The Impact of Technological Development on Audit Evidence

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1-Abstract

Modern audit engagements often involve examination of clients that are using Big Data and analytics to remain competitive and relevant in today's business environment, as Client systems now are integrated with the cloud, the Internet of Things, and external data sources such as social media. Furthermore, many engagement clients are now integrating this Big Data with new and complex business analytical approaches to generate intelligence for decision making. This scenario provides almost limitless opportunities and the urgency for the external auditor to utilize advanced analytics. Therefore, big data has become an indispensable resource for many organizations and has the potential to be a very valuable resource for financial data auditors.

This paper analyzes the use of big data technologies in auditing, which is the latest link in the evolution of audit technology.

2- Introduction

Technological development has become the dominant feature in the world, as continuous innovations and updates in the world of information and communication technology, software and applications do not stop, which puts the various countries of the world in front of the imperative of development, change and benefit from information technology. The world of money and business has been affected by this in terms of preparing, analyzing, displaying, storing and utilizing data and information. The auditing profession meets the technological development, which made the benefit exist between the two parties, At the same time, it opens the way for the auditing profession to employ the new technologies and technological tools in the field of auditing, to achieve the required speed, effectiveness, achievement and accuracy that characterize the audit profession. The benefit from information technology is not limited to one aspect of the audit profession; Rather, on the various processes, this benefit did not change the nature and purpose of auditing, but rather exposed the auditing profession to a great challenge to develop its tools and methods to continue providing its services with high quality, Technological developments have changed the form and nature of audit evidence, which is the main focus of the audit process. and thus the procedures and methods the auditor use to collect audit evidence to obtain reasonable assurance and achieve the objective in accordance with both local and international auditing standards.

The audit evidence is the central element in the audit process that gives emphasis to the transactions and events of the organization, and future audit processes require obtaining

information through online systems, and the elimination of manual audit paths has become imminent, and the need for automated tracks and the use of electronic exchange of data will be the emerging source for audit evidence. [1]

3- The Research Problem

The technological development does not stop, which contributes to reducing time and effort, increasing reliability and accuracy at work, in addition to the ease of retrieval and comparison between data and information, which imposes on institutions the necessity of seeking to invest these technological tools in the development of performance, which applies to the auditing profession. So, the research problem is the following question:

What is the impact of technological development on audit evidence?

4- Objective of This Research

The digital transformation does not leave the audit world without change. On the contrary, auditors have already begun to adopt the digital revolution to carry out their tasks in the most efficient and effective way. The words of artificial intelligence, the Internet of things, sensors, robots, big data, Smart audit, digital audit, and blockchain have entered our daily vocabulary and embody the world we live in. Data is the basis of everything, and audits should continue to harness the latest technological developments in the field of data analysis, machine learning and artificial intelligence to enable auditors to conduct audits in a faster and more innovative way, therefore, this paper aims to:

1- Identify the impact of technological development on the audit profession in general.

2- Identify the impact of technological development on audit evidence in light of the impact of big data and its analyzes on audit evidence.

5- Research Importance

The importance of research stems from the importance of both the technological development and the audit profession to the world of finance, business and government, as well as the importance of audit evidence and procedures for obtaining it for the auditing profession.

6- Background on Financial Statement Auditing

An audit of financial statements relates to the examination of the organization's financial statements by an independent auditor. Auditors opinion is about the fair presentation of the financial statements and related disclosures. The purpose of the audit is to add credibility to the reported financial statements and business performance. The audit went through many stages to adapt to the changing environment. The following figure illustrates the transition from

