

The requirements for adoption Artificial Intelligence in External Auditing: A case study of PWC and Grant Thornton subsidiary companies in Algeria

متطلبات تبني الذكاء الاصطناعي في التدقيق الخارجي: دراسة حالة شركتي PWC و Grant Thornton فرع الجزائر

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Abstract:

Artificial intelligence is the process by which computer systems are developed and new programs are introduced that make them capable of performing tasks that require the use of human intelligence, such as translation, solving difficult problems, analyzing a huge amount of data, Decision-Making and others.

With the increasing size of companies and their complex processes, the auditor is faced with the challenge of lack of time and the need to provide quality reports. AI will revolutionize audits by automating procedures, enhancing quality, and efficiently Analyze large reliable and unreliable data sets to identify anomalies, improve risk assessment and prioritize tasks.

The study examines the adoption requirements of AI and obstacles faced by PWC and Grant Thornton audit companies in Algeria. In order to achieve this, we relied on the case study approach using the interview tool in the applied aspect, through which we came to explore the difficulties facing external auditors for the adoption of artificial intelligence in Algeria.

The study also called for highlighting the importance of adopting these modern technologies in external audit that contribute to saving time and reducing costs.

Key words: Artificial intelligence; External Audit; PWC and Grant Thornton.

Jel Classification Codes: O33; M42

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I- Introduction :

Artificial intelligence (AI) is a interdisciplinary field that focuses on creating smart machines capable of performing tasks typically requiring human intelligence. Advancements in machine learning and deep learning are causing a paradigm shift across various sectors .

This technology has developed rapidly, and it will become important for auditors to understand the capabilities of (artificial intelligence) and how it affects audit decision-making processes, and by utilizing artificial intelligence, auditors can obtain and absorb as much information as possible, and analyze a wider range of data formats. Moreover, they can perform lengthy tasks faster than ever before.

In a related context, the profession is facing a major challenge represented by the necessity of providing the tools that Enables it to deal with the modern technical environment, and the emergence of what is called digital review, especially those Technologies support the work of accountants and auditors in many ways, But it is logical that a question comes to mind about the impact of the use of artificial intelligence applications on the future of the accounting and auditing profession globally, and in the Algerian environment in particular and what are the new skills Which must be present among accounting and auditing professionals so that they can keep pace with the mechanisms Artificial intelligence.

The central issue this study addresses is encapsulated by the inquiry: What are the prerequisites for implementing artificial intelligence in external auditing: A case study of PWC and Grant -Thornton subsidiary companies in Algeria?

Under this main question fall sub-questions:

- What is External Audit?
- What does it mean Artificial intelligence?
- What are the applications of artificial intelligence in external audit?
- What is the future prospects and trends for External audit?
- what are the advantages and risks of using AI in auditing?

I.1. Importance of Research:

To know the significance of embracing artificial intelligence and to identify the requirements and the reasons behind Algeria's decision not to get artificial intelligence in the field of the research. Some solutions can also be proposed that help to adopt modern technologies in audit.

I.2. Research objectives:

- Explore the emergence and integration of AI technology.
- detail the challenges encountered in applying AI within the auditing contexts
- Identify the reasons why artificial intelligence technologies are not adopted in auditing field.

I.3. Research Methodology:

The study employed a qualitative case study approach, utilizing semi-structured interviews with auditors of PWC **and Grant Thornton** subsidiary companies in **Algeria**. To find out the reasons for the hesitant adoption of artificial AI in Algeria in the field of external auditing. And a descriptive Research: Using descriptive research methods to provide an indepth analysis of using new technology in audit.

II- Conceptual Foundation

II.1. Conceptual Foundation for using AI in External Auditing:

II.1.1. Understanding External Audit:

Is a series of procedures followed; in order to examine the lists and financial records of an organization by a specialized, independent auditor. By the end of the fiscal year, companies must provide information about their financial performance, and that information must be error-free. Here comes its importance in examining information. (Ríkharðsson, Þórisson, Bergthorsson, & Batt, 2022, p. 324).

