

The Integration of Artificial Intelligence in Financial Auditing to Optimize Efficiency, Risk Management, and Transparency

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Abstract: The financial audit landscape is changing rapidly, driven by globalization, technological innovation, and the growth of financial data. Traditional auditing methods are struggling to keep pace with this growing complexity, driving the need for a more efficient and accurate approach. Artificial intelligence (AI) plays a crucial role in addressing these challenges. This analysis explores the varied impact of AI on financial auditing, highlighting trends, challenges, and opportunities. By examining academic studies, empirical research and real-life cases, this article reveals significant transformations brought about by AI in financial auditing. Its integration does not simply replace human expertise but offers synergistic collaboration. AI enables auditors to extract deep insights from financial data, highlighting risks and promoting transparency in organizations. As the financial world moves towards digitalization, the partnership between human auditors and AI promises to profoundly reshape the future of financial auditing.

Keywords: artificial intelligence, financial auditing, financial data analysis, audit risk, data management, financial regulation

Introduction

The major turning point came in the 2000s with the advent of Big Data and increased computing power. The availability of vast data sets and the rise of deep learning, with architectures such as convolutional and recurrent networks, propelled AI to unprecedented levels of performance. Tasks once considered impossible for machines, such as machine translation or facial recognition, have become everyday realities.

New technologies such as artificial intelligence (AI), data analysis, robotics and the Internet of Things (IoT) are transforming the world. These technologies offer considerable potential to improve our lives in many ways. Despite its meteoric progress, AI raises important ethical and social issues. Algorithmic biases, job loss due to automation, and intrusive surveillance are among the challenges to building responsible and transparent AI that aligns with human values (Krishnan et al. 2019).

Throughout its history, the auditing profession has seen many changes in the way financial statements are audited. In recent years, the change has been the result of various environmental factors where the company operates and where the audit is performed. Financial auditing is an essential practice in the business world, aimed at ensuring the transparency and reliability of corporate financial information. With the advent of the digital age, new technologies, including artificial intelligence (AI), offer unprecedented opportunities to revolutionise traditional auditing practices (Chen et al. 2021).

Artificial intelligence (AI) and new technologies are transforming the finance and audit industry. These technologies offer considerable potential to improve the efficiency, accuracy and risk assessment of finance and financial auditing. (Li et al. 2020).

Furthermore, the new technologies we have today enable us to capture and communicate data digitally and instantaneously, on an unprecedented scale. The result of this technological evolution is a growing interest in data, whether structured or unstructured, internally generated or not. In response to these developments, companies are changing their business models in innovative ways, as they now have information systems that are

increasingly capable of processing, analysing, communicating and responding to data-related changes. As a result, theway in which audits are conducted must also evolve.

Objective and issues: Today, there are many new technologies and techniques that are changing the way audits are carried out. This thesis analyses some of these technologies, in particular artificial intelligence. Audit firms are currently incorporating these methods into their day-to-day audit procedures as the environment in which they operate is characterised by an ever-increasing amount of available data.

As part of this pile of information, artificial intelligence pushes auditors beyond their comfort zone of traditional auditing methods. This challenge has given rise to the subject of this dissertation. The aim of this work is to investigate the multi-faceted impact of AI on financial auditing, exploring the trends, risks and opportunities it presents.

By examining a wide range of academic work, empirical studies and concrete examples, this dissertation aims to present a synthesis of the potential impact of artificial intelligence on the evolution of the field of auditing. To this end, we will basically try to answer the following problematic question: How can artificial intelligence be used to improve audit efficiency and mitigate risk?

This research question will be addressed by examining the literature on how new technologies are shaping the audit profession today. This theoretical research will enable us to draw conclusions about the various changes that these technologies imply. In addition, the issue will be addressed from a practical point of view through qualitative research. In order to feed this qualitative research, interviews will be conducted with the audit and consultancy firm X to examine the way in which they integrate new technologies into their audit approach and to see how they manage the changes that this implies.

