Factors Affecting Usage of Computer-Assisted Auditing Tools and Techniques in Egypt from a Comprehensive Perspective

Dr. Ola Mohamed Shawky Eissa

Assistant professor in accounting

Accounting department

Faculty of Commerce and Business Administration

Future University in Egypt

Ola.esa@fue.edu.eg

olamshawky@hotmail.com

Abstract:

One of the most important developments in the domain of auditing is the usage of computer-assisted auditing tools and techniques CAATTs. Even though it contributes to increasing the efficiency and effectiveness of the auditing profession, these tools and techniques haven't been used as it is expected in developing countries. This research depends on a comprehensive perspective with three different dimensions, business environment, audit firm, and auditors which provides a more complete picture of using CAATTs and empirically tested with external auditors in Egypt. The analysis is based on survey data from 333 respondents and the survey was conducted on big and non-big audit firms in Egypt. The results show that the three levels and their factors have a positive significant effect on using CAATTs. The results also reveal that the clients and the auditors' knowledge and skills have the strongest significant impact compared to the other factors of the business environment and the auditors. This study produces important contributions not only to accounting and auditing research but also to various stakeholders: regulators, professional bodies, audit firms, and auditors.

Keywords: Audit profession – Computer-assisted auditing tools and techniques CAATTs – External auditors.

1. Introduction:

The audit profession has been considerably impacted by the recent rapid advancement of technology (Tarek, Mohamed, Hussain, and Basuony, 2017; Pedrosa, Costa, and Aparicio, 2020), particularly in carrying out the audit function (La Torre et al., 2018; Kozlowski, 2018). As a result, audit firms are forced to integrate technology (Allbabidi, 2021). Using CAATTs, in particular, is crucial for improving the auditing process (Daoud, Marei, Al-Jabaly, and Aldaas, 2021).

1.1 Research gap:

According to Nasrah et al., 2023, regarding computer-assisted auditing tools and techniques (CAATTs), very little information is still available. The most of research in auditing related to using computer-assisted auditing tools and techniques (CAATTs) has focused on the acceptance of information technology or using these tools and techniques and has always concentrated on one level, the individual level, (Davis, 1985; Davis 1989; Davis et al., 1989). Others have focused on factors of two levels such as the organization, and environment factors that include technology in both levels (Tornatzky and Fletscher, 1990; Rosli et al., 2016; Widuri, R., O'Connell, B., & Yapa, P. W. 2016; Doğanay, 2019; Handoko and Thomas, 2021).

Handoko, Sabrina, & Ayuanda, 2019 have explored the social, individual, and organizational factors and have used the perceived usefulness and perceived ease of use as intervening variables.

On the other hand, research on the effect of the business environment, especially professional bodies, has been barely done and little research has been undertaken (Pedrosa, Costa, & Aparicio, 2020). In addition, in developing countries, the evaluation and examination of an auditee's information technology are not conducted sufficiently and adequately by auditors (Ismail & Abidin, 2009; Mansour, 2016; Allbabidi, 2021), Furthermore, the previous research has referred that, in developing

countries, audit firms still give low priority to the adaptation of computer-assisted audit tools and techniques CAATTs despite the benefits of using CAATTs, in particular increasing productivity levels and decreasing costs (Siew, Rosli, & Yeow, 2020; Lutfi, & Alqudah, 2023).

In addition, the previous research has not considered classifying the factors into the three dimensions, business environment, audit firm, and auditors that constitute the auditing profession, except for the study of Eissa,2023 which has produced this classification and has provided a conceptual framework using a holistic approach based on the technology acceptance model, the technology organization environment model, and the unified theory of acceptance and use of technology. This conceptual framework is merely a theoretical construct, and it is important to be tested in real-world settings.

1.2 Objective of the study

So, it is still required for more research on the factors of using CAATTs (Janvrin et al. 2008; Byrnes et al. 2015; Lins et al. 2016; Mansour 2016; Pedrosa, Costa, & Aparicio, 2020) with a more thorough standpoint, especially in developing countries. The current study draws on prior research to explore the main factors that lead auditors to use the CAATTs in performing audits from a comprehensive perspective and to validate its assumptions and hypotheses by testing them in Egypt. The key research question that motivates this work is:

What are the factors that have a significant influence on auditors to use computer-assisted auditing tools and techniques CAATTs in Egypt?

1.3 Significance of the study

The results of this study are anticipated to have an impact on the accounting industry, particularly the discipline of auditing. This is because it offers a wealth of insightful information about the factors influencing the use of technology in the auditing profession, which can assist regulators in taking this issue into account when creating or

updating regulations, as well as professional bodies for maintaining standards. In addition, it encourages audit firms to take action in leveraging technology as a tool to improve the performance of the auditors. This study is anticipated to be a useful reference for audit firms as they improve their policies and procedures.

The rest of this research is structured as follows.The research model and hypotheses are developed in the second section, which also discusses the theoretical background for the study. Section three explains the research methodology. Section four describes the way the empirical study was conducted and provides the results of the study. The final section concludes the research, reports on the findings, and offers limitations and future research.

