: a literature review that includes the theoretical background and research hypotheses development, research methodology, analysis and findings, and finally the conclusion that involves the limitations and future research as well as the practical implications.

2- Literature Review:

2.1 Theoretical Background:

2.1.1 Computer-Assisted Audit Techniques and Tools (CAATTs):

Computer-assisted auditing tools and techniques (CAATTs) are a type of technological breakthrough in the auditing profession (Nasrah *et al.*, 2023), which are computer tools and techniques that auditors use as part of their audit procedures (Abdul Ghani, *et al.*, 2023). In other wards, computer-assisted auditing tools and techniques (CAATTs) are any technology used to perform the auditing tasks, and to fulfill the objectives of auditing (Sayana, 2003; Pedrosa *et al.*, 2020), and automate these tasks (Abdul Ghani, *et al.*, 2023). These tools and techniques involve data and information used as part of the audit process and the computer programs or applications (Braun and Davis, 2003; Coderre, 2005; Mahzan and Lymer, 2008) that can be used not only in the auditing work process but also in testing the client's information system (Essia, 2023 August). These tools and techniques improve the efficiency as well as the effectiveness of the auditing profession (Abdul Ghani, *et al.*, 2023; Essia, 2023 August).

2.1.2 IT Facilities Resources:

Individuals are having troubles with hardware, software, and technical support that are all related to using information systems. The degree to which a person feels that a technological and organizational infrastructure is in place to facilitate the use of the system is known as the IT facility resources (Venkatesh *et al.*, 2003; Bierstaker *et al.*, 2014). In other words, IT facilities resources represent preparing the organizational environment and IT resources to apply IT and mitigate problems related to using technology (Venkatesh *et al.*, 2003). IT facilities resources include the financial resources for acquiring the technology and maintaining it, the procedures to purchase or develop the technology (Abdul Ghani, *et al.*, 2023), as well as the availability of user manuals or guides for issues and problems caused by the use of new technology (Xuan and Hoang, 2023). In summary, IT facility resources represent features of the IT environment and the organization that are intended to remove barriers of using IT (Venkatesh *et al.*, 2003). According to Xuan and Hoang (2023), facilitating the resources of the organization is one of the aspects that should be focused on in future research.

2.1.3 IT Training Programs:

Because an information system is a system that involves hardware, software, and a communication network, and its design and operations depend on human factors, the auditor's capacity to

use technology should be taken into account in terms of the usage of information systems (Xuan and Hoang, 2023). Especially, recent technological developments, including blockchain technology, artificial intelligence (AI), and big data analytics (Tiberius and Hirth, 2019), have required more advanced knowledge and skills through training.

The end user is interested in the system that helps him to improve his performance without much effort (Xuan and Hoang, 2023); then, auditors are more likely to accept using technology that increases work efficiency (Debreceny *et al.*, 2005), improves audit report quality (Banker *et al.*, 2002), and saves audit time (Curtis and Payne, 2014).

The training program is not only important to increase auditors' awareness of the advantages of technology in the audit process (Xuan and Hoang, 2023) but also to improve their knowledge and skills so the use of technology in the auditing profession should be covered in auditing courses (Daoud, 2023).

2.1.4 The Role of the Top Management of the Audit Firm:

Because the decision to use CAATs is considered a strategic decision (Pedrosa *et al.*, 2020), its responsibility belongs to the top management of the audit firm. In other words, the usage of technology by the auditor must always align with the goals of the audit firm (Xuan and Hoang, 2023). So, promoting auditors to

use CAATTs is a major responsibility of the audit firm's management (Eissa, 2023 December).

For the audit firm, it is important to establish a conducive environment with appropriate conditions for technology use, especially since understanding IT continuance is crucial for the independence of the audit process (Xuan and Hoang, 2023).

Building a conducive environment requires different courses of action that should be taken by the audit firm's management. First, as we mentioned before, using CAATs must be included in the audit firm's policy and its strategic decisions. Besides, creating a sort of obligation to adhere to auditing standards for how to carry out audit tasks in light of technological advancements and to realize how such developments affect their responsibilities (Tarek *et al.,* 2017) as well as technology-related guidelines (Allami *et al.*, 2023).

The second one, the audit firm management has to raise the awareness of auditors about the benefits of using technology in audit tasks (Xuan and Hoang, 2023; Eissa, 2023 August); furthermore, make the rules that encourage auditors to use it. Then, auditors will have the expectation that using technology can lead to prospects for professional growth (Curtis and Payne, 2014), which can be a strong motivation. In particular, it's possible for the auditor to lose its competitive advantage if one or more new auditors have greater experience and are better able to

adjust to technological changes than the current auditor (Xuan and Hoang, 2023).