Context of the research: There are several advantages to choosing this issue and conducting this study in Morocco. Over the next few years, Morocco should see an acceleration in the deployment of artificial intelligence in several sectors.

"Based on a process of imitating human intelligence, which is based on the creation and application of algorithms, artificial intelligence has a promising future and represents an enormous opportunity for the country". According to MAP (Moroccan press agency), speaking at the opening of the national symposium on "the use and development of responsible artificial intelligence in Morocco", organized in collaboration with the United Nations Educational, Scientific and Cultural Organisation (UNESCO), Ms Mezzour noted the need to set up a system dedicated to artificial intelligence as a lever for innovation and economic growth in the Kingdom, noting that this would generate new services, jobs and skills. The theme of our study is a personal and well-considered choice, as it fits in with the theoretical knowledge of auditing that I received at ESCA EM. I am also passionate about new technologies, which will help me fulfil my desire to do a study on artificial intelligence and auditing.

The theoretical part, consisting mainly of two chapters, will firstly introduce AI technologies in financial auditing and secondly the potential of AI in financial auditing, while presenting the tools of data analytics and the challenges it presents, as well as the advantages, areas and levelof maturity of integrating analytics into financial auditing.

In the first chapter, we will present the survey and propose an AI integration system. In the last chapter, we will discuss the implications of the use of AI for financial auditing and propose solutions and recommendations for a responsible use of AI.

Literature review

Artificial intelligence (AI) is revolutionising financial auditing by automating tedious tasks, analysing massive volumes of data to identify risks and anomalies, and providing continuous monitoring for proactive fraud detection. This literature review aims to explore the different perspectives and approaches proposed in the literature concerning AI in financial auditing,

drawing from scientific articles by renowned authors and reports from major audit firms. The detailed exploration of these works is as follows:

The impact of AI on the audit of financial statements has been comprehensively explored, showing potential applications that enhance efficiency and effectiveness. Chen and Leung (2020) discuss the benefits and challenges associated with AI adoption in auditing, highlighting how advanced data analytics and automation can streamline audit processes. Similarly, Mladenovic and Milosevic (2019) emphasize the improvements in efficiency and accuracy brought by AI, while also addressing the ethical challenges that must be managed to fully realize AI's benefits.

The need for a balanced approach in leveraging AI in auditing is crucial. Agogué, Ferraris, and Peerbux (2019) argue for the integration of technical, ethical, and educational considerations to harness AI's full potential. Their holistic view underscores the importance of addressing both the advantages and challenges of AI transformation in auditing. This perspective aligns with Zhang (2019), who provides a comprehensive analysis of AI's ability to improve audit efficiency and accuracy while noting the associated cost, skills, and ethical challenges.

Overcoming barriers to technology adoption and auditor training is essential for maximizing AI's benefits. Ramamoorthy and Srinivasan highlight the transformative potential of AI in auditing, emphasizing the need to address issues related to technology adoption and ethical considerations. In line with this, Kotsiantis (2020) underscores the importance of overcoming challenges related to data quality, ethics, and regulation, as well as enhancing the skills of audit professionals to fully exploit AI's capabilities.

A strategic approach to integrating AI into business operations can yield significant benefits. Davenport and Ronanki (2018) highlight AI's potential to transform business operations by improving efficiency, reducing costs, and increasing customer engagement. They suggest that businesses must adopt a strategic approach, invest in necessary skills, and manage ethical and data quality challenges to fully realize these benefits. This strategic perspective is echoed by Beattie, Goodacre, and Thomson (2019), who discuss how AI can transform audit reporting by improving efficiency, reliability, and speed.

AI's positive impact on audit quality and its associated challenges are evident. Kwon and Song (2019) demonstrate that AI enhances audit quality by improving accuracy, efficiency, and coverage. However, they also note the importance of addressing challenges related to data quality, auditor training, and ethical and regulatory issues. This is further supported by Lee and Park (2021), who examine the integration of AI and big data into audit processes, showing a significant impact on accuracy, reliability, and quality of audit judgments.