2- Literature Review:

2.1 Theoretical Background

Computer-assisted auditing tools and techniques CAATTs are the tools and techniques of information technology that are used in auditing missions and audit engagements (IAASB, Vol. I 2018; Handoko, Sabrina, & Ayuanda, 2019) which includes automated working papers and traditional word processing applications (Braun and Davis, 2003), as well as specific programs that are designed especially for auditing tasks (Pedrosa, Costa, & Aparicio, 2020) that support auditors for the effectiveness and efficiency of audit work (Rosli, Yeow, & Siew,2012). Computer-assisted auditing tools and techniques CAATTs can be used not only for the audit work process (Bierstaker, Janvrin, and Lowe 2014; Handoko, Sabrina, & Ayuanda, 2019) but also in testing the client's information system (Jakšić,2009; Handoko, Ariyanto, & Warganegara, 2018).

The client's information system may be tested either explicitly or implicitly through computer-assisted auditing tools and techniques CAATTs (Jakšić,2009; Handoko, Ariyanto, & Warganegara, 2018), as

well as the auditing procedures (Bierstaker, Janvrin, and Lowe 2014; Handoko, Sabrina, & Ayuanda, 2019).

Good examples of CAATTs include professional software and spreadsheet programs. The auditor can use CAATTs for a variety of work duties, such as creating and reviewing audit work papers using spreadsheet applications (Handoko, Sabrina, & Ayuanda, 2019). The software can be used for analytical procedures as well as data summarization and anomaly detection (Boritz and No, 2011; Handoko, Sabrina, & Ayuanda, 2019). In addition to assessing audit evidence, auditors can use CAATTs to identify audit evidence, particularly trace back electronic evidence (Boritz and No, 2011).

The benefit of using computer-assisted auditing tools and techniques is that more transactions and controls may be covered but using these tools and techniques occasionally necessitates consulting with experts, which might take time, particularly in the first year of use (IAASB, Vol. III 2018).

2.2 Research Hypotheses Development:

The model will be described in more detail below, and it is likely to lead to a deeper knowledge of the elements that influencethe use of computer-assisted auditing tools and techniquesCAATTs The. conversation will then be broken downi:nto three levels environmental ,level auditfirm .level, and individual level
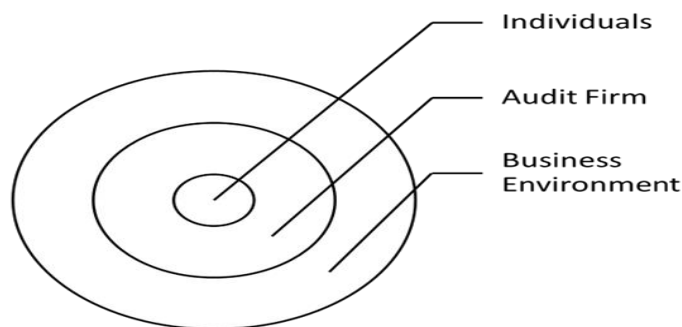
A. :Business Environment Level

The business environment of the audit profession can be defined as the domain in which the audit profession can be conducted (Widuri,. O'Connell, & Yapa, 2016). The business environment includes three factors, the client, competitors, and professional bodies, that influence, implicitly or explicitly, the philosophy and values of the audit firm as well as the auditors' beliefs and mentality, hence, these factors have a significant effect on using computer-assisted auditing tools and techniques CAATTs (Eissa, 2023).

1- The client

Recently, in the business world, companies always invested in information technology to enhance organizational performance and the quality of financial reporting (Wicaksono & Lusianah, 2016), especially businesses todaythat are moving toward e-business (Daoud ٢٠٢٣). Therefore the accounting information systems, at these companies, have been changed from paper-pencil-based functions to computer-internet and software-based functions (Ashok, & MS,2019). Consequently, the audit profession, particularly financial auditing, has faced a lot of challenges because of the large volume and diversity of data that increased from day to day, as well as the complexity of the auditee's accounting information system (Pedrosa, Costa, & Aparicio ٢٠٢٠). According to AAISB vol. III (2018), the nature, timing, and extent of audit evidence gathered will depend on the nature and caliber of auditees' information systems. So, the top management of an audit firm should consider the characteristics of auditees' accounting information systems when they specify audit strategies to be aligned with these systems (Allbabidi, 2021; Mansour,2016) leads to adopting computer-assisted auditing tools and techniqueCAATTsEissa, 2023) .

2- The competitors:

Technology's impact on the business environment will change the competitive landscape (Zhu et al., 2006), as it sets new rules for competitiveness that encourage businesses to work hard to outperform their rivals (Chan et al., 2012). Therefore, the adoption of IT byseveral businesses will inspire others, particularly rivals, to do the same(Zhu et al., 2003; Enaizan et al., 2020; Daoud, Marei, Al-Jabaly, and Aldaas,2021). Consequently, using CAATTs is strongly encouraged by .competitive pressure for audit firms (Rosli, Yeow, & Eu-Gene, 2013) To prevent missing a customer (Handoko, Sabrina, & Ayuanda, 2019) and to get a competitive advantage over rival audit firms technology assistance is therefore necessary for audit firms (Daoud, Marei, Al-Jabaly, and Aldaas, 2021).

3- The professional bodies:

An auditor' s performance depends fundamentally on the applicable auditing standards (Amin, & Mohamed, 2016) which is the main responsibility of professional bodies. Recently, because of the fourth industrial revolution, these professional bodies have started to be interested in the effect of advanced information technology on auditing Allbabidi),٢٠٢١).

