

A comprehensive model for factors affecting the usage of computer-assisted auditing tools and techniques

Ola Mohamed Shawky Eissa

Accounting department

Faculty of Commerce and Business Administration

Future University in Egypt

Keywords

audit profession - computer - assisted auditing tools and techniques (CAATTs) - external auditors.

Abstract

The paper aims to highlight the most important factors affecting using computer-assisted auditing tools and techniques, with special attention given to three levels covering these factors: environmental level, audit firm level, and individual level. This requires two steps. The first one is to argue the models used in the adoption and implementation of technology. The second step is to review the academic literature on auditing that examines the factors affecting the usage of computer-assisted auditing tools and techniques. The researcher has presented a conceptual framework for a comprehensive understanding of factors affecting the use of computer-assisted auditing tools and techniques, which is beneficial for professional bodies and audit firms as well as researchers.

Introduction

Recently, technology has advanced rapidly, and as a result, it has significantly influenced the audit profession (Tarek, Mohamed, Hussain, and Basuony, 2017; Pedrosa, Costa, and Aparicio, 2020), especially in performing the audit function (La Torre et al., 2018; Kozlowski, 2018). So, audit firms have no choice but to adopt the implementation of technology, as well as auditors (Allbabidi, 2021); in particular, using CAATTs plays an important role in enhancing the auditing process (Daoud, Marei, Al-Jabaly, and Aldaas, 2021).

Auditing research related to this issue has been divided into two categories: some of them have focused on computer-assisted auditing tools and techniques (CAATTs) (Handoko, Sabrina, and Ayuanda, 2019; Mansour, 2016), and others have focused on generalized audit software (GAS) (Kim, Kotb, and Eldaly, 2016). Because generalized audit software (GAS) is one type of computer-assisted auditing tool and technique (Kim, Kotb, and Eldaly, 2016), this study has pursued the factors affecting the use of computer-assisted auditing tools and techniques (CAATTs), which are more general than generalized audit software (GAS).

Computer-assisted auditing tools and techniques (CAATTs) are the tools and techniques that are used in the auditing profession for both external and internal audits, depending on information technology (Handoko, Sabrina, and Ayuanda, 2019) in collecting and analyzing data (Pedrosa and Costa, 2012) that help auditors achieve audit work effectively and efficiently (Rosli, Yeow, and Siew, 2012). In other words, CAATTs can be defined as the use of technology in performing audits, which includes automated working papers and traditional word processing applications (Braun and Davis, 2003), as well as certain software products that are designed especially for auditing tasks (Pedrosa, Costa, and Aparicio, 2020).

The spreadsheet applications and software for professionals are good examples of CAATTs. The auditor can use CAATTs for a lot of work tasks; for instance, spreadsheet applications can be used to create and examine audit work papers (Handoko, Sabrina, and Ayuanda, 2019). The software can be used for summarizing data and detecting anomalous data and information, and it can also be used for analytical procedures (Boritz and No, 2011; Handoko, Sabrina, and Ayuanda, 2019). Auditors can also use CAATTs

to determine audit evidence, in particular trace-back electronic evidence, as well as assess audit evidence (Boritz and No, 2011).

Briefly, Computer-assisted auditing tools and techniques (CAATTs) can be used in testing the client's information system, implicitly or explicitly, (Jakšić, 2009; Handoko, Ariyanto, and Warganegara, 2018) as well as audit work process (Bierstaker, Janvrin, and Lowe 2014; Handoko, Sabrina, and Ayuanda, 2019).

Many researchers have emphasized that auditors need to use Computer-assisted auditing tools and techniques in their work that can help them to conduct an audit efficiently and effectively (Curtis and Payne 2008; Jenkins and Pinkney 1978; Pedrosa, Costa, and Aparicio, 2020); in addition, further research is still required on the topic of computer-assisted auditing tools and techniques (CAATTs) (Janvrin et al. 2008; Byrnes et al. 2015; Mansour 2016; Lins et al. 2016; Pedrosa, Costa, and Aparicio, 2020).

For the lack of CAATTs' usage in developing countries, the current study draws on prior research in information systems and auditing to explore the factors that might lead auditors to use the advanced technology in their fieldwork from a comprehensive approach. The key research question that motivates this work is:

What are the main factors influencing significantly the usage of computer-assisted auditing tools and techniques (CAATTs) in the auditing profession?