By reviewing these works, we gain a comprehensive understanding of how AI is reshaping the field of financial auditing. While AI offers numerous benefits such as improved efficiency, accuracy, and cost reduction, it also presents several challenges that need to be addressed to fully harness its potential. A strategic, balanced, and ethical approach is essential to maximize the benefits of AI in financial auditing while mitigating the associated risks.

Methodology

This section explains the method we have chosen to use in order to make a proposal for the integration of artificial intelligence to improve audit efficiency and mitigate risk. This is a qualitative analysis based on interviews. The advantages of this method are "the depth of the analysis gathered" and "the flexibility and low directivity of the system, which allows the interviewees' accounts and interpretations to be gathered while respecting their own frames of reference: their language and their mental categories" (Raymond Quivy and Luc Van Campenhoudt, 1988).

More specifically, we are going to use semi-directive interviews, leaving each interviewee a certain amount of freedom to "speak openly, in the words they wish and in the

order that suits them" (Raymond Quivy and Luc Van Campenhoudt, 1988). We thus created a questionnaire, identical for all the people we interviewed, which served as a 'guide' and enabled us to direct the interviewees towards the objectives of our research work, when they strayed from them.

To carry out this work and find out how artificial intelligence can be integrated into the firm and the tools that are being developed for the financial audit profession, we first of all did a lot of research on the internet and in books to find as many articles on the subject as possible. We realised that there were several scenarios set out for the future of this profession. Furthermore, we decided to interview staff at audit firm X to see in concrete terms how they reacted to this technology. We found it very interesting to see whether the people interviewed were already familiar with the concepts of AI, whether they were already using it in their processes, or whether they had plans to integrate this new technology.

Our research is based on a qualitative approach using an interview guide based on semidirective interviews. Our interview guide consists of questions addressed to 10 employees in the financial services, industry and digital business units of audit firm X. For each interview, we used a guide made on Google Forms. The respondent targeted junior auditors, senior auditors, managers and partners. This study was carried out over 6 months. In terms of analyzing the results, we carried out a content analysis. We will then analyze the responses in order to make a proposal for the integration of artificial intelligence into the practice and make recommendations.

Results

Knowledge and perceptions of AI

In this section, we present questions 1 to 5. The third question we asked our interviewees was: Have you ever been involved in using AI tools for auditing?

• 50% of our respondents answered YES.

The fourth question concerned the level of knowledge about AI. Most of the people we spoke to had only a basic knowledge of artificial intelligence and defined AI as the automation of processes.

Perceived usefulness in the use of artificial intelligence

In this section, we observed that all the interviewees had similar answers to the five questions they were asked about completing tasks more quickly and improving work performance and efficiency. All the interviewees strongly agreed that the use of artificial intelligence in their daily work will contribute to the efficiency of the tasks entrusted to them.

Perceived ease of use

In this section, we will look at the ease of using AI in the financial audit process. In the first three of the five questions we asked our interviewees about their knowledge of artificial intelligence, we obtained the following results:

- 80% of the people we talk to have some basic knowledge of artificial intelligence.
- 10% of interviewees confirmed that they had some intermediate knowledge and a further 10%had no knowledge at all.

We received the following answers to the following questions concerning the training of the people we spoke to:

- 70% of the listeners questioned said that it was very easy for them to use artificial intelligence.
- 20% of those interviewed replied that it is not as easy to be skilled in using artificialintelligence.
- Overall, 80% of those interviewed found it easy to obtain and interact with megadatainformation.

Needs and expectations

In this section, we will explore the specific needs and expectations in terms of functionality. We received the following responses:

- 80% of respondents would like to integrate AI into the automation of data collection.
- 90% of interviewees believe that AI can automate routine and repetitive tasks such as verifying transactions, comparing financial statements and validating data. This allows auditors to focus on higher value-added tasks, such as analyzing and interpreting data.