Therefore, the hypotheses are stated in the following sentences:

H1: Business environment has a positive effect on using computer-assisted auditing tools and techniquesCAATTs

H_{1a}**:** The clients have a positive effect on using computer-assisted auditing tools and techniquesCAATTs

H_{1b} **:** The competitors positivelya ffectthe use ofcomputer-assisted auditing tools and techniquesCAATTs

H_{1c}**:** The professional bodies have a positive effect on using computer-assisted auditing tools and techniques CAATTs

B.   Audit Firm Level:

Despite the usage of computer-assisted audit tools and techniques CAATTsnot only decreas ecosts but also increas e productivity, using computer-aided audit tools and techniques is still not given high & ,importance by audit firms in developing countries (Siew, Rosli Yeow, 2020).

Although Handoko, Sabrina, & Ayuanda, 2019 have found that audit firm' s factorsdo not a ffectthe use of computer-assisted auditing tools and techniquesCAATTs other studies have concluded that these , factors have a significant influence onthe adaptation of computer- assisted auditing tools and techniquesCAATTs & ,Pedrosa, Costa) Aparicio, 2020).

According to the study of Eissa,2023the audit firm ,' s factors are the size of the audit firm and the perceptions of the audit firm' s .management

1- Audit firm size:

The decision ofan audit firm to use computer-assisted auditing tools and techniqueCAATTs ,depends on the cost and benefit analysis (Daoud Marei, Al-Jabaly, & Aldaas, 2021) and according to Eissa,2023 it is related to the size of the audit firm because the auditees of big audit firms typically have large business and complicated IT that may encourage using computer-assisted auditing tools and techniques CAATTs (Mansour,2016) besides the bigger the size of the audit firm, the more financial resources that is necessary for acquiring computer-assisted auditing tools and techniquesCAATTs Handoko, & Thomas, 2021) .

2- Perceptions of audit firm's management:

The t op management ofthe audit firm plays an important rolein encouraging auditors to use CAATTs in .two ways The f irst one establishing a policy to follow the auditing standards related to how to perform audit tasks in the technological advances and to recognize the

,effects of technological development on their responsibility (Tarek Mohamed, Hussain, & Basuony, 2017). The second one involves raising awareness of the benefits of CAATTs usage in improving their performance(Mansour,2016; Handoko, Ariyanto, & Warganegara, 2018).

:Therefore, the hypotheses are stated in the following sentences

H2: Audit firm level has a positive effect on using computer-assisted auditing tools and techniquesCAATTs

H_{2a}**:** Audit firm size has a positive effect on using omputer-assisted auditing tools and techniques CAATTs.

H_{2b}: Perceptions of audit firm' s management have a positive effect on usingc omputer-assisted auditing tools and techniques CAATTs.

C. **Individual level:**

Despite the research of Pedrosa, Costa, & Aparicio, 2020 has concluded that auditorsare interested in using the technological tools and techniques for auditing tasks, the findings of other studies have revealed that auditors haven' t used the computer-assisted auditing tools and techniquesCAATTs as they are expected, especially in the light of sophisticated IT-based environments (Bierstaker et al., 2014; Allbabidi, 2021; Daoud, Marei, Al-Jabaly & Aldaas, 2021). The research of Eissa, 2023 has found that the auditor' s willingness to learn and use technology dependson the auditor ' s knowledge and skills, as well as the auditors'peers .

1- **Auditors 'knowledge and skills:**

IT is no longer a specialized field reserved for information technology specialists due to information technology's rapid development (Allbabidi, 2021) so, it' s required to pay more attention to the usefulness of information technology, as well as the technical skills of auditors.

On the other hand, users are more likely to accept tools that are easy to use (Hoque, Saif, AlBar, and Bao, 2016). This means that the ease of use of the technology is primarily determined by the technological abilities of each auditor, which differ from one auditor to another Handoko, Sabrina, & Ayuanda, 2019).

The study of Tarek, Mohamed, Hussain, & Basuony, 2017 has concluded that the auditors' IT knowledge and skills play a vital role in the auditors' perceptions of Its importance and their realization of the client's IT complexity as well as their ability to use new audit applications. Furthermore, Handoko, Sabrina, & Ayuanda, 2019 have found that auditors' perception of the usefulness and ease of use of CAATTs positively affects their adoption and performance.

Finally, the usefulness and ease of use are related to the knowledge and skills of auditors, then, the auditors need to have a suitable level of competence that gives them the capacity to assess the usefulness and utility of these tools and techniques (Eissa,2023).

2-Auditors'peers

Peers influence referees to the individual's expectation that others who work in the same field believe that it is necessary to use the new tools and techniques (Pedrosa, & Costa, 2014). Auditors' peers are those who work in the same professional field and extend to include others outside the firm. Peers and social influence have a favorable effect on the acceptability of computer- ,assisted audit tools and methodologies ,according to Pedrosa and Costa's 2014 research. Furthermore, according to Pedrosa, Costa, and Aparicio 2020, peer influence has a beneficial impact on social influence, but social influence has no impact on the intention ofCAATS usage.

When using technology for fieldwork, auditors frequently teach their & ,peers how to utilize technology in the field (Handoko, Sabrina Ayuanda, 2019), which is anticipated to influence the auditors' beliefs and motivate them to use technology, particularly CAATTs.