2.2 Research hypotheses development:

2.2.1 The Effect of IT Facilities Resources:

In practice, before accepting to utilize a technology, people frequently rely on utilitarianism to analyze and consider the possibilities of controlling activities which means that if suffering is reduced they will have a good life, then one of the expectations that users continue to utilize technology in their work is its utilitarian utility (Xuan and Hoang, 2023). It means that the availability of IT facilities resources plays an important role in encouraging auditors to use computerized tools and techniques.

According to Ojaide, et al. (2018), the facilitating condition does not affect CAATs usage. Likewise, Abdul Ghani, et al. (2023), found that the adoption of CAATs is not greatly impacted by IT facilities resources.

However, many studies concluded that the availability of IT facilities and other conditions that support CAATTs has a substantial impact on auditors' intention to use these tools and techniques (Mansour,2016; Handoko *et al.*, 2018; Eissa, 2023August). Over and above that, other studies demonstrated that IT facilities resources are considered one of the primary

factors driving the acceptance and application of CAATs (Pedrosa *et al.*, 2020; Khalil and Olfa, 2020), then, it represents a predictor of using information technology (Venkatesh et al., 2003), as well as using CAATTs (Janvrin *et al.*, 2008).

Furthermore, the study of Xuan and Hoang (2023) has proposed a research model that integrates rational action, represented by perceived usefulness, subjective norm, continuance intention, and empirical response to shape the continuance behavior of auditors utilizing a specific technology. One of its important findings is that auditors' continuous usage of IT is positively influenced by IT facilities resources and when auditors are dissatisfied with the technology they have previously utilized, they will reduce their future conduct. In addition, the study has also ensured that IT facilities resources have control over both the intention of auditors to use technology and their use behavior. From there, the first research hypothesis can be formulated as follows:

H1: IT facilities resources have a positive significant effect on using CAATs.

2.2.2 The Effect of IT Training Programs:

According to the study of Handoko et al. (2019) and the study of Al-Hattami (2023) adopting and using computer-assisted auditing tools and techniques are favorably impacted by auditors' opinions of their perceived benefits and ease of use. And there is a significant

relationship between IT training and perceived benefits (Al-Ansi *et al.,* 2017) as well as ease of use (Kustono, 2022).

Training enhances deep understanding as well as more frequent and varied use, then, training programs are essential for improving staff performance (Allami *et al.,* 2023). The lack of both understanding of the unique capabilities of audit programs and adequate training in IT auditing represents major barriers to adopting computerized tools and techniques in auditing (Thottoli *et al.,* 2022). These barriers are for first-time users and become less for users used to a specific technology (Xuan and Hoang, 2023). According to Thottoli, and Ahmed (2023), IT proficiency has a direct effect on IT adoption, then, auditors with skills related to IT are in great demand due to the growing use of audit software (Kuruppu and Oyelere, 2017) and training is important to enhance knowledge of generalized audit software as an essential for using CAATs (Pedrosa *et al.,* 2020).

Despite the results of Allami et al. (2023) refers that the adoption of information technology in audit is unaffected by competency and IT training programs, as well as the study of Abdul Ghani, et al (2023) reveals that training programs have less significant impacts on the adoption of CAATs, many studies proved that IT training significantly influences the utilization of technologies (Pedrosa *et al.,* 2020; Mujalli and Almgrashi, 2020 December; Awuah et al.,2022; Purnamasari *et al.,* 2022; Thottoli

and Thomas, 2022), because of the role of professional development to help auditors in adapting the developments at audit profession and making efficient use of IT(Allami *et al.*, 2023). According to Daoud (2023), auditing courses ought to focus on how technology is used in this field. Then, the second research hypothesis can be recommended as follows:

H2: IT training programs have a positive significant effect on Using CAATs.

2.2.3 The Effect of The Audit Firm's Management:

Many studies have referred that the decision to use a specific tool may come from top management rather than the auditors (Curtis and Payne, 2008; Pedrosa *et al.*, 2020), and the auditors' acceptance to use technology is influenced by the perceptions of the audit firms' management (Eilifsen *et al.*, 2020). According to Allami et al. (2023), organizational support includes technology-related guidelines, and management's awareness of the benefits of technology use, as well as administrative support. Despite the study of Allami et al. (2023) has concluded that the adoption of information technology in audit is unaffected by organizational support, many studies have reached a different conclusion.