Obstacles and concerns

In this section we aim to identify potential concerns regarding the adoption of AI in the practice and also understand the concerns related to security and data management. Most of the people we spoke to had concerns about the integration of AI, particularly the problems of data confidentiality and security. AI requires access to large quantities of sensitive and confidential data. Protecting this data against cyber-attacks and leaks is crucial. In addition, the most cited obstacle is investing in robust security infrastructures and complying with strict data protection regulations.

The potential impact of AI on the audit profession

The aim of this section is to understand the transformations and developments that artificial intelligence can bring to this field, in particular, how AI can reduce human error and improve the accuracy of financial audits by analyzing large quantities of data with a high degree of accuracy.

• 90% of interviewees believe that the potential of artificial intelligence (AI) on the audit profession is considerable, and opinions vary among audit professionals, here are some identified impacts: Improved efficiency, advanced detection of fraud and anomalies, improvedaccuracy and reliability.

Training and skills

The purpose of this section is to define future actions and the steps to be taken to move forward with the AI integration project. Since our study focuses on artificial intelligence in financial auditing, it is useful to remember that artificial intelligence is a branch of computer science whose aim is to create systems integrating a large amount of knowledge and processing, known as intelligent systems. Our interview revealed that, within the firm, most of the people we talk to have a basic knowledge of AI, which reflects the fact that employees can easily use AI technologies and that employees are ready to integrate AI into the financial audit process.

In addition, interviewees expect AI to automate tedious and repetitive tasks, freeing up auditors' time to focus on deeper, higher-risk analyses, as well as process large volumes of data faster and with greater accuracy, improving overall audit quality. Finally, the interviewees believe that AI can help auditors assess risks at entity and line item level by analyzing historical data, industry trends and other relevant factors. This would allow audits to target the areas of highest risk and resources to be allocated more efficiently. Predictive algorithms can be used to identify entities and transactions with a high audit risk, allowing auditors to plan their work more effectively.

After analyzing our results, we will propose a process for integrating AI into firm X. This initiative aims to make financial audit engagements more efficient and mitigate the associated risks.

Stage 1: Foundational layers needed to integrate AI

In this first stage, we are going to set up an RPA (Robotic Process Automation), which is a technology based on the programming of software robots to perform various tasks, often repetitive and with little added value. These tasks are then automated using different modes (RPA Attended, Unattended or Cognitive) to save time in carrying out operations and increase productivity. An

RPA project can be deployed very quickly, partly because of its intrinsic qualities, but mainly because of its agile mode. Agile mode is a collaborative approach that puts the customer at the centre of the project. RPA is implemented on three levels:

Firstly, intelligent process solutions (IPS) enable auditors to be more effective and efficient, while improving the quality of their audits. Creating a roadmap: this enables the audit objectives to be clearly defined, along with the stages to be followed and the resources required. For example, developing a work plan and drawing up a timetable will provide an overall vision of what is being sought. The IPS will also enable the listing of due diligence procedures, i.e., all in-depth investigations and analyses carried out by a team of experts in the context of a financial operation, such as a merger or acquisition, a company sale, a fundraising, or an IPO.

Secondly, smart layer solutions integrate with existing systems and processes to provide a holistic view of financial data. Smart layer solutions utilize advanced analytics to identify patterns and anomalies in financial data, enabling auditors to focus on areas of increased risk of fraud or error. These solutions also enable auditors to focus on the most significant risks and anomalies, such as API plugins + robotization, data quality, data source detection, redundancyelimination and task automation.

Finally, to conclude the implementation of an RPA, here is the application and use phase. Here are a few concrete examples of applications and uses of RPA in financial auditing: managementrules + intelligent learning, interactive reporting.

Stage 2: Audit Application Proposal

In the second part, we will outline the audit applications.

• Reconstitution of the data using the formulas:

The greatest difficulty encountered by a 1^{er} exercise lies in understanding the files sent by customers. These contain no information about the source of the data (no VB/Python code or formulas inserted).

• Confirmation process by the auditors

AI processes the files, with cross-checks based on the history + database + thousands of iterative test sets. The tools must then give the auditors the power to confirm the information and correctit.