Therefore, the hypotheses are stated in the following sentences:

H3: Individual- level factors have a positive effect on using computer-assisted auditing tools and techniquesCAATTs

H_{3a}**:** Auditors' knowledge and skills affect positively the usage of computer-assisted auditing tools and techniquesCAATTs

H_{3b}**:** Auditors' peers have a positive effect onthe usage of computer-assisted auditing tools and techniquesCAATTs
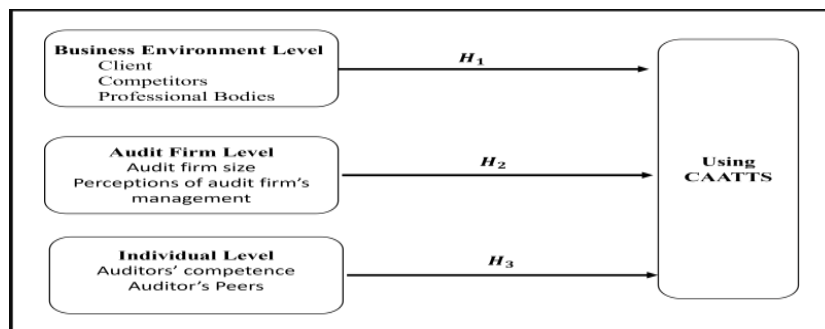
3- Research Methodology:

3.1 Variables:

Usage of computer- assisted auditing tools and techniques is the dependent variable, which is affected by independent variables in three levels. The first level is the business environmentwhich consists of three independent variables, the client, the competitors, and the professional bodiesThe a udit firm level is the second one that includes two variables, audit firm size and perceptions of the audit firm' s management. Finally, the third levelis related to the auditor which is the end user of computer- assisted auditing tools and techniquesThe i :ndividual level includes two independent variables auditors' knowledge and skills and auditors'.peers

3.2 Population and Sample:

Respondents for this research are auditors (333) who work in audit firms in Egypt. The most important observations regarding the demographic characteristics of the study sample are:

- There were 229 Males (68.7%) and 103 Females (31.3%) in the sample.
- Most respondents 137 (41.1%) were aged between 51:60 Year .
- The majority at educational level were Bachelor Degree 245 (%73,5),while the minority were doctoral degree 24 (%7.2).
- For professional certifications, there were nothing 162 (48.6%), While the minority were both American Accounting Association and bachelor's (degree 14 by 4.2%.).
- For years of experience the majority of the sample were more than 29 years by (48%), While the minority are between 10: 19 Year of 36 respondents by (% 10,8).

3.3 Method of Data Collection:

The researcher prepared a questionnaire on factors affecting the usage of computer- assisted auditing tools and techniques in Egyptthat consists of two parts (Appendix). The first part consists of the demographic characteristics, which include (Gender, Age, professional ,certifications, Years of Experience, Current job and .(audit firm size The second part consists of the items used in measuring the variables used to test the hypotheses of the study. The respondents marked their opinion on a five-point Likert scale, ranging from 1 "strongly agree" to 5"strongly disagree" .

4-Analysis and Findings:

4.1 Validity and Reliability:

Table (1): Reliability and ValidityA nalysis

Variables	Dimensions	Const.	Loadings	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Business Environment Level	The clients	C1	0.856	0.870	0.916	0.785
		C2	0.974	0.870	0.916	0.785
		C3	0.820	0.870	0.916	0.785
	The competitors	CP1	0.947	0.932	0.965	0.932
		CP1	0.983			
	The professional bodies	TP1	0.921	0.931	0.950	0.826
		TP2	0.955			
		TP3	0.880			
		TP4	0.876			
Audit firm level	Audit firm size	FS1	1.000	1.000	1.000	1.000
	Perceptions	P2	0.955	0.924	0.963	0.928
		P3	0.972			
Individual Level	Auditors 'peers	AP2	1.000	1.000	1.000	1.000
	Auditors' knowledge and skills	AKS1	0.875	0.798	0.869	0.768
		AKS2	0.878			
Using CAATTs		CAATTs1	0.887	0.951	0.960	0.585
		CAATTs2	0.903			
		CAATTs3	0.823			
		CAATTs4	0.875			
		CAATTs5	0.965			
		CAATTs6	0.962			
		CAATTs7	0.831			
		CAATTs8	0.903			
		CAATTs9	0.726			
		CAATTs10	0.891			
		CAATTs11	0.698			
		CAATTs12	0.946			
		CAATTs13	0.715			
		CAATTs14	0.804			
		CAATTs15	0.681			
		CAATTs16	0.106			
		CAATTs17	0.317			
		CAATTs18	0.256			
		CAATTs19	0.445			

Source: Based on calculations using Smart PLS

The Variance inflation factor (VIF) needed to be determined for the investigation. This is because evidence of the Common Method Bias (CMB) is being detected using a comprehensive collinearity technique. Kock, 2017 found that the VIFs were less than five, ruling out the possibility of CMB. The validity and trustworthiness of numerous factors can be monitored with Confirmatory Factor Analysis (CFA). Cronbach's alpha was used to calculate how reliable the results were. The Cronbach alpha for each of the variables was greater than 0.7. According to the findings of the study, each of the statements provides a sufficient summary of the factors that went into it (Vellone et al., 2013). Both the composite reliability and the average variance extracted were calculated to gain a better idea of how well the statements conveyed the elements. Both the Average variance extracted (AVE) and Composite reliability (CR) for each component were more than 0.7 and 0.5 respectively. This is an example of how the claims can be used to account for the relevant factors (Shrestha, 2021).

