

The Effect of Technological Innovation on Audit Evidence

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September 2020

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Abstract

Technological innovations in computer hardware and software, internet, websites, online search engines, smart phones, machine learning, artificial intelligence, data analytics, drones technologies, cloud technologies, robotic process automation, and distributed ledger technologies has an important role for audit data collection, analysis, and reporting purposes. This article discusses the effect of technological innovation on audit evidence.

The article revealed that if properly utilized, technological innovation and automation has an important effect on improving the collection of sufficient appropriate audit evidence, improving testing, saving auditing time, lowering costs, developing electronic working papers, providing higher levels of assurance, and managing risk more effectively; therefore enhancing audit quality. It is also shown that lack of financial and skilled human resources, inadequate training and experience of auditors, and the auditors' personal behavior may pose a challenge in effectively utilizing technological resources in the auditing process.

1. Introduction

1.1 Background

Technological innovation touches almost all domains of life and people are continuously searching for technology and innovation for every human activity which has previously been done manually. In one way or another, technological innovation is affecting the social, economic, and political life of people around the world. Technology has also been changing the mode of governance and enables governments to provide services to their citizens more efficiently and effectively.

With substantial changes taking place in technological innovations, public organizations and different institutions need to adapt themselves to the changing reality. One of those organizations which are being influenced by technological innovation and the external environment are auditing organizations. Adopting technological innovations and workplace innovative practices could help audit organizations contribute to better public services and achievement of objectives (Demetriades, 2020).

The increasing sophistication of technology as well as the progressive digitization of business and government service delivery has fundamentally altered the manner in which audits are

conducted (Vasarhelyi & Romero, 2014). Accordingly, the auditing profession should be adapted to the changing environment of society that are currently exposed and influenced highly by innovation. This may require new methods of planning, conducting, and reporting an audit process. New technological tools support a shift from traditional sampling techniques to real-time whole population audits, allowing for results that are more accurate as well as greater accountability and transparency. Besides, automating repetitive tasks could free up valuable audit time, while data analytics may facilitate a more investigative analysis in the early stages of an audit (Fossati, Reilly, and Schnell, 2020).

It is inevitable that technological innovation has an impact on the auditing process. Innovation is also having a significant influence on the way in which audit evidence is collected and documented and offers a way of enhancing audit quality if used properly. One of the major activities in conducting an audit is the accumulation of sufficient and appropriate audit evidence.

There are some researches and scholarly articles on technology, innovation and audit. To mention a few, Vasarhelyi and Romero (2014) in their study: technology in audit engagement: a case study, examine external auditor usage of technology. They concluded that the characteristics of the audit team largely determine the levels of technology utilization. Matthew (2016) in his paper discussed the effect of emerging technologies on data in auditing and concluded that the prevalence of advanced technologies in auditing is increasing slowly but significantly, and will certainly continue in the coming years. Professional bodies such as the Association of Chartered Certified Accountants (ACCA) and Chartered Accountants Australia and New Zealand (ACCA, CA ANZ (2019)) investigated the link between audit and technology and identified that auditors need to adapt to the changes in business models of their clients and will need to be more adaptable to technological changes in the future.

On the other hand, this piece of article mainly discusses the effect of technological innovation on audit evidence. Thus an attempt has been made to highlight audit and technological innovation, audit evidence and technological innovation, effects of technological innovation on audit evidence, the challenges of technological innovation, and finally the future of auditing and actions required to be taken to make full use of technological innovation in the audit process.

1.2 Objectives of the Study

The main objective of this article is to assess the effect of technological innovation on audit evidence. In line with this general objective specific objectives include the following:

- To identify the link between technological innovation and audit evidence;
- To pin point the challenges of technological innovation on audit and specifically audit evidence;
- To examine what the future of auditing would look like and actions to be taken by audit institutions at the era of rapid technological advancement.

1.3 Significance of the study

The rationale of preparing this article is to assess the effect of technological innovation on audit evidence. Hence, the results of this study will help public audit institutions, private audit firms, and other auditing bodies to know what benefits do technological innovation could bring to the auditing profession. Also it is hoped that the findings from this article will help these auditing entities in identifying strengths and weaknesses of their current status of using modern technologies in their audit undertakings. This will enable them to redefine audit methodologies, procedures and manuals in line with the changing environment.