The study of Rosli et al. (2012), as well as Mansour (2016), have concluded that the utilization of computer-assisted auditing

tools and techniques (CAATTs) by auditors is heavily influenced by the top management of the audit firm. The study of Mansour (2016) also referred to the role of top management in creating incentives and promotion standards to encourage and motivate auditors to use it, as well as increasing investments in IT facilities resources and training programs essential for employing these tools and techniques.

The study of Xuan and Hoang (2023) investigated the influencing elements derived from a synthesis of theoretical viewpoints on IT continuance at audit firms, such as rational action and automatic reactions based on experience, followed by empirical testing and concluded that organizational support has a significant impact on continuance using a specific technology in the auditing profession. In particular, the long-term budget for the expenses of using technology greatly affects the audit firm's strategic choice, which in turn has a significant influence on the auditor's continuing behavior.

Furthermore, according to Daoud (2023), the support of top management plays a moderator role and positively influences the effect of performance expectancy, effort expectancy, social influence, facilitating condition, and trust on the auditors' use of computer-assisted auditing tools and techniques. Therefore, the research hypothesizes can be presented as follows:

H3: The perception of the audit firm`s management has a positive significant effect on IT facilities resources.

H4: The perception of the audit firm`s management has a positive significant effect on IT training programs.

H5: The perception of the audit firm`s management has a positive significant effect on using CAATs.

The result of (Ghani and Jahim, 2023) has referred to that there is a significant relationship between organizational resources and the auditors' attributes which includes knowledge and skills in accounting and audit, and IT competency. Despite the facility's resources and training programs resulting from a combination of internal and external factors, top management's perception in the audit firm plays an important role in investing in IT facility's resources and IT training programs. These investments depend not only on the audit firm's perception but also on the availability of financial resources (Eissa, 2023 August) as well as the cost and benefit analysis (Daoud *et al.*, 2021) which depend on the audit firm's size. Additionally, some studies have referred that the big audit firms, as well as audit firms with a large number of auditors, may have incentives to use CAATs (Rosli *et al.*, 2012; Bierstaker et al., 2014; Pedrosa *et al.*, 2020; Eissa,2023August). Therefore, the research hypothesizes are as follows:

H6: The audit firm size has a positive significant effect on IT facilities resources.

H7: The audit firm size has a positive significant effect on IT training programs.

H8: The audit firm size has a positive significant effect on using CAATs.

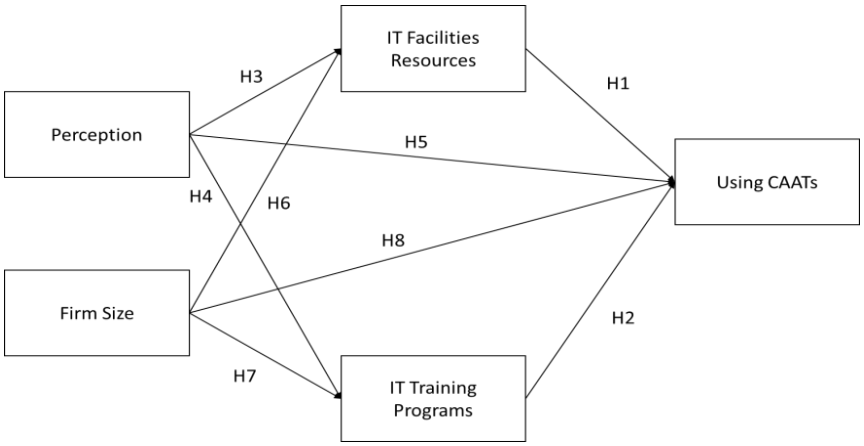
Briefly, the organization's support, as well as the evaluation of the supervisor, for the individual at work reflects either a positive or negative attitude toward them (Rhoades and Eisenberger, 2002; Herda, 2012; Herda and Lavelle., 2012), then, auditors are motivated to use technology by perceptions and supporting of managers at the audit firm (Curtis and Payne., 2014). Besides, big audit firms influence using CAATTs. Based on the above arguments, the research hypothesizes that mediating effect can be formed as follows:

H9: IT training programs mediate the relationship between the audit firm size and using CAATs.

H10: IT facilities resources mediate the relationship between the audit firm size and using CAATs.

H11: IT training programs mediate the relationship between the perception of the audit firm`s management and using CAATs.

H12: IT facilities resources mediate the relationship between the perception of the audit firm`s management and using CAATs.