4.2 Hypotheses Testing

Structural Equation Modelling
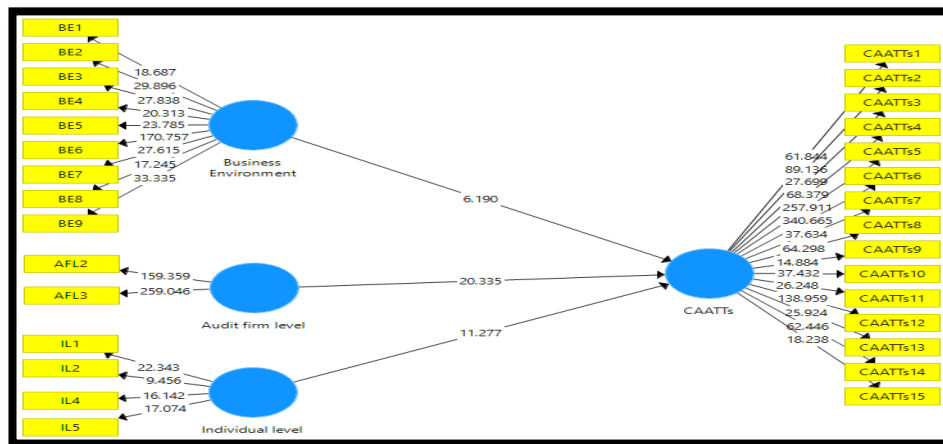
Structural Equation Model of the Phenomenon

The preceding diagram illustrates the structural equation model's method of constructing relationships. Structural equation modeling

(SEM) is employed to examine the interrelationships between variables. It explains the phenomenon in detail. Once CFA is applied, the assumptions of the SEM are met, allowing for accurate modeling of the data (Cepeda-Carrion et al., 2018). The path analysis is considered a subset of SEM that would help assess the effect of multiple independent variables through multiple pathways. While path analysis can estimate the strength of each path, SEM calculates the fitting and performance of the overall model (Zhang, 2022).

To determine if the hypotheses assertions presented before were supported or not, hypotheses testing was done.

Table (2): Estimates of structural equation model

	Original Sample Standard Error	Original Sample Standard Error
Business Environment -> CAATTs	0.156***	0.025
The clients -> CAATTs	1.271***	-1.000
The competitors -> CAATTs	0.589***	-0.537
The professional -> CAATTs	0.833***	-0.747
Audit firm level -> CAATTs	0.592***	0.030
Audit firm size -> CAATTs	0.315***	-0.130
Perceptions -> CAATTs	0.312***	0.139
Individual level -> CAATTs	0.593***	0.049
Auditors 'peers -> CAATTs	0.455***	0.460
Auditors' knowledge and skills -> CAATTs	0.559***	-0.544

***p-value<0.01, ** p-value<0.05, "" p-value>0.05

Source: Based on calculations using Smart PLS

The business environment, the audit firm level, and the individual level had a positive significant impact on CAATTs usage at a 99% confidence level. So, the main hypotheses, H1, H2, and H3, are accepted.

For the business environment, the clients, competitors, and professional bodies had a significant strong positive effect on using CAATTs at a confidence level rate of 99%. It is noticed that the clients ($\beta=1.271$) had the strongest significant impact on using CAATTs followed by

professional bodies (β=0.833) and lastly the competitors (β=0.589). Thus, the sub-hypotheses, H1a, H1b, and H1c, are accepted.

For the second level, the audit firm level, audit firm size and perceptions of the audit firm's management had a significant strong positive effect on usage of CAATTs at a confidence level rate of 99%. Both the audit firm size (β=0.315) and perceptions of the audit firm's management (β=0.312) had almost an equal impact on the usage of CAATTs. Then, the sub-hypotheses, H2a and H2b, are accepted.

For the third one, the individual level, auditors' knowledge & skills and Auditors' peers had a significant positive effect on CAATTs at a confidence level rate of 99%. The auditors' knowledge and skills (β=0.559) constituted a stronger impact on CAATTs than the auditors' peers (β=0.455). Thus, the sub-hypotheses, H3a and H3b, are accepted.

4.3 Model Evaluation:

Table (3): Model Evaluation.

	SSO	SSE	Q^2	R Square	R Square Adjusted
CAATTs	4980.000	3337.038	0.330	0.683	0.678

SRMR=0.134, d_ULS=8.330, d_G=20.211, Chi-Square=2901.448, NFI=0.665

With an R2 of 0.678, we may deduce that CAATTs account for 67.8% of the variation in CAATTs occurred because of the business environment level, the audit firm level, and the individual level. The model is evaluated using Q2, the cross-validated redundancy metric. The model was shown to have predictive value because Q2 was greater than zero. Root mean square of residuals (SRMR) is a statistical fit metric. As it approaches zero, the model is deemed to be a good fit for

the data. According to Ximenez et al. 2022 an SRMR of 0.134 is an acceptable value.

