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Exploring the Position of Modern Technologies in Activating the Remote Audit Approach in Light of the Corona Pandemic - a Big 4 Case Study –

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Abstract

The extraordinary events of the COVID-19 pandemic have led Big 4 Audit Firms, like many other global companies, to a place where everything is different. Overnight, all practitioners worldwide have been forced to work in an entirely new environment that requires them to scramble for survival. However, the same destructive forces and the challenges of maintaining business continuity, as well as the widespread working home methods and providing remote services, have offered enormous opportunities and potentials for audit firms [in particular, Big 4 audit firms] to develop their digital innovations and increase reliance on modern technologies. Therefore, the main objective of our research lies in exploring the position of modern technologies (particularly in Big 4 audit firms) in activating the remote auditing approach considering the COVID-19 pandemic. So, in achieving the objectives of the research, we relied on the documentary descriptive approach, through which we reached several results, most notably that Modern technologies have contributed to drawing the line between what is possible in the external audit profession and what can only be imagined, by expanding the circle of possibilities and enabling auditors to practice their jobs anywhere, anytime and in real-time with the auditee, which translates into activating the remote auditing approach.

Keywords: *Remote auditing, Modern technologies, COVID-19 pandemic, Big 4 audit firms*

Classification JEL: M42

Introduction

The world has witnessed many crises and epidemics from ancient times to the present, which negatively affected a large part of the business environment at various levels,

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the latest of which is the rapid developments it is currently facing related to the outbreak of the emerging Corona Virus [COVID-19] pandemic, which made the last three years the most complex and challenging years in ways that no one expected, the exceptional circumstances and unprecedented transformations of the pandemic have caused severe damage and multi-dimensional effects on the personal, organizational and societal levels, and disrupted people's lives psychologically, emotionally, physically and professionally, which exceeded the health effects of the virus and cast its shadow on all sectors and fields. The audit profession was not isolated from it.

The reality of what the international arena has experienced and is still going through in terms of emergency changes and varying effects as a result of the forced and strict implementation of health protocols and social distancing policies, including the approach of working from home and restricting travel cases, in addition to the increasing interest in digitization and the sweeping of modern technologies that the profession is witnessing Which the information and communication technology revolution has been producing, indicates that the functions and methods of the audit profession in its current form are no longer sufficient to meet the requirements of the work, and in a manner that ensures its influential role to keep pace with these successive developments, which necessitated the introduction of radical changes to the profession and giving it a new breath and making it more effective, By adopting most auditing companies, especially the Big 4 companies, the remote audit approach as a modern approach and a better alternative to the traditional audit methods, which have become limited to keeping pace with sudden changes and successive developments, especially those caused by the Corona virus for the profession, Considering that the applications and innovations created by the Big4 companies to activate the remote audit approach will contribute to making qualitative leaps in auditing practices for decades to come, as an intelligent solution that will help auditors benefit from the innovative technologies of digitization that were supposed to take several decades before full implementation.

From this standpoint, the features of our problem become apparent in the following question: **What is the position of modern technologies in activating remote auditing during the Corona pandemic?**

From which the following sub-questions are branched:

1. What are the latest trends of the external audit profession that were used during the Corona pandemic crisis?

2. What benefits may the profession accrue from applying the remote audit approach?

3. How can the risks associated with modern technologies be analyzed and managed during remote audit implementation?

4. Do audit firms [particularly Big 4] have the appropriate technological base to activate the remote audit approach?

Research aims

This research mainly aims to:

1. Getting acquainted with the recent trends of the external audit profession in light of the Corona crisis.

2. Highlight potential practical challenges and risks that may arise from using TIC for remote audits.

3. Contributing with updated theoretical data on the most prominent emerging technologies that most audit firms [specifically Big four audit firms] relied on in the light of the pandemic paved the way for embracing the remote audit approach.

Research Importance

This research derives its importance from the novelty and significance of the topic, where remote auditing is the topic of the hour, especially amid the widespread emerging technologies and the exceptional circumstances left by the COVID-19 pandemic in the business environment [Zhan & Radu, 2020]. The theoretical knowledge included in this research will help insight into the need for auditors to keep abreast of the developments of digitization and the adoption of modern technologies to form a new generation for the profession of the future; in addition to that, the research data will contribute to reviving the theoretical side of the work with the latest digital innovations on which Big 4 companies stand to activate the remote audit approach, considering that it represents the lens of accounting and auditing in the world. It is also considered one of the first research dealing with this topic by research in the Arab world, which contributes to removing the severity and difficulty of the beginning.

Research Methodology

As shown since the beginning of our research, the latest trends in the external audit profession in light of the pandemic refer to remote auditing that revolves around a large number of technologies that are being used to create new value and opportunities, where we focused only on emerging technologies and digital innovations adopted by the four major companies during the health crisis. To answer the questions raised, the descriptive documentary method was relied on, as the appropriate approach to the nature and objectives of the research, by conducting a documentary survey of various documents, articles, and Specialized reports as well as official publications of international professional organizations, the research has also been updated with the latest studies and insights published by significant audit firms in the past three years on the subject and other sources and references.

