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Exploratory Study on the Role of Digitalization in Improving the External Audit Quality in Public Institutions: Evidence from Morocco

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ABSTRACT: This study aims to understand the relationship between digitalization and the quality of external audit in public institutions, especially in the context of a developing country like Morocco. The paper adopts a qualitative approach in the form of interviews with stakeholders such as auditors, researchers and finance specialists. Data analysis was performed using NVIVO version 15 software. The results of the study show that digitalization impacts audit quality, particularly through the competence of the auditor. Indeed, this revolution pushes the practitioners of the profession to rise in theoretical and practical competency and adopt new technological tools in order to derive the best benefit from them within the scope of their mission. In addition, the relationship between digitalization and auditing can have both benefits and disadvantages mainly linked to the risk of data confidentiality and loss of human contact with the audited entity. Based on these findings, recommendations were made to ensure that the use of technology is fully aligned with the auditor's objectives and the customer's aspiration. The main novelty of this study is the adoption of a qualitative analysis for studying the intersection of digitalization and external audit quality in the public sector, specifically in a developing country like Morocco where the research is limited. This study is timely given the increase in the adoption of technology tools both in the public sector and in the field of audit.

Keywords: external audit quality 1, technology 2, digitalization 3, public institutions.

I. INTRODUCTION

Nowadays external auditors face challenges and opportunities to keep their skills and professional knowledge up-to-date in order to adapt to changes in the digital world [1] .Indeed, according to the empirical study carried out by the big firm called "FIDAROC" in partnership with Dauphine-PSL University in 2022, on the contribution of artificial intelligence to external audit on a sample of 120 companies. The study found that AI contributes to several benefits for auditors and auditees, including the improvement of sampling quality and scope of controls, the reduction of on-the-spot checks and travel, and the non-performance of low value-added tasks. Indeed, the external audit has undergone a rapid evolution in recent years, expressed in a very

remarkable way, due to the effect of globalization, technological innovation and the exponential increase in financial data.

In the Moroccan context, the audit has generated a certain mature flexibility, thanks to the development of digitized tools facilitating external auditors' missions in the COVID19 period [32] .This development enables the external audit to evolve in particular in an ever-changing economic context where traditional methods are increasingly unsuited to this evolution. This is why AI has become an increased necessity for all external audit firms with the potential to significantly improve the process and quality of external audit. Likewise, very few studies in the Moroccan and African context have addressed the impact of digitalization on the quality of external auditing in public sector, which is why this research study is crucial and will be able to further improve the gap in addressing this topical issue in the context of a developing country and truly contribute to the advancement of research literature in this more fertile field.

Indeed, the Moroccan public sector needs auditors, whether internal or external, qualified and experienced in the use of modern digital tools in order to improve the quality of management of public affairs and contribute to the improvement of governance and transparency, the prevention of fraud in the Moroccan public sector as a developing country. Regarding fraud detection and prevention mechanisms, internal auditors perceive operational audits, the enhanced role of audit committees, the review and improvement of internal controls, the fraud reporting policy, and the staff rotation policy as among the most effective mechanisms (Benazzi, 2022).

In recent years, digitalization has greatly contributed to the transformation of the audit function, especially in developing countries such as Morocco. This has enabled auditors to facilitate the audit process by preventing wasted time, reducing low value-added tasks, performing tasks in real time in an efficient manner and subsequently preventing fraud.

In Morocco's public sector, the General Inspectorate of Finance (IGF), established by law in 1960, plays a central role in internal audit and control functions. It is empowered to oversee treasury and accounting services, monitor public officials and state entities, supervise public account management, and assess the effectiveness of financial operations. However, as part of ongoing reforms, Morocco is working to strengthen the IGF's technical capacity to conduct more effective internal audits. In this context, the OECD (2018) recommends embedding values of integrity and ethics into the internal control system, which may include the development of a code of conduct for public officials and civil servants.

Indeed, the decree No. 2-24-249, published in Official Bulletin No. 7399 on April 28, 2025, marks a major milestone in the reform of public establishments and enterprises (EEP) in Morocco. Through the official adoption of the Code of Good Governance Practices, the Ministry of Economy and Finance is implementing a strategic step outlined in Article 38 of Framework Law No. 50-21. This new code represents a key lever for promoting a culture of audit, transparency, and accountability within the public sector. It aims to further structure and professionalize governance practices by establishing clear principles regarding internal control, accountability, risk management, and performance monitoring in Moroccan public sector.

The aim of this paper is to examine the theoretical framework that studies the impact of digitalization on external audit by facilitating understanding of the benefits of digitalization on external audit quality while testing a body of academic and empirical work and concrete examples on the subject. The main objective of this document is to present a rich literature review followed by a homogeneous qualitative empirical study explaining the role of digitalization on the quality of external audit in Moroccan public institutions. In this sense, our research problem is formulated as follows: how do digital transformation tools improve the quality of external audit in Moroccan public institutions?

In order to do this, this article first defines the basic concepts of this relationship between AI and external audit quality, then studies the impact of artificial intelligence (AI) on both dimensions of external audit quality, be it the competence or independence of external auditors, highlighting the contribution of technology expectancy theory in the interaction between AI and external audit quality, which shows that performance expectations play an important role in the acceptance of technology by external auditors. Finally, a qualitative empirical study using NVIVO 15 software to explore the relationship between digital tools and the quality of external auditors in the Moroccan public context.