The findings of this article will also add value to other researchers and the relevant body of knowledge regarding the effect of technology on audit evidence.

1.4 Methodology of the Study

In this article, I employed qualitative research approach. Qualitative research method is used to obtain an in-depth understanding of the link between technological innovation and audit evidence. Thus, this article is written by studying a wide array of relevant sources, both published and unpublished. Mainly, it is based on secondary data sources such as books, audit manuals, organizational publications, seminar papers, commentaries, and journal articles.

2. Technological Innovation and Audit

The Webster's dictionary define technology as a capability given by the practical application of knowledge and a manner of accomplishing a task especially using technical processes, methods, or knowledge. Innovation can be defined as a new idea, product, device and a way of thinking beyond the present and into the future (Stenberg, 2017). Technological innovation is a new

device, a new thinking, or a new process that enables to transform society in general. Thus, technological innovation is considered as a process which is science, technology and system based (Letangule and Letting, 2012).

When we come to auditing, auditing is the accumulation and evaluation of evidence about information to determine and report on the degree of correspondence between the information and established criteria (Arens, Elder & Beasley, 2012). The auditing process is currently supported by the emergence of recent technological innovations. Technology offers the ability both to improve the quality of audit and to add value to it (Suffield, 2020). Consequently, embracing new technologies and innovations allows us to reimagine our audits, aiming to provide a smarter, better, and different type of audit (Meuldijk, 2020).

As with all technological developments, there are several key drivers signaling the need for technological change in audit. Such drivers include the rapid increase in the sheer volume of data, the changes in business models and rapid digitization of both government and business organisations, the shift towards automation and the demand for a proactive and forward-looking approach to audit (Suffield, EU, 2020).

There have been different technological innovations that assist an audit to be more efficient. Such as

- The development of computer hardware from desk top to smart phones;
- Software such as application software, (including spreadsheet and database software like Microsoft excel, Microsoft access, statistical software, etc.);
- VoIP (Voice over Internet Protocol) technologies which enables video conferencing (Skype, Zoom, Cisco WebEx etc.);
- The development of internet in various generations; and
- Online search engines (Google, Yahoo!, MSN etc...), and different websites.

More recently, there are also technological innovations that play a tremendous role for the auditing process. Such technologies include distributed ledger technology (DLT), data analytics, robotic process automation (RPA), drones technology, artificial intelligence (AI), machine learning (ML), natural language processing (NLP), deep learning (DL), and cloud technologies (ACCA, CA ANZ, 2019; Suffield, 2020). In addition to these, various computer software audit

tools are also being used across countries and audit organizations within the same country at different levels. These audit tools include computer assisted audit techniques (CAATs), spread sheets, Interactive Data Extraction and Analysis (IDEA), and KNIME (Konstanz Information Miner).

Technology will drive down the time taken to conduct an audit, as testing becomes more automated and conducted on a real-time basis (ICAEW, 2018). Artificial intelligence (AI) can be a powerful tool for auditors (e.g. pattern detection, fraud detection, analytics, and trends) (Pilos, 2020). In addition, as Cheong, A. Cho, S., Vasarhelyi, M.A., Zhang, C. (2020) citing Yoon *et al* (2015) stated, sophisticated data analysis techniques using automation and computerization enable auditors to process data in an increasingly effective and efficient ways. Rota also highlighted that:

Digitalization, the development of robotic process automation (RPA), artificial intelligence, machine learning capabilities and big data analytics provide substantial opportunities for compliance and financial audits to become more precise and comprehensive. The characteristics of millions of entries can be checked in a few minutes, immediately flagging any exceptions so that auditors can concentrate on higher risk transactions. The increased processing speed means that instead of checking samples, auditors can analyze full populations of transactions (Rota, 2020).

