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Computer-Assisted Audit Tools and Techniques: Advantages and Challenges

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Abstract:

This paper aims at exploring the implementation of computer-assisted audit tools and techniques (CAATTS). It tries to answer the following problematic: what are the potential advantages and challenges that may face auditors when adopting CAATTS? This paper adopts a descriptive analytical method using qualitative secondary data. The main findings of this research indicate that the use of CAATTS increases the efficiency and effectiveness of audit work across different audit steps and activities; however, the main challenges are related to the lack of auditor's proficiency on CAATTS and the complexity of computerized information system. Thus, a set of suggestions are proposed to face these challenges, namely the necessity to reduce the differences between accounting software and to develop auditing software that could be implemented on existing accounting systems; further, the study recommends the imposition CAATTS mastery to get certificated as chartered auditor.

Keywords: CAATTS; computerized information system Advantages; challenges

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1. INTRODUCTION

Almost all businesses in the world adopt Information technology (IT) in their operations, communication and reporting; thus, many sophisticated and complex software were developed to meet businesses' needs. Therefore, data is maintained on an electronic medium rather than paper based one, and the accounting information system becomes computerized. In parallel, audit is obliged to keep the pace and the mode of accounting changes.

Once, auditors adopt IT in their mission, computer-assisted audit tools and technique (CAATTS) take place. Auditors, in this context, may gain effectiveness and efficiency when performing audit process, but they may face big challenges as working with such complicated environment. They must know the way a company uses information systems and the way to trace electronic source documents. This knowledge is necessary to execute the audit activities. From the above account, the problematic of this research raises as follow: What are the potential advantages and challenges that may face auditors when adopting CAATTS?

From this central question, three sub-questions are asked:

-What are the famous CAATTS used in the world?

- How can CAATTS be integrated in audit activities?

- What are the potential advantages and challenges must the auditor know when adopting CAATTS?

The purpose of this research is to make evident the use of technology in the accounting and auditing field through several noted literature. This paper adopts a descriptive analytical method using qualitative secondary data in the sake of suggesting general comments based on the previous literature of CAATTS adoption.

2. Review of literature

Many studies have been carried out to treat the implementation of information technology in audit. The following is a presentation of the principal concepts related to Computer-Assisted Audit Tools and techniques in relevant studies.

2.3 Definition of Computer-Assisted Audit Tools and techniques (CAATTS)

Definition of Computer-Assisted Audit Tools and techniques (CAATTS) varies from an author to another.

The term computer-assisted audit techniques have become common since 1974, when the American Institute of public Accountants (AICPA) recognized the importance of Electronic Data Processing (EDP). According to AICPA, CAATS are "generalized audit software, test data, including use of an integrated test facility and program tracing, review of program logic, programs comparisons, utility programs, specialized audit programs, timesharing programs, and additional techniques".(1)

According to international federation of accountants (IFAC), CAATS is the use of information technology and software that help the auditor to conduct test, controls and verifications, data validation and analysis of financial statements and continuous monitoring of audit work.(2)

According to Lin & Wang (2011), CAATTS are "various tools, technologies, and software that help auditors to conduct control and confirmation tests, analysis and verification of

(1) Isabel Maria Mendes Pedrosa, Computer-Assisted Audit Tools And Techniques Use: Determinants For Individual Acceptance, PHD Thesis, university Institute of Lisbon, Portugal, May 2015, PP 29-30.
(2) Rusman Ghani et al, Application of Computer-Assisted Audit Tools and Techniques (CAATTs) in Audit Firms, Journal of Advanced Research in Business and Management Studies, volume 9, Issue 1, 2017, pp 68-69. Journal homepage: www.akademiabaru.com/arbms.html (consulted on 30/06/2021)

financial statement data, and continuous monitoring and auditing". (1)

From the aforementioned definitions, CAATTS can be defined as follow: the use, by an auditor, of different information technology software, tools and techniques, to review a computerized accounting information system. They provide a wide range of technique and tools that help the auditor evaluating internal control, conducting tests, collecting evidences, and so forth.

2.2 technology acceptance in audit process

There are many theories that explain the factors that influence the individual's willingness to accept and use Information Technology (IT).(2) The most common model is the UTAUT, it proposes that performance expectancy, effort expectancy, social influence and facilitating conditions impact IT adoption:(3)

- Performance expectancy which means the extent to which an individual believes the use of the tool will aid him better getting significant rewards. For instance, auditor may expect that adoption of Computer-Assisted Audit Tools (CAATS) will help him to meet audit deadlines since CAATS cut time required to conduct tests and controls, thereby enhance audit efficiency.