II. LITERATURE REVIEW

1. DEFINITION OF EXTERNAL AUDIT QUALITY

The external auditor plays a key and crucial role in improving corporate governance and continuously contributes to ensuring the transparency of financial and non-financial information, in order to enhance stakeholders' confidence in the certification of company accounts. However, the main responsibilities of an auditor lie in the detection of material misstatement, the prevention of material omission and fraud or misrepresentation of financial data [31].The external audit is considered as an effective external mechanism to improve the quality of the corporate governance body [9].

In this context, a large part of the research studies on audit quality have been developed and enriched on the basis of the DeAngelo studies [20, 21] which showed that the achievement of a high-quality external audit mission is conditioned by the combination of the two variables: its competence and its independence. Indeed, the quality of external auditing is a subject of interest to the various researchers and professionals and remains an important topic of interest in academic and professional literature. Previous studies have shown that the quality of the audit ensures investor confidence, financial market stability and good corporate governance [20, 70] Indeed, the competence of auditors is a key factor in the quality of external audit. D'Angelo's research (1981) highlights the importance of technical expertise and knowledge in improving the skills of external auditors in the conduct of quality external audits. In addition, the independence of external auditors is a necessary element contributing to the quality of the external audit and indicates the ability of the external auditors to communicate all material misstatements and irregularities detected in the financial statements to the corporate governance body.

2. DEFINITION OF GENERATIVE AI

Generative AI has been introduced since the early 1960s in terms of chatbots. However, it was only in 2014, with the birth and emergence of generative adversary networks (GANs), that generative AI was able to build and create authentic and convincing images, videos and sounds of real people. Generative artificial intelligence remains an important technological advance in the field of AI, since it allows the creation of synthetic data perfectly representing real data. Thus, generative artificial intelligence (AI) represents a branch of AI that focuses on creating data similar to existing data. In contrast to other classical AI models that aggregate and anticipate while relying on models in the data, generative AI models are able to introduce new synthetic data based on the models they have learned.

Simply put, the generative concept implies the verb generate, or in other words produce and create. As a result, Generative Artificial Intelligence is able to build content. "Generative artificial intelligence (AI) refers to algorithms such as ChatGPT as an example that are ready to be exploited to create new content, audio, code, images, text, simulations and also videos [53]. This technology, which is widely used, for example Dall-E 2, GPT-4 and Copilot, is currently revolutionizing the way we work and communicate with others. As a result, generative AI, while creating complex scenarios and simulations from existing data, offers unprecedented opportunities in a variety of areas. In particular, the technology is beginning to transform the external audit industry, improving the accuracy of analysis and optimizing audit processes.

3. ARTIFICIAL INTELLIGENCE AND EXTERNAL AUDITING IN THE CONTEXT OF THE THEORY OF TECHNOLOGICAL EXPECTANCY

Performance expectation refers to how the use of technology enables users to perform their daily tasks more efficiently [76]. The literature suggests that this performance expectation positively influences the intention to adopt a specific technology in general [52, 76]. Performance expectations are a separate concept that assesses the extent to which the auditor believes that robotics will improve the way he or she works. This includes the perception of the impact of robotics on productivity, efficiency and professional development. In such contexts, including risk management, the potential of AI becomes increasingly significant in enhancing risk detection and providing real time support for the tasks performed by the auditors [22, 66, 73].

The audit standards and guidelines indicate that the use of technological tools can improve the effectiveness and efficiency of the work of internal auditors (see for example IIA Standard 1220.A2). In addition, other publications on transaction auditing and analysis technology tools have found that auditors adopt these tools to perform various functions, such as: testing program controls [39, 63]; facilitating risk assessment during audit planning [62]; and improving the effectiveness of audit testing [35].

Previous studies on audit technologies have also shown that performance expectations play a key role in the acceptance of the technology by auditors. Study [27] noted that the intention of auditors to adopt a technology was strongly influenced by their expectation of performance with respect to that technology. Concerning the relationship between performance expectation and behavioral intent, [50, 68] and [6] claim that technological advances in auditing have improved the performance of auditors, making their work faster and more efficient, notably by reducing costs and time. According to [17], auditors are developing a better understanding of how to conduct risk assessments, leading to more sophisticated and transparent audit testing processes.

Indeed, performance expectation impacts ethical perceptions of AI in recruitment, which, in turn, influences perceptions of trust within the organization, reinforcing its acceptance and usage in other functions. Performance expectation influences people's ethical perceptions about the use of AI in the recruitment process. These ethical perceptions, in turn, have a positive effect on people's trust in the organizations that embed AI.

4. IMPACT OF DIGITAL TOOLS ON THE COMPETENCE OF EXTERNAL AUDITORS

Study [24] argues that audit firms and auditors more generally are affected by the evolution of information technology. In particular, these include big-data analytics, artificial intelligence, and, most recently, blockchain technology. Digitalization and its impact on the audit profession is still not well disclosed in the sense that this impact is emerging. As a result, according to the FAR 2016 report, digitalization and process automation will certainly bring about changes in the accounting field, leading to a change in the audit profession.