Conclusion:

Recent research has shown that the fourth industrial revolution has forced audit firms to focus on the effect of technology (Allbabidi, 2021), and to adopt the computer-assisted audit tools and techniques CAATTs specially, using CAATTs leads to increased productivity levels as well as decreasing costs (Siew, Rosli, & Yeow, 2020). Despite the usage of CAATTs has become no longer optional, the adaptation and implementation of computer-assisted auditing tools and techniques CAATTs still have been given low priority in developing countries (Lutfi, & Alqudah, 2023). So, It is still required for more research on the factors of using CAATTs (Janvrin et al. 2008; Byrnes et al. 2015; Lins et al. 2016; Mansour 2016; Pedrosa, Costa, & Aparicio,2020) with a more thorough standpoint, especially in developing countries.

This research aims to study the effect of different factors of three levels, the business environment, the audit firm level, and the individual level, on using CAATTs in big four and non-big four audit firms in Egypt. The data analysis illustrates some important results.

For the first level, the business environment has a positive significant impact on using CAATTs, as well as, its factors, the clients, competitors, and professional bodies, have a significant strong positive effect on using CAATTs, and the clients have the strongest significant impact.

For the second one, the audit firm level has a positive significant impact on using CAATTs. audit firm size and perceptions of audit firm's management have a significant strong positive effect on using CAATTs and both of them have the same impact on using CAATTs.

For The individual level, it has a positive significant impact on CAATTs usage and auditors' knowledge & skills and auditors' peers

have a significant positive effect on using CAATTs, but the auditors' knowledge and skills have a greater influence than the auditors' peers.

Limitation and future research:

This study has limitations, that is using a sample from the external auditors in Egypt. There is an opportunity for future research to explore the same issue in other countries and further research can use other types of auditors, such as internal auditors.

As the use of computer-assisted auditing tools and techniques CAATTs becomes increasingly prevalent in the field of auditing, it is important to investigate their impact on various aspects of the profession. Future research could explore several key questions related to CAATTs, such as the effect of their use on the code of ethics for professional accountants. Additionally, studies could examine the role of CAATTs in enhancing the risk assessment process in auditing. Another important area of investigation is the knowledge and skills necessary for auditors to effectively use CAATTs in their work. Furthermore, future studies could employ a variety of methods, such as case studies.

References

- Allbabidi, M. H. A. (2021). Hype or Hope: Digital Technologies in Auditing Process. *Asian Journal of Business and Accounting*, 14(1), 59-86.
- Amin, H. M., & Mohamed, E. K. (2016). Auditors' perceptions of the impact of continuous auditing on the quality of Internet reported financial information in Egypt. *Managerial Auditing Journal.*
- Ashok, M. L., & MS, D. (2019). Emerging Trends in Accounting: An Analysis of Impact of Robotics in Accounting, Reporting and Auditing of Business and Financial Information. *International Journal of Business Analytics and Intelligence, 7(2).*

- Bierstaker, J., Janvrin, D., & Lowe, D. J. (2014). What factors influence auditors' use of computer-assisted audit techniques?. *Advances in Accounting*, 30(1), 67-74.

- Boritz, J. E., & No, W. G. (2011). E-commerce and privacy: Exploring what we know and opportunities for future discovery. *Journal of Information Systems,* 25(2), 11-45.

- Braun, R. L., & Davis, H. E. (2003). Computer-assisted audit tools and techniques: analysis and perspectives. *Managerial Auditing Journal.*

- Byrnes, P. E., Al-Awadhi, C. A., Gullvist, B., Brown-Liburd, H., Teeter, C. R., & Warren Jr, J. D. M. Vasarhelyi. (2015). Evolution of Auditing: From the Traditional Approach to the Future Audit. *Audit Analytics and Continuous Audit–Looking Toward The Future.*

- Chan, F. T., Chong, A. Y. L., & Zhou, L. (2012). An empirical investigation of factors affecting e-collaboration diffusion in SMEs. *International Journal of Production Economics,* 138(2), 329-344.

- Cepeda-Carrion, G., Cegarra-Navarro, J. G., & Cillo, V. (2018). Tips to use partial least squares structural equation modelling (PLS-SEM) in knowledge management. *Journal of Knowledge Management,* 23(1), 67-89.

- Daoud, L., Marei, A., Al-Jabaly, S., & Aldaas, A. (2021). Moderating the role of top management commitment in usage of computer-assisted auditing techniques. *Accounting*, 7(2), 457-468.

- Daoud, L. (2023). Predictors of Auditors' Usage of CAATs: The Role of Top Management Support and Trust.

- Davis, F. D. (1985). *A technology acceptance model for empirically testing new end-user information systems: Theory and results* (Doctoral dissertation, Massachusetts Institute of Technology).

- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340.

- Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management science,* 35(8), 982-1003.