historical auditing to the way auditors audit today. Initially, the auditors performed manual audits based on very small samples. It then evolved into a more automated audit with larger sample sizes. Future audits will be within 100% of the population, and will focus on patterns and data analysis of outliers and anomalies, in a form unimaginable today. Big data is part of this pile of information and will push auditors further beyond their comfort zones than traditional auditing methods. [1] [16]
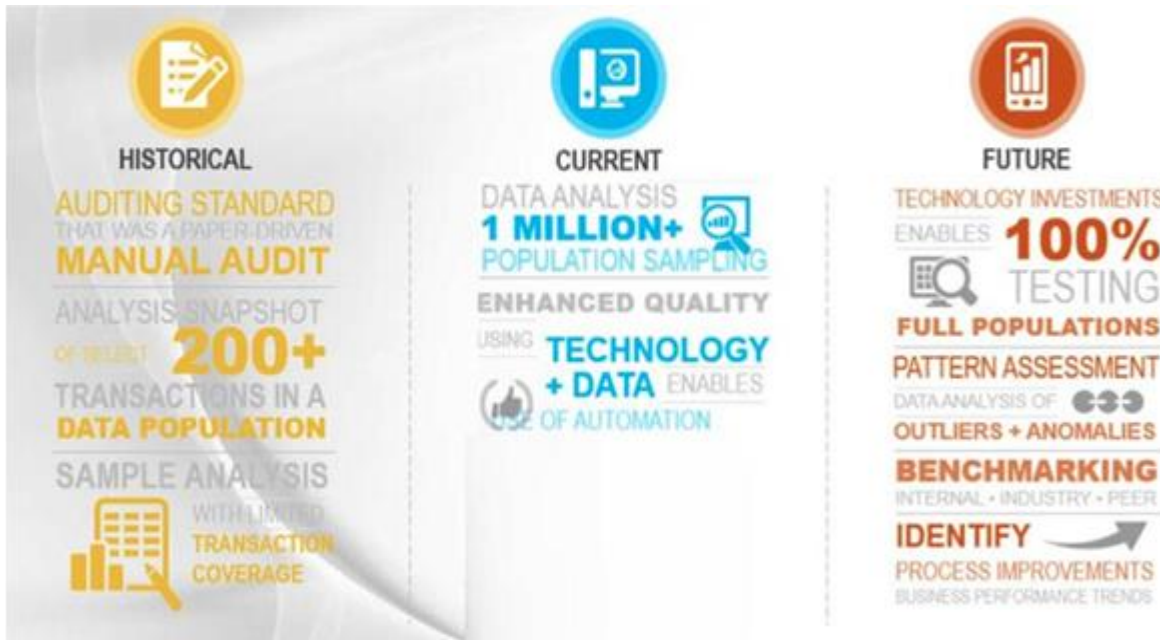
The Evolution of Audit (Trumpener et al, 2017)

7- The Concept of Audit Evidence

Audit evidence is all the information, obtained from the audit procedures or from other sources that the auditor uses to reach the conclusions on which the auditor's opinion is based. The audit evidence consists of all the information supports and confirms management's assertions regarding financial statements or internal control over financial reports and information that are Contrary to these assertions; it includes all records and data or other relevant and verifiable information. The quality of the audit findings depends directly on judgment on the methodology used to collect the evidence, the quality of the audit evidence collected and the competence of the auditor who gathered it. [3] [11] [12] [15]

The traditional view of audit evidence may not be sufficient, and the audit profession and regulators should be aware of the impact of information technology on the shape and nature of audit evidence.

8- Characteristics of Audit Evidence

Evidence should be sufficient and appropriate. The characteristics of the audit evidence can be summarized as follows: [3] [7] [15]

Sufficient	Amount of evidence considered enough: i) to form a reasonable opinion (sample size, representativeness) ii) to convince stakeholders of validity of auditors opinions iii) representative of the audit universe and relevant period of time
Relevant	Extent to which the evidence has a clear and logical relationship to the audit objectives and criteria.
Reliable	Evidence that can be considered trustworthy (accurate, credible and where integrity has not been compromised); the likelihood of coming up with the same answers if audit test is repeated or information is obtained from a different source or test.
Verifiable	Evidence which can be confirmed by cross-checking with other evidence
Objective	Evidence free from bias (e.g. the auditors preconceived ideas) Evidence which accurately reflects the functioning of a system, or part of a system, operated by the auditee and that does not intentionally support/defend the interests of the auditee.

9- Audit Procedures to Obtain Audit Evidence

The auditor performs risk assessment procedures, by itself, it does not provide sufficient and appropriate audit evidence to build the audit opinion. The risk assessment procedures must be supplemented with additional audit procedures in the form of tests of objective controls and procedures. Even if the auditor tests the controls, there are inherent limitations in internal control including the risk of management override, the potential for human error, and the impact of systems changes. Therefore, objective procedures for the classes of significant transactions, account balances and disclosures are always required to obtain sufficient and appropriate audit evidence.