II.1.2 AI Defined:

It is a new technology aims to emulate human problem-solving skills and abilities, and is now of interest with the use of computing systems to complete tasks normally performed by human intelligence. An artificial intelligence-based discovery was made more than sixty years ago when scientists designed a program to translate between Russian and English. (Dagunduro, Falana, Adewara, & Busayo, 2023, p. 42).

Artificial Intelligence is a field of computer science and engineering that focuses on creating intelligent machines capable of thinking, learning, and acting independently, enabling them to quickly analyze large amounts of data, recognize patterns, and make decisions. (Noordin, Hussainey, & Hayek, 2022, pp. 3-4).

Artificial Intelligence is a combination of hardware and clever programs that can analyze information, can crunch data, make decisions, and even handle tricky problems and perform complex judgments based on available data. This advanced technology can enhance performance and simplify daily tasks by eliminating traditional methods and performing routine transactions. (Puthukulam, Ravikumar, Sharma, & Meesaala, 2021, p. 1185).

II.1.3 Artificial intelligence in auditing:

Through artificial intelligence, auditors get rid of traditional methods in performing their routine tasks. Artificial intelligence technologies contribute to improving risk assessment procedures, speeding up audits, and making it easier to detect violations or fraudulent activities that may otherwise go undetected. (Aitkazinov, 2023, p. 117)

II.2 THE FUTURE OF AUDIT IS INTELLIGENT:

AI can significantly improve public audit by streamlining tasks and reducing time-consuming tasks, thereby addressing the growing volume of data and oversight processes.

Table n°01: THE FUTURE OF AUDIT IS INTELLIGENT

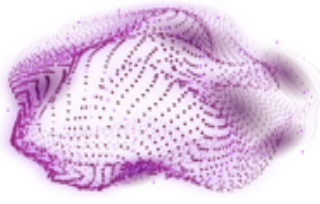
 Nepal's SAI plans to implement artificial intelligence tools to improve auditing process	ROBOTIC PROCESS AUTOMATION identify inconsistencies and outliers that human auditors can address 
SEARCH OPTIMIZATION Using artificial intelligence, the risk engine classifies and groups entities, calculating risk scores. 	ARTIFICIAL NEURAL NETWORK A predictive model is a tool that uses data or various patterns of transactions that are recognized and stored. 
DATA EXTRACTION & DATA MINING It involves collecting, pulling, and analyzing data from different systems to identify patterns and differences 	NATURAL LANGUAGE PROCESSING aims to create natural language processing tools for various applications. 

Table n°01 : THE FUTURE OF AUDIT IS INTELLIGENT

source: (Ramu, 2020, pp. 31-34)

III- The digital transformation of external audit:

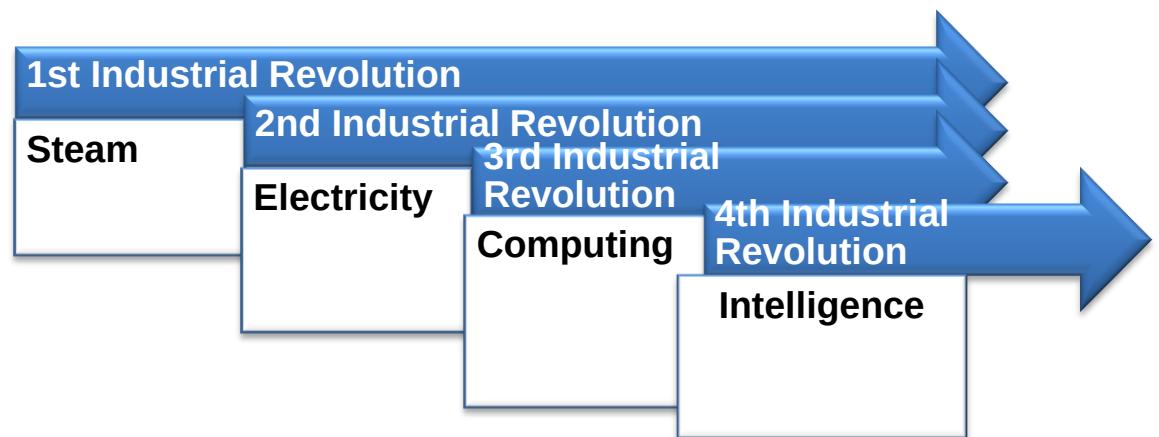
III.1. Digitalization in Audit:

Digital transformation is a completely new development in thinking and doing, and the industry has witnessed a definite transformation due to the benefits it offers. the dynamics of public scrutiny also require fundamental change.

The most important of these advantages are increased efficiency and reduced costs and time.

The rapid transformation in the post-industrial revolution process consists of four distinct periods as shown in the figure one

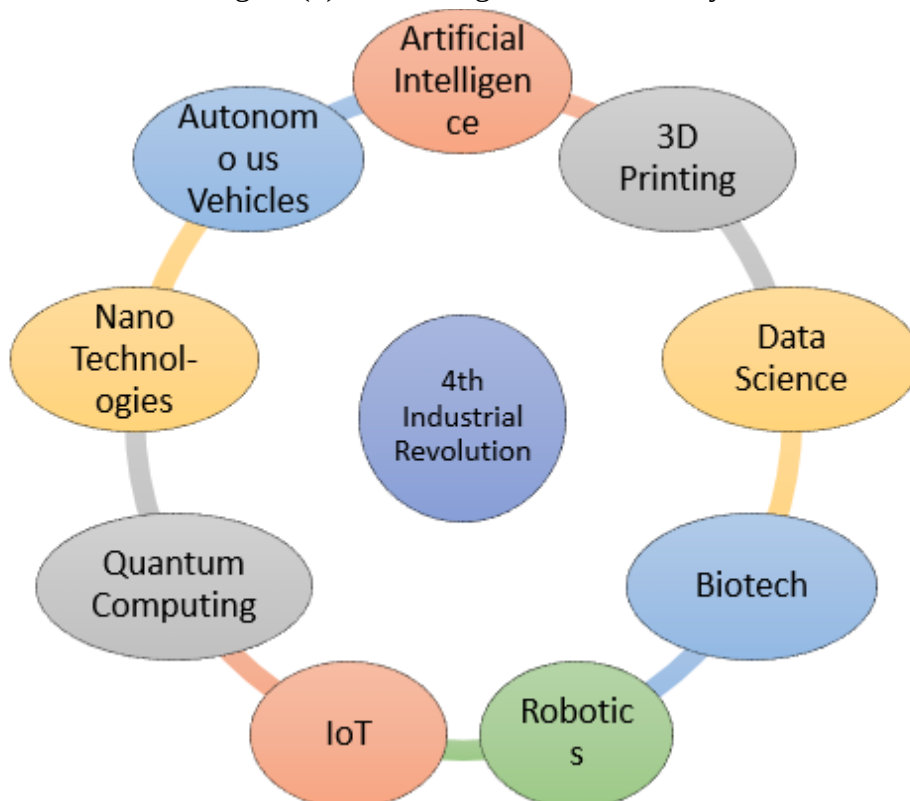
Figure (1): Industrial Revolution



The source: (Aksoy & Gürol, 2021, pp. 3-4)

The industry evolved with new ideas, benefiting from steam engines in the first industrial revolution, electricity in the second, and computers in the third, with "intelligency" being a significant technological shift in the field.