In this period of increasing digitalization, it is clear that data processing and auditing is a major challenge that bypasses the audit and accounting professions. It requires the development of new methods and tools to ensure the accuracy of data generated by digital means. Artificial intelligence technology is not only capable of carrying out cognitive tasks, but is also capable of solving difficulties encountered in terms of auditing, which encourages its implementation and practice

The academic literature represented by the various authors [41, 55, 56] emphasizes that the overarching objective of AI in the field of auditing must focus on structured and repetitive tasks. This view has also been raised and advocated by practitioners. Advancements in technology, data analysis and AI in auditing will become more important in the years to come. AI is conditioned by the use of big data and intensive data processing. The impact of AI on audit is very evident in the areas of data acquisition, transaction processing verification and reporting [41]. Today, a variety of powerful data analytics tools allow auditors to process customer data comprehensively. Instead of manually reviewing the data in a sample, the auditor becomes able to quickly process and view complete data to improve the quality and efficiency of the audit. The documentation of audit files is also better represented, as digitization opens up a real traceability process, while offering the ability to re-check later. As a result, the auditor gains a better understanding of the client and its environment and, in addition, the auditee can easily access information in order to perform its own risk control.

Moreover, artificial intelligence (AI) is transforming the process of planning and executing audits, while providing advanced risk-assessment capabilities that surpass traditional methods in terms of accuracy, speed of processing, and completeness. By leveraging machine learning algorithms and big data analysis, AI-enabled tools are able to identify patterns and detect anomalies that human auditors may neglect, leading to a more focused and efficient audit [7]. In addition, risk identification and management are critical to ensuring the accuracy and reliability of financial statements. By minimizing the risk of human error, AI increases the reliability of risk assessment results and optimizes the quality of audit.

Indeed, one of the major objectives of digitizing audit firms is to detect fraud while improving the understanding and quantification of risks for their clients and making the analysis of large volume of data more efficient [16].

The emergence of artificial intelligence (AI) represented a significant turning point in fraud detection. With machine-learning algorithms that can learn from data and identify patterns without requiring explicit programming, AI offers a dynamic and adaptable solution. These AI systems are able to analyze large data sets, spot subtle anomalies, and continuously evolve to adapt to new fraud tactics [29]. AI systems are capable of simultaneously taking into account a variety of factors, such as transaction history, user behavior and contextual information. This holistic approach allows AI to examine complex relationships and detect anomalies that may indicate fraudulent activity. Continuous learning ensures that the system continuously adapts to emerging threats, providing proactive and dynamic defense against evolving fraud patterns.

Study [25] summarizes the impact of artificial intelligence on the audit profession, since machine learning supports the automatic recording of accounting transactions and the creation of models according to this sub-concept of AI facilitates the detection of fraud to auditors. This technology can also be used to analyze unstructured data, and to optimize the time spent by auditors while processing a very large data set. IBM Watson, for example, uses artificial intelligence to read, listen, learn, and process billions of documents per minute.

Automation of structured and repetitive audit tasks [55, 56]. allows auditors to redirect their time to secondary tasks, thus providing the opportunity to focus on high value-added missions [43, 69]. Integrating robotic process automation into auditing improves audit efficiency and reduces workload by optimizing the use of auditors' time and skills. This allows them to focus on higher-level tasks that require increased professional judgment [36]. Applying robotic process automation to audit procedures can increase the efficiency and quality of audits by minimizing human error when performing audit procedures. Automation of robotic processes can enhance the audibility, security and governance of audit engagements. Given the confidential nature of audit data, automation of robotic processes automates the collection and transfer of data, limiting the number of people with access to sensitive information. However, integrating AI into auditing will lead to significant changes that auditors will need to be prepared for [45]. Therefore, training for new auditors will need to be adapted to ensure that they have the skills, knowledge and experience to evolve in the AI-driven audit environment [30]. Auditors were encouraged to switch from conventional auditing techniques to more computer-assisted methods [14].

According to [22], it is crucial to have auditors with a thorough understanding of the risks associated with emerging technologies, including AI applications and robotic process automation. Increased digitization will require organizations to pay greater attention to inherent risks, such as cyber security, privacy and data security. [15] stresses the importance for auditors to have advanced training in computer science and recognizes that the challenges of integrating this increased training into the curricula of higher education institutions will remain a problem. Auditors must also possess analytical skills to master new audit techniques using various data sources [37].

In Canada, KPMG has chosen to strengthen the skills of external auditors so that they can master and adapt the technology to the specific needs of their clients [42]. It is crucial that auditors develop their skills and understanding of digital technologies, data analytics and other areas related to information technology [71].

The information technology (IT) skills required by auditors encompass a wide range of areas that are crucial for effective evaluation of information systems. First, a deep understanding of IT infrastructure, including IT operations, is critical to understanding how systems influence audits. Cybersecurity and data protection skills are critical to securing sensitive information from threats and unauthorized access. Auditors must also be proficient in data analysis and visualization to interpret complex datasets and present clear conclusions. The ability to extract relevant information through data mining is also essential to uncover meaningful patterns and trends. The use of computer-aided audit techniques (CAATS) and the management of electronic working documents are essential skills to improve the efficiency of audit procedures. Data risk assessment helps identify potential problems and establish appropriate controls. With the emergence of technologies such as robotics, blockchain and artificial intelligence, it is becoming increasingly crucial to understand these innovations. In addition, a good understanding of cloud computing environments is crucial to assess their impact on data security and audit processes. The introduction of continuous auditing allows controls and risks to be continuously monitored and assessed. Finally, knowledge of the different IT control frameworks enables auditors to assess the effectiveness of IT controls within organizations. These skills are essential to navigate the

complex IT landscape and ensure comprehensive and effective audits. Therefore, [60] explains that AI only supports auditors, because machines lack the human qualities needed for complex judgment. Thus, the auditor always remains ultimately responsible for decision-making. Therefore, auditors need to exercise professional judgment and maintain critical skepticism to evaluate automated procedures. Based on research studies, we believe there is a positive relationship between digital tools and the competence of external auditors.