Technological innovations have, therefore, wide-ranging applications in audit and the auditing profession is digitalized these days more than ever. The change of business models and the continuous use of technological innovations by governments and business organizations in their day to day operations compelled auditing institutions to utilize modern technologies to audit these processes. As a consequence, audit should become more and more digital to cope with a changing reality (Pilos, 2020). The Institute of Chartered Accountants in England and Wales (ICAEW) pointed out that:

Given the speed of technological and digital advances, it is imperative that those in the audit and finance profession invest in understanding and developing these technologies to benefit their respective sectors. This is a huge challenge, particularly in audit, where the pace of technological change, specifically the move from sample testing to 100% populations testing, and from historic testing to real-time testing, is spearheading the need to revisit the audit approach in an unprecedented manner (ICAEW, 2018).

Furthermore, technology utilization varies among different sectors. Technological innovation and utilization in the auditing process by private audit firms and supreme audit institutions is less developed as compared to digitization of activities carried out by business organizations and most government sectors. In my view, many audit institutions are not making use of the available technology in the audit process. There is also a big gap between big audit firms and smaller audit firms as far as the usage of technological innovations and audit software tools are concerned. It is underscored that,

As technology evolves, the accounting profession has been lagging, with a set of anachronistic rules of disclosure and assurance. Both in the government and the private sector, the lag between technological practice and accounting and assurance have further and further widened. More discussion – and action on the nature of this gap, and the characteristics of technologies that are being used and also can be used in the measurement and assurance of business, needs to be encouraged (Cheong et al, 2020).

Therefore, audit institutions should pay a much greater attention for technological innovations and effective utilization as their clients are now more digitalized than ever. The increasing volume, variety, and velocity of data also necessitates the application of modern and advanced analytical tools in order to organize, interpret, structure and present data into useful information that gives meaning to the user.

3. Technological Innovation and Audit evidence

The purpose of an audit is to help establish and maintain deserved confidence in a company, in its directors and in the information for which they have responsibility to report, including the financial statements (Brydon, 2019). Collecting audit evidence against different assertions and established criteria is the main part of the auditing process. Audit evidence is any information used by the auditor to determine whether the information being audited is stated in accordance with the established criteria (Arens, Elder & Beasley, 2012). Thus, financial auditors provide audit opinions on the basis of their verification of the data underlying the assertions made by others. On the other hand, performance auditors and information technology/information system auditors provide conclusions and recommendations based on the audit evidences that are collected against the established criteria.

Customarily, auditors collect audit evidence through different techniques. These include file examination, observation, interview, analytical review, recalculations, re-performance, photography, and specialist assistance. Currently the existence of large volume and variety of data necessitates the need for modern technologies for the collection and analysis of audit data. For instance, the use of exogenous ‘big data,’ such as the automated collection and analysis of online news articles, scientific papers and public documents can provide supplementary or corroborating audit evidence for performance audit projects (Hardy, 2020).

Using technological innovations with assistance of internet, computers and smart phones, the auditor can perform

- Document collection and review using online search engines;
- Conducting focus group discussions and interviews via video conferencing tools and social media platforms from different people, institutions and organizations that may be very far or remote;
- Data manipulation, analysis and reporting;
- Recent advances in technology like artificial intelligence, robotic process automation, cloud technologies and data analytics, to mention a few, also play an important role in accumulating sufficient appropriate audit evidence.

Collecting and collating audit evidence involves administrative and repetitive tasks that do not require judgment and hence lend themselves to automation (FRC, 2020). As it is stipulated in the Financial Reporting Council, while the primary objective is efficiency, the use of automated techniques when properly implemented may improve quality by guarding against human error (FRC, 2020). Technology can also help identify previously unrecognized patterns or clusters of interest and therefore raise questions which would have otherwise been overlooked. It is also valuable in that it permits the exploratory analysis of audit evidence and has the potential to increase the audit scope (Fossati, Reilly, and Schnell, 2020).

The appropriate use of technology is dependent on an entity’s system landscape and quality of data (FRC, 2020). Technologies are useful only when people develop and exploit them properly. As it is mentioned before, these technologies have the potential to greatly enhance audit quality and efficiency, but at the same time may represent a challenge for auditors when they seek to demonstrate their compliance with auditing and ethical standards (FRC, 2020).