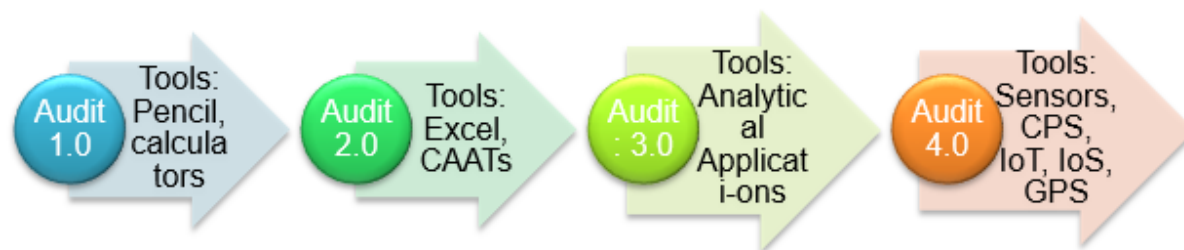
Figure (2): Technologies of 4th Industry Revolution



The source: (Aksoy & Gürol, 2021, pp. 4-5)

The technologies shown in Figure 02: are not only relevant to the industry, but are also important for other business activities. Marketing, distribution, human resources, accounting, and finance are examples of these activities.

Figure (3): Revolution of Auditing



The source: (Aksoy & Gürol, 2021, pp. 4-5)

As shown in Figure 3, the evolution of auditing can be divided into four periods: In the early days (stage 1.0), auditors meticulously examined records by hand. 2.0, the second stage saw the introduction of computers. 3.0; where Excel and CAATs were used, which included analytical applications; And the last period, which is significantly different from other periods, is attributed to the Fourth Industrial Revolution.

III.2. Embracing AI into The Big Four Accounting firms:

Recently Big 4 firms have invested heavily into AI innovation and analytics.

Among the four largest accounting firms in the world, **Deloitte** has introduced AI for the first time in its audit work and opened the way into the field of AI exploration. They've developed a system that automates tasks like reviewing configurations, substantive testing, and creation of worksheets. The system automatically sniff out errors, fraud, deviations, abnormal data and suspicious conditions, and generates a draft audit report template. Auditors can monitor facts in real time through the system interface, allowing quick and effective decisions to be made, increasing audit benefits and reducing risks. (Gultom, Umar, & Mayangsari, 2021, pp. 10-11).

PricewaterhouseCoopers (PwC's) The International Accounting Bulletin named GL.ai technology, which was created in collaboration with the Silicon Valley startup H2O.ai, "Audit Innovation of the Year" in October 2017. capable of document analysis. as well as writing reports. It has created the ground-breaking "HALO," an analytical platform that facilitates the development of an effective and high-caliber auditing procedure. (Faggella, 2020).

KPMG has made a significant investment in auditing recently through dynamic auditing. Dynamic auditing, part of KPMG's audit strategy, focuses on electronic audits and increased use of data, automation and visualization. It aims to enhance, improve and raise the efficiency of audit evidence, define auditors' relationships with clients in the digital age, and enhance the evolutionary audit called KPMG Clara. (Gultom, Umar, & Mayangsari, 2021, pp. 10-11).

EY is split into a group of companies operating independently in various countries in the world, it enhances the capture of important information such as lease start date, payment amount, and renewal/termination options.

III.3. Methodologies and Applications of AI in Auditing:

There are a number of approaches used to develop and build AI systems. These include:

❖ Neural networks:

They are designed to perform specific tasks and functions of electronic models implemented by computer-aided systems. Neural networks enable systematic learning through computer systems and programs, which act and think like human brains through structural simulations. They play an important role in the dynamics of artificial intelligence. (Adeoye, Akintoye, Agugom, & Olagunju, 2023, p. 761).

❖ **Maching Learning:**

Machine learning allows computers to use existing data to predict future behaviors, outcomes, and trends. Machine learning can automate routine accounting processes such as cost reporting, account management, and risk assessment, thus eliminating the use of sampling. (Hayek, 2022, pp. 481-482).

❖ **Expert systems:**

Expert systems are a revolutionary way to integrate computers into the managerial decision-making process, and were originally designed to handle effective problem solving and analysis similarly to human experts. It is applicable to accounting fields where there is an expert. However, they are not flexible or adaptable and are better suited for static rather than dynamic applications. (Monzer, Amr, & Gamal, 2022, p. 15).