- Doğanay, D. (2019). *Identifying factors affecting auditors' adoption of computer assisted audit tools and techniques (CAATTs: an empirical investigation* (Master's thesis, Middle East Technical University).
- Eissa, O. S. (August,2023). A Comprehensive Model for Factors Affecting the Usage of Computer Assisted Auditing Tools and Techniques. In Proceedings of the 12th International Conference on the Restructuring of the Global Economy (ROGE) (pp. 224-233). The Business and Management Review Proceedings, 14(2).
- Enaizan, O., Eneizan, B., Almaaitah, M., Al-Radaideh, A. T., & Saleh, A. M. (2020). Effects of privacy and security on the acceptance and usage of EMR: the mediating role of trust on the basis of multiple perspectives. *Informatics in Medicine Unlocked*, 21, 100450.
- Eneizan, B. I. L. A. L., Alsaad, A. B. D. A. L. L. A. H., Abdelbaset Alkhawaldeh, H. N., & Rawash, O. E. (2020). E-wom, trust, usefulness, ease of use, and online shopping via websites: the moderating role of online shopping experience. *Journal of Theoretical and Applied Information Technology*, 98(13), 2554-2565.
- Handoko, B. L., Ariyanto, S., & Warganegara, D. L. (2018, July). Perception of financial auditor on usage of computer assisted audit techniques. In *2018 3rd International Conference on Computational Intelligence and Applications (ICCIA)* (pp. 235-239). IEEE.
- Handoko, B. L., Sabrina, S., & Ayuanda, N. (2019, August). Admission of Information Technology in External Audit Profession: Impact of Organizational, Social and Individual Factors. In *2019 International Conference on Information Management and Technology (ICIMTech)* (Vol. 1, pp. 36-41). IEEE.
- Handoko, B. L., & Thomas, G. N. (2021). How Audit Firm Size Moderate Effect of TOE Context toward Auditor Adoption of Technology. *Turkish Journal of Computer and Mathematics Education (TURCOMAT),* 12(6), 1518-1526.
- Hoque, M. R., Saif, A. N. M., AlBar, A. M., & Bao, Y. (2016). Adoption of information and communication technology for development: A case

study of small and medium enterprises in Bangladesh. *Information Development,* 32(4), 986-1000.

- IAASB- IFAC, (Vol. I, 2018) Handbook of International Quality Control, Auditing, Review, Other Assurance, and Related Services Pronouncements, Vol. I, 2018

- IAASB- IFAC, (Vol. III, 2018) Supplement to the Handbook of International Quality Control, Auditing, Review, Other Assurance, and Related Services Pronouncements, Vol. III,2018.

- Ismail, N. A., & Abidin, A. Z. (2009). Perception towards the importance and knowledge of information technology among auditors in Malaysia. *Journal of Accounting and Taxation*, 1(4), 61-69.

- Jakšić, D. (2009). Implementation of computer assisted audit techniques in application controls testing. *Management Information Systems,* 4(1), 9-12.

- Janvrin, D., Bierstaker, J., & Lowe, D. J. (2008). An examination of audit information technology use and perceived importance. *Accounting horizons,* 22(1), 1-21.

  - Kock, N. (2017). Common method bias: a full collinearity assessment method for PLS-SEM. *Partial least squares path modeling: Basic concepts, methodological issues and applications,* 245-257.

- Kozlowski, S. (2018). An audit ecosystem to support blockchain-based accounting and assurance. In *Continuous Auditing*. Emerald Publishing Limited.

- La Torre, M., Botes, V. L., Dumay, J., Rea, M. A., & Odendaal, E. (2018). The fall and rise of intellectual capital accounting: new prospects from the Big Data revolution. *Meditari accountancy research.*

- Lins, S., Schneider, S., & Sunyaev, A. (2016). Trust is good, control is better: Creating secure clouds by continuous auditing. *IEEE Transactions on Cloud Computing,* 6(3), 890-903.

- Lutfi, A., & Alqudah, H. (2023). The Influence of Technological Factors on Computer-Assisted Audit Tools and Techniques Usage during COVID-19. *Sustainability*, 15(9), 7704.

- Mansour, E. M. (2016). Factors affecting the adoption of computer assisted audit techniques in audit process: Findings from Jordan. *Business and Economic Research,* 6(1), 248-271.

- Nasrah, H., Muda, I., & Kesuma, S. A. (2023). Computer Assisted Audit Tools and Techniques Adoption: A Systematic Literature Review. *International Journal of Social Service and Research,* 3(3), 630-638.

- Pedrosa, I., & Costa, C. J. (2014, May). Statutory auditor's profile and computer assisted audit tools and techniques' acceptance: indicators on firms and peers' influence. In *Proceedings of the International Conference on Information Systems and Design of Communication* (pp. 20-26).

- Pedrosa, I., Costa, C. J., & Aparicio, M. (2020). Determinants adoption of computer-assisted auditing tools (CAATs). *Cognition, Technology & Work,* 22(3), 565-583.

- Rosli, K., Yeow, P. H., & Siew, E. G. (2012). Computer-assisted auditing tools acceptance using I-Toe: a new paradigm. *Computer,* 7, 15-2012.

- Rosli, K., Yeow, P., & Eu-Gene, S. (2013). Adoption of audit technology in audit firms. In ACIS 2013*: Information systems: Transforming the Future: Proceedings of the 24th Australasian Conference on Information Systems* (pp. 1-12). RMIT University.

- Rosli, K., Siew, E. G., & Yeow, P. H. (2016). Technological, organisational and environmental aspects of audit technology acceptance. *International Journal of Business and Management, 11(5),* 140-145.

- Siew, E. G., Rosli, K., & Yeow, P. H. (2020). Organizational and environmental influences in the adoption of computer-assisted audit tools and techniques CAATTs by audit firms in Malaysia. *International Journal of Accounting Information Systems,* 36, 100445.

- Shrestha, N. (2021). Factor analysis as a tool for survey analysis. *American Journal of Applied Mathematics and Statistics,* 9(1), 4-11.