1. Modern trends of the external audit profession in light of the Corona crisis

1.1. Audit Methods that can be used to meet the challenges of the COVID-19 pandemic

The unprecedented crisis caused by the spread of the COVID-19 pandemic has led to many effects in all fields, creating many difficulties and challenges for the audit profession. Therefore, auditors must keep pace with the development of the surrounding environment to face the continuous changes and consequences in the business environment. This requires focusing on using modern technology in data analysis and activating modern auditing methods.

Table No. [1] summarizes the main differences associated with modern methods of auditing that can be adopted during the Coronavirus crisis in the international arena, Where the focus was on the most widespread methods, which are: remote auditing [RA], assisted

remote auditing [ARA] [or hybrid auditing] and technology-enhanced auditing [TEA]. ([Castka & al, 2021, p. 6])

Table 1.

The main differences between modern auditing methods

	On-Site Auditing	**Assisted Remote Auditing**	**Remote Auditing**	**Technology Enhanced Auditing**
Approach	Auditor determines compliance based on the evidence that is primarily collected on-site	Same as on-site; onsite auditor is assisted by technical experts or others that operate remotely	Technology is used to replicate on-site auditing	Technology is used to assist in auditor's decision -making
Data Collection	Data exchanged between clients and auditors on-site [e.g. Review of hard copies, review of electronic files/ databases, in-person interviews]	Data exchanged between clients and auditors on-site [e.g., review of hard copies, review of electronic files/databases, in-person interviews]	Data exchanged between clients and auditors remotely [e.g., review of scanned documents, review of cloud-based platforms, review of satellite imaging, interviews through video conferencing]	multiple parties exchanged remotely [e.g., review of cloud-based platforms, review of social media platforms, review of data collected by technology in a real-time, interview through video conferencing]
Type of Technology	Technology is secondary to the audit process [though it may be used to facilitate the process]	ICT used to communicate between on-site and remotely-based auditors	ICT, such as audit/ video conferencing, screen sharing is used to replicate on-side audit	Various technologies [e.g., machine learning to identify patterns, make predictions, and guide decision-making; sensors collecting real-time information] are used to assist an auditor with an audit
Reliance on Technology	Low Audit can be essentially performed without technology	Low/Medium Remotely based auditors need to be able to connect with on-site auditors	Medium Relies predominantly on ICT; off-line [e.g., desktop review], or real-time [e.g., e-interviews] or a combination of thereof.	High Audit relies on multiple technologies
Auditor Competence	Auditing competence [as specified in IAF Guidelines]	Auditing competence and ICT competence	Auditing competence and ICT competence	Auditing competence, ICT competence, and competence in Big Data Analytics

(Source: Castka, et al. 2020: 16)

1.1.1. Benefits of using modern auditing Methods during the Covid-19 pandemic:

The use of contemporary audit methods and increased reliance on technological means and data analytics when carrying out audit work is one of the contemporary issues that have received the attention of many studies due to its contribution to achieving many benefits, the most important of which are: [Abd El-Monem Serag & Mohammed Daoud, 2021, p. 2]

- Reducing the costs of audit tasks, which enables auditors to expand and diversify their advisory services, thus maintaining their competitive position and increasing their market share;
- Easy to identify data models and trends and relationships among them, and increase the ability to monitor risks;
- Excluding activities that do not add value to the organization, which contributes to reaching better conclusions and meeting the needs of stakeholders;
- Increasing the speed and efficiency of conducting audits, as well as expanding the scope of auditing;

Saving time and effort for the audit team and thus reducing the number of members needed to implement audit programs.

1.2. The theoretical framework of the remote auditing approach:

The reality of what the business environment is witnessing today, in terms of the sweeping of modern technologies that the information and communication technology [ICT] revolution has continued to produce, as well as the unprecedented transformations imposed by the current health crisis of the Coronavirus, have put the auditing profession in front of a great challenge to develop its tools and traditional methods so that it continues to provide its services efficiently And high quality, which led the auditors to adopt the remote audit approach as a modern trend to perform audit tasks and overcome the challenges facing the profession.

1.2.1. The adoption of a remote auditing approach before the Covid-19 pandemic

Internationally, before the pandemic, the concept of remote auditing attracted the attention of many specialized professional bodies, as documents issued by [IAF] and [ISO] have already included the main principles related to remote auditing in their guideline and standards [IAF, 2015; ISO/IEC, 2017; IAF, 2018], and the uptake of remote auditing before the pandemic was somewhat limited, and it was used on a relatively small scale as it was devoted to the following cases [Castka & al, 2021, p. 9] :

- audit offered on a relatively small scale (remote verification of a food business);
- Audits in very isolated and hard-to-reach areas;
- Audits in high-risk areas [such as politically unstable areas;
- As part of contingency plans [as noted in the management's unusual event information document [IAFID 3:2011].

Thus, remote auditing existed and was implemented, but only sometimes, where some organizations have been experimenting with remote auditing for years while exploring new auditing techniques and optimizing the use of technology. Nevertheless, few implemented remote auditing [KPMG, Remote auditing for internal auditors, 2021, p. 2].