❖ **Robotics:**

Robots are widely used in factories and hospitals, with drones emerging in recent years. These sophisticated systems also use automated cognition and complex programming to navigate between tasks

❖ **Genetic Algorithms:**

Search algorithms adopt a heuristic approach based on natural selection, using mutation models and crossover techniques to address complex biological issues. ((Y.Shams, 2020, pp. 8-9).

❖ Using drone technology auditors can conduct inventory counts much faster compared to counting inventory mechanically (Appelbaum & Nehmer, 2017, pp. 101-102).

IV- Consequences and Positive aspects of Artificial Intelligence:

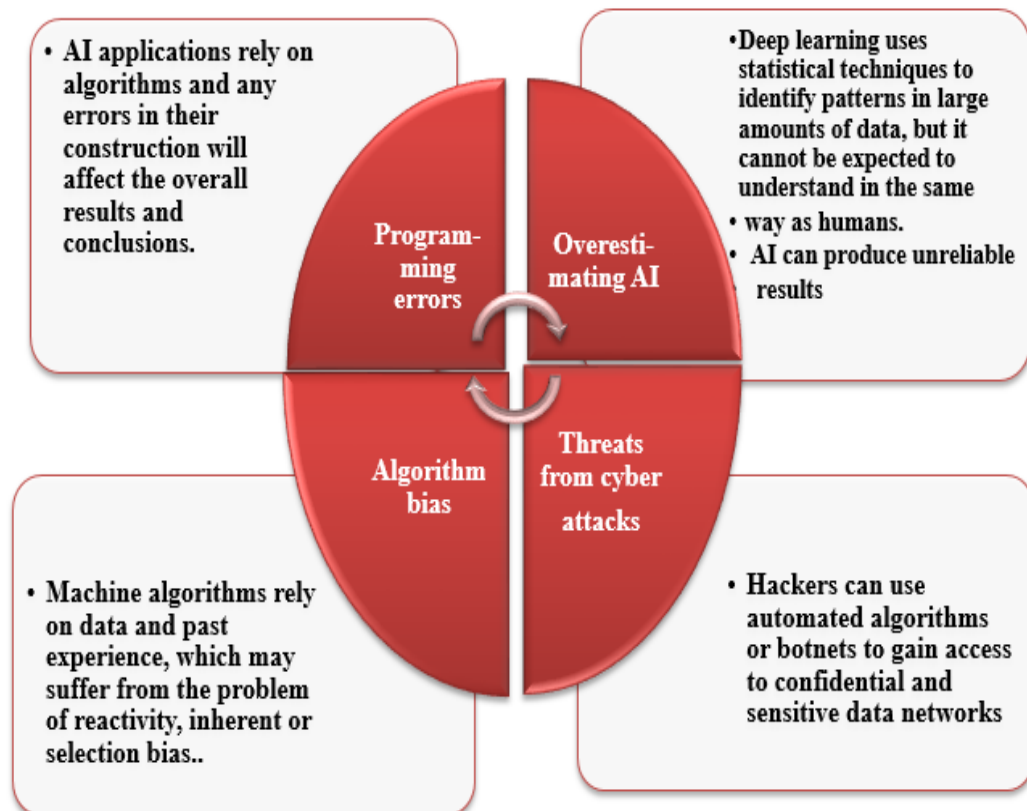
Researchers have not been very interested in looking at the possible negative aspects of AI in auditing. AI's potential to lessen the need for human audits

- AI is effective at finding mistakes in financial statements.
- Possibility of doing away with the requirement for human auditors. (Noordin, Hussainey, & Hayek, 2022, p. 4).

IV.1. Consequences of Artificial Intelligence:

Artificial intelligence has a significant and positive impact on business, but it also comes with risks.