3- Research Methodology:

This study was conducted experimentally using a survey questionnaire (Appendix A) for auditors at audit firms in Egypt. This questionnaire is prepared depending on other studies (Venkatesh *et al.*, 2003; Pedrosa *et al.*, 2020; Allbabidi, 2021). A five-point Likert scale, with one representing strongly disagree and five representing strongly agree, was used to measure each of the factors except for the size of the audit firm which includes four choices “big 4, big 10, medium, and small”. Out of 410 questionnaires distributed, 349 matched questionnaires were returned with approximately a response rate of 85 %.

According to the demographics of the 349 surveyed respondents around 31.5% and 68.5% were females and males in the sample respectively. Concerning the education level, the majority representing 287 respondents 82.2% held a bachelor's degree, however only 14 respondents 4% were PhD holders. For professional certificate holders, 196 (56 %) had reported that they had no professional certificates while 89 (25.5 %) respondents reported they had the Egyptian Association of Accountants and Auditors and 38 (10.9%) held CMA or CFA, and 26 (7.4%) held others such as CPA and ACCA.

Convenience sampling's many uses were outlined by Berk and Freedman (2003). Time and financial restraints motivate the use of non-probabilistic convenient sampling to pick respondents. In exceptional cases where no list is at hand, a realistic sampling technique is required to find a solution. When the sample size is big enough, generalizations about the population at large can be made from the results. The sample size is calculated in the study article by:

$$n = \frac{z^2 * p * (1-p)}{e^2} = \frac{(1.96)^2 * (0.5)(0.5)}{0.1^2} \approx 96.04 \approx 97 < 349$$

Therefore, the sample needs to exceed 97 respondents to obtain a margin of error of 0.1

4-Results and Discussion:

4.1 Validity and reliability:

Table (1): Reliability and Validity Analysis:

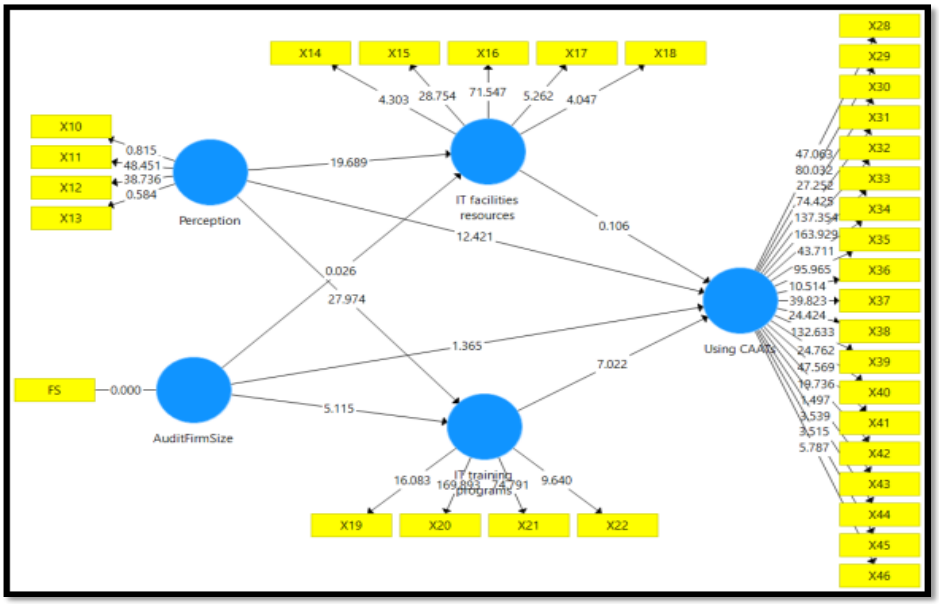
Dimensions	Const.	Loadings	Cronbach's Alpha (CA)	Composite Reliability (CR)	Average Variance Extracted (AVE)
Audit firm size	FS1	0.252	0.852	0.902	0.561
IT facilities	ITF-1	0.569	0.754	0.775	0.509
	ITF-2	0.896			
	ITF-3	0.883			
	ITF-4	0.663			
	ITF-5	0.679			
IT training programs	ITt-1	0.705	0.847	0.936	0.524
	ITt-2	0.801			
	ITt-3	0.825			
	ITt-4	0.803			
Perceptions	P1	0.776	0.903	0.935	0.625
	P2	0.814			
	P3	0.658			
	P4	0.638			
CAATTs	CAATTs1	0.834	0.951	0.957	0.554
	CAATTs2	0.838			
	CAATTs3	0.710			
	CAATTs4	0.765			
	CAATTs5	0.930			
	CAATTs6	0.896			
	CAATTs7	0.833			
	CAATTs8	0.899			
	CAATTs9	0.722			
	CAATTs10	0.811			
	CAATTs11	0.732			
	CAATTs12	0.877			
	CAATTs13	0.768			
	CAATTs14	0.739			
	CAATTs15	0.698			
	CAATTs16	0.248			
	CAATTs17	0.460			
	CAATTs18	0.395			
	CAATTs19	0.584			