10- Techniques of Collecting Evidence

The auditor obtains audit evidence by one or more of the following techniques: [3] [15]

Technique	Definition	Examples
Inquiry	Consists of seeking information of knowledgeable persons inside or outside the entity.	Obtaining written or oral information from the client in response to specific questions during the audit.
Observation	Consists of looking at a process or procedure being performed by others.	Observation by the auditor of the counting of inventories by entity's personnel, site visit at the client's facilities.
Inspection	Consists of examining records, documents, or tangible assets.	Reviewing sales orders, sales invoices, shipping documents, bank statements, customer return documents, customer complaint letters, etc.
Recalculation	Consists of checking the arithmetical accuracy of source documents and accounting records or performing independent calculations.	Extending sales invoices and inventory, adding journals and subsidiary records, checking the calculation of depreciation expense and prepaid expense.
Reperformance	Consists of independent execution of procedures or controls that were originally performed as part of the entity's internal control.	Use CAATs to check controls recorded in the database. Reperform aging of accounts receivable.
Confirmation	Consists of response to an inquiry to corroborate information contained in the accounting records.	Used to confirm the existence of accounts receivable and accounts payable, verify bank balances with banks, cash surrender value of life insurance, notes payable with lenders or bondholders.
Analytical procedures	Consist of the analysis of significant ratios and trends including the resulting investigation of fluctuations and relationships that are inconsistent with other relevant information or that deviate from predictable amounts.	Calculating trends in sales over the past few years, comparing net profit as a percentage of sales in current year with the percentage of the preceding year, comparing client current ratio to the industry current ratio, and comparing budgets to actual results.

11- Factors That Must Be Taken Into Account When Judging The Quality and Quantity of Audit Evidence [6] [7] [11]

- The purpose for which the evidence will be used
- The level of significance of the audit findings (the higher the level of evidence, the higher the level of evidence required)
- Degree of independence of the source of evidence (more reliance can be placed on evidence that emerges from independent sources)
- Cost (money and time) to obtain additional evidence to support findings and conclusions
- The risk involved in making incorrect results or arriving at incorrect conclusions (the higher the risk of actions the higher the level of evidence required)
- Care in data collection and analysis, including the auditors' skills

12- Linking Auditing and Information Technology

Information and communication technology is described as various technological tools and resources that are used to shape, manage, store and distribute information. With the use of accounting systems based on advanced technologies, making the audit process a subject compatible with these technologies has become important, so increasing the quality and efficiency of the audit has gained great importance, so the change in audit techniques has become, and conducting audits of these electronic environments has become a necessity. [14]

The audit activities with the help of information technology techniques have a critical importance for the auditor to achieve the audit activities as it ensures that the errors arising from the human in the accounting transactions are minimized.

The audit objectives have not changed in the case of processing the accounting information manually or electronically, however the methods of applying audit procedures to obtain evidence may be affected, and the auditor can use manual procedures for auditing or use electronic auditing or both methods together. [6]

The advantages that IT provides in auditing as follows: [10]

- Efficiency, productivity, quality increase, cost savings and time savings.
- New, interactive and creative auditing tools compatible with high volume of data.
- Independence and increased oversight.
- Create added value and produce information.

- The possibility of reviewing in many areas that do not contain printed documents, such as electronic commerce.

There are many risks in the IT environment which can be classified into:
- Operational risks (insufficient system security, inadequate system design, poor maintenance, misuse)
- Reputation risk (effective penetration)
- Legal risks (money laundering, violation of agreements, lack of a clear definition of rights and obligations)
- Other risks (such as market risk)

The need for special auditing appeared in the information technology environment, which was supported by scientific and professional societies and organizations at the global level, including the International Federation of Accountants, through international auditing standards. [6]

13- Electronic Audit Evidence

In response to technological development, many entities process information electronically, such as electronic data exchange with customers, suppliers, electronic commerce, and cash payments. Transaction documents may only be available in electronic form or original documents may be available only at certain points in time, and accordingly it may be difficult or It is impossible for the auditor to access certain information for examination or confirmation without the use of information technology, or the auditor may be able to reduce the risk of disclosure to an acceptable level by performing only substantive tests for one or more financial statements confirmations, for example the possibility of incorrect occurrence or alteration of the information. Disclosure is greater if the information is produced or accessed in electronic form in such circumstances, and the auditor must conduct control tests to collect evidence to support the level of assessed control risk below the maximum assertions. [4]