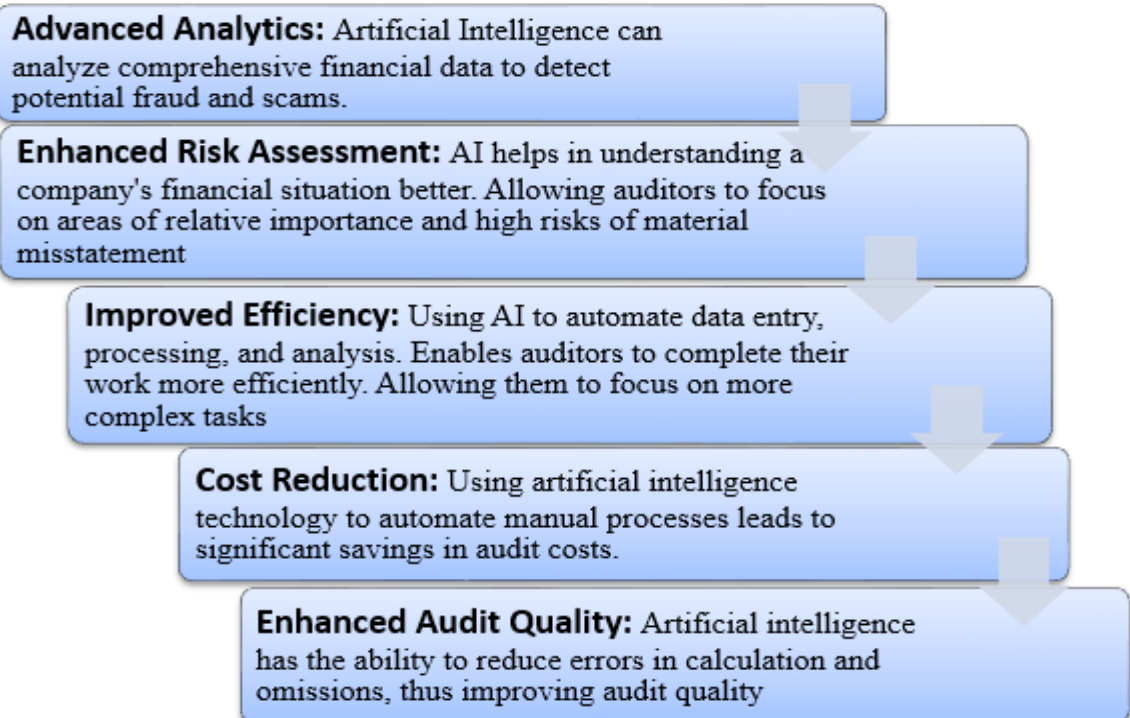
Figure (4): Consequences of Artificial Intelligence



The source: (Dalwai & Mohammadi, 2022, p. 111)

IV.2. The positive aspects of Artificial Intelligence:

Figure (5): The positive aspects of Artificial Intelligence



The source: (Co, 2023)

V- Practical Framework (Methods and Results):

This part includes some statistics about audit companies uses of artificial intelligence, as well as an interview with financial managers in two major audit companies.

V.1. Statistics on the use of artificial intelligence according to big Audit firms:

Grant Thornton's Q2 2022 CFO Survey shows a significant shift towards AI in asset management. 30% of CFOs are already using generative AI, while others, about 55%, are exploring its applications. With more than 80% of companies adopting artificial intelligence, neglecting it may lead to missing better investment opportunities..AI in Asset Management : 3 key Use cases | Grant Thornton, 2023) (Thornton, AI in asset management: 3 key use cases, 2023)

A recent Forbes Insights survey found that 58% of auditors and firms believe technology will have the greatest impact on auditing over the next two to five years.

Also, there is widespread agreement that organizations that employ auditors will be positively impacted by this innovation revolution: 59% of Forbes survey respondents agreed that advanced technology will enable deeper and more sophisticated data analysis as part of the audit process. (Maissar, 2023).

PwC's 2023 Global Risk Survey shows that 60% of business leaders view generative AI as a growth opportunity, but there are many differences between technology, operations, risk and audit responders in the extent to which their organizations use technology and data to reduce risks.