It is required to check the Variance Inflation Factor (VIF). The detection of evidence on the Common Method Bias (CMB) is facilitated through the utilization of a comprehensive collinearity technique. According to Kock's (2017) study, the Variance Inflation Factor (VIFs) was determined to be below the

threshold of five, thereby negating the likelihood of collinearity among the variables. The use of confirmatory factor analysis (CFA) enables the assessment of the validity and reliability of various factors. The reliability of the results was assessed using Cronbach's alpha (CA). The Cronbach alpha coefficients for all variables exceeded the threshold of 0.7 (see table 1). Based on the research conducted by Vellone et al. (2013), it can be concluded that each of the statements adequately encapsulates the various factors considered in the study. The composite reliability (CR) and average variance extracted (AVE) were computed to assess the extent to which the statements accurately represented the underlying constructs. The AVE and CR values for each component exceeded 0.50 (see table 1). This exemplifies the utilization of claims to accommodate the pertinent factors (Shrestha, 2021).

4.2 Hypotheses Testing:

Structural Equation Modelling:



The approach to building relationships in the structural equation model is shown in the above diagram. Utilizing structural equation modeling, the interrelationships between variables are examined. The phenomena are fully explained. When confirmatory factor analysis (CFA) is used, the structural equation modeling's (SEM) presumptions are satisfied, enabling accurate data modeling (Fauzi, 2022).

Table (2): Estimates of structural equation model:

	Original Sample	Standard Error
Audit Firm Size -> IT facilities resources	0.301**	0.354
Audit Firm Size -> IT training programs	0.233***	0.095
Audit Firm Size -> Using CAATs	0.467**	0.158
IT facilities resources -> Using CAATs	0.411**	0.117
IT training programs -> Using CAATs	0.726***	0.312
Perception -> IT facilities resources	0.720***	0.162
Perception -> IT training programs	0.695***	0.292
Perception -> Using CAATs	0.972***	0.261

***p-value<0.01, ** p-value<0.05, “” p-value>0.05
Source: Based on calculations using Smart PLS

IT facilities resources (β=0.411) had a positive significant impact on Using CAATs at a 95% confidence level, as well as IT training programs (β=0.726) had a positive significant impact on using CAATs at a 99% confidence level (see table 2). Thus, the hypotheses, H1 and H2, are accepted.

In addition, the perception of audit firms’ management (β=0.720, β=0.695, β=0.972) had a positive significant impact on IT facilities resources, IT training programs, and Using CAATs at a 99% confidence level (see table 2). Thus, the hypotheses, H3, H4, and H5 are accepted.

In the end, the audit firm size (β=0.301, β=0.467) had a positive significant impact on IT facilities resources and using CAATs at a 95% confidence level. While audit firm size (β=0.233) had a positive significant impact on IT training

programs at 99% confidence level (see table 2). Then, the hypotheses H6, H7, and H8 are accepted.

Table (3): Mediating effect of variables:

	Original Sample	Standard Error
Audit Firm Size -> IT facilities resources -> Using CAATs	0.200**	0.076
Perception -> IT facilities resources -> Using CAATs	0.308**	0.106
Audit Firm Size -> IT training programs -> Using CAATs	0.169***	0.063
Perception -> IT training programs -> Using CAATs	0.505***	0.133

***p-value<0.01, ** p-value<0.05, "." p-value>0.05
Source: Based on calculations using Smart PLS

Both IT facilities resources and IT training programs served as partial mediators in the study. Referring to Table 3, IT facilities resources had a significant indirect effect on the relationship between dependent and independent variables which are audit firm size and using CAATs at a 95% confidence level. IT facilities resources served as a partial mediator between the perception of audit firm's management and using CAATTs at a 95% confidence level. Moreover, IT training programs served also as partial mediator between audit firm size and using CAATTs at a 99% confidence level., as well as IT training programs served also as a partial mediator between the perception of audit firm's management and using CAATTs at a 99% confidence level. Then the hypotheses, H9, H10, H11, and H12 are accepted.