The main objective of this research article is to develop a model from a comprehensive approach based on the technology acceptance model (TAM), the technology organization environment model (TOE), and the unified theory of acceptance and use of technology (UTAUT) as well as prior research in auditing that is related the same issue.

The findings of this study are expected to make a difference in the accounting field, in particular the auditing discipline. This is because, it provides a wide useful insight into the determinates affecting technology usage in the auditing profession which can help regulators to consider this issue when they intend to set up or update regulations, as well as professional bodies for maintenance standards. This study is also expected to be a good guide for audit firms as they improve their policies and procedures. Besides, it encourages audit firms to take action in using technology as a tool to enhance the auditors' performance.

The remainder of this paper is organized as follows. The second section reviews the theoretical background of the research and develops a comprehensive model. The last section concludes the paper and offers additional future research.

Literature Review:

Theoretical Background

For many years, prior research in IS and IT has proposed, developed, and applied several models to test the adoption and implementation of technology. On the other hand, several auditing research has been pursued on technology acceptance depending on these models. The main three models have been used in most auditing research are the technology acceptance model (TAM) (Davis 1989; Davis et al., 1989), the technology organization environment (TOE) framework (Tornatzky and Fletscher, 1990), and the unified theory of acceptance and use of technology (UTAUT) (Venkatesh, Morris, Davis, and Davis, 2003).

The technology acceptance model (TAM) focuses on the effect of characteristics of the computerized information systems on the end user's behavior and motivation, and consequently its influence on his acceptance to use it in his work (Davis, 1985).

Davis, 1989 provides the technology acceptance model (TAM) by developing and validating two variables, perceived usefulness and perceived ease of use, which are considered the main determinants for user acceptance of information technology.

Davis et al., 1989 defined perceived usefulness as "the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational context", and Davis, 1989 also defined perceived usefulness as "people believe that using the new system will provide value-added in their work". Additionally, Davis et al., 1989 defined perceived ease of use as "the degree to which the prospective user expects the target system to be free of effort", and Davis, 1989 defined it as a "person believe that using the system would be easy and no difficulties".

Although both variables, perceived usefulness and ease of use, have a positive association with technology acceptance (Davis et al., 1989), the effect of perceived usefulness on the actual use of technology is stronger than the effect of perceived ease of use on the actual use of technology (Davis, 1989).

In 1990 Tornatzky and Fletscher introduced the technology organization environment (TOE) theory that overlooked the individual perspective (Widuri, R., O'Connell, B., and Yapa, P. W. 2016) and added the technological aspects. In other words, according to the technology organization environment (TOE) model, the decision-making process of technology adaptation depends on three aspects: technology, organization, and environment. Technology factors include all aspects of technology inside and outside the organization (Awa et al., 2015; Handoko and Thomas, 2021). Organizational factors are those factors related to business activity, support of management, organizational culture, and corporate structure (Handoko and Thomas, 2021). Environmental elements cover factors that surround the company and affect its operations such as government, competitors, and suppliers (Doğanay, 2019). Although these three dimensions are useful for auditing research on technology acceptance from the audit firm's perspective, it is not applicable to research on technology acceptance from the auditors' viewpoint (Doğanay, 2019; Handoko and Thomas, 2021).

In 2003, Venkatesh, Morris, Davis, and Davis stated a theory, called Unified Theory of Acceptance and Use of Technology (UTAUT), by a combination of some models, one of them was Technology Acceptance Model (TAM). For Unified Theory of Acceptance and Use of Technology (UTAUT), technology acceptance depends on two dimensions, contextual factors and individual characteristics, (Pedrosa, and Costa, 2012), and includes four variables, performance expectancy, effort expectancy, social influence, and facilitating conditions, to determine the impact of human behavior on technology acceptance (Handoko, Ariyanto, and Warganegara, 2018).