The traditional view of audit evidence may not be sufficient, and the audit profession and its regulators must consider the impact of a more advanced technological environment on some traditional forms of audit evidence. [1] [2]

The purpose of electronic evidence does not differ from traditional forms, and strong electronic evidence generally depends on the effectiveness of internal controls, but there is a question that the auditor needs to address regarding the reliability of the electronic evidence obtained, the customer may not have physical documents to examine it, and he may not be aware The auditor

believes that electronic evidence lacks credibility unless the auditor examines the internal controls related to electronic evidence. [2]

14- Big data

There is no an agreed definition of big data, in general it means a huge volume of data that cannot be expected and cannot be stored, managed and processed using traditional technological tools or means. Therefore, big data is the basis for future innovations that will increase the productivity and competitiveness of the organization where it aims to improve the decision-making process and serves the executive management and focuses on the efficiency of the organization's operations. They are collections of structured or unstructured data that are distinguished by being superior in size, speed and diversity in comparison to traditional data, and they require innovative forms of information processing that exceed the ability of traditional database tools to collect, store, manage and analyze that data. [5]

The importance of big data is to forecast, or what is known as foresight, which helps avoid problems and make appropriate decisions.

Auditors are motivated to use big data in their audits for various reasons. First, the audit client has used big data in a major way in the process of accounting decision-making and judgment, which may have a material impact on the financial data. Second, the auditors' ambition to use it in risk analysis, customer evaluation, industry and assurance. As the auditing profession is highly regulated, big data has recently been incorporated into the audit environment. [6] [9]

15- Characteristics of Big Data

The following table illustrates the characteristics of big data [7]

Volume	The volume of big data is very large, and therefore you need large processors and devices capable of dealing with this data, and this may be the most important in analyzing big data
Variety	It refers to the diversity in the forms of data and includes structured data and unstructured data such as audio files, video files, web pages, etc., and it requires time and effort to prepare it in a suitable form for processing and analysis.
Velocity	It refers to the speed and appropriate timing of data processing to achieve the maximum benefit for users and beneficiaries

Great value	You need specialists with sufficient experience and skills to handle and analyze this data with appropriate analysis
Variability	The same information can mean many things
Veracity	The ability of big data technologies to eliminate biases and anomalies in data, and their ability to deal with uncertainty and unreliability of data
Multiple appearances	It must be analyzed and shown in different forms commensurate with the nature of its use, and it takes multiple forms such as statistics, numbers, geometric shapes, etc. to convey information in a more efficient manner.
Variability	It refers to how data is constantly changing, as data can change significantly periodically
Complexity	Complexity refers to the number of data sources

16- Types of Big Data

Big data can be divided into structured data (data organized in the form of tables or databases), unstructured data (text writings, video clips, websites), semi-structured data (documents) [7] [6] [18]
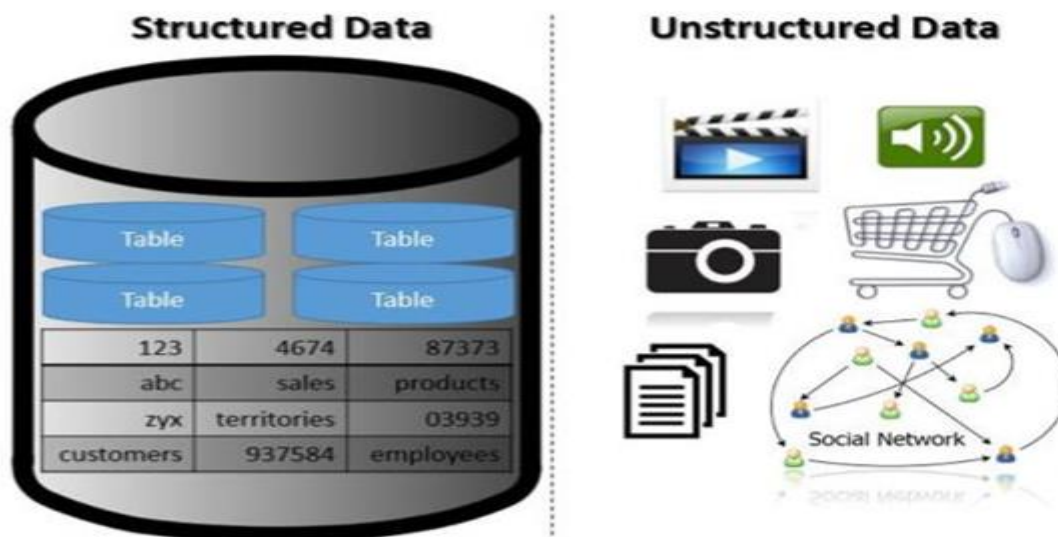