1.2.2. The concept of remote audit :

There is no doubt that the rapid developments and unprecedented transformations witnessed by the audit profession, like other professions for about three years, starting from the eleventh of March of the year 2020 until the present day, as a result of the emergence and spread of the Coronavirus pandemic, has forced auditors to modify traditional work and move towards remote auditing as a modern approach that enables them to adapt audits and meet the challenges of this pandemic, especially in light of the strict measures taken by countries to address this invisible enemy related to imposing travel restrictions and obligating citizens to work from home, and thus a remote audit is no longer an option yet right Now. It has become necessary [KPMG, Remote auditing for internal auditors, 2021, p. 2].

Several studies have addressed the concept of remote auditing, the most important of which are:

- According to Teeter et al., [2010], the term remote auditing can be defined as "the process by which auditors couple information and communication technology [ICT] with data analytics to assess and report on the accuracy of financial data and internal controls, gather electronic evidence, and interact with the auditee, independent of the physical location of the auditor" [Teeter & al, 2010, p. 74]. This definition is like ISO 19011, which states *"remote audit refer to the use of information and communication technology [ICT] to gather information, interview an auditee, etc., when -face-to-face- methods are not possible or desired"* [ISO19011, 2018].
- "Remote audit, also known as virtual audit, is the method of conducting an audit remotely, using electronic methods such as video conferencing, email, and telephone to obtain audit evidence, just like auditors would during an on-site audit. The overall aim is to evaluate this evidence objectively to determine the extent to which the audit criteria has been fulfilled" [Abd El-Monem Serag & Mohammed Daoud, 2021, p. 2].
- Based on the preceding, the remote audit can be defined as the audit process through which data is analyzed. Financial information accuracy is evaluated, and evidence is obtained using electronic tools and technological means in a safe digital environment through the sharing of documents, discussion of processes/procedures, and conducting Interviews, where the auditee and report presentations are handled with online meeting tools.

1.2.3. Prerequisites for participating in the implementation of remote audit:

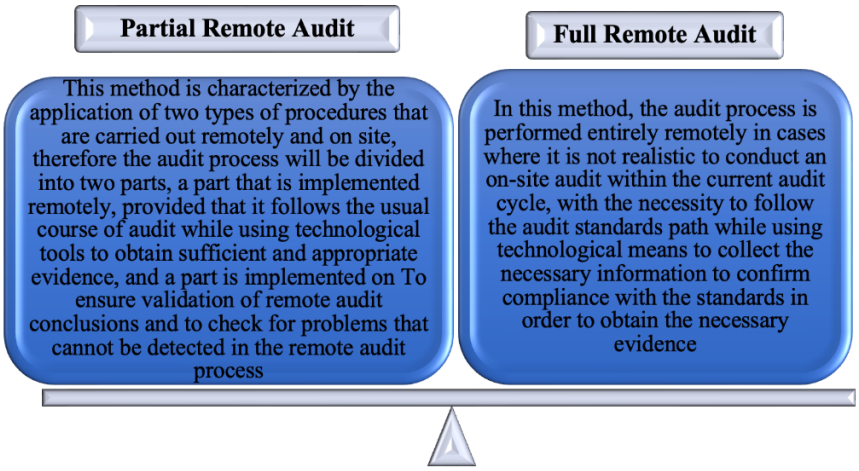
To achieve the desired feasibility of remote audit, and since the exchange, sharing, and discussion of information between the interacting parties is implemented simultaneously and by multiple technological means within a researched virtual environment, it is necessary for both the auditor and the auditee to meet the primary conditions related to the security, protection, and ease of operation too, among these conditions, are [Kiwa, 2021, p. 3]: the necessity of having reliable and fast internet connections for the participants; ensure secure access to all computers, servers, and devices involved in remote auditing; ensure that each participant has an authentic and good voice by providing comfortable webcams, microphones, and headphones in high quality; to have multiple screens that allow sharing and viewing of various documents; ensure that the underlying technology is in place and compatible.

1.2.4. The main approaches for conducting remote auditing:

The remote audit can be performed wholly or partially off-site, depending on the defined audit objectives, scope, and criteria, as well as duration and location:

Figure 1.

The two main approaches for conducting remote auditing



[Source: Abd El-monem serag Asmaa & Mohammed Daoud Mona. 2021:3)

1.2.5. Advantages of using remote auditing:

One of the main features that distinguish remote audits is that they are paperless electronic audits that are conducted in a virtual environment and without face-to-face interaction between the auditor and the controlled entity, where all data is exchanged in electronic formats such as MS Word and MS Excel, PDF, XML, Text Files, EDI Files, etc. Thus, remote audits can benefit companies and auditors for the following reasons [Abd El-Monem Serag & Mohammed Daoud, 2021, p. 4] stated in table 2.

Table 2.