For more details, performance expectancy refers to the individual's beliefs that he can achieve the expected performance or gain benefits by using a specific system or a specific tool (Williams, Rana, Dwivedi, and Lal., 2011). Effort expectancy is the expected individual's effort to use a specific system or a specific tool in executing the work (Handoko, Ariyanto, and Warganegara, 2018) and how this system or tool makes the work easier (Dwivedi, Rana, Chen, and Williams, 2011). Social influence is the individual's belief that others expect that, he should use a specific tool or a specific technique (Handoko, Ariyanto, and Warganegara, 2018). Facilitating conditions refer to the availability of facilities and technical infrastructure that are necessary to use computerized tools and techniques (Venkatesh, Morris, Hall, Davis, Davis, and Walton, 2003).

What is mentioned before illustrates some important information that can lead to a research gap that needs to be fulfilled. First, the TAM model concentrates on perceived usefulness and perceived ease of use in measuring technology acceptance which are considered good indicators for auditors' acceptance and the focus of the Unified Theory of Acceptance and Use of Technology (UTAUT) is also on the individual technology acceptance by examining the four factors: performance expectancy, effort expectancy, social influence, and facilitating conditions. The third model, the TOE model, is applicable to determine factors affecting technology acceptance at the level of the audit firm and ignores individuals' factors. Then, it is important to build a comprehensive model that includes auditors' factors, besides other factors inside and outside the audit firm that influence the technology implementation for both, the auditor and the audit firm.

Second, from the review of previous auditing research, it is found that most of the studies have basically focused on the acceptance or adaptation of technology, particularly in developing countries, despite this decision is no longer optional and becomes obligatory, especially in the light of the effects of both coronavirus pandemic and the rapid extension of the fourth industrial revolution on the auditing profession. Besides, although IT development requires more technology-based audits, there are very few studies related to the use and importance of IT in auditing are conducted within the developing country (Tarek, Mohamed, Hussain, and Basuony, 2017).

It means that determining factors affecting the usage of computer-assisted auditing tools and techniques (CAATs) from a comprehensive perspective with three different dimensions, business environment, audit firm, and auditors themselves, will absolutely provide a more complete picture that may be a motivation for more research in this area. Then, this study is to specify the determinates of using

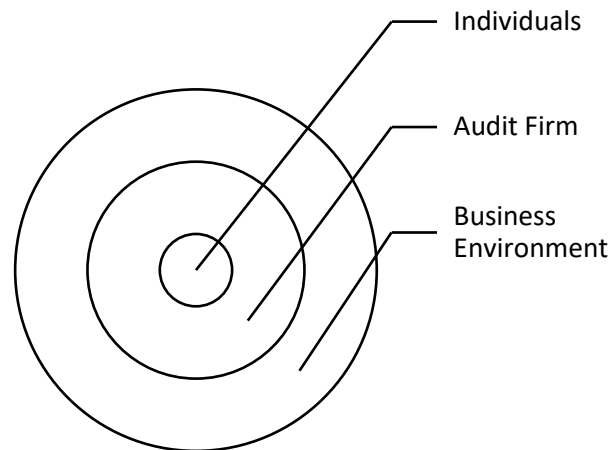
the CAATTs from a comprehensive standpoint. For this purpose, the next part of the literature review is to build this comprehensive model.

Theoretical Model

In the previous section, the aforementioned approaches or models that have been relied on to specify determinates affecting technology acceptance in auditing research are the starting point to build a unique and comprehensive model for the auditing discipline.

As mentioned previously, we need to have a specific model for auditing to cover all factors that are expected to influence the usage of computer-assisted auditing tools and techniques (CAATTs) from a broad perspective. So, this study provides a comprehensive model that has been designed based on the three models that are discussed before and in the light of the prior research that will be discussed in this section.

This model suggests three levels of factors that affect the use of computer-assisted auditing tools and techniques. The first level is the level of the business environment, the second level is the audit firm level, and the third one is that of individuals.



A more detailed specification of the model will be discussed below, and it is likely to generate a deep understanding of factors related to the three levels that affect the usage of computer-assisted auditing tools and techniques. Then, the discussion will be divided into three levels: environmental level, audit firm level, and individual level.

Business Environment Level

The business environment of the audit profession, or audit firm, refers to the domain the audit profession can be conducted which includes professional bodies, regulators, auditees, and competitors, (Widuri, R., O'Connell, B., and Yapa, P. W. 2016), and therefore, business environment factors are those which are involved in the business environment and influence, implicitly or explicitly, on the auditors' attitude as well as an audit firm, and audit firm has no authority on it or at least has a little control on it. Hence, the main factors related to the business environment that affect the usage of computer-assisted auditing tools and techniques (CAATTs) are the client, competitors, and professional bodies.