Examples of Structured and Unstructured Data (Source: IIA, 2017)

17- The emerging data environment and automatic data collection

Connecting business to external data is fundamentally changing the data environment. The first companies used a series of different virtual location arrangements on the Internet. This type of arrangement allows for flawlessly comprehensive corporate data support and facilitates better interaction with the external big data environment. [1] [5] [7]

In the past the data was prepared mainly in punch cards and paper strips, then stored on magnetic strips. Databases were of limited size. With the advent of data scanners, the process remained mainly manual, but some degree of automation was achieved in data collection, and links were established between traditional data and purchase baskets as shown in the figure.[7]
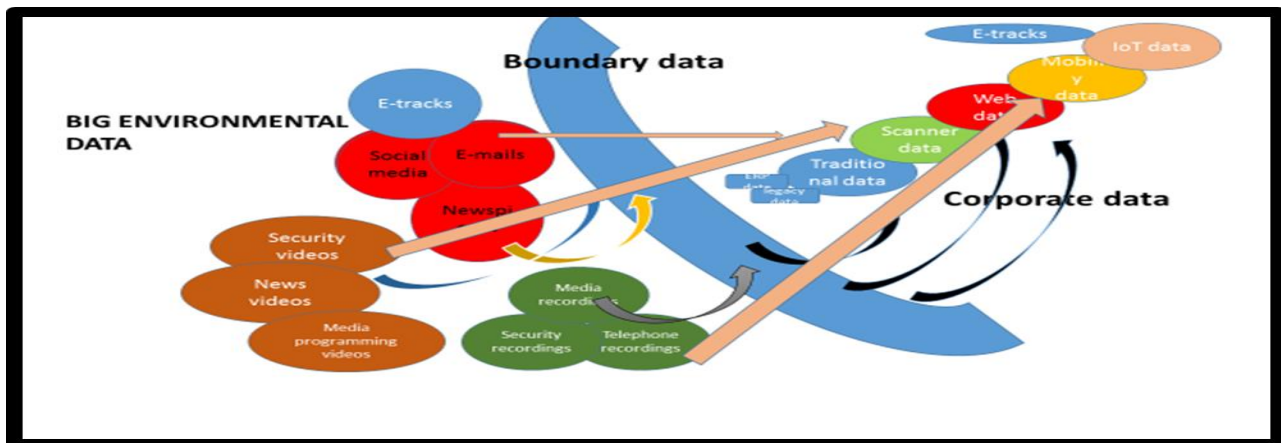
The Big Data environment (adapted from Vasarhelyi, Kogan, & Tuttle, 2015)

Later on, web data (including click information, URLs and referral links) provided more data links and a much greater volume. Once again there have been significant increases in data volume and storage, and non-structured data captured automatically has been integrated.[7] The RFID chips (Radio-frequency identification) paired with these communication devices will allow the development of "electronic paths" that will reflect the records of the available items, and ultimately more intelligent information will be combined. Institutions will integrate chips into their inventory and fixed assets, and use tracking devices on equipment and employees. They will also integrate smart devices into most of their facilities. It will raise many privacy and security concerns. [7]

18- Sources of Big and Medium Data Evidence

Overall, the emerging data environment should be evaluated in light of its impact on the adequacy, efficiency and reliability of audit evidence. While traditional evidence tends to be primarily archival and internal evidence, evidence usually extracted from the external environment is evidence of a more probabilistic nature that must be considered in light of the

characteristics of the information. A new body of knowledge must be created to understand this information and the emerging limitations imposed by the traditional audit model. [10] [13]

