The Implications of Artificial Intelligence on Junior Auditors

Kaye Charmyl Ragasajo

A Senior Thesis submitted in partial fulfillment
of the requirements for graduation
in the Honors Program
Liberty University
Spring 2024

Acceptance of Senior Honors Thesis

This Senior Honors Thesis is accepted in partial
fulfillment of the requirements for graduation from the
Honors Program of Liberty University.

_____
Mechelle Lafon, D.B.A.
Thesis Chair

_____
Jamie Stowe, D.B.A.
Committee Member

_____
Emily C. Knowles, D.B.A.
Assistant Honors Director

_____
Date

Abstract

The aim of this paper is to explore the evolving intersection of financial statement auditing and artificial intelligence (AI). A timeline of AI adoption in auditing is traced, detailing its impact on audit processes and the contemporary role of junior auditors. Challenges faced by junior auditors are identified, with an emphasis on the potential benefits and ethical concerns surrounding AI integration. Recommendations for adapting to AI's emergence and addressing challenges are provided. The analysis underscores the need for industry-wide collaboration, regulatory adjustments, and the cultivation of digital ethics. As AI continues to reshape auditing, future trends expected within the profession include the importance of Explainable AI and digital ethics.

The Implications of Artificial Intelligence on Junior Auditors

In the past decade, the influence of Artificial Intelligence (AI) has permeated various areas of contemporary society, sparking discussions abouts its transformative potential. While research and development of AI has been ongoing for several years, recent advancements have allowed the public to experience greater access to the advanced technology, such as ChatGPT. The increased exposure to AI applications has caused a surge in speculation and concern about the future of various professions in the face of automation.

As society adjusts to the expanding impact of AI, one occupation that remains at the center of transformative discussions is auditing (Almufadda & Almezeini, 2022; Estep, 2023; Kend & Nguyen, 2020; Mpofu, 2023). As a field that is traditionally known for meticulous examination and analysis by human auditors, the prospects of AI's adoption have caused consideration about the potential displacement of human professionals (Boritz & Stratopoulos, 2023; Brender et al., 2019). Many experts ponder whether AI, with its capacity for data processing and analytics, might render the role of auditors obsolete (Boritz & Stratopoulos, 2023; Brender et al., 2019; Fedyk et al, 2022).

Through an exploration of the intersection of AI and auditing, the aim of this paper is to explain the complexities of their evolving relationship. Rather than imminent replacement, the focus of current research has shifted towards understanding how AI is actively shaping and transforming the role of human auditors. As junior auditors will be particularly affected by the implementation of AI, they should take action in anticipation of these changes.

Auditing Process

Financial statement auditing is the process of obtaining evidence to provide reasonable assurance that a company's reported financial information adheres to certain assertions and

established criteria (Louwers et al., 2023). The assertions and criteria are set by the Public

Company Accounting Oversight Board (PCAOB) and are known as Generally Accepted

Auditing Standards (GAAS). GAAS is used to measure audit quality and ensure the necessary

objectives are achieved during the audit.

In accordance with GAAS, a team of auditors carry out the five stages of an audit: obtain

(retain) engagement, engagement planning, risk assessment, audit evidence, and reporting. The

first stage involves deciding whether the team will pursue an audit engagement with a previous

or potential client. During this time, the auditors will evaluate for ethical compliance and

business risk in regard to the client. In the second stage, an audit plan is established that outlines

the types of procedures conducted on the client and the auditing team's overall strategy

(Karmańska, 2022). Risk assessment is the third stage of the audit. In accordance with GAAS,

auditors must assess the audit risk which is the "risk assumed by the auditors that they could

express an incorrect opinion on financial statements that are materially misstated as a result of

errors or fraud" (Louwers et al., 2023, p.153). Audit risk is a combination of inherent risk,

control risk, and detection risk. Both inherent risk and control risk, known together as the risk of

material misstatement, are beyond the auditor's control. After assessing whether the client's risk

of material misstatement is high or low, the auditors set detection risk to derive an overall low

audit risk (Louwers et al., 2023).

In the fourth stage, the auditing team uses audit procedures to gather evidence supporting

management's assertions concerning the company's financial information (Mpofu, 2023). There

are eight general procedures used: inspection of intangible assets, inspection of records or

documents, confirmation, reperformance, inquiry, and analytical procedures. In the final stage,

the auditors create a written report stating whether the audit findings revealed that the company's

financial information was presented in accordance with the required financial reporting framework (Louwers et al., 2023).