The client

Recently, the audit profession, especially financial auditing, has faced many difficulties and challenges with present and future that have been posed by a large volume and diversity of data which increased from day to day as well as complications have occurred regarding the auditee (Pedrosa, Costa, and Aparicio, 2020). It means that the activity of the auditee and his business size can play an important role to enforce the audit firms, especially engagement partners and leaders, to use computer-assisted auditing tools and techniques (CAATTs) (Widuri, R., O'Connell, B., and Yapa, P. W. 2016).

On the other hand, in the business world, companies always invest in information technology to promote operational performance and financial reporting quality (Wicaksono and Lusianah, 2016). Consequently, the accounting information system has been changed from paper-pencil-based functions to

computer-internet and software-based functions (Ashok, and MS,2019). So, audit firms should consider the advanced accounting information systems of their auditees when they specify audit strategies to be aligned with these systems (Allbabidi, 2021; Mansour,2016). As a result, audit firms need to adopt computerized tools and techniques and determine the essential requirements for using them. In other words, because of the continuous increasing development of information technology (IT) in the worldwide business environment, and consequently in auditees, audit firms have no choice but to adopt different and several computer-assisted auditing tools and techniques (CAATTs) (Kim, Kotb, and Eldaly, 2016), in particular for clients with the more complex accounting information systems (Handoko, Sabrina, and Ayuanda, 2019). It is necessary for an audit firm to be compatible with the auditees' accounting information systems (Allbabidi, 2021) from the first step of planning the audit engagement to the last one of producing the audit report. In particular, in developing countries, the evaluation and examination of an auditee's information technology are not conducted sufficiently and adequately by auditors (Ismail and Abidin, 2009; Mansour, 2016; Allbabidi, 2021).

In brief, the client's characteristics, particularly the auditee's size, large volume and diversity of data, and information technology used in the information system, are the fundamental determinants of the usage of computer-assisted auditing tools and techniques (CAATTs) in auditing tasks.

The competitors

The effect of technological advances on the business environment will definitely convert the competitive landscape (Zhu et al., 2006) because it imposes new requirements for competition that argue companies to do their best to have a competitive advantage over others (Chan et al., 2012). Consequently, IT adaptation by several firms in the market will encourage others, especially competitors, to make the same (Enaizan et al., 2020; Zhu et al., 2003; Daoud, Marei, Al-Jabaly and Aldaas,2021).

Likewise, competitive pressure is a substantial motivation for audit firms to utilize CAATTs (Rosli, Yeow, and Eugene, 2013). Hence technology assistance, for audit firms, is not only to align with the auditee's information system, but also to avoid missing the client (Handoko, Sabrina, and Ayuanda, 2019) and to have a competitive advantage over the competitors (Daoud, Marei, Al-Jabaly and Aldaas, 2021).

The professional bodies

Auditors' performance not only depends on the effect of the business environment on auditing but also on the applicable auditing standards (Amin, and Mohamed, 2016) which is considered the main responsibility of professional bodies. In other words, the role of professional bodies is an important environmental factor with a significant effect on the auditing profession (Mansour, 2016; Lim-u-sanno and Ussahawanitchakit, 2009). At the same time, these professional bodies have started to be interested in the influence of technology on the auditing profession because of the fourth industrial revolution (Allbabidi, 2021). Though professional bodies have referred to the importance of using information technology and computer-assisted auditing tools and techniques (CAATTs) in performing auditing profession, especially financial auditing, using these tools and techniques in the auditing profession has been grown completely weak (Mansour,2016), so professional bodies need to take action to inspire and boost using digital technologies (Allbabidi, 2021)

On the other hand, research on the effect of professional bodies has been barely done and little research has been undertaken (Pedrosa, Costa, and Aparicio, 2020).