4.3 Model Evaluation:

Table (4): Model Evaluation:

	SSO	SSE	Q^2	R Square	R Square Adjusted
IT facilities	1660.000	1290.507	0.223	0.519	0.516
IT training programs	1328.000	804.084	0.395	0.617	0.614
CAATT	6308.000	4944.971	0.216	0.810	0.809

SRMR=0.198, d_ULS=21.908, d_G=25.437, Chi-Square=170212.559, NFI=0.045
Source: Based on calculations using Smart PLS

Referring to Table 4, The obtained R2 value of 0.519 suggests that the size of the audit company and the management's perception account for roughly 51.9% of the observed variability in IT facilities. Comparably, 61.7% of the observed heterogeneity in IT training programs can be attributed to the audit firm's size and management view. Of the observed heterogeneity in CAATTs, about 81.0% may be attributed to the audit firm's size, IT training programs, IT facilities resources, and management perception.

Q2, a cross-validated redundancy metric, is used to evaluate the mode. The fact that Q2's value was greater than zero proved the model's predictive power. A statistical model's fit quality is assessed using a statistical fit metric called the root mean square of residuals (SRMR). The model is thought to have a good fit for the data as the number gets closer to zero. A standardized root means square residual (SRMR) score of 0.198 is deemed to be

within an acceptable range, per the research conducted by Ximenez et al. (2022).

5-Conclusion:

The primary goal of this research is to explore the effect of IT facilities resources, IT training programs, and the support of audit firm's management on using CAATTs. In other words, the focus is on how to succeed in using CAATTs which is useful for operational and implementation issues in the audit firm.

This research not only provides a theoretical contribution in providing a deep understanding of the importance of IT facilities, IT training programs, and the perception of audit firm's management that support CAATTs usage, but also has practical value through providing information on the fundamental role of these determinants that can help in drawing policies and enhance the development strategies of the audit firms, and consequently, make a difference in the auditing profession.

In other words, this study contributes to understanding the significance of IT facilities and IT training programs as well as the perceptions of the audit firm's management besides the audit firm size on using CAATTs. The author has presented a theoretical framework and empirically tested it with external auditors in Egypt. This study's contributions can support the audit firms' management to apply CAATs successfully.

The findings indicated that IT facilities resources, IT training programs, perception of audit firms' management, and the audit firm size have a positive significant impact on using CAATs. In addition, both the perception of audit firms' management and the audit firm size have a positive significant impact on the availability of IT facilities resources and IT training programs.

Results also demonstrated that IT facilities resources and IT training programs have a significant indirect effect on the relationship between the perception of audit firm's management and using CAATTs. Furthermore, both of them, IT facilities resources and IT training programs served as partial mediators between the audit firm size and using CAATs. Then, the findings of the study can help top management at audit firms as well as professional bodies in laying down the policies and rules that support using CAATTs and consequently enhance the efficiency and effectiveness of the audit profession.

In conclusion, the effective usage of computer-assisted auditing tools and techniques heavily relies on the existence of adequate IT facilities resources, and IT training programs, as well as the organizational culture and support, collectively influence auditors' usage of computer-assisted auditing tools and techniques. It is important for audit firms to invest in IT facilities resources, provide comprehensive training programs, and foster a

supportive culture to maximize the benefits derived from using CAATTs in auditing practices.

Limitation and future research:

This research is conducted in Egypt and to generalize the results, other investigations may be carried out in other countries. Besides, the findings can be considered for future research .First, conduct the same research considering the age, experience, and gender. Second, use the findings of this study in two or more audit firms that enhance their facilities conditions and improve their IT training programs to determine the differences between before and after ,to explore its effect on the audit quality, and to discover the difficulties and resistances of applying CAATTs . Moreover, we need more research about the effect of the auditor's satisfaction on using CAATTs because the auditor is the end user of CAATTs. We need also to investigate the relationship between using CAATTs and audit fees.

Practical Implications:

This study produces contributions that can help audit firms enhance their development strategies in both aspects of the investment in IT facilities and IT training programs. On the other hand, the findings of this study may be a good guide for the professional bodies and other institutions that produce education and training programs for auditors.

List of abbreviations:

CAATTs	**Computer-assisted auditing tools and techniques**
SEM	**structural equation modeling**
CFA	**Confirmatory Factor Analysis**
PLS	**Partial least squares**
VIF	**Variance inflation factor**
CA	**Cronbach's Alpha**
CR	**Composite Reliability**
AVE	**Average Variance Extracted**
SRMR	**Standardized Root Means Square Residual**

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Appendix 1
The questionnaire

أرجو العلم بأن استمارة الإستقصاء تهدف إلى التعرف على الواقع الفعلى فى مكتب المراجعة من أجل الحصول على البيانات وذلك لإجراء ورقة بحثية عن

"تأثير موارد تكنولوجيا المعلومات وبرامج التدريب المتعلقة بتكنولوجيا المعلومات وادارة مكتب المحاسبة والمراجعة على استخدام أدوات وتقنيات تكنولوجية للمساعدة فى مهام المراجعة."