Artificial Intelligence

As there is no current prevailing definition, AI has been defined in multiple ways. One definition given by the Organization for Economic Co-operation and Development described the technology as a "machine-based system, for a given set of human-defined objectives, make predictions, recommendations or decision influencing real or virtual environments" (Dotel, 2020, p. 32). For the purpose of this thesis, the term AI will refer to the systematic use of machines to mimic human intelligence (Almufadda & Ameizeini, 2022; Fedyk et al., 2022; Mpofu, 2023; Rikhardsson et al., 2022; Seethamraju & Hecimovic, 2023). Additionally, it is an overarching term that encompasses several sub-divisions. There are five sub-divisions within AI: expert systems, natural language processing (NLP), machine learning (ML), artificial neural networks (ANN), and deep learning (Almufadda & Ameizeini, 2022).

In contrast to the other subfields mentioned, expert systems are a separate mechanism from the other four. This technology utilizes a knowledge base to aid the user in decision-making. The knowledge base is curated by professionals within a specific industry into rules which are then used by the inference engine of the expert systems to make further deductions (Almufadda & Ameizeini, 2022; Rikhardsson et al., 2022).

NLP has techniques that overlap with ML, ANN, and deep learning, but it also has its own distinct functions. NLP is capable of understanding the human language and assists in various text-based tasks, namely spell check and smart search. ML technology utilizes data and algorithms to imitate the human learning process (Mpofu, 2023; Fedyk et al., 2022). ANN imitates the function of biological neural networks. It is a system composed of interconnected

processing elements. Deep learning builds on the connectedness of ANN and statistical analysis capabilities of ML to identify the complex connection between certain variables (Almufadda & Ameizeini, 2022). It has been known to perform highly complex tasks while continuously building on previous knowledge (Mpofu, 2023).

The Evolution of AI in Auditing

The use of AI in the field of audit is not a recent occurrence. Since its initial introduction in the late 90s, AI audit application has significantly developed. The technology has shifted to not only perform repetitive tasks, but also those requiring more critical evaluation.

Timeline

Though the increased emphasis on AI within public auditing is a recent development, the foundations for its implementation began with the use of Computer-Assisted Audit Techniques (CAATs) in the 1960s (Seethamraju & Hecimovic, 2023). Advanced CAATs, such as Power BI, employ linear regression and other prediction models to aid the audit process. Audit firms began utilizing expert systems in the 1990s. Fundamental expert systems were used to support early phases of the audit process such as audit planning and compliance testing (Almufadda & Ameizeini, 2022; Seethamraju & Hecimovic, 2023). Auditing firms then moved on to adopting robotics process automation (RPA). RPA is process-driven technology used to automate tasks that auditors regularly perform, such as integrating and organizing audit data from multiple files and conducting audit tests (Perdana et al., 2023; Thottoli, 2022). Almufadda & Almezeini (2022) noted that RPA is a mechanism distinct from AI, but the utilization of this technology was crucial in automating tasks to complement the introduction of future AI.

Firms began to invest in and develop AI systems around 2010-2012 (Fedyk et al., 2022; Seethamraju & Hecimovic, 2023). NLP was incorporated around the late 2010s by some of the

top public auditing firms. Both Deloitte and EY discussed the use of NLP in the planning phases

of their audits. Since 2012, KMPG and Deloitte have utilized NLP to conduct text clustering

analysis to aid in fraud prevention (Fedyk et al., 2022). While NLP provides great support in the

analysis of important documents, audit firms have recently shown a greater interest in utilizing

ML in conjunction with Big Data. Some audit firms have conducted tests in using ML to learn

from auditor conclusions to comprehend trends and create its own predictions (Mpofu, 2023).

Deloitte began developing such AI around 2016 to analyze journal entries and increase the

quality of their audit assessments. Since these initial adoptions, the role and use of AI within

public auditing has only grown and spread throughout the industry.

Use of AI Technology in Auditing

Audit firms are currently utilizing AI to perform various tasks within the audit process.

The implementation of AI differs from previously incorporated technology as AI can handle

vastly more data and perform procedures that traditionally require professional judgment (Estep,

2023). NLP is commonly used to extract key information in contracts and financial records

(Mpofu, 2023). The technology is taught how to differentiate key terms within a document

through pattern recognition. Additionally, AI in combination with other emerging technology

can help with procedures that require observation. Almufadda and Almezeini (2022) detailed

various studies that explore how drones could be used in combination with AI to aid in the

observation of inventory, a common audit procedure. Researchers explained how the drones

could be used to scan radio-frequency identification tags, while another proposed using image

recognition software to count livestock, diamonds, and lumber (Appelbaum et al., 2020 as cited

by Almufadda & Almezeini, 2022; Zhang, 2019). Karmańska (2022) stated that AI and drone-

assisted inventory procedures reduced working time by 662 hours (about 4 weeks) and reduced

the frequency of errors by 0.12% compared to traditionally performed inventory procedures.

Kend and Nguyen (2020) found that AI is able to complete cross-referencing tasks in only half

an hour which is six times faster than the time it takes a human auditor.