Audit Firm Level

Recent research has pointed out that the fourth industrial revolution has forced audit firms to focus on the effect of technology (Allbabidi, 2021). Although Handoko, Sabrina, and Ayuanda, 2019 have found that audit firm does not influence the auditors' perceptions of the information technology value as well as the ease of use technology, several studies have concluded that organizational factors have a significant influence on acceptance and adaptation of computer-assisted auditing tools and techniques (CAATTs) (Pedrosa, Costa, and Aparicio, 2020). Top management of the audit firm has a significant impact on the use of computer-assisted auditing tools and techniques (CAATTs) by auditors through more investments and

training programs necessary for using these tools and techniques, besides establishing incentives and promotion criteria to encourage and motivate them to use it (Mansour,2016).

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, and Yeow, 2020). The audit firm level involves two main factors: perceptions of the audit firm's management and the size of the audit firm.

Perceptions of audit firm's management

As discussed previously, it is expected that the business environment influences the top management of audit firm to adopt computer-assisted auditing tools and techniques (CAATTs) and it also affects the auditors for using computer-assisted auditing tools and techniques (CAATTs) directly as well as indirectly by its effect on management of audit firm.

Despite sophisticated IT-based environments, auditors have moved forward slowly (Bierstaker et al., 2014; Allbabidi, 2021). Using CAATTs by auditors depends on their awareness of the importance of using CAATTs in improving their performance (Mansour,2016; Handoko, Ariyanto, and Warganegara, 2018), besides obvious policy to promote auditors comply with standards that provide guidelines to help auditors to understand their responsibility and how to execute audit tasks in the electronic environment (Tarek, Mohamed, Hussain, and Basuony, 2017). Both awareness spread and establishing the policy are undertaken by the managers at the audit firms. So, the audit firm's management has to plan to spread awareness and cause a growing realization about using CAATTs. Getting an inadequate response from auditors for technology developments due to not only the lack of awareness and willingness of auditors but also the insufficient Knowledge and skills that are required for this advancement. It means that the management of audit firms needs to pursue auditors to use CAATTs through its policies and training programs.

Audit firm size

Audit firm decision on CAATTs adaptation must be accompanied by investment in technical infrastructure and what is necessary to support auditors in using CAATTs (Rosli, Yeow, and Siew,2012), taking into consideration the cost and benefit analysis of using CAATTs (Daoud, Marei, Al-Jabaly, and Aldaas, 2021) which is different from one audit firm to another depending on the financial resources and market share of the audit firm. Consequently, the bigger the size of the audit firm, the more encouragement for auditors to use CAATTs as a result of two main reasons. First, the clients of big audit firms usually have large business with more complex IT that may uphold the auditors to use computer-assisted auditing tools and techniques (CAATTs) (Mansour,2016). Second, big audit firms have sufficient financial resources to acquire what they need to support using technology in auditing (Handoko, and Thomas, 2021) whether these investments are for organizational and technical infrastructure supporting CAATTs or to acquire different types of CAATTs (Mansour,2016). Further, the intention of auditors to use CAATTs is affected significantly by the availability of IT facilities and other conditions that support them (Mansour,2016; Handoko, Ariyanto, and Warganegara, 2018).

Briefly, audit firms must undertake the responsibility to spread awareness and encourage auditors to use more advanced tools and techniques, besides providing all facilities that are needed and training programs for improving the auditors' Knowledge and skills.

Individual level

The auditor is the end-user of CAATTs; hence the individual factors of the auditor play an important role in using CAATTs. According to Pedrosa, Costa, and Aparicio, 2020, auditors have a high intention to use technology in auditing tasks and they actually use CAATTs at a high level. To the contrary, for Daoud, Marei, Al-Jabaly and Aldaas, 2021, auditors haven't used the computer-assisted auditing tools and techniques (CAATTs) broadly as they should until now, despite knowing how it is important for them. Generally, using computer-assisted auditing tools and techniques (CAATTs) varies from one auditor to another because it depends fundamentally on the auditor's willingness to learn and use technology (Handoko, Sabrina, and Ayuanda, 2019).

This type of factor is the conclusion of the combination of the characteristics of auditors themselves and the effects of both the business environment and audit firm on auditors. These individual factors are those related to the auditor himself such as his beliefs and his knowledge and skills, besides the effect of auditors' peers.