In 2020, 56% of external auditors used artificial intelligence and machine learning technologies, with data analytics and fraud detection among the most popular technologies. In 2021, artificial intelligence and data analysis are the two most important areas for auditors. 78% of auditors believe that AI has improved audit quality and 74% have made the process more efficient. Despite the challenges, risk leaders have also shown that the opportunity for early advantage lies in the rapid adoption of artificial intelligence and machine learning. (Korolov, 2020).

In 2024, AI will make a huge difference in business operations and will significantly reduce expenses and increase revenues and operations. The 2023 Emerging Technology Survey found that 73% of US companies have adopted AI in some field. This shift is likely to impact customer engagement, business models, and overall business operations. (PricewaterhouseCoopers, 2024 AI business predictions. PwC, s.d).

These statistics show that artificial intelligence is increasingly being used by external auditors, Technological progress, the increase of investments, and competition for talent are all working to achieve one thing that has been mentioned. We will mention in the table below the uses of artificial intelligence. At PWC and Grant Thornton:

Table n°02: AI: The application of AI in Audit firm

Audit Firms	Applications of Artificial intelligence
Price Water Coopers(PWC)	GL.ai is a system that examine every transaction, user, amount and account to identify suspicious transactions, indicating potential fraud. As GL.ai becomes smarter, it will make a big difference in audits by improving customer service, quality and efficiency, and freeing up more time for human engagement. Cash.ai: A new tool utilizes artificial intelligence and machine learning to conduct an automated cash audit, analyzing various financial

	aspects such as bank reconciliations, letters of confirmation, and foreign currencies. Halo :The PwC Audit utilizes a data auditing technique called "Employee Expenditure Halo" to analyze large amounts of data, identify high-risk transactions, and detect anomalies through graphical visualizations.
Grant Thornton	Grant Thornton has launched an in-house AI generation tool, GTAssist, to enhance efficiency and anticipate client needs. This tool, along with other AI has made an investment in developing its own generative AI platform utilizing Microsoft Azure OpenAI in order to leverage the power of AI in a responsible, safe, and secure manner. The platform is known as GTAssist and has a chatbot feature that secretly duplicates the features of open-source programs. Grant Thornton's team now has access to the technology after it was tested earlier this year.

The source: (Üçoğlu, 2020) ; (Bourne, s.d)

V.2. Case study of PWC and Grant Thornton subsidiary companies in Algeria using the interview tool:

We conducted an interview with the financial auditor of PricewaterhouseCoopers and Grant Thornton subsidiary companies in Algeria, where we asked them some questions related to the determinants of adopting artificial intelligence technologies in auditing in Algeria, as well as the reasons that prevented these companies in Algeria from adopting artificial intelligence, although they are branches of audit companies in Europe or UK that have already adopted artificial intelligence in auditing.

We received some clarifications from them on this matter. Among the requirements and reasons that we concluded from the answers of both parties, they were divided as follows:

1/ AI adoption requirements at PWC and Grant Thornton in Algeria:

Among the requirements facing auditing companies in Algeria in order to adopt artificial intelligence are:

- The necessity of an active market that facilitates the movement of capital.
- Stimulating investments in order to win many clients and increase the profits of auditing companies.
- Applying international auditing standards to make auditing procedures unified.
- Amending the laws related to audit offices to grant some facilities regarding the activity of audit offices.
- Training experts in the field of artificial intelligence to keep pace with global developments

V.3. Obstacles to the non-adoption of artificial intelligence applications by audit companies in Algeria:

Through the answers and oral explanations obtained by the financial auditors, we concluded that the reasons that stand as an obstacle to the adoption of modern technology are as follows:

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Foreign subsidiaries in Algeria are not ranked among the top twenty, so they are not equipped with modern technologies. This is due to several factors, including the profits achieved, the number of customers, and others:

- Lack of an active market
- The costs are more than the fees received by the auditor
- Few customers compared to European countries.
- Weak economy.
- Random decisions related to audit offices.
- Imposing some restrictions on accounting professionals.
- Lack of incentive to invest.
- an infrastructure lacking in subject matter specialists, making it unprepared for the implementation of contemporary technologies.
- Applications of artificial intelligence are too expensive that do not correspond to the income of audit companies in Algeria.