Applications development for managing multiple operations connects big data to the company's measurement, management, and assurance processes. For example, cameras in a company's parking lot, surrounding streets, and in stores can be used to collect a range of visual information for short-term use. It may use face recognition software to identify frequent or unwanted employees or clients. [17]

Data sources can be identified by the following sources:

- Commercial sources related to transactions, such as credit cards

- Sources of sensor networks, such as imaging satellites

- Sources of devices tracking data from cell phones

- Sources of behavioral data

- Sources of opinion data such as comments on social media sites


Examples of Big Data Sources (IIA, 2017)

 19- **Considerations of Evidence in an Evolving Data Environment**

A progressive system for automatic audit

An audit system to administer a progressively automated audit

Dai (2014) suggested the usage of the Audit Data Standard and related apps into an integrated audit of the future. This audit includes a risk assessment platform generating an automated audit plan with a set of assertions, a recommender system choosing apps, results being analyzed by routines, and the process software generating internal and external audit reports. At all steps of the process, software agents would be working and generating forms of evidence.
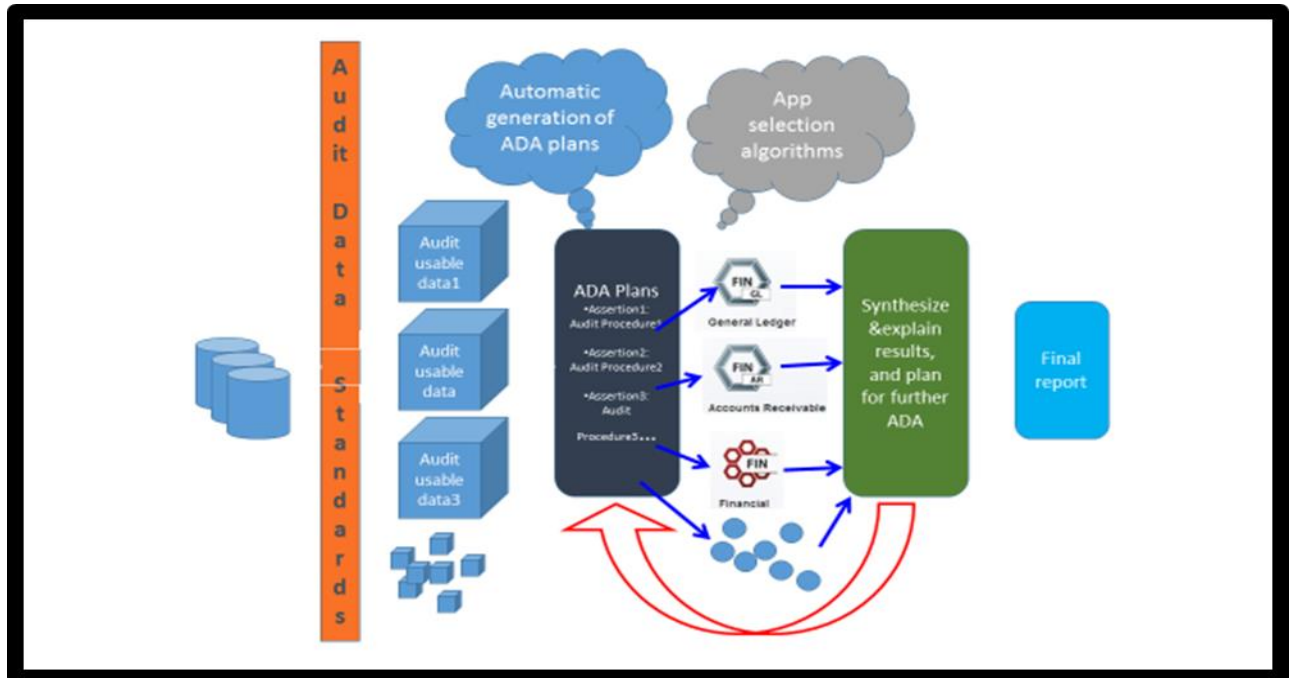
Evolving view of an automated system using the Audit Data Standard (ADS) (from Dai, 2014)

What forms of evidence arise in the big data environment?