1- Auditors' knowledge and skills

Most research in auditing that is interested in the acceptance and the use of computer-assisted auditing tools and techniques (CAATTs) always use perceived usefulness and perceived ease of use to measure as proxies for the actual use of auditors or the auditors' perceptions and acceptance of technology. Users definitely accept the tools and techniques that are expected to be easy to use (Hoque, Saif, AlBar, and Bao, 2016). The study by Handoko, Sabrina, and Ayuanda, 2019 has found that using computer-assisted auditing tools and techniques (CAATTs) is affected positively by the auditor's perception of the usefulness of information technology and ease of use technology because it is expected to enhance the auditors' performance with no more effort to learn how to use it.

Generally, the ease of use of the technology is based basically on the technological skills that always differ from one auditor to another (Handoko, Sabrina, and Ayuanda, 2019). With the rapid development of information technology, IT is no longer a specific domain for only information technology specialists (Allbabidi, 2021) that requires paying more attention to improving the technical and analytical skills of auditors. From my standpoint, these two variables perceived usefulness and perceived ease of use, are related to the competence of auditors. In other words, the auditors need to have a suitable level of knowledge and skills that enable them to have the ability to determine if these tools and techniques are useful and usability.

Moreover, Tarek, Mohamed, Hussain, and Basuony, 2017 have found that the auditors' IT knowledge and skills have a significant influence not only on using new audit applications and their perceptions of their importance but also on the auditors' realization of the client's IT complexity.

2-Auditors' peers

Auditor's peers are those who work in the same professional field and extend to include others outside the firm and 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, and Costa, 2014). Pedrosa and Costa, 2014 found that peers and social influence have a positive impact on the acceptance of Computer-assisted audit tools and techniques. In 2020, Pedrosa, Costa, and Aparicio found that peer influence has affected positively social influence and social influence has no effect on the intention to use CAATS.

Because of the increasing development of technology, auditors should have a perfect realization of its importance and pay more attention to how to use technological auditing techniques and tools (Amin, and Mohamed, 2016), and auditors always share with their peers their knowledge about how to use technology in the fieldwork (Handoko, Sabrina, and Ayuanda, 2019) which is expected to affect the auditors' believe and encourage them to use technology, particularly CAATTs.

Conclusion

The purpose of this paper is to build a comprehensive model for a better understanding of the factors that affect the usage of computer-assisted auditing tools and techniques. Firstly, the author has briefly introduced the models to test the adoption and implementation of technology that has been applied by prior research in IS and IT. Likewise, the author has reviewed the academic literature in auditing research related to factors affecting the usage of computer-assisted auditing tools and techniques (CAATTs), besides research that has consecrated in generalized audit software (GAS). Finally, a model has been built from a comprehensive perspective. This model suggests three levels of factors that affect the use of computer-assisted auditing tools and techniques. The first level is the level of business environment that includes the client, competitors, and professional bodies. The second level is the audit firm level which involves two main factors: perceptions of the audit firm's management and the size of the audit firm. The

third one is relevant to the auditor himself such as his beliefs and his knowledge and skills, besides the effect of auditors 'peers.

Because of the effects of both the coronavirus pandemic and the rapid extension of the fourth industrial revolution on the auditing profession, it is expected to need more research in using computer-assisted auditing tools and techniques. Hence, the suggested model in this paper represents a good starting point for many researchers. Additionally, it is useful to apply this comprehensive model in different cultures with different characteristics and different circumstances that may lead to different results.