The main advantages for using remote auditing

Saving time and money by using technology	❯	Through remote auditing, there will be a significant reduction in the time and cost spent on traveling to audit sites, as it will be possible to access most of the data, conduct interviews, and provide feedback from anywhere via popular platforms such as: cloud portal, Skype, or Zoom. Which many companies use regularly.
Avoid traveling to challenging audit sites	❯	The remote audit application helps to remove and bypass the difficulties related to geographical and temporal boundaries that may prevent the achievement/implementation of the audit process in hard-to-reach areas, isolated areas, or those that require strict entry permits, as we find that sometimes-even visas are mandatory and required if audits are performed internationally].
The audit team will be more efficient	❯	The audit team's implementation of their tasks in a familiar work environment such as working from home and their use of various available technologies such as high-speed

		internet, monitors, printers etc., will contribute significantly to raising productivity and taking less time to complete audit tasks and thus adherence to the schedule. Increase the efficiency and effectiveness of the audit team.
Expanding the use of specialists		Remote auditing allows for more benefit from professional expertise around the world, by enabling experts to connect remotely for specific interviews or parts of audit planning, so their physical presence is not required to conduct a full audit.
More flexible approach improves document review		Remote reviews of plans and documents help the auditor take sufficient time and at the appropriate pace that enables him to achieve a higher quality of review and more depth in the documentation.
Improved use of available technology strengthens documentation and reporting:		The use of technological means to obtain video recordings and photographic information allows for a better understanding of the available technology and to facilitate its use. It also contributes to better documentation of facility conditions, improving the ability to report accidents and emergency conditions to employees outside the company's site, while increasing future opportunities to adopt more remote audit tools.

[Source: developed by Researchers based on: Abd El-Monem Serag Asmaa & Mohammed Daoud Mona. 2021:4)

1.3. Assessment of the risks that may arise from the use of [ICT] in remote auditing

Considering that information and communication technology [ICT] is the primary support for the implementation of remote audits, and despite the many advantages and benefits that this approach provides for both auditor and auditee, it is necessary to take into account the limitations and risks that may be posed by the use of information and communication technology when Achieving the objectives of the remote audit, which include: information security issues, data protection, and confidentiality, the validity and quality of objective evidence collected, among others, and the following are the questions that may arise when performing a remote audit [ISO9001, 2020, p. 3] :

- When watching images, are we looking at real-time photos, or are we looking at video records?
- Can we capture everything about the remote site, or are we being guided by selected images?
- When planning a remote interview, will there be a stable internet connection? Does the person to be interviewed know how to use it?
- Can the processes and sites to be audited be realistically audited offsite?
- Can you get a good overview of facilities, equipment, processes, and controls? Is all relevant information accessible?

Many of these questions can only be answered after a visit to the site. Therefore, to use information and communication technology in the audit process, the auditor and the audit team must have the necessary knowledge and competence that helps them identify risks and opportunities and determine the criteria for decision-making to accept or not accept their use. Where and under what conditions ?Thus, one of the critical issues for identifying,

evaluating, and managing risks related to the use of technology to achieve audit objectives is the issue of understanding what kind of operations, activities, or sites of the organization may be audited remotely and with which ICT tool, besides that, the IAF Mandatory Document for the use of information and communication technology [ICT] for Auditing/Assessment purposes states that *"this decision should be based on the documented identification of risks and opportunities that may affect the audit/assessment of each ICT use, including its selection and management"* [IAFMD4, 2022, p. 8].

The table below lists the main issues for assessing the feasibility and risk analysis for conducting remote audits, which is included in the guide on remote auditing issued by both [IAF] and [ISO], which states that: *"this assessment should be conducted and documented for each audit, including all members of the audit team and a representative of the organization being audited. Any specific arrangements should be documented and reported between relevant stakeholders"* [ISO9001, 2020, p. 6].

Table 3.

Key Issues for Feasibility Assessment and Risk Analysis for Remote Audits

1.	**FEASIBILITY AND RISK ANALYSIS FOR REMOTE AUDITS** **Confidentiality, Security, and Data Protection [CSDP]**
	Ensure agreement between auditor and auditee about CSDP issues. Document any arrangements to ensure them.
2.	**Use of ICT**
	There is a stable connection with good online connection quality.
	The ICT allows access to relevant documented information including software, databases, records, etc.
	It is possible to make the authentication/identification of interviewed people preferably with image.
	If observation of facilities, processes, activities, etc., is relevant to achieve audit objectives, it is possible to access them by video.
3.	**People in the organization**
	It is possible to access and interview people relevant for the QMS
4.	**Operations**
	If the organization is not operating regularly, due to contingency situations, the processes/activities being performed are representative and allow fulfillment of the audit objectives.
5.	**Complexity of the organization and Audit Type**
	In case of complex organizations, processes, or products and services and where the objectives of the audit type require a full assessment of the standard and wider sampling [e.g. initial assessment or reassessment] a careful analysis of feasibility of remote audits to fully evaluate the organization conformity to all requirements should be performed.
6.	**Conclusions**
	The audit objectives can be attained with the remote audit - proceed to remote audit.
	The audit objectives can be achieved partially - a remote audit may be done partially and later complemented with an on-site audit.
	The audit objectives cannot be attained via remote audit.
7.	**Validate risk analysis with audit program manager**

(Source: ISO 9001.2020:6)

Furthermore, it is important to note that the ultimate goal in arriving at a documented decision on whether or not to proceed with remote methods is not to design a complex,