The audit standards largely provide guidance regarding traditional forms of audit evidence [such as evidence provided by a company or external documents] and considerations of evidence in an electronic environment [for example, information transmitted, processed, maintained, or accessed electronically. However, these standards do not adequately address the nature of the issue of proof that will be necessary in the more complex technological environment.

The table summarizes the features required of audit evidence and issues that should be considered in a more complex large data environment. [2] [12]

Evidence Characteristics	Considerations in Big Data Environment
Difficulty of alteration	external Big Data is not under the business control

Credibility	data capture and preprocessing must be verified
Completeness	external data is practically infinite and not always accessible
Evidence of approvals	data is external
Ease of use	new automatic methods are being developed for this purpose
Clarity	external Big Data tends to be stochastic

As a result, it is important to assess how the technology is used to ensure that it meets the characteristics specified in the standards. There are several related points that should be considered: [10] [12]

1) Sufficiency (quantity) may not be the primary problem. And because the new technology will allow the auditors to inspect 100%, the shift will likely relate to the timely access to relevant data and the auditor's use of various analysis tools to analyze and interpret the data in a more serious and effective way.

2) Suitability (quality). Relevancy and reliability are two major issues and this judgment will be subject to evaluation through the formalization of various tests that will formalize computational procedures that do not currently exist. Usually, data extraction and use automatically using formal forms creates a higher level of reliability compared to manual processes

3) The sources and types of evidence are new, and how this evidence complements or replaces traditional evidence must be better understood by researchers and the profession.

20- Incorporating Modern Technology to Obtain Audit Evidence
Incorporating advanced technology into the audit process will undoubtedly raise questions concerning the implication of a less transparent audit trail (e.g. traceable paper documents may not exist). Although the traditional manual audit trail has become rare, computer processes can create logs with reasonable facility and these can be collected and processed in many ways not previously possible.

Another question to consider is how should traditional audit procedures change to adapt to technology? Audit procedures address assertions. Since assertions are driven by financial reporting standards, they are unlikely to change and auditors will still be required to establish audit objectives and design their audit procedures to address these assertions. The change will

instead be driven by how technology impacts the nature, extent and timing of audit procedures performed. For example, most audit objectives and assertions will be formalized and programmed into repetitive apps to be applied within an automated audit that will implement a formal audit plan with elements to be repeated at predetermined times or continuously.[7] [17] [18]

The use of more sophisticated audit tools will assist the auditors by automating the collection, coordination and mapping of key audit objectives and procedures. For example, these auditing tools will be greatly regulated due to the formalization of the audit plan with pre-defined application processing data at predetermined times, then unforeseen or manually disclosed evidence or judgments is evaluated and the human approach is put into place Consideration and its incorporation into the existing system. A feedback system that evaluates both short and long term results will be used to evaluate the performance of the audit system over time.

21- Smart audit and big data

What about auditors after the introduction of the ERP system, the Internet and digitization in the financial and business world? The reasonable answer would be data analytics.

The auditor must know how to examine the data to find the answer to meet the audit objectives. Accordingly, more tools, namely audit analytics, are offered to the auditors to handle big data; moreover, automation tools such as robotic process automation make the audit process hands-free. The tools not only make auditors smarter, but they also get them focused on the more productive tasks. [1]

As more information becomes available, it must be validated for decision-making, and audit agencies and organizations must develop strategic plans for data management and analytics and make greater efforts to implement such methodologies and auditors must be encouraged to integrate big data and analytics into their field work to generate better insights.[10]

In the current era of big data, auditors can collect external data from various sources such as social media and the Internet, and in addition, advanced data analysis techniques use automation and computing enable auditors to process data in more efficient and effective ways, thus obtaining more relevant evidence. , And they can reduce the possibility of material misstatements and audit gaps. [4]

As the world becomes more digital, the audit should become more digital to keep pace with the changing reality, and that the first major component of what we might call digital auditing

is the automation of data collection, data preparation and analysis, and the second major element in digital audit is data analysis [6]