The AI technology that auditing firms anticipate being the most promising is ML. ML

has the potential to significantly improve the efficiency and quality of the audit process. Both

experts and professionals within the audit industry have found that AI has increased firm

productivity by helping staff auditors complete testing and data extraction faster (Fedyk et al.,

2022). The number of clients expected to be handled by one auditor has now doubled since the

implementation of AI. However, further improvements in firm efficiency may not be so readily

seen as compared to audit quality. Fedyk et al. (2022) indicated in his study the extent of AI's

impact on audit quality:

> Specifically, a one-standard-deviation increase in the share of a firm's AI workers over
>
> the course of the prior three years translates into a 5.0% reduction in the likelihood of a
>
> restatement, a 1.4% reduction in the likelihood of a material restatement, a 1.9%
>
> reduction in the likelihood of a restatement related to accruals and revenue recognition,
>
> and a 0.3% reduction in the likelihood of a restatement-related SEC investigation. (p.
>
> 940)

ML can be used to help in the identification of deviations. Hoogduin (2019) discussed that ML

aids in the performance of regression analysis which helps auditors in the identification of

outliers within dependent financial elements. ANN, a subset of ML, is a predictive classification

tool also used in audits (Almufadda & Almezeini, 2022). Regression analysis and predictive

classification guide auditors as to which accounts have a higher level of risk and require

additional testing (Almufadda & Almezeini, 2022; Stöckle, 2023). Deep learning, an advanced

type of ML, has the ability to identify patterns and anomalies within unstructured data (Imoniana

et al., 2023; Mpofu, 2023). The ability to utilize unstructured data would substantially increase

the amount of audit evidence available to auditors which would enhance the quality of future

audits (Karmańska, 2022). Other experts have suggested that a practical application would be in

the assistance of interviews to detect signs of deception in the speech patterns of the interviewee

(Dickey et al., 2019; Munoko et al., 2020).

<p style="text-align:center">Contemporary Role of Junior Auditors</p>

The modern role of junior auditors includes traditional responsibilities and present-day

challenges. Little to no changes have occurred in the standard assignments given to beginner

auditors. In contrast, the challenges they encounter are a result of the evolving corporate

landscape.

Responsibilities

The tasks of a junior auditor are largely similar to those performed by more experienced

staff members. However, as new audit staff have little to no experience with the audit process,

some procedures, those more repetitive and involving lower risk accounts, are more likely to be

assigned the new audit staff. Saunders et al. (2023) discovered that many first-year auditors

perform risk assessment related duties such as calculating materiality, fraud or other risk,

brainstorming, fraud inquiries, etc. In this auditing stage, new auditors are either just as or more

likely to complete preliminary analytical procedures and journal entry testing. In regard to

internal control, junior auditors are less likely to be involved with creating flowcharts and

identifying design efficiencies compared to more experienced staff. Additionally, new audit staff

perform substantive analytical procedures and tests of details on numerous types of balance sheet

accounts (accounts receivables, prepaid assets, accounts payable, etc.). Differences on which

activities first-year auditors perform can be determined by whether they are employed by a Big 4 (Deloitte, PwC, EY, and KPMG) or non-Big 4 firm. Big 4 staff auditors are more involved with internal control tasks and leveraging technological advancements, whereas non-Big 4 staff auditors are more involved with drafting representation letters and employee benefit plan related tasks (Sanders et al., 2023).

Challenges

Junior auditors face both existing and new challenges in their current role. These problems can result from either internal change with audit firms or from external sources such as clients and policymakers. While all levels of audit staff may deal with the following difficulties, these areas can be a particular source of strain on inexperienced auditors.

Changes in Training Process

Compared to the onboarding process of previous generations', current staff trainees have a significantly shorter period of training (Westermann et al., 2015). Prior newly hired auditors were given approximately three to eight weeks in basic audit training, whereas current formal instruction lasts around only one week. Another change involves the informational substance of the training given. Some audit partners have pointed out that the material of new hire instruction has shifted to include more team-building exercises and similar collaboration-centered activities (Westermann et al., 2015). This results in less time for formal training in regard to technical auditing skills. The decrease in time and technical audit instruction given by firms may further exacerbate the difficulty that junior auditors face in transitioning to the workplace and in keeping pace with the growing demands of the audit environment.

Inadequate Technological Support

Current staff auditors continue to mainly rely on data managing and analytical software, such as Excel, Alteryx, and PowerBI to prepare, organize, and analyze the given data (Booker et al., 2023). However, these technological tools still require the auditor to spend numerous hours integrating data from multiple files and then preparing the information before higher-level analysis and judgments can be accomplished by the auditing team. The long and arduous hours associated with working in an audit firm is one of the main areas of dissatisfaction among young auditors and is a driving factor for turnover within the profession (Hardies, 2023). The workload demanded often interferes with other aspects of an auditors' life which can lead to burnout and deterioration of work-life balance (Boritz & Stratopoulos, 2023).

Increasing