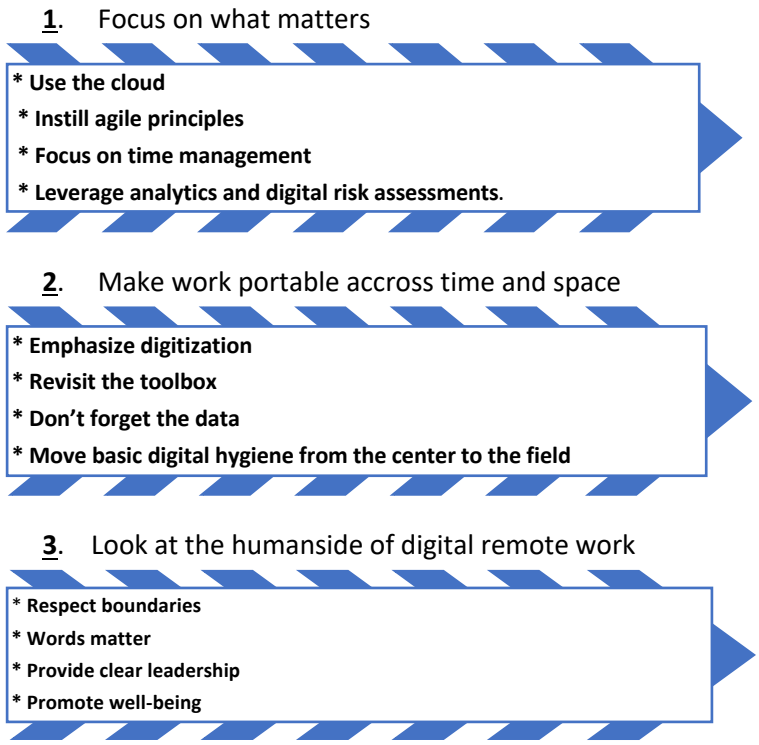
formal, and quantitative approach to identifying risks and opportunities but rather to provide and have the ability to identify opportunities and threats, and to determine whether these risks will be mitigated.

1.4. Remote auditing insights and techniques in the wake of the pandemic:

To mitigate the severity of the crisis and against the backdrop of the emergency and unprecedented transformations left by the pandemic, Deloitte summarized its experience in implementing remote auditing by providing three insights that may help companies in one way or another move towards a new generation of auditing that is smarter and more digitized and thus gave an experience better customer audit [Deloitte, 2022], which are:

Figure 2.

Three insights and remote auditing techniques in the wake of the pandemic:



Source: Developed by researchers based on:
https://www2.deloitte.com/us/en/pages/audit/articles/three-insights-for-remote-auditing.html

2. Identifying the position of big 4's modern technologies in activating the remote auditing approach:

The outbreak of the Covid-19 pandemic in most countries coincided with the busy season for year-end audits for fiscal 2019, with most companies using December 31 as the end date of the fiscal year. Public companies are required to submit/file annual reports within four months after the end of the fiscal year. In response to the spread of the pandemic and the imposition of closures and travel restrictions, remote work has suddenly become an

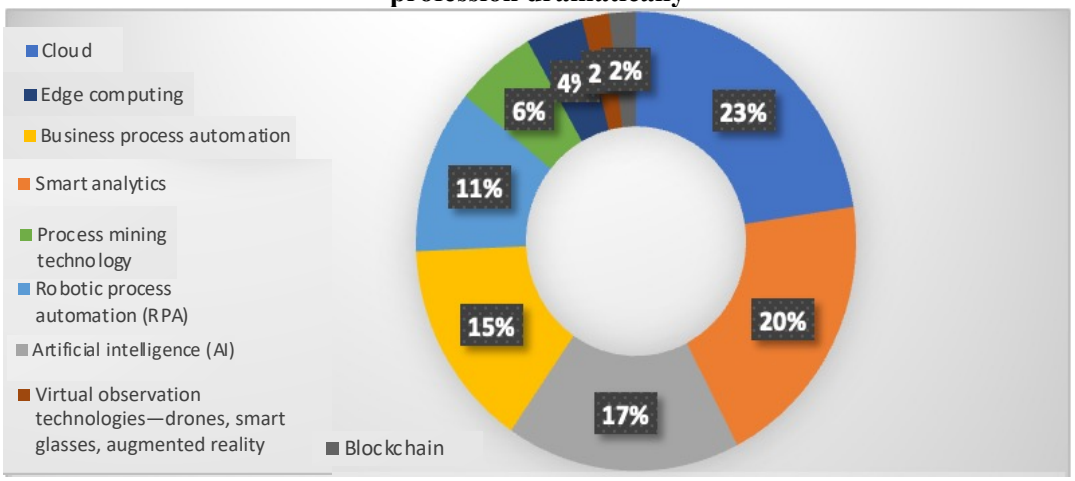
inescapable and well-established reality that prompted most audit firms to move immediately from on-site auditing to Remote audit. Therefore, to identify and discover the effectiveness of relying on modern technologies in activating the remote audit approach, we have relied on the case study of Big4 audit firms [represented by: Deloitte, PricewaterhouseCoopers [PWC], Ernst & Young [EY], and KPMG] which all offices and companies of all sizes and locations in the world seek to follow and imitate as they represent the leading companies in the field that have proven their flexibility and efficiency in transforming the new reality of remote work into a golden opportunity to build a future career, and in this regard, a documentary survey was conducted of the most prominent studies and research, as well as various reports and publications provided by the websites of these companies to find out the technologies adopted by Big 4 companies to transform and reshape the profession on the one hand. On the other hand, activating remote auditing, supporting the profession, and continuing to serve its customers during the epidemic can be summarized as follows.