- Effort expectancy, which means the extent of ease gained by the use of the tool. For example, auditors who are familiar with

(1) Ebrahim M. Mansour, Factors Affecting the Adoption of Computer Assisted Audit Techniques in Audit Process: Findings from Jordan, Business and Economic Research, Volume 6, issue 1, 2016, p 249.
(2) Muhammad Rifki Shihab et al, determinants of CAATS Acceptance: Insight from public accounting firms in Indonesia, Procedia computer science, volume 124, 2017, pp 523-524.
(3) Diane Janvrin et al, Auditor Acceptance of Computer-Assisted Audit Techniques, 2008, PP 6-7. Retrieved on: https://www.researchgate.net/publication/253742129_Auditor_Acceptance_of_Computer-Assisted_Audit_Techniques . (Consulted on 20/06/2021)

IT may feel at ease adopting CAATS.

- Social influence, which refers to the degree to which an individual feel that a wide number of persons believe he should use the new tool. To illustrate, the degree to which an auditor perceive that his direct managers support the use of CAATS may influence whether or not he adopt them.

- Facilitating conditions, they refer to 'the degree to which an individual believe that organizational and technical infrastructure exist to support the usage of a new tool'. In audit world, this infrastructure may include audit firms providing appropriate CAAT resources and computer support to their auditors, like specialized instructions, support center, and usage guideline.

2.3 types of CAATTS

CAATS can refer to use of any kind of technology in the sake of assisting auditors, like the use of electronic spreadsheets, electronic working papers, test data, integrated test facility (ITF), parallel simulation, and embedded audit modules (EAM), /system control and audit review files (SCARF), generalized audit software (GAS).(1) table 1 describes the seven types of CAATS (techniques).

Table 1. Typology of CAATs

Types of CAATS	Description
Electronic spreadsheet	Is a computer software application that serves data classification, analysis and storage. Spreadsheets developed as an electronic imitation of paper accounting and auditing work sheets.
Electronic working paper	They are documents that accumulate and preserve all audit evidence collected during the audit process. They support audit work done and provide assurance about the accomplishment of audit in conformity with the applicable auditing standards.

(1) Ebrahim M. Mansour, op.cit, p 251.

Test data	Dummy data prepared by the auditor, which will be processed by the audited systems. The evaluation of these systems is done through a comparison between the results of the test data and the auditor's expectations. Data processing in these systems is a "black box".
Integrated test facility	Processing of test data in separated area or module within the audited system. The results of the internal system controls are visible for the auditor.
Parallel simulation	An auditor developed application that is completely separated from the client's systems, the results of processing real data by the auditor system are compared with those processed by the client's system .
Embedded audit module (EAM)	This is implemented within a client's system. EAM evaluates real data by predefined criteria while it is processed. Results of EAM evolutions can be written into a SCARF, which is sent to auditors for further examination.
Generalized audit software (GAS)	Auditor developed and self-contained applications which evaluate extracted real data and analyze them regarding predefined criteria. Precisely, the software designed for auditors to facilitate and automate testing of 100% of population, which allows auditors to focus on specific risk areas and transitions and to identify duplicate items. The most famous GASs are: audit command language (ACL) and interactive data extraction and analysis (IDEA).

Source : Ibrahim M. Mansour, p, cit, pp251, 252**.**

Furthermore, Jaksic (2009) mentions another technique (tool) which is online audit monitor. This tool enables continuous audit via integration of program code into client's transactional application. Its role is to control transactions and make extractions if certain criteria are met (unusual transaction, high risk transactions). To integrate it, new lines of program code into accounting system should be added into client's computer program. If transactions meet predefined criteria, embedded audit module (EAM) is activated and two possible actions can be

executed: Audit log creation or Transaction tagging.(1)

According to Asniarti and Iskandar Muda (2018), auditors can use various software packages or audit programs to perform audit. Generalized audit software is commonly used audit software; in addition, there are other software that can assist the auditor directly or indirectly, namely:(2)

- Electronic Data Management (EDM), EDM is a system that uses telecommunication and computer technology, it is composed of four components namely hardware, software, data organizing methods and data processing methods. The advantage of EDM system comparing with manual system is to provide better consistency in data processing, but it is criticized by generating limited traces.