5. IMPACT OF DIGITAL TOOLS ON THE INDEPENDENCE OF EXTERNAL AUDITORS AND DETECTION FRAUD

As part of the relationship between AI and the independence of external auditors, we conducted an in-depth study and analysis on the relationship between digital technology, especially AI, and the independence of external auditors. Indeed, few research studies have examined the interaction of AI variables and the independence of external auditors, unlike the same impact on the competence of external auditors.

Firstly, digital technology, especially artificial intelligence, makes it possible to improve the quality of external audit through digital tools that make it possible to ensure the effectiveness of a better quality external audit. Indeed, [67] confirmed that the use of BI (Business Intelligence) tools saves more time, these tools allow external auditors to reduce the time allocated to carry out their external audit missions. Artificial intelligence tools even if their adoption by the company requires a very high financial investment, but they make it possible to minimize the duration of collaboration between the audited company and the external audit firm, which will have a positive impact on the independence of external auditors in general and the quality of external audit in particular. However, digital technologies provide necessary benefits to the field of external audit, adding value to external auditors by reducing the time spent on repetitive tasks and collecting data.

In addition, [74] in India, confirmed that the use of technology in auditing ensures effective, efficient, timely and timely auditing. In the context of an external audit mission, the speed provided by digital tools is important in order to present the results of the audits and audits of the financial statements as soon as possible and to ensure effective and high-quality external audits thereafter.

In the Moroccan context, [32] pointed out that, thanks to the use of digital tools by Moroccan external audit firms, they managed during the COVID-19 health crisis to ensure the continuity of their external audit missions, maintain the duration of collaboration with the audited company and guarantee a better quality of external audit. In fact, according to the results of this study, an alternation between in-person and distance is the predominant idea among external auditors. Based on all of these research studies, we believe there is a positive relationship between digital tools and the independence of external auditors.

Artificial Intelligence (AI) plays a transformative role in the auditing process by significantly enhancing efficiency, accuracy, and fraud risk management. Its ability to process and analyze vast volumes of data at high speed greatly reduces the time and effort required for auditing transactions [8]. AI algorithms are adept at identifying anomalies and unusual patterns in financial data that might be overlooked by human auditors, thereby increasing the accuracy of fraud detection and minimizing the likelihood of human error [58]. Furthermore, AI offers a more objective and consistent approach to analysis and has the capability to learn and adapt over time, enabling it to respond to emerging trends and evolving fraud tactics [57]. One of the most significant advantages of AI in auditing is its predictive capability. By leveraging historical data and advanced analytical models, AI can anticipate potential fraud risks before they occur, allowing organizations to implement preventive measures that protect both resources and reputation [13]. This predictive insight enables auditors and financial managers to prioritize high-risk areas, thereby increasing the overall effectiveness and strategic focus of audit activities [77].

Indeed, the integration of these digital tools transforms traditional audit methodologies by enabling more data-driven and proactive approaches. For instance, real-time data analytics and predictive modeling allow auditors to identify anomalies and risks before they materialize. Blockchain ensures the integrity and traceability of financial transactions, while AI enhances decision-making through automated reasoning and pattern recognition. As a result, audit firms can shift from a retrospective review model to a forward-looking, strategic function that aligns more closely with the expectations of stakeholders and the demands of a rapidly evolving business environment specially in the context of public sector in developing country like Morocco.

III. METHODOLOGY

1. *QUALITATIVE APPROACH*

Our research approach is qualitative and interpretive in order to understand the phenomenon we are studying, which is digitization in depth by interviewing stakeholders. The analysis of the data follows a thematic approach by identifying the themes resulting from the interviews and analyzing them in order to have a thorough and nuanced reading of the impact of this digitalization on the quality of the external audit.

2. *DATA COLLECTION AND ANALYSIS PROCESS*

The study was exploratory and qualitative in order to have a detailed vision of the subject. The data were analyzed using the NVIVO 15 software, which allows the qualitative data to be coded in a structured and rigorous manner and to generate suitable themes. It also allows for detailed reporting and easy visualization of data, which facilitates analysis and interpretation by comparing empirical results with literature.

The sample consists of 12 interviewees who are external auditors, researchers and experts in the field of audit and finance. This sample size is very representative because it concerns all the people who have direct relations with external auditing in the context of Moroccan public institutions. There is a certain equality between the number of women and men in our sample and the majority of our respondents have more than 2 years of experience. These semi-structured interviews were developed using an interview guide that included a set of questions related to our research theme. Indeed, we used smartphones to record audio from our respondents in a transparent manner in order to receive reliable and valid responses capable of studying the interactions between these research variables.

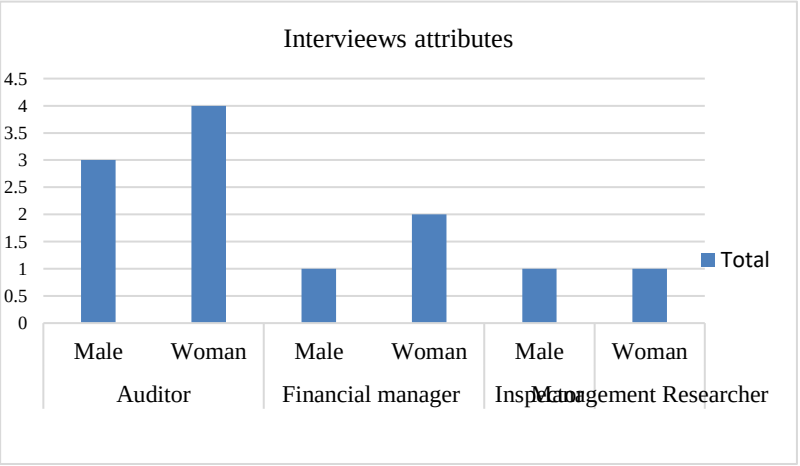

FIGURE 1. Interviewee attributes.