2.1. Highlighting the leading-edge technologies that have the potential to transform the external audit profession dramatically

The increasing pressure of the pandemic has forced audit firms [particularly in Big4 audit firms] to rethink, reformulate a new approach to auditing, or even potentially change their profession so that the first innovative solution that came to mind was to move towards remote auditing. In order not to find itself in a weak position in front of its competitors, it has constantly sought to adapt and activate its new approach through a set of emerging technologies, which have the potential to revolutionize external audits. These have been cited as must-haves for external auditors during and after the dramatic change revealed by this sanitary crisis, according to the insights derived from the *"KPMG Finance and Audit Technology"* survey for the year 2021, which can be illustrated in figure 3.

Figure 3.

Emerging technologies that have the potential to transform the external audit profession dramatically



[Source: Developed by researchers based on: Forbes insights report from the 2021 KPMG Finance and Audit Technology Survey. 2021:24)

Thus, the results of this survey show that cloud [80%], intelligent analytics [70%], and artificial intelligence [61%] is the essential must-have technologies for external auditors today, which will have the potential to transform and adapt the outward audit profession and making it more flexible with the changes that have faced and will still face in the future [Forbes, 2021, p. 24].

2.2. Reimagining remote auditing experience with the latest technological innovation designed by Big 4 Firms

2.2.1 Case 01: Deloitte Company

Deloitte is a leading global audit firm referring to the group of member companies of Deloitte Touche Tohmatsu Limited; each member firm offers four primary services: audit, corporate risk, advisory, tax, and financial advisory. Since its first office was established in 1845 by William Welch Deloitte, and with nearly 177 years of experience and a commitment to hard work, the company has grown into an international network of more than 286,000 professionals in More than 150 countries and territories [Deloitte, 2022]. Among the Big Four, Deloitte had the most significant number of employees in 2021. In the same year, generated the highest total revenue in the United States of the four companies, with a total revenue of nearly 50 billion U.S. dollars [Statista, 2022]. Deloitte has created a seamless experience during the transition to virtual working with clients while continuing to provide the same high-quality audits for which they are known through the delivery of a digital, flexible, and dynamic platform, especially Deloitte Omnia and connect.

- *Deloitte Omnia platform:* Deloitte Omnia is a global, cloud-native platform developed and powered by cognitive technologies, custom workflows, and advanced data analytics to provide a seamless, end-to-end digital audit experience. It provides differentiated data and better services to clients by reducing audit burden with focus, flexibility, and advanced audit technology. Providing deeper insights by providing qualitative insights that fit the details of the audit process and the industry in which the client operates - introducing a more brilliant audit by focusing on the client's unique risks and analyzing the various associated changes [Deloitte, 2022]. One of the most critical components of the Deloitte Omnia platform is the Omnia DNAV module, which has revolutionized the auditing of investments and related transactions [Deloitte, 2020], and the Omnia ESG unit that helps ensure the quality and flexibility of stakeholder assessments and standards for ESG [Deloitte, 2022].
- *Deloitte Connect:* is a secure online collaboration site that is part of a cloud-based auditing platform and intuitive client portal that has been specifically designed to reduce the administrative burden on clients and provide a seamless and informative transparent experience that facilitates a two-way dialogue between the Deloitte team and the client [Deloitte, 2021].

2.2.2. Case 02: PWC Company

PwC specializes in providing professional services in assurance, advisory, tax, performance improvement, and crisis management. The international audit firm was established in 1998 through the merger of Pricewaterhouse, Coopers & Lybrand [PwC, 2022]. Based on solid experience formed over 160 years with a network of firms in 156 countries with more than 295,000 employees, PwC provides high-quality audit services through an innovative approach characterized by the integration of leading technology and

human resources [Permenter, 2022]. In 2021, PwC was ranked as the second largest of the four companies by revenue, amounting to $45.1 billion [Statista, 2022].

To meet the challenges raised by the post-pandemic reality and activate the remote audit approach, PwC has relied on an innovative approach by investing in the following three digital Technologies:

- *Aura Audit Technology*: A seamless, cloud-based audit platform that combines leading-edge technology and the right human know-how to provide a fully integrated, innovative end-to-end experience, it is PwC's ERP system, allowing the customization and implementation of every audit stage of the audit firm and continuously relying on advanced analytics, secure data extraction, and ensuring improved communication and information sharing to ensure audit quality and standardization [PWC, 2022].
- *Connect Technology*: a web-based collaboration platform designed to facilitate information sharing and to monitor document exchange, process flow, and tasks at all times and across different devices in real-time with the audit client in an efficient, fast and secure manner at every stage of the audit [PWC, 2022].
- *Halo Technology*: does PwC design a financial data audit technology specifically to identify high-risk anomalies at the transaction and master data level. Thanks to its reliance on the power of data analytics, PwC auditors will be able to scan intelligently, aggregate, and integrate vast amounts of audit-related data, allowing for assurance of Bigger, deeper insight, better risk assessment, and unlocking understanding towards creating complete audit assertions and anomalies detection year-round and in real-time [PWC, 2022].