- Generalized Audit Software (GAS), is the use of computers to perform the task or audit testing procedures of the client records. Although development and maintenance of GAS requires high costs, it brings many advantages. Firstly, it allows quick training for all staff of auditors to use the general program. Second, single general program can be implemented in a wide range of testing tasks without the need to additional costs of creating individual programs.

- Commercial general use software

It is relatively simple and easy to use. It is also affordable. Electronic spreadsheets, or word processing and word processors are examples of widely used commercial software. Besides, Microsoft Excel, visicale, supercale, and Multiplan are examples of number processing software.

(1) Dejan Jakšić, Implementation of Computer-Assisted Audit Techniques in Application Controls Testing, Management Information Systems, Volume 4, issue 1, 2009, P 11.
(2) Asniarti and Iskandar Muda, The Effect of Computer Assisted Audit Tools on Operational Review of Information Technology Audits, Advances in Social Science, Education and Humanities Research (ASSEHR), volume 208, 2018, PP 24-25.

Among the relevant accounting software used by Algerian companies and audit firms is 'Sage comptabilité', which is designed by the British company 'Sage', it is widely used by the biggest companies in Algeria such as Algerian airport, SIDAR, Loya, Cevital Group, Danone, Railway company and so forth. Another famous Algerian accounting software is 'PC Compta', it is widely used across the national territory especially by medium and small sized companies and professionals. Furthermore, there is other competitive software.(1)

Auditing standards encourage auditors to adopt IT and computer assisted audit tools (CAATS) during the audit process to evaluate fraud risks, identify journal entries or to test other operations, evaluate inventory existence and competence, choose a sample of transaction from key electronic files, sort transactions with particular criteria, test the whole population rather than a sample, collect evidence about control effectiveness, verify the accuracy of electronic files, and re-perform procedures .(AICPA,2001,PCAOB,2004) (2).

2.6 Integration of CAATTS in audit process

Those techniques could be used in four global audit processes which are: 1) review of system of internal accounting control, 2) Tests of compliance, 3) Tests of details of transactions and balances, 4) Analytical review.(3)

The table No 2 illustrates the correspondence of the adequate technique to each audit procedure.

Table 2. Common Uses of Computer-Assisted Audit Techniques

Audit	Audit process

(1) Mohamed Bourkaib, Hindrances of Computerized Accounting Environment on Auditing in Algeria, Phd thesis, Medea university (Yahya Fares), 2017, pp 137-138.
(2) Heba Abou-El-Sood et al, Exploring Auditors' Perceptions of the Usage and Importance of Audit Information Technology, International Journal of Auditing, Volume19, Issue 3, November 2015 (Wiley 2015), P 253. doi:10.1111/ijau.12039
(3) Isabel Maria Mendes Pedrosa, op.cit, pp 30-31.

Techniques				
	review of system of internal accounting control	Test of compliance	Substantive procedures	
			Tests of details of transactions and balances	Analytical review
Generalized audit software	X	X	X	X
Test data including use of an integrated test facility and program tracing	X	x		
Review of program logic	x			
programs comparisons		x		
utility programs	X	X	X	
specialized audit programs	X	X	X	X
timesharing programs	X	X	X	X
additional techniques	X	X	X	X

Source: Isabel Maria Mendes Pedrosa, op.cit, 2015, pp 30-31.

Dejan Jakšić (2009) tried to examine possibilities of implementation of advanced computer-assisted audit techniques into verification of efficiency and effectiveness of application controls (input, processing and output controls). According to him, the main computer-assisted audit techniques could be categorized as: test data, integrated test facility, parallel simulation and online audit monitor. The implementation must be based on cost-benefit analysis since they are time-consuming and must be tailored for each single audit client. (1)

3. Advantages and challenges of CAATS adoption

(1) Dejan Jakšić, op.cit, pp 11- 12.

Auditor function may gain many benefits from applying CAATTS in his work; however, potential risks, difficulties and challenges may appear with this application.

3.1 advantages of CAATTS implementation

Computerized information processing provides many benefits for the auditor if he was familiar with information and communication technology tools and techniques.

3.1.1 The role of CAATTS in application controls

The objectives of application controls are to ensure the completeness and accuracy of records, in addition to the validity of entries made to each record. Traditionally, application controls can be in the form of: input controls, processing controls, and output controls:(1)

- Input controls should provide a reasonable assurance that input data is correctly authorized and entered into computer system. The most important input controls are validity controls.