So, from the answers of both parties, it can be said that in order for auditing companies in Algeria to be able to adopt artificial intelligence in auditing, the state must pay more attention to this field, by modifying the infrastructure in a way that allows providing what is necessary to embrace these technologies and study how other countries adopt Artificial intelligence and work on its basis in accordance with the Algerian environment.

V.4. How to connect into AI:

Three fundamental methods to plug into AI:

❖ Select your issue:

Identifying the right problem and the best solution is crucial. Understanding AI in business requires a comprehensive understanding of its capabilities and the specific business problems it aims to address. Therefore, when designing an AI solution, it must fit the specific problem and target process, while ensuring data quality and management.

❖ The task is to set up governance:

Establishing effective governance is crucial for guiding successful outcomes in AI applications, as good management should continue to evolve as they evolve. (Thornton, Fundamental Steps to AI in Manufacturing, 2023).

❖ Defining success:

You must clearly identify when the effort is off target or needs to be adjusted. Not just looking to capture the expected target. (3 Fundamental Steps to AI in Manufacturing | Grant Thornton, 2023)

V.5. In what ways is AI transforming auditing and the role of auditors?

The creation of artificial intelligence a huge transformation in auditing tasks by automating various processes, increasing their efficiency and increasing their value. KPMG expects that artificial intelligence will help identify suspicious and high-risk transactions, focus on risk assessment, and obtain audit evidence on unreliable and complex data. Artificial intelligence allows auditors to apply their skills in other areas by eliminating long and traditional tasks. (Stöckle, 2023)

V.6. Consequences of non-response of auditors to artificial intelligence requirements

Auditors face some concerns due to emerging risks in industry and government. Therefore, they must keep pace and adapt to technological changes, especially in dealing with huge amounts of data coming from different sources and the expected risks. Modern technology and artificial intelligence are essential for auditors to analyze the vast data available to clients, enabling them to do their work efficiently and meet clients needs quickly (Asa, 2023).

VI- Conclusion:

Despite significant investments made by Big Four accounting companies, AI is not anticipated to displace CPAs. the auditing industry is undergoing a significant transformation due to the advent of innovative technologies, particularly artificial intelligence, which is revolutionizing traditional practices and posing significant potential for reshaping accounting and auditing.

However, there are many countries that have not yet adopted artificial intelligence in the field of auditing.

Through this study, we have come to know the most important reasons that prevent the adoption of artificial intelligence in **PWC and Grant Thornton subsidiary companies in Algeria**. as well as the requirements for adoption, which are the high cost.

For artificial intelligence tools, weak investments, lack of an active market and other factors stand in the way of auditing companies to adopt this modern technology. while the large audit companies have already integrated artificial intelligence into the external audit process, from which we can draw several advantages that encourage countries that have not yet kept pace with this technological evolution to think about it.

As a result, we concluded that Algeria is not yet ready to adopt artificial intelligence, and this is for several reasons that we mentioned previously. However, it is striving to gradually keep pace with developments.

VII-Recommendations:

- What we can recommend regarding how to adopt artificial intelligence technologies in Algeria include.
- Stimulating investments to enable audit companies to raise their profits and reduce their costs to face the high costs of adopting modern technology.
- Providing an infrastructure that allows the adoption of artificial intelligence in auditing and trying to adopt it gradually.
- The development of artificial intelligence specialists who can facilitate the use of this cuttingedge technology is essential for the effective deployment of artificial intelligence.
- Examine choices pertaining to audit firms.
- Assisting the external auditor in their job, as this is the first step in supplying a reasonable level of confidence regarding the accuracy and equity of a company's financial status, which contributes to raising the national economy indirectly.
- Urging auditors to resort to artificial intelligence techniques in order to achieve quality in the audit process.
- Auditors should use AI techniques to audit audit quality and professional care, manage internal audit activities, Evaluate risk management, as well as organize and carry out the audit procedure.

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