The characteristics of this sample are summarized as given in Table 1.

Table 1. Sample characteristics.

Participant ID	Genre	Profile	Experience
I1	Woman	Financial manager	2 years
I2	Male	Auditor	3 years
I3	Male	Inspector	3 years

I4	Woman	Financial manager	2 years
I5	Woman	Auditor	2 years
I6	Woman	Auditor	1 year
I7	Woman	Management Researcher	2 years
I8	Woman	Auditor	5 years
I9	Male	Auditor	1 year
I10	Male	Auditor	4 years
I11	Male	Financial Manager	3 years
I12	Woman	Auditor	3 years

3. DATA CLEANING

After collecting data from our respondents in the form of recorded audios based on the interview guide, we transformed the recorded audios into texts manually. This method took us a lot of time and effort, but it was successfully completed. Afterwards, we used the NVIVO version 15 software, a software highly recommended by management science researchers in qualitative studies. This software allowed us to extract the keywords most cited by our respondents according to the Figure 2:

FIGURE 2. Word frequencies.

The cloud shows that term “tools” is most frequently mentioned during interviews with a frequency of 4.39% followed by the word’s “audit” with 1.94% and “data” with 1.78%. This shows the importance of these three terms, which are precisely related to our research topic

IV. RESULTS

The hierarchy of themes identifies 5 main themes that emerge from the analysis of the interviews. The detailed analysis of the sub-themes will allow us to answer our research question. They are as follows:

FIGURE 3. Hierarchy of themes.

FIGURE 4. Hierarchical diagram of the impact of technology on external audit quality.

The impact of technological tools on audit quality is mainly felt over the mission time, which becomes reduced without losing effectiveness. These tools enable deeper analysis of data with greater completeness, something that humans cannot do alone. This acceleration is felt in particular during the audit testing phase and during data analysis.

"Digitalization is a natural evolution of things. By allowing a faster and more comprehensive analysis of the data, we can focus on more analytical tasks" Interviewed I11

"There are heavy tasks to be done and low added value, but they are still necessary for the auditor. This automation will save time and focus on higher value added tasks. It will save time and be faster and more efficient." Interviewed I8

This increases efficiency and reduces the time needed to complete the audit by automating tasks and using robust algorithms to exploit data in depth at record times.

"Better data collection and analysis, including AI and data analytics" Interviewed I5

This enables the auditor to resolve anomalies more quickly and efficiently, allowing the auditor to propose improvements before they spread and compromise the entire system. This responsiveness increases risk resilience and ensures the smooth running of the audit engagement.

"Also, the role of digitalization in anomaly detection cannot be overlooked, for example, there are artificial intelligence algorithms that help to identify irregularities perfectly." Interviewed I6

"Detecting errors is also a great advantage because software allows you to do meticulous work and find anomalies that you may have overstepped." Interviewed I11

FIGURE 5. hierarchical diagram of the technology use risks theme.

Cyber security risk emerged in almost all responses, making it a top concern that needs to be given high priority. By entrusting the auditor with access to his confidential data, the client must be assured that it will be protected against theft or dissemination to competitors or ill-intentioned persons.

"The main risk associated with audit digitization is data security, especially since this profession imposes a strict obligation of confidentiality" Interviewed I12

"Of course, when you talk about using technology, you talk about the cybersecurity risk, primarily the malicious intrusion risk, the information tampering risk: that someone is using personal data for an inappropriate purpose. It is also the risk of data loss, of being hacked, of losing test results or of disclosing the audited customer's confidential data." Interviewed I8

"Certainly, digitalization can have bad and negative effects on auditing. Cybersecurity risk can be present, sensitive data can be exploited and exposed to external attacks, so it is essential and paramount to anticipate and implement strong security protocols" Interviewed I6

Algorithmic bias has also been cited as a major drawback in the use of these technologies. By offering a misinterpretation of the data, decision-making becomes highly impacted and can mislead the auditor.

"[...] Misinterpretation of results if models are not well calibrated [...]" Interviewed I5

This problem of bias is all the more important when the auditor becomes fully dependent on technology in the analysis and interpretation of his results.

"Sometimes, if we speed up the process, we can make several mistakes, and this is due to the absence of thinking and cognitive design in human memory, where the human being will be lazy and rely heavily on these tools." Interviewed I1

A failure in the IT system would then block all work and could even result in the loss of all data if it was not properly backed up.

"[...] We can also talk about the risk of a technical failure that could block any activity. [...]" Interviewed I6

Digitalization also poses a threat to the human side of the audit profession, which will become dependent on algorithms in decision-making and will limit itself to analyzing the figures with a complete absence of the context and subtleties of the profession.