22- Big data as audit evidence

With the continuous advancement in technology, traditional audit evidence is no longer sufficient due to the changing nature and efficiency of audit evidence. Big data, especially external, is complementary to traditional client data in case the evidence is insufficient, so auditors must be able to access the data to ensure that it is safe and secure. Trustworthy, the auditor's access to big data can contribute to the various auditing stages, gain additional knowledge about the audit client and the industry, provide support to the auditor in the risk assessment phase, use non-financial information such as social media data, provide auditors with more knowledge about their clients, Moreover, external data provides support for the auditor to detect fraud because traditional data may hide important information, so evaluating external data such as emails can be a useful tool for auditors to detect fraud, and evidence from big data is sufficient due to the size and variety of data available in real time. [6] [7]

The following are the big data issues as audit evidence

Challenge of Big Data	Recommendation
How can the availability of Big Data sets be used to enhance analytics?	Research can suggest analytical techniques that take advantage of Big Data and evaluate how they improve audit effectiveness and/or efficiency.
Can the volume of data compensate for uncertain or lower quality of data?	Studies should be conducted that determine whether there exists an upper threshold of data volume, exceeding which could compensate for lower data quality. A framework for data value should be generated.
How can the amount of audit evidence provided by analytics in a Big Data context be measured?	Research should re-examine the concept of whether evidence derived from analytics is ''soft,'' and a quantitative reliability scoring system developed for all types of audit evidence. This score could then be integrated in the overall risk assessment

Alterability: How can the auditor be assured that the data have not been altered?	Research examining various tests for the assertion of accuracy in a Big Data context should be conducted.
Credibility: How can the auditor be assured of the controls surrounding the generation of Big Data external to the client?	Research examining/suggesting certain verifications of controls should be undertaken.
Completeness: How can the auditor verify that Big Data is complete?	Research should be undertaken that can provide suggestions as to the verification of Big Data for the assertion of completeness.
Approvals: Should Big Data provide evidence of approvals/ controls validations? Is this viable?	Studies of controls measurements of Big Data at all levels of generation and extraction should be conducted. For example process-mining techniques can be used.
Ease of Use: Will Big Data require expertise to understand and extract and prepare for analysis?	What level of expertise should engagement staff attain to be competent in the modern audit engagement?
Clarity: Can this Big Data be replicated/reperformed/recalculated by the auditor?	Research should examine whether this is a viable test in a Big Data context and, if so, how to perform it. This is the level of accuracy to be demanded from Big Data analytics. The concepts of materiality and relative error in the context of Big Data audit analytics should be examined in research.

23- Audit insight

Here are some examples of technology being used to obtain evidence

1- Obtaining confirmations:

Previously, clients' account statements were sent in a bank through the mail so that they were delivered to the customer hand in hand to their addresses registered in the bank, to certify the balances of their accounts with the bank on the date of preparing the financial statements, provided that the customer re-sent the approval after signing them and also

Here are some examples of technology being used to obtain evidence

24- Conclusions

- The purpose and nature of the audit process has not changed due to technological development.

-The concept and nature of audit evidence is changing due to the emergence of big data, digital evidence, and electronic implications that RFID, GPS and IoT recording favor.

- The emerging public importance that big data and advanced analytics provide to the public audit profession cannot be ignored.

- Big data analytics will enable 100% of the parameters to be tested to find anomalies in the sample.

- Big data and business analytics are dramatically changing the business environment and business process capabilities.

- Big data analytics helps speed up analysis, understand data links, and provide new and deeper insights. This, in turn, will help improve risk assessment for better audit planning, analyze all transactions, and discern hidden links for more insightful audit results and present results in an easy-to-read manner for the reader through visualization tools. Above all, data analytics will help the SAI to focus audit resources on high-risk areas, however, to reap the benefits from big data, the SAIs will have to address issues of data quality and confidentiality, and create the infrastructure (hardware and software tools) To analyze and train the workforce on big data. This may require a comprehensive policy for managing big data in the SAI.

25- Recommendations

‑ Conducting more studies on information technology tools and their role in developing the auditing profession.
‑ Paying attention to the technical training of auditors.
‑ The use of information technology in general and the use of big data analytics in particular to improve the quality of auditing in terms of efficiency and effectiveness.
‑ Spreading the technological culture among auditors to increase their awareness.

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