"The Effect of IT Facilities Resources, IT Training Programs, and The Audit Firm's Management on Using CAATTs."

، برجاء التكرم بالإجابة على الأسئلة بدقة وطبقاً للواقع الفعلى فى مكتب المراجعة الذى تعمل به حيث أن صحة نتائج هذا البحث تعتمد بالدرجة الأولى على دقة اختيارك، كما نود الإشارة إلى أن المعلومات المقدمة من حضراتكم ستعامل بسرية تامة، ولن تستخدم إلا لأغراض البحث العلمي فقط.

ولكم جزيل الشكر على تعاونكم

معلومات شخصية:

النوع:

- ذكر
- أنثى

المستوى التعليمى:

- درجة البكالوريوس
- درجة الماجستير
- درجة الدكتوراه
- غير ذلك.

أذكرها من فضلك.....

الشهادات المهنية:

- CPA
- ACCA
- CMA
- CFA
- جمعية المحاسبين والمراجعين المصرية
- أخرى

أذكرها من فضلك.....

- لايوجد

1

- جمعية المحاسبين والمراجعين المصرية
- أخرى
أذكرها من فضلك.....
- لايوجد

- حجم مكتب المحاسبة والمراجعة الذى تعمل به حالياً:
  - من الأربعة الكبار Big Four
  - من الخامس الى العاشر Big Ten
  - متوسط – ليس من Big Ten الا أن له نصيب كبير فى سوق المهنة وله عدد كبير نسبياً من العملاء
  - صغير

	أوافق بشدة	أوافق	محايد	لا أوافق	لا أوافق تماماً
الإدارة العليا بمكتب المراجعة تولى أهمية لاستخدام أدوات وتقنيات تكنولوجية للمساعدة فى مهام المراجعة. Top management of our audit firm is interested in usage of computer-assisted auditing tools and techniques (CAATTs).					
الإدارة العليا بمكتب المراجعة على دراية بالفوائد التى تتحقق من جراء استخدام أدوات وتقنيات تكنولوجية للمساعدة فى مهام المراجعة. Top management in our audit firm is aware of the benefits that can be achieved by using computer-assisted auditing tools and techniques (CAATTs).					
الإدارة العليا بمكتب المراجعة تدعم بشكل كبير استخدام أدوات وتقنيات تكنولوجية للمساعدة فى مهام المراجعة. Top management in my audit firm gives strong support for CAATTs usage in firm's operation.					
يقدم لى رؤسائى المباشرين فى مكتب المراجعة المساعدة التى أحتاجها لاستخدام أدوات وتقنيات تكنولوجية للمساعدة فى مهام المراجعة. Firm senior managers in our audit firm have been helpful in the use of CAATs.					

2

					Training programs provided by our audit firm developed my IT skills and knowledge that necessary to use CAATTs.
					البرامج التدريبية فى مجال تكنولوجيا المعلومات التى يقدمها مكتب المراجعة دعمت الخبرات المهنية الخاصة بى فى مجال المراجعة. IT training programs provided by audit firm enhanced my auditing job experiences.
					التدريب المستمر فى مجال تكنولوجيا المعلومات الذى يقدمه مكتب المراجعة ساهم فى أدائى لمهام المراجعة بكفاءة. Continuous IT training provided by our audit firm helped me to do my auditing job more efficiently.
لا أوافق تماماً	لا أوافق	محايد	أوافق	أوافق بشدة	**استخدم أدوات وتقنيات تكنولوجية للمساعدة فى مهام المراجعة التالية:**
					- تحديد وتقييم / تقدير المخاطر للأخطاء ذات الأهمية النسبية الناتجة عن الغش. - To identify and assess the risks of material misstatement due to fraud.
					- تحديد العلاقات أو المعاملات غير المعتادة أو غير المتوقعة. - To identify unusual or unexpected relationship or transactions.
					- تحديد مستوى الأهمية النسبية. - To determine the materiality level.
					- اعداد أوراق العمل (فى مرحلة التخطيط للمراجعة). - To prepare working papers (planning procedures).
					- الحصول على أدلة مراجعة بشأن فاعلية الرقابة الداخلية. - To obtain evidence about control effectiveness.
					- الحصول على أدلة مراجعة كافية وملائمة بشأن تقييم المخاطر للأخطاء ذات الأهمية النسبية من خلال تصميم وتنفيذ الإجراءات المناسبة لمواجهة تلك المخاطر.