"It also results in the loss of human contact because digitalization reduces direct interaction, so it is very important to maintain a balance between the use of technological tools and exchanges with human beings." Interviewed I6

"For the evolution of the profession, it must be led by human beings because there is the analysis part, contact with the client, the analytical journals, a certain number of things that must be led by a human being" Interviewed I8

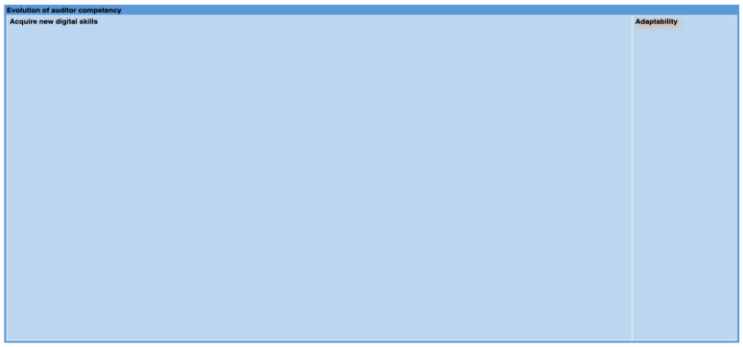

FIGURE 6. Hierarchical diagram of the Evolution of auditor competencies theme.

The majority of the interviewees agreed that the auditor's skills will be impacted by digital technology by acquiring new skills. This adaptation of the auditor to this revolution is crucial for him to be able to use the tools at his disposal and derive the best benefit from them.

"New technologies are changing the profile of the external auditor by requiring more IT skills. Above all, knowledge of the new digital tools developed. Auditors must be able to use technology effectively and interpret the results" Interviewed I9

"With the emergence of new technologies, auditors are being forced to improve their learning skills and cognitive abilities in relation to digital tools. When an auditor is proficient in these technologies, he or she has a considerable competitive advantage, enabling him or her to perform his or her duties effectively and accurately." Interviewed I12

"Yes, you have to have IT skills, and you also have to be aware of the risks that this is going to create. The core of the business will not change, these tools will only help in optimization. The mission itself will not change, the auditor will be able to gain in efficiency and speed. He must be aware of the risks and respect the measures put in place to guard against these risks." Interviewed I8

Digitalization will also require the auditor to be more adaptable in order to be able to take ownership of the new tools on a continuous basis so as to keep pace with their evolution and fully exploit their potential. The adaptation also allows the audited entities to be in line with their technologies and not to be out of step with their information systems and methods.

"Auditors will have to be able to adapt their skills and methods to meet the challenges and opportunities offered by new technologies and, above all, to remain independent of the entity for which they work." Interviewed I3

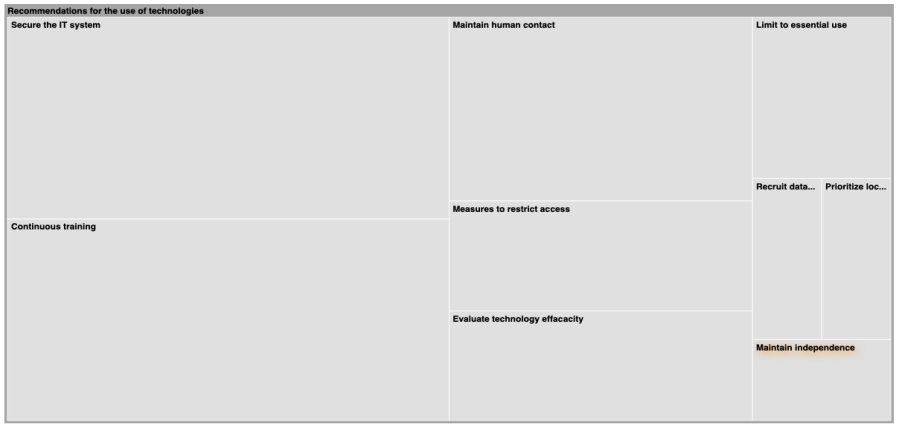

FIGURE 7. Outline of the recommendations for technology use theme.

The security of the computer system comes as the main concern, which demonstrates the importance of protecting against cybersecurity and data theft risks. Having quality data is not enough, it must be exploited in a secure environment free from any malicious intrusion.

"Controls are needed to lock processes internally and externally and to enhance IS security to prevent malicious attacks and restrict access to questionable sites" Interviewed I8

"Building robust data security systems." Interviewed I12

Restrictive access measures are also one of the solutions to protect against the risk of theft and to secure data. By limiting the use of applications and databases that contain sensitive information, the auditor knows who has access to which tool, and can trace leads and define responsibilities.

"To manage these risks, we need to put locks in place: a defined framework and a charter to ensure that there is no deviation and no abuse, a framework that shows what needs to be done and not done. It is also necessary that the teams in charge of these technologies put in place locks to avoid any intrusion" Interviewed I8

Continuous education is also one of the main recommendations to ensure a proper digitalization of the profession. This includes training on how to use technology, understanding the principles behind these new tools and how they work.

"Train auditors in digital tools, and educate teams on the potential limitations and biases of algorithms to avoid blind reliance on AI results." Interviewed I12

"Continue to develop the digital skills of external auditors through continuous training" Interviewed I9

As not all tools are effective in every situation, the effectiveness of these tools must be regularly assessed and solutions adjusted to the needs of the auditor by adopting new tools and abandoning those which have not proved their usefulness.

"And also regularly assess the use of technology to see if it meets the need and provides real added value." Interviewed I6

In this context, it is crucial to recruit data experts who can regularly propose adjustments in line with market developments and evaluate the performance of the tools used in a technical and meticulous manner.

"Strengthen audit teams with data analytics experts to fully exploit insights from digital tools." Interviewed I12

Also, we must not forget the human aspect of the job of auditor, so maintaining this human contact is essential to foster cooperation and build a climate of trust with the client, this side cannot be replicated by a machine or a computer program.