- Tarek, M., Mohamed, E. K., Hussain, M. M., & Basuony, M. A. (2017). The implication of information technology on the audit profession in developing country: extent of use and perceived importance. *International Journal of Accounting & Information Management.*
- Tornatzky, L., & Fletscher, M. (1990). The deployment of technology. *The processes of technological innovation,* 118-147.
- Vellone, E., Riegel, B., Cocchieri, A., Barbaranelli, C., D'Agostino, F., Glaser, D., ... & Alvaro, R. (2013). Validity and reliability of the caregiver contribution to self-care of heart failure index. *Journal of Cardiovascular Nursing*, *28*(3), 245-255.
- Wicaksono, A., & Lusianah, L. (2016). Impact Analysis of Generalized Audit Software (GAS) Utilization to Auditor Performances. *Binus Business Review*, 7(2), 131-136.
- Widuri, R., O'Connell, B., & Yapa, P. W. (2016). Adopting generalized audit software: an Indonesian perspective. *Managerial Auditing Journal.*
- Ximénez, C., Maydeu-Olivares, A., Shi, D., & Revuelta, J. (2022). Assessing cutoff values of SEM fit indices: Advantages of the unbiased SRMR index and its cutoff criterion based on communality. *Structural Equation Modeling: A Multidisciplinary Journal*, *29*(3), 368-380.
- Zhang, H. (2022). Structural equation modeling. *In Models and Methods for Management Science* (pp. 363-381). Singapore: Springer Nature Singapore.
- Zhu, K., Kraemer, K., & Xu, S. (2003). Electronic business adoption by European firms: a cross-country assessment of the facilitators and inhibitors. *European journal of information systems,* 12(4), 251-268.
- Zhu, K., Dong, S., Xu, S. X., & Kraemer, K. L. (2006). Innovation diffusion in global contexts: determinants of post-adoption digital transformation of European companies. *European journal of information systems,* 15(6), 601-616.

Appendix
QUESTIONNAIRE

Personal information:

- Gender:
  - o Male
  - o Female
- Age:
  - o 21 – 30 years
  - o 31 – 40 years
  - o 41 – 50 years
  - o 50 – 60 years
  - o 61 years and above
- Educational Level:
  - o Bachelor
  - o Master
  - o Doctorate
  - o Others
- Type of professional qualification:
  - o CPA
  - o ACCA
  - o CMA
  - o CFA
  - o Egyptian Society of Accountants and Auditors
  - o Others
  - o No qualification
- Years of experience in auditing:
  - o 0 – 5 years
  - o 6 – 10 years
  - o 11 – 15 years
  - o 16 – 20 years
  - o 21 - 25 years
  - o 26- 30
  - o 31 years and above
- Current position:
  - o Audit Partner
  - o Audit Senior Manager
  - o Audit Manager
  - o Senior Auditor
  - o Junior Auditor
  - o Audit Trainee
  - o Others
- Audit firm size:
  - o Big 4
  - o Big 10
  - o Non Bigten but it has a significant share in the market and a relatively large number of clients.
  - o Small

Variables	Questionnaire Items
1- The client:	Majority of our clients have large accounting transaction volumes.
	Most of our clients have highly computerized financial reporting systems.
	It is necessary for some clients to use CAATTs in audit tasks.
2- Competitors:	Our audit firm's decision to implement CAATTs is affected by competitors in audit industry.
	Our audit firm's adoption of CAATTs is helpful in allowing our audit firm to remain competitive.
3- Professional bodies:	Professional bodies work to promote the profession of audit to cope with IT.
	National professional bodies support CAATTs usage.
	International professional bodies support CAATTs usage.
	Professional bodies such as ESAA provide the essential framework of the audit procedures in the computerised environment.
1. Perceptions of audit firm's management:	Top management of our audit firm is interested in usage of computer-assisted auditing tools and techniques (CAATTs).
	Top management in our audit firm is aware of the benefits that can be achieved by using computer-assisted auditing tools and techniques (CAATTs) .
	Top management in my audit firm gives strong support for CAATTs usage in firm's operation.
	Firm senior managers in our audit firm have been helpful in the use of CAATs.
1-Auditors' competence	I have the sufficient knowledge necessary to use CAATs.
	I have the sufficient skills necessary to use CAATs.
2-Auditors 'peers	My peers, in my audit firm, behavior on CAATTs influences positively my CAATTs usage.
	My peers, in other audit firms, behavior on CAATTs influences positively my CAATTs usage.
	As a response to the competition, I use CAATTs to perform my audit job.
Using CAATTs	To identify and assess the risks of material misstatement due to fraud.
	To identify unusual or unexpected relationship or transactions.
	To determine the materiality level.
	To prepare working papers (planning procedures).
	To obtain evidence about control effectiveness.
	To obtain sufficient appropriate audit evidence regarding the assessed risks of material misstatement, through designing and implementing appropriate responses to those risks.
	performing substantive analytical procedures to identify unusual or unexpected revenue relationships or transactions
	To select sample transactions from electronic files which match predetermined parameters or criteria.
	To use large populations to electronically test a repetitive calculation or other process.
	To execute analytical substantive procedures.
	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.
	To extract specific records such as payments more than a specified amount or transactions before a given date.
	To extract top or bottom records in a database.
	To identify missing and duplicate records.
	To identify possible fraud.
	To sort transactions with specific characteristics.
	To test an entire population instead of a sample.
	To recalculate (add up) the total monetary amount of records in a file(such as inventory) and check extensions such as pricing
	To stratify, summarize, and age information.
	To match data across files.