- Processing controls give an automated means to assure that processing is complete, accurate and authorized. Mistakes in electronic data processing due to miscalculation, errors in program algorithm, use of wrong file records, and automatic execution of non-validated transactions.

- Output controls, on the other side, treat what is done with data and should compare output results with intended results by checking the output against the input. Sometimes, output could be confidential data like list of payrolls, where unauthorized access to it could touch the company credibility.

3.1.2 The role of CAATS in Fraud detection

Audit software enable auditors to obtain a quick glance of the audit operations and go down into the details of specific areas of concern. The auditor program can verify a 100% of

(1) Ibid, pp 9-10.

certain transactions and recalculate relevant rations and figures. Audit software can highlight those individual transactions which meet fraudulent activity criteria with audit software. A huge number of files can be examined, historical data can be used to identify anomalies, and comparisons can be carried out between many locations. The techniques and types of data interrogations in modern audit software are almost unlimited. For instance, audit software has many tools that assist auditor requirement to review transactions for fraud like the existence of duplicate transactions, missing transactions and anomalies.(1)

CAATS can be used to examine a company's data files and identify data patterns related to fraud. Further, CAATS can help auditors to focus their efforts on the areas of highest risk and choose to exclude low risk transactions from their review. Audit software can, as well as, provides auditor with the possibility to extract information from several files from different databases in order to identify relevant samples or relationships among data. Computerized techniques can help auditors to identify systems early in the life of a fraud. This will avoid the negative effect of many frauds before assets are lost or good will is destroyed. The possibility to monitor key systems and track trends can be a big deterrent of fraud, preventing some fraudulent activities and indentifying misstatement almost as soon as it occurs. (2)

3.1.2 Benefits of CAATTS in audit activities

There are a lot of benefits of implementing CAATS in auditing; the following is a sample of them:(3)

- The ability to create electronic worksheets on a centralized database, which allows comparison with past or similar worksheets.

(1) David Coderre, Computer- assisted techniques for fraud detection, edited by Paul D. Warner, the CPA Journal, August 1999, p 57.
(2) David Coderre, op.cit; p 57.
(3) Y. serpeninova et al, Computer-Assisted Audit Techniques : Main Advantages And Disadvantages, volume 3, 2019, pp 55-56.

- The ability to detect unexpected or unexplained samples in the audited database to identify fraud or to prevent it.

- Continuous monitoring as a constant process of collecting, analyzing and reporting company database.

- Effective method to test the client's accounting software.

- testing a huge volume of database accurately in a short time.

- Testing the database sources directly at their origin.

- Cost effectiveness due to using the same auditing software across years as long as the client doesn't change his accounting software.

- Similar results obtained by comparing between CAATS tests and classic tests will increase the auditor confidence.

- CAATs allow an auditor to check specific risks with a 100% certainty.

3.2 challenges of CAATTS implementation

According to (D. Janvrin, et al, 2008), more recent researches claimed that auditors still demonstrate difficulties in accepting complex tools.(1) The adoption of IT in accounting creates new challenges that require the auditor to sharpen his skills to face difficulties when executing audit process. These difficulties are:(2)

-The complexity of electronic accounting information systems. Therefore, the auditors have a new task of assuring the safety of information systems security, and assert the accuracy of utilized accounting software.

- Difficulties related to disappearance of audit path. This feature render difficult for the auditor to assure that computer entered

(1) Isabel Maria Mendes Pedrosa, op.cit, p 43.
(2) Hanan Djellab and Muhammad Laaribi, The Implications Of The Electronic Accounting Environment For The Auditing Process, Accounting, Audit and Finance Review, volume 2, issue 1, 2020, pp 54-57.

data are the same contained in documents, given these latter may be electronic in its turn. Moreover; data may be entered without proving documents like depreciation installments which is calculated automatically.

- Difficulties related to significant errors. Any simple error in computerized accounting system becomes significant misstatements, as operations are executed by the same instruction. Thus, the auditor must assert the safety of programming.

-Difficulties related to internal control system. Among the important pillars of internal control system in computerized accounting information system is the creation of new functions like electronic systems' director, systems' analyzer, systems' operator and librarian in charge of maintaining databases, programs and backups. Besides, due to computer use, delegation and authorization of some accounting operation are automated.

In the Algerian context, there are several studies that dealt with the obstacles of IT adoption in accounting and auditing. The following are the most relevant results.