4. The Effect of Technological Innovations on Audit Evidence

Technological innovation is changing the way business operations are conducted and managed. Rapid technological innovations and continuously moving, larger volumes and variety of data provide opportunities to renew the whole auditing industry. Whilst the nature, timing and extent of the impact that technology will have on the audit are difficult to predict, emerging technologies like automation, artificial intelligence, block-chain and even drones have the potential to transform the way an audit is conducted whilst enhancing audit quality (KPMG, 2017).

Technology will have a major and ongoing impact on the audit profession, including the nature, quantity and sources of data, analyzed to generate audit evidence (KPMG, 2017). The various effects that technological innovations have on audit evidence include the following:

Sufficient appropriate audit evidence: technological innovations enable to make efficient data collection and analysis thereby providing sufficient appropriate audit evidence. It enables to collect, test and analyze huge amount of data than traditional ways of data collection and analysis. Thus,

- Technologies in computer hard ware enable to store, retrieve, process, analyze data and keep audit evidence.
- Using different application software on Smartphones and drones support to take photos and videos that are used as audit evidence.
- Using the internet; online search engines and websites of different organizations allow remotely accessing more data from various institutions, stakeholders, professional bodies and individual scholars.
- E-mails and various social media platforms help obtain information from large domain of population and people from different geographical areas. They also permit to undertake questionnaires in distant areas.
- Video conferencing help to conduct focus group discussions and interviews of people including the audit client at different places.
- In addition, software such as Statistical Package for the Social Sciences (SPSS), Stata software etc. assist for data manipulation, visualization, analysis and reporting.

- Artificial intelligence, machine learning and drones technology supports to undertake inventory counts, process video and digital images, and transcribe verbal recordings of interviews and other testimonial data.
- Cloud computing technologies facilitate the access of applications and data from any location worldwide and from any device with an internet connection.
- Audit data analytics methods can be used in audit planning and in procedures to identify and assess risk by analyzing data to identify patterns, correlations or relationships, and fluctuations from models.

Improved audit quality: Technological innovations, as it is discussed above enables to accumulate sufficient appropriate audit evidence even from distant areas. This offer the ability both to improve the quality of audit and to add value to it.

Improved testing: Data analysis technologies have opened opportunities for auditors to comprehensively test and analyze (on an automated basis) entire populations of financial transactions and operations instead of testing only a sample. This help collect more appropriate audit evidence. Analysis of entire population avoids the problem of bias in sampling. Moreover, technological resources enable the auditor to perform tests on large or complex data sets where a manual approach would not be feasible (FRC, 2020).

Saving time: Technological resources for audit data collection and analysis save a significant time for the auditor which enable to complete audit plan in a timely manner (something many firms run into issues with).

Low cost: The price an accounting firm charges a client is mostly based on the number of days it takes to undertake the audit, and the cost incurred by the audit firm. Technological resources make the repetitive tasks of auditing much easier and faster. This reduces the number of days required to collect audit evidence. This in turn reduces the time to complete the audit process and also the cost as well.

The development of electronic working papers: electronic working paper reduces the cost that would otherwise be incurred for paperwork and printing. Electronic working papers facilitate the production, review, storage and transfer of documents and audit evidences.

Providing higher levels of assurance: provision of sufficient appropriate audit evidence enables to provide higher level of assurance. For example, machine learning provides the opportunity to identify unusual patterns and exceptions in large populations of data that might not be discernible using more traditional techniques (which commonly include setting expectations of what would be unusual in advance) (FRC, 2020).

Managing risk more effectively: This is a key benefit of a high dependence on technology in the audit process as firms who capitalize on data analysis technology are able to gain insights beyond the reach of the business' (whom they are auditing) internal team (KLR, 2016).

In a nut shell, technological innovations play an important role in audit in general and accumulation of audit evidence in particular. They assist to deliver added-value to clients and to keep up-to-date of developments in the audit sector. The new and advanced software developments have helped automate many functions of the audit process, allowing auditors to spend less time on paperwork and more time lending their knowledge to other high-risk areas of the businesses they are assessing (KLR, 2016).