2.2.3. Case 03: EY Company

Ernst & Young [EY] is the fourth largest public accounting firm in the world, founded in 1989 following the merger of the third largest accounting firm at the time, Ernst & Whinney, with the sixth largest, Arthur Young [History, 1999], EY provides professional services in the fields of insurance, taxes, transactions, and consultancy, it also works on designing an ideal work environment for its employees and clients by providing a purposeful package of visions and high services that ultimately aim to build confidence in the capital markets and various economies in all parts of the world [EY, 2020], where it operates in more than 150 countries worldwide. In 2021 Ernst & Young [EY] employed approximately 312,250 employees worldwide, generating a total of $40 billion in revenue [Statista, 2021].

Amid the Corona pandemic and to continue its journey towards building a better world of work, EY has continued to integrate the latest technologies in the audit process to facilitate the adoption of remote work and activate the remote audit approach, as there was no better time than the time of the Corona crisis to detect On the advantages and position of its technological innovations in response to evolving needs, the most important of these technologies are:

- *EY Canvas:* EY Canvas is the first fully online and cloud-based global auditing platform, providing high-quality audit services, centralized and seamless auditing through a single centralized plan and methodology that allows audit teams to manage and coordinate their employees regardless of size continuously, complexity, or location giving them the ability to conduct remote audits and help meet the evolving expectations and needs of companies, regulators and investors [EYCanvas, 2020]. In addition, to facilitate direct communication between clients and audit teams, Ernst & Young has developed two types of services: the EY Canvas Client Portal Service that connects audit professionals to clients,

simplifying their communications and monitoring their requests in real-time, wherever the audit takes place and the EY Canvas Mobile apps service that allows audit teams to get daily updates on audit status and customer support on the go [EYcanvas, 2020].

- *EY Helix***:** It is EY's global platform for data analysis, specifically designed to suit the needs of all customers through its reliance on an analytics approach in every aspect of auditing, which contributes to revealing hidden patterns and trends in financial statements. A more in-depth understanding of financial closures [EY Helix, 2020].
- *EY Atlas:* EY Atlas is the cloud-based knowledge platform that delivers the latest accounting and auditing content, including external standards, interpretations, insights, EY expertise, and thought leadership, business-appropriate to all clients who can tap into this treasure of professional knowledge through the EY Atlas portal. EY Atlas Client Edition [EYAtlas, 2020].

2.2.4 Case 04: KPMG Company

KPMG is a global network of professional firms that provide a set of audit, tax, and advisory services to a wide range of local and international companies in 144 countries. KPMG Company was founded in 1987 because of the merger of Peat Marwick International and Klynveld Main Goerdeler, with total employment of more than 236,000 people and generating a total of $32.1 billion in revenue in 2021 (Statista, 2021). KPMG stands on a vast network of alliances with the world's leading technology, data, and services companies, which has allowed it to face various challenges and respond to opportunities by providing the best offers and services that help clients overcome the unprecedented turmoil witnessed in the business environment in recent times [KPMG, 2022]. One of the most prominent digital innovations designed by KPMG company has proven its usefulness in activating the remote audit approach, facing challenges, creating opportunities, improving the user experience, and changing the way work is done. We mention:

- *KPMG Clara smart audit platform*: With the launch of the intelligent Clara KPMG audit platform in 2017, as a result of the gigantic alliance established by KPMG with Microsoft Azure, KPMG became the first of the Big Four audit firms to bring audit workflows to the cloud [KPMG, 2019], Where the platform specializes in providing audit services 24/7 through a central portal that acts as a single source for exchanging important information, giving clients the ability to communicate with the audit team and access in real-time to their audit process with greater transparency, as it is an integrated and scalable platform, based on In the cloud, it enables an enhanced audit methodology through a data-enabled workflow, as the platform integrates new and emerging technologies, with advanced capabilities that leverage data science, audit automation, and data visualization to deliver a better audit experience [KPMG, 2022].
- *The virtual audit room technology:* in the wake of the pandemic, KPMG switched to working remotely through its smart audit platform KPMG Clara, where it had to find a place for virtual meetings to conduct all company gatherings in a way that ensures the quality and continuity of communications between the individuals involved, which prompted it to design a virtual audit room as a Fully Custom Virtual Venue that allows the creation of a virtual perimeter Intelligent and well-equipped familiar with the work environment in which the work team used to work [Kumospace, 2022], to enable the audit team to communicate, share and collaborate on files, carry out the audit, and own their own business rules, and Increased transparency and the ability to have real-time conversations and share knowledge.

Thus, virtual audit room technology helps create a decisive action for enhancing the ability to take the work journey remotely even after returning to the office [KPMG, 2022].