Mohamed Bourkaib (2017) enumerates 12 of the most important accounting software in Algeria, and stated that there are more. The variety of accounting software may constitute a difficulty and a challenge for the auditor in case of contracting with companies that adopt different accounting software at the same period. So, the auditor must evaluate them and make a plan of audit, deliver a report of internal control system and application controls for each company.(1)

The study of A. Ihadaden and S. Ait Meziane intitled: "the impact of management information system (MIS) computerization on external audit from Algerian auditors view". This study has administered a questionnaire to a sample of legal auditors (5% of the population). It has concluded that

(1) Mohamed Bourkaib, op.cit, p 138.

computerization of MIS cause dematerialization of information and difficulty to restore it. Legal audit faces new challenges related to the risks of computerization of MIS and the need, in certain cases, to call on an IT expert to collect information on the audited company (auditee) information system.(1)

An article by O. Mameri and A. djemal named the 'influence of electronic information system on auditing and IT adoption in the audit process.' Through which a questionnaire was administered to professionals and academicians in Algeria, the study concluded that the adoption of IT by the auditee with the lack of competence and qualifications of the auditor in IT raises audit risk estimation, especially detection risk. Besides, auditors face problems when collecting enough and appropriate evidence in computerized environment. Further, there is no legal framework that supports the delivery of his opinion in this environment.(2)

Several studies (M. Bourkaib, 2017; A. Ihadaden & S. Ait Meziane, 2017; O. Mameri & A. djemal, 2020) have discussed the lack of sufficient legal framework that serves the usage of CAATTS by the Algerian auditors. They claimed that the executive decree 09-110 is still superficial and general; it doesn't support sufficiently the auditor to collect evidence, conduct tests and build an audit opinion about IT-based accounting information system.

4. CONCLUSION

The purpose of this research is to highlight the advantages

(1) Atmane IHADDADEN and Salima AITMEZIANE, the impact of the computerization of Management Information System (MIS) on an external financial auditing mission from legal auditors' view, Review of Economic Reforms and Integration in the World Economy, Volume 12, Issue 24, 2017, pp 68-90.
(2) Ossama Mameri and Djamel Amoura, The influence of electronic information systems on auditing and IT adoption in the audit process -A survey study-, Human resources management and development journal, volume 8, issue 2, 2020, pp150-166.

and challenges of IT adoption in audit process; thus, professionals and organizations may benefit from previous experiences of CAATTS implementation.

In literature, this adoption is known by Computer-Assisted Audit Tools and Techniques (CAATTS). Some authors (Rusman Ghani et al, 2017) use the term CAATS to refer to Tools such as ACL and IDEA and others (Dejan Jakšić, 2009) refer to Techniques like test data and parallel simulation; however, these tools and technique are generally not separated (Ebrahim M. Mansour, 2016 and others). This work has discussed the definition, typology and integration of CAATTS in audit activities, then relevant advantage and challenges from important studies has been extracted. Further, three Algerian studies results were displayed.

Several findings were concluded. The use of CAATTS increase the efficiency and effectiveness of audit work across different areas. CAATTS can examine the adequacy of data input, data processing and output controls, they provide unlimited techniques and requests which detect fraud and anomalies as soon as it happens. They enable to check a 100% of transactions and to extract information from several files from different databases. Further, CAATTS assist to select samples of data and transactions and perform analytical procedures in a short duration with low cost, they allow conducting comparisons between worksheet of different years, detect unexpected samples, perform continuous monitoring, test huge volume of data accurately in a short time, and increase the auditor confidence through the comparison between manual and automated test results.

On the other hand, many challenges and difficulties are present with CAATTS adoption. Some auditors may refuse to trust and adopt CAATTS, and others lack IT competence required when performing audit process as electronic accounting information systems become more complex. Auditors face also the challenge of collecting evidence where records and

calculations are automated. In addition, the appearance of new functions, the non-segregation of duties, the automatic delegation and authorization of operations make difficulties when evaluating internal control.

From the above account, this research suggests the following advices:

- Minimizing the diversity of accounting software to make training on them practical for the auditors.

- The development of auditing software that cover the authorized accounting software.

- Impose CAATTS mastery as a requirement to obtain the professional certificate of chartered auditor.

- Prepare a legal framework that organize the usage of CAATTS audit process, namely in evaluating internal control, conducting tests, collecting evidence, and delivering audit opinion in a computerized environment.

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