"It is also necessary to maintain this human contact, which allows us to understand subtleties that the figures cannot communicate." Interviewed I12

FIGURE 8. Hierarchical diagram of the theme transformation of the profession and its future.

We note that the use of artificial intelligence is no longer confined to the field of computer science but also extends to the audit profession. AI is a powerful tool that, in conjunction with other technologies such as blockchain, can harness all available data and extract the maximum amount of information from it.

"The business will certainly evolve towards greater dematerialization of data and greater automation of repetitive tasks. Technologies such as blockchain and AI will revolutionize the business by enabling immutability of transactions and the evolution towards continuous auditing." Interviewed I11

"I think the audit profession will expand into new areas, for example with the integration of AI. The audit team will need to include specialists in artificial intelligence and cyber security to face the new challenges." Interviewed I12

By moving towards increased dematerialization and the integration of new technologies, the auditor will be able to take advantage of the data flow visualization capabilities, thereby facilitating decision-making.

"The external auditor's business continues to evolve through digitalization. This makes it more visual and makes it easier to propose improvement recommendations." Interviewed I2

The auditor will not only be a specialist of figures, but will also have an obligation to use the technological means in order to use them in the context of his mission

"Auditors will have to be versatile and combine financial management expertise with the mastery of technology tools." Interviewed I6

Continuous contact with the audited entity will allow the auditor to perform regular testing and real-time risk assessment, which will not only detect anomalies well in advance of the preparation of the financial statements, but also proactively resolve them.

"Evolution towards a more real-time audit, with continuous controls" Interviewed I5

V. DISCUSSION

The results of our study show an undeniable relationship between digitalization and the quality of external audit, which shows the importance of this transformation in the audit process. It is particularly noted that this digitalization impacts the auditor's profile in terms of competence and capabilities. These technological tools require a mastery of specialized know-how in order to use them in the best conditions and to enable the value of the data in the hands of the auditor. This mastery is also crucial in order to avoid methodological flaws that can result in a misinterpretation of the results. Technological proficiency also provides best practices in tool handling to avoid the risk of intrusions and unwanted leakage of information to unauthorized entities, which requires appropriate training. In addition, the presence of data specialists with advanced computer skills makes it possible to identify cybersecurity risks, but also to understand in detail the mechanisms with which software and tools work. Digitalization also improves mission speed and efficiency with tools such as artificial intelligence that can analyze a large data stream and detect anomalies. These results are supported by literature such as [30] which shows the importance of auditor training, as well as [7,41,69] which highlight the benefits of digitalization in terms of task automation and value proposition.

Nevertheless, there are risks involved in using these tools, mainly the risk of cybersecurity and data leakage. It is also important that the auditing profession does not lose its human aspect, which is a significant part of the specificity of the profession. Human interaction through communication and knowledge of the auditee makes it possible to understand subtle aspects that are difficult to communicate through figures such as the social climate, culture, interactions with stakeholders. The latter are a significant aspect and may affect the risks to which the entity is subject.

These results provide practitioners and researchers with a qualitative view of the relationship between digital and the audit profession, enabling them to take advantage of the analyzes and results in order to avoid the disadvantages highlighted by our study and to adopt its recommendations.

With the help of new technologies, the audit mission is performed with more accuracy, avoiding any missing information. The interviewees agree that technology helps identify patterns hinting at possible fraudulent behavior or anomalies that the auditors would hardly detect by leveraging the capacities and machine learning. [2]. The improvement of audit efficiency is also a major advantage that helps the audit firms

to optimize their cost with the help of tools like machine learning that analyzes data quickly, reducing time and human resources allocated to the mission [10].

While internal auditing is the primary mechanism for fraud detection, external audit serves a complementary and essential role. It assesses the effectiveness of internal controls implemented within public entities, identifies weaknesses, suggests improvements, and ensures compliance with laws and regulations. External auditing thus plays both a preventive and corrective role in reducing fraud in the public sector. It enhances transparency, reinforces accountability among public managers, and helps restore trust in the management of public funds. Although external audits cannot completely eliminate fraud, they significantly contribute to minimizing it and detecting it more quickly. Moreover, the mere awareness that an external audit may occur often acts as a deterrent against fraudulent behavior [49].

The integration of digital competence becomes crucial, any lack of it would lead to an incorrect and incomplete judgment of the audit mission, conclusion in agreement with [72] . New technologies also make decision-making easier thanks to a simpler visualization of the large mass of data generated by big data, [39] ensures that the visualization of the data makes it possible to select the most important one and improves the decision-making process by avoiding unnecessary information. Consistent with the literature, continuous audit is considered to be the natural evolution of the profession, ensuring a real-time provision of financial information to the auditor continuously and without error or omission, this automation improving the performance of the audit by adopting a proactive and automatic approach [19]. It is therefore important to recruit auditors who are familiar with these new tools, particularly artificial intelligence, in order to identify their advantages and limits [5].

To effectively contribute to value creation, the digitalization of external audit quality must be underpinned by advanced technologies such as Big Data, Artificial Intelligence, Blockchain, and Business Intelligence. These mechanisms empower audit firms to improve risk management, reinforce the accountability of external auditors, detect and prevent fraud, and generate added value. Moreover, they support an independent, real-time, and continuous evaluation of audit practices, thereby enhancing the overall reliability and transparency of the audit process [48].

In summary, the study shows the double-edged nature of the relationship between digitalization and audit quality, with technology playing a crucial role through all the phases of the audit mission, from the familiarization with the audited firms to the audit report, via mechanisms like automated testing and artificial intelligence that increase the speed and efficiency of data analysis.