5. Challenges of the Adoption of Technological Innovation in Audit

Technological innovation has both benefits and challenges. The coming of new and advanced technological resources to the auditing process entails a modification to the existing manuals and standards of auditing. It is also evident that the regulatory framework for audit will evolve more slowly than technology (Pilos, 2020). However, focusing primarily on the potential impact of technology on auditing standards and viewing changes that may be needed to standards as a precondition to the use of technology we believe could inhibit or slowdown innovations in auditing (KPMG, 2017).

There are areas where the use of technological resources creates new challenges for auditors. The heterogeneity in clients' data makes it challenging to use audit automation or analytics tools (Cheong et al, 2020). Technological resources are utilized for audit procedures that are repetitive and standardized. Therefore, to achieve audit automation, adjustment is needed to make audit data homogenous.

Another challenge is the skill requirement of using technological resources for audit. Cheong et al, (2020) citing (Zhang, Dai, and Vasarhelyi, 2018) states that in most audit institutions, many

auditors have not yet gained the skills needed in a more automated audit workflow and are not ready for the digital transformation. Examples of such new skills are data analytics, programming, and acquaintances with emerging technologies.

The attitude of the auditors and management to changes in the application of technological resources in the audit process could be another challenge. Some auditors might be skeptical of the benefits that modern technologies could bring to the auditing process and some others could fear the change itself due to their personal behavior. Leadership at top of the audit institution may also challenge the adoption of new technological innovations in audit probably due to lack of financial and human resources, unavailability of the technological resource, or any other constraint.

6. The Future of Auditing and Actions required to be taken by Audit Institutions

The usage of technological innovations such as data analytics, distributed ledger technologies, machine learning, artificial intelligence, drones, and cloud technologies in the audit processes are so far not immense. The use of technology by businesses and government is expanding dramatically as technologies such as data analytics are embedded into decision making and financial reporting processes, as well as the internal control environment. This will inevitably impact on the way an audit is conducted in the future (KPMG, 2017).

Technology has much to offer the auditor in terms of enhancing efficiency and effectiveness. It may be used increasingly to support the assessment of the reasonableness of estimates made by management. The potential for the use of technological resources to enhance audit quality is clear. However, technology is not a replacement for the skills and informed judgment of an experienced auditor (FRC, 2020).

Consequently, despite the growing digitization of audit, technological innovation could not replace the role of the auditor especially in professional judgment, skepticism, and communicating the audit report. However, combining IT and digital working methods with auditors' professional judgment promises to be the most successful way forward into the future (Rota, 2020). Also technology cannot yet fully replace human auditors; however, it can perform specific and narrowed tasks more effective than humans (Cheong et al, 2020). In addition,

machine learning and AI can become a supportive tool for the auditors to make a professional judgment (Cheong *et al*, 2020). As Cheong *et al* (2020) quoting (Zhang, 2019) stated,

[...]machines are intrinsically better than humans at performing tedious and rule-based tasks. When auditors do not need to spend most of their time performing repetitive and basic tasks, they can focus their effort on more challenging and critical tasks, especially those related to the assessment of the risk of material misstatement. This 'man-machine cooperation' is the future form of audit.

While technical and ethical (TEQ) competencies remain at the core of the professional accountant's skill, all professional accountants must complement strong technical skills and ethics with strong communication skills (ACCA, CA ANZ, 2019). In addition, the auditors of the future should be technologically sound with excellent project management skills, the ability to adapt to change, skillful at telling their audit narrative and aware of the technological development that can help them do their job (Suffield, 2020). A key skill for auditors – at least during the coming years – will be the flexibility to adapt to a working environment which will continue to evolve (ACCA, CA ANZ, 2019). Auditors don't necessarily need to be technology development experts or computer programmers; however, they do need practical knowledge, experience, and a high level of comfort using cutting-edge, rapidly evolving technology to manipulate and analyze data (Raphael, 2017).

As to what actions to be taken by audit organizations including supreme audit institutions of countries, one of the skills that will be required is commitment and creativity combined with critical thinking. Investing only in technology without changing anything else can easily lead to a situation where we have simply converted our analogue processes and practices into digital ones. The benefits of this kind of approach are likely to be marginal (Lahdelma and Gullichsen, 2020).