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., and 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., and 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).
- Awa, H. O., Ojiabo, O. U., and Emecheta, B. C. (2015). Integrating TAM, TPB and TOE frameworks and expanding their characteristic constructs for e-commerce adoption by SMEs. *Journal of Science and Technology Policy Management*.
- Bierstaker, J., Janvrin, D., and Lowe, D. J. (2014). What factors influence auditors' use of computer-assisted audit techniques? *Advances in Accounting*, 30(1), 67-74.
- Boritz, J. E., and 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., and 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-Liburud, H., Teeter, C. R., and 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*.
- Byrnes, P. E., Al-Awadhi, A., Gullvist, B., Brown-Liburud, H., Teeter, R., Warren, J. D., and Vasarhelyi, M. (2018). Evolution of Auditing: From the Traditional Approach to the Future Audit1. In *Continuous auditing*. Emerald Publishing Limited. 2012
- Chan, F. T., Chong, A. Y. L., and Zhou, L. (2012). An empirical investigation of factors affecting e-collaboration diffusion in SMEs. *International Journal of Production Economics*, 138(2), 329-344.
- Curtis, M. B., and Payne, E. A. (2008). An examination of contextual factors and individual characteristics affecting technology implementation decisions in auditing. *International Journal of Accounting Information Systems*, 9(2), 104-121.
- Daoud, L., Marei, A., Al-Jabaly, S., and Aldaas, A. (2021). Moderating the role of top management commitment in usage of computer-assisted auditing techniques. *Accounting*, 7(2), 457-468.
- 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., and Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management science*, 35(8), 982-1003.
- Depietro, R., Wiarda, E., and Fleischer, M. (1990). The context for change: Organization, technology and environment. *The processes of technological innovation*, 199(0), 151-175.
- 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).
- Dwivedi, Y. K., Rana, N. P., Chen, H., and Williams, M. D. (2011, September). A Meta-analysis of the Unified Theory of Acceptance and Use of Technology (UTAUT). In *IFIP international working conference on governance and sustainability in information systems-managing the transfer and diffusion of it* (pp. 155-170). Springer, Berlin, Heidelberg.
- Enaizan, O., Eneizan, B., Almaaitah, M., Al-Radaideh, A. T., and 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. A. H., Abdelbaset Alkhawaldeh, H. N., and 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., and 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., and 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., and 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., and 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.
- Ismail, N. A., and 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., and Lowe, D. J. (2008). An examination of audit information technology use and perceived importance. *Accounting horizons*, 22(1), 1-21.
- Jenkins, B., and Pinkney, A. (1978). An Audit Approach to Computers: A new practice manual. *The Institute of Chartered Accountants in England and Wales*.
- Kim, H. J., Kotb, A., and Eldaly, M. K. (2016). The use of generalized audit software by Egyptian external auditors: The effect of audit software features. *Journal of Applied Accounting Research*.
- 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., and Odendaal, E. (2018). The fall and rise of intellectual capital accounting: new prospects from the Big Data revolution. *Meditari accountancy research*.
- Lim-u-sanno, K., and Ussahawanitchakit, P. (2009). Audit risk judgment and performance of Thai auditors: An empirical investigation of their antecedents and consequences. *Journal of Academy of Business and Economics*, 9(3), 59-83.
- Lins, S., Schneider, S., and Sunyaev, A. (2016). Trust is good, control is better: Creating secure clouds by continuous auditing. *IEEE Transactions on Cloud Computing*, 6(3), 890-903.
- 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.
- Pedrosa, I., and Costa, C. J. (2012). Computer-assisted audit tools and techniques in real world: CAATT's applications and approaches in context. *International Journal of Computer Information Systems and Industrial Management Applications*, 161-168.
- Pedrosa, I., and 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., and Aparicio, M. (2020). Determinants adoption of computer-assisted auditing tools (CAATs). *Cognition, Technology and Work*, 22(3), 565-583.
- Rosli, K., Yeow, P. H., and Siew, E. G. (2012). Computer-assisted auditing tools acceptance using I-Toe: a new paradigm. *Computer*, 7, 15-2012.
- Rosli, K., Yeow, P., and Eugene, 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.
- Siew, E. G., Rosli, K., and Yeow, P. H. (2020). Organizational and environmental influences in the adoption of computer-assisted audit tools and techniques (CAATs) by audit firms in Malaysia. *International Journal of Accounting Information Systems*, 36, 100445.
- Tarek, M., Mohamed, E. K., Hussain, M. M., and 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 and Information Management*.
- Tornatzky, L., and Fletscher, M. (1990). The deployment of technology. *The processes of technological innovation*, 118-147.
- Venkatesh, V., Morris, M. G., Davis, G. B., and Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly*, 425-478.
- Venkatesh, V., Morris, M. G., Hall, M., Davis, G. B., Davis, F. D. and Walton, S. M. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly*, 425-478.

-
- Wicaksono, A., and 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., and Yapa, P. W. (2016). Adopting generalized audit software: an Indonesian perspective. *Managerial Auditing Journal*.
- Williams, M., Rana, N., Dwivedi, Y., and Lal, B. (2011). Is UTAUT really used or just cited for the sake of it? A systematic review of citations of UTAUT's originating article.
- Zhu, K., Dong, S., Xu, S. X., and 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.
- Zhu, K., Kraemer, K., and 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.
-