• Information storage with impact on management rules

It must be possible to apply an iteration of the management rules with validation by the auditor. It must be possible to store previous management rules for any case-by-case management.

• Detection of anomalies with % efficiency

Analysis of the information by robot and comparison with the results of the Forvis Mazars + API auditors.

• Return of differences with explanatory effect

Feedback to follow up on the auditor's analyses. Quantitative explanation (at the auditor's expense).

Reporting

Reporting will include: Dashboard benchmark reflecting trends in bookbuilding, Pnl, and the number of deals. It will also include result restitution, historical trends + projections based on estimates.

Stage 3: Essential technical requirements – Upstream and downstream of integration

Prerequisites

As a prerequisite, a database (data lake) must be created to include all the information received from customers as part of the CAC exercises. The data must then be standardized, organized using management rules, and automated. Finally, a workflow should be created.

Tools

The most recommended tools are: Power BI, Power Query, K-means algorithm, pricers, authorization management, and Python API.

Discussion

This section provides a brief reminder of the research question and the objectives of the study. As stated in the introduction, the research question was: *How can artificial intelligence be used to improve audit efficiency and mitigate risk?* The primary objective was to demonstrate how AI could have improved the audit profession by making audit assignments more efficient and reducing human error. To carry out our study, I joined audit firm X for a 6-month placement in the financial audit position, which enabled me to gain a better understanding of the various stages in the audit process, from planning and risk analysis to drafting the final audit report. I also became familiar with the internal workings of the firm, including its culture, values, and working methods, and I gained insight into the challenges faced by its clients across various business sectors, in particular in the financial services business unit. On the strength of this wealth of experience and the expertise I acquired, I was in a position, with the support of my colleagues, to propose a system tailored to the specific needs of firm X.

AI has the potential to transform financial auditing by making it more efficient, accurate and risk-based. However, it is important to consider the significant limitations of AI before it is widely integrated into audit practice.

The limitations of our study lie in the small sample we interviewed during our survey. Another limitation is the technical difficulty of setting up the AI integration system.

Despite its promise, AI also has limitations that should not be underestimated. AI cannot replace the judgment and expertise of a human auditor. It can identify potential problems, but it cannot understand the nuances of a company and its environment. Moreover, the quality of AI results depends heavily on the quality of the data it is trained on. Biased or incomplete data can lead to erroneous conclusions. Finally, the use of AI raises important ethical issues, such as the transparency, accountability and bias of algorithms.

Audit firms need to be aware of the limitations of AI and put adequate safeguards in place to mitigate the risks. Combining AI with the expertise and judgement of human auditors is essential to ensure high-quality audits that meet the needs of stakeholders.

Conclusion

Artificial intelligence is having a major impact on audit performance. Technological developments allow auditors to automate certain monotonous tasks, which speeds up the audit and reduces errors, but also raises issues concerning data protection information and the reliability of output data. Therefore, it is important to ensure a balance between the use of AI and respect for professionalism and ethical audit values.

Integrating AI into the audit process has many advantages. Machine learning algorithms can analyse large amounts of data in record time, enabling auditors to detect anomalies and irregularities more quickly. In addition, artificial intelligence can automate repetitive tasks such as collecting and analysing financial data, freeing up auditors' time to focus on more analytical and strategic tasks.

However, the integration of AI also raises concerns. Data confidentiality is a major issue, as the use of artificial intelligence often involves the collection and analysis of sensitive data. It is therefore crucial to put in place robust security measures to protect this information. In addition, the reliability of the results generated by artificial intelligence can be called into question. Auditors must ensure that the algorithms used are reliable and that the results obtained are accurate and relevant.

Ultimately, the integration of AI into the audit process presents both benefits and challenges. It is essential to strike a balance between using AI to improve audit efficiency and accuracy, while maintaining high standards of data confidentiality and reliability of results. Auditors need to be aware of the implications of using artificial intelligence and take appropriate steps to ensure aneffective and ethical audit process.

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