4

					توفر الإدارة العليا بمكتب المراجعة الموارد المالية الكافية لاستخدام أدوات وتقنيات تكنولوجية للمساعدة فى مهام المراجعة. Top management in our audit firm provides adequate financial resources for CAATTs implementation
					يوفر مكتب المراجعة جميع الموارد المادية المتعلقة بتكنولوجيا المعلومات واللازمة لاستخدام أدوات وتقنيات تكنولوجية للمساعدة فى مهام المراجعة. Our audit firm has IT facilities needed to implement CAATTs
					جميع الموارد الضرورية لاستخدام أدوات وتقنيات تكنولوجية للمساعدة فى مهام المراجعة متاحة بالنسبة لى. The resources necessary to use CAATs are available for me.
					عندما تواجهنى صعوبات فى استخدام أدوات وتقنيات تكنولوجية للمساعدة فى مهام المراجعة اتلقى المساعدة الكافية من خلال فنى متخصص أو من خلال ادارة تكنولوجيا المعلومات. Assistance with CAATs' difficulties is always available for me by a technical person or by group.
					التعليمات والإجراءات المتعلقة باستخدام أدوات وتقنيات تكنولوجية للمساعدة فى مهام المراجعة متاحة لى. Specialised instructions concerning the computer-assisted auditing tools and techniques (CAATTs) are available to me.
					توفر الإدارة العليا بمكتب المراجعة البرامج التدريبية المناسبة لاستخدام أدوات وتقنيات تكنولوجية للمساعدة فى مهام المراجعة. Top management in our audit firm provides adequate training programs for CAATTs implementation.
					البرامج التدريبية التى تقدمها الإدارة العليا بالمكتب ساهمت فى تطوير المعارف والمهارات الخاصة بى والمتعلقة باستخدام أدوات وتقنيات تكنولوجية للمساعدة فى مهام المراجعة.

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					- To obtain sufficient appropriate audit evidence regarding the assessed risks of material misstatement, through designing and implementing appropriate responses to those risks.
					- أداء اجراءت المراجعة التحليلية الخاصة بإجراءات التحقق لتحديد معاملات وعلاقات الإيرادات غير المعتادة أو غير المتوقعة. - performing substantive analytical procedures to identify unusual or unexpected revenue relationships or transactions
					- اختيار عينة من المعاملات الموجودة بملفات الكترونية والتى تتطابق مع صفات المجتمع وأهداف المراجعة. - To select sample transactions from electronic files which match predetermined parameters or criteria.
					- اجراء اختبار الكتروني لحجم كبير من المعاملات ذات الطبيعة المتكررة. - To use large populations to electronically test a repetitive calculation or other process.
					- اجراء الإجراءات التحليلية الخاصة بإجراءات التحقق. - To execute analytical substantive procedures.
					- الحصول على أدلة مراجعة كافية وملائمة بشأن ملائمة تطبيق ادارة الشركة محل المراجعة لفرض الاستمرارية في إعداد القوائم المالية. - To obtain sufficient appropriate audit evidence regarding the appropriateness of management's use of the going concern assumption in the preparation of the financial statements.
					- تحديد مفردات العينة مثل المدفوعات التي تزيد عن مبلغ محدد أوالمعاملات قبل تاريخ محدد.

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					- To extract specific records such as payments more than a specified amount or transactions before a given date.
					- تحديد مفردات العينة الأعلى والأدنى فى قاعدة البيانات. - To extract top or bottom records in a database.
					- تحديد المعاملات المكررة أو غير المقيدة بالدفاتر والسجلات. - To identify missing and duplicate records.
					- تحديد احتمالات الغش/ الغش المحتمل. - To identify possible fraud.
					- تصنيف المعاملات ذات الخصائص المتشابهة. - To sort transactions with specific characteristics.
					- اجراء اختبار للمجتمع ككل بدلاً من استخدام اسلوب العينة. - To test an entire population instead of a sample.
					- إعادة حساب أو تجميع إجمالي المبالغ النقدية لأحد الحسابات أوالمعاملات (مثل المخزون) والتحقق من المعلومات المرتبطة به (مثل التسعير). - To recalculate (add up) the total monetary amount of records in a file(such as inventory) and check extensions such as pricing.
					- تصنيف المعلومات الى مجموعات متجانسة وتلخيصها وترتيبها على أساس زمنى. - To stratify, summarize, and age information.
					- اجراء المطابقة بين البيانات فى ملفات مختلفة. - To match data across files.

Thank you very much for answering!

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