Policy makers likewise need to develop appropriate audit standards, procedures and manuals that are keeping up with practical needs and business trends of the day. New standards should be developed to examine and regulate the adoption of new technologies for data collection and analytic purposes in the auditing process. More innovative auditing standards for big data and analytics can be a driving force for progress in smart audit practices and enhanced audit procedures (Cheong *et al*, 2020).

Another skill audit institutions need to focus on is leadership. Leadership plays a vital role in promoting creativity in organisations. Effective implementation and utilization of technological innovation in the audit process requires committed leaders who work for change and improvement. This includes cooperating with relevant stakeholders and building the capacity of the management and the auditors to make the adoption of technological innovation in audit a reality.

There is also a need for technical knowledge and skills for the digital transformation to succeed. Lahdelma and Gullichsen (2020) identified the following three set of skills:

- Being able to understand the potential impact of new technologies on our audit;
- Being able to determine how to use new technology efficiently in our daily work;
- Knowing how to acquire expertise to develop and maintain technical solutions that are not only sustainable but also affordable.

7. Conclusion and Recommendations

7.1 Conclusion

This article assessed the effect of technological innovation on audit evidence and thereby an attempt has been made to pinpoint the link between technological innovation and audit, technological innovation and audit evidence, the effect of technological innovations on audit evidence, the challenges of the adoption of technological innovation in audit, and finally the future of auditing and actions required to be taken by audit institutions.

This technical article is mainly prepared by reviewing books, different scholarly articles, academic journals, insights of various professional bodies, and newsletters. The article revealed that technological innovations in machine learning, artificial intelligence, data analytics, drones technologies, cloud technologies, robotic process automation, distributed ledger technologies, as well as computer software such as CAATs, IDEA, KNIME has an important role for audit data collection, analysis, and reporting purposes.

The article showed that if properly utilized, technological innovation and automation has an important effect on improving audit quality, improving testing, saving auditing time, lowering costs, developing electronic working papers, providing higher levels of assurance, and managing

risk more effectively. It is also indicated that lack of financial and skilled human resources, lack of commitment of leaders, inadequate training and experience of auditors, and the auditors' personal behavior may pose a challenge in effectively utilizing technological resources in the auditing process.

To conclude, the article further revealed that technological innovations are developed to assist, not to replace, the human auditor. The importance of technological resources to enhance audit quality is clear. However, although technological resources would help in audit data collection, analysis, and reporting, it could not replace the role of the auditor especially in professional judgment, skepticism, and communicating the audit report.

7.2 Recommendations

The article revealed that there are challenges for the adoption of technological innovations in the audit process. Consequently, the audit organizations including supreme audit institutions should give due emphasis to those challenges to improve the application of those technological resources which has a tremendous impact for achieving the objective of their respective offices.

Audit firms and institutions need to invest in technological innovations that help accomplish their audit vision, mission, objective and goals. But before the adoption of any technological innovation, costs and benefits of such deployment should be thoroughly investigated and researched. Countries and institutions could also learn the real effect of the application of such technologies from those counterparts that are already adopting such tools.

The main purpose of an audit has not changed with its main focus of ensuring accountability and transparency, stakeholder and the general populations' trust concerning the effective, efficient and economic use of resources. However, the methodology on how this is to be achieved and the related regulatory framework, manuals and standards should be reviewed to ensure they correspond to the digital reality.

Audit institutions should work together with higher education institutions so that students of accounting and auditing get training and skill in curriculums that take into account the emerging technologies in the field. Supreme audit institutions should also work in cooperation with the concerned stakeholders including professional bodies in this regard. Experts in technological innovations should work together with audit institutions.

A strategic area going forward for audit institutions will be the training and development of audit staff to ensure they have the knowledge and skillset required to deal with new technological innovations and the criteria and parameters being applied. Therefore, auditors should be trained and equipped with the necessary inputs to make them adapt to technological innovation and change and conduct an effective audit that stand with the changing world. This should be implemented and monitored through annual plans and reports of the respective institutions.

Finally, audit institutions should work and be prepared now for the future. They should work together with technology companies and the concerned government stakeholders to adopt technological innovations properly in the audit process. They should also need to cooperate and exchange their skills and experiences to each other as to how various technological innovations can be applied in audit. They have to maintain high motivation levels and turn drawbacks into successful learning experiences.

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