VI. CONCLUSIONS

This paper examines the intersection between digitalization and the quality of external audit, highlighting the transformative role that digital technologies can play in the field of audit. The quality of external audit is traditionally defined by the competence, objectivity and ability of the auditor to provide accurate and credible financial information. Thanks to rapid advances in generative AI, which refers to AI systems that can create new content from existing data models, the external audit landscape is poised for considerable change.

Based on the theory of technological expectancy, this study examined how digitalization can help improve the quality of external audit by increasing the efficiency, reliability and rigor of audit processes. AI techniques can automate routine tasks, detect anomalies and provide predictive information, allowing auditors to focus more on the most complex and decision-making tasks. This strengthens the overall skills of external auditors, as technological tools make them better able to carry out analyzes and make more relevant decisions.

AI not only strengthens the technical skills of auditors, but also directs the range of skills required to analyze data, manage AI tools, and process the output data generated from them. This requires continuous training and adaptation of audit professionals in order to effectively exploit AI technologies. This study has practical implications for the main stakeholders:

For auditors and audit firms: It points to the need to acquire new skills related to the field of IT and data analysis; it also shows the need to make the audit team more heterogeneous by mixing members from different fields like finance and informatics, and it also shows the necessity to not rely too much on technology and to preserve the human contact with clients to deepen the understanding of their needs.

For policymakers and public institutions: the integration of ICT courses in the curricula of finance students is crucial to better equip them for the challenges and evolution of the audit sector. There is also a need to adopt laws for managing data security threats and unethical use of AI and other emerging technology. There is also a need for high investment in technology in the public institutions.

In conclusion, while digitalization offers significant opportunities to improve the quality of external audit, it also raises challenges related to auditor training, ethical aspects and protecting the integrity of AI-based audit processes. The auditing profession will have to adapt to these technological advances while developing strong frameworks and guidelines that guarantee the quality of audit and maintain public confidence in the audit process. In this way, technology can become a powerful ally in enhancing the reliability and effectiveness of external audits, and ultimately help improve the governance and transparency of financial reporting.

1. *LIMITATIONS OF THE RESEARCH*

This qualitative research, focused on the impact of digitalization on the quality of external audit in the public sector, presents certain limitations that should be acknowledged. On one hand, the use of qualitative methods such as semi-structured interviews or case studies allows for an in-depth understanding of perceptions and practices but limits the statistical scope and representativeness of the findings. Indeed, the conclusions drawn are based on specific contexts and particular experiences, making it difficult to generalize the results to other sectors. On the other hand, the public sector has unique characteristics—such as regulatory frameworks, budget constraints, and public service objectives—that differ significantly from those in the private sector or other fields like healthcare, industry, or finance. Therefore, the observed effects of digitalization on the quality of external audit in this specific context cannot be automatically extrapolated to other organizational settings. These limitations highlight the need to complement this study with comparative or quantitative research across varied environments to strengthen the scope and external validity of the results.

2. *RESEARCH RECOMMENDATIONS*

Public sector auditors can successfully integrate digital tools into their work by first identifying the areas of the audit process that would benefit most from technology, such as data analysis or fraud detection. It is essential to select user-friendly tools that are compatible with existing systems and to provide adequate training so auditors feel confident using them. Automating routine tasks and leveraging data analytics can enhance efficiency and accuracy. Auditors should collaborate closely with IT teams to ensure data security and effectively address any technical challenges. Beginning with small pilot projects allows for testing and refining tools before full implementation. Finally, regularly evaluating the impact of these technologies on audit quality ensures continuous improvement and effective adoption.

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Author Contributions

Nacer Mahouat: Conceptualization, literature analysis, theoretical analysis, writing, data investigation, data organization. Anas Azenzoul: Conceptualization, literature analysis, theoretical analysis, writing, data investigation, data organization, data analysis. Majda Chaiboub: Conceptualization, literature analysis, theoretical analysis, editing, Data Investigation Loubna Daoudi: Conceptualization, literature analysis, theoretical analysis, data investigation, editing. Hafsa Lemsieh: Conceptualization, literature analysis, theoretical analysis, editing. Ahmed Aftiss: Conceptualization, literature analysis, theoretical analysis, editing. Khalil Mokhlis: Conceptualization, literature analysis, theoretical analysis, validation, review.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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Appendix A

Interview guide: Exploratory study on the role of digitalization in improving the quality of external audit in public institutions: Evidence from Morocco

Objective: As part of our research study, we are conducting a qualitative study on " Exploratory study on the role of digitalization in improving the external audit quality in public institutions: Evidence from Morocco". This guide aims to assess the contribution of new technologies and digitalization to the quality of external audit. More specifically, it aims to assess how technologies such as artificial intelligence, big data and blockchain improve independence and competence, which are both used to measure the quality of external audit.

Introduce yourself (name, position, experience, industry)

What technology tools do you use to conduct your audit? Please specify the tools used at each step of the process?

How much do you think digitalization impacts the quality of external auditing (speed, efficiency, anomalies detected, task automation)?

In your opinion, what are the risks associated with the use of technological tools in the audit (bias, cybersecurity, human contact, etc.)? How can these risks be managed as part of the external audit engagement?

To what extent do these new technologies change the profile of the external auditor (training, experience, knowledge)? Do you need IT skills to use them effectively?

How do you see the evolution of the business and these new technologies in the next 10 years?

What are your recommendations for making the best use of these tools in external audit missions?