- *Smart glasses technology:* KPMG continues its unprecedented technological innovations to support its customers during the pandemic, this time highlighting smart glasses technology as the latest innovation designed to meet the challenges that may arise in the business environment, travel restrictions, and lockdown imposed by the pandemic, providing the benefit of the specialist who sees what you see, which is the ability to Sharing vision and communication in real-time, one of the most critical processes that require the adoption of this technology is remote inventories, where intelligent glasses will help provide seamless two-way communications that enable auditors to take stock remotely, thus it is considered one of the most essential virtual monitoring technologies that increase accuracy, reduce costs, bridge distances and reduce the time between interacting parties. On the other hand, intelligent glasses are another tool that can be paired with tech-savvy auditors today, but it does not replace the skepticism of professional auditors [KPMG, 2022].

Conclusion

Over the past two years, the audit profession, like other professions in the world, has been reeling from the shock of the pandemic, which has not only changed the trends and ways of working, it simply put an exclamation mark on the current priorities and capabilities of audit firms, in particular, the Big 4 audit firms, that already started in early 2020 to modernizing and training its teams, rolling out their innovations, and upgrading their emerging technologies to transition to a comprehensive approach of remote working. In an attempt to collectively transition to the new normal, and provide the appropriate digital platform to activate the remote audit approach, each of the Big4 firms updated their digital strategy and implemented innovative analysis tools, such as Deloitte Omnia, Aura Audit Technology, and EY Canvas and KPMG Clara, which are cloud-based auditing platforms based on advanced data analytics, specially designed to provide high-quality audit services to clients regardless of their work location through an improved, flexible and smooth central working methodology, allowing to provide an integrated and comprehensive audit experience.

Moreover, to ensure continuity of communication and improve information exchange between them and their customers during and after this health crisis, we find that Deloitte, PWC, and EY have provided their customers with secure, seamless. Easy-to-use digital communication portals, where Deloitte designed the Deloitte Connect collaboration site intending to reduce the administrative burden for clients, PWC also used the Connect Technology digital collaboration platform to facilitate the flow of information and documents in real-time with the audit client. We also find that Ernst & Young has developed two types of communication services, which are represented by the Canvas Portal service that connects audit professionals with clients, allowing them to monitor and respond to their requests in real-time, and the EY Canvas Mobile Applications Service, which works to provide audit teams with daily updates on the status of the audit without having to go to the client's site. At the same time, it is noted that KPMG has gone further by creating the virtual audit room as an intelligent work environment and a new collaboration suite that allows the audit team to communicate and share knowledge, thus providing more organized and effective remote audits. As for the risks that auditors may face when carrying out their tasks, especially in light of the difficulty of the physical presence of an auditor at the client's site

and the increasing uncertainty associated with the credibility of financial statements, we find that the Big Four companies did not hesitate to adopt the latest technologies based on risk management and assessment, Such as Halo Technology designed by PWC specifically to identify anomalies and provide a better and more profound evaluation of risk at the level of financial statements, in addition to using EY Helix's global data analysis platform, which contributes to revealing hidden patterns and trends in financial data through its advanced analytics and thus identifying areas that may involve a high rate of risk.

On the other hand, to bridge distances, increase accuracy, reduce costs, and ensure the smooth running of audits that require the actual presence of the auditor at the customer's site during the pandemic, especially inventory evaluation and control processes, KPMG has turned to use virtual monitoring technologies, which are most notably, the smart glasses technology that sends it to the customer's location, with the wearer transmitting everything he sees and hears to the audit team, thus enabling them to conduct inventories remotely by giving them the ability to share vision and communication in real-time.

Findings

- The theoretical study of the big four firms concluded that remote auditing is not just a backup plan reserved as an emergency mechanism but rather a golden opportunity to make auditing practices more flexible, effective, and valuable and transfer them from primitive methods to the era of intelligent innovations.
- The Corona pandemic crisis has stimulated an increased reliance on modern tools and technologies such as artificial intelligence and big data analytics, as well as the cloud, which contributed to exceeding spatial and temporal limits and activating new methods of auditing such as remote auditing.
- The advantages provided by the application of the remote audit approach during the pandemic, such as reducing audit time, reducing travel and transportation costs, as well as approximating geographical distances, etc., indicate that remote auditing will remain common in the future.
- The extensive use of emerging technologies and increased investment in digital innovations by the Big 4 firms indicates that in the near future, remote auditing will become suitable for all audit firms that are trying to gain a competitive advantage and occupy a leading position in the audit services market. The Big 4 audit firms have the latest virtual audit platforms and the appropriate technological tools that allowed them to activate the remote audit approach with flexibility and smoothness.
- Modern technologies have contributed to drawing the line between what is possible in the external audit profession and what can only be imagined by expanding the circle of possibilities and enabling auditors to practice their professions anywhere, anytime, and in real-time with the audit client, which translates into activating the audit approach through distance.
- Analysis and management of risks associated with the use of modern technology during the implementation of remote audit require the ability to conduct a documented assessment and achieve an in-depth understanding of the type of operations, activities or locations of the organization that can be audited remotely, and with any ICT tool, where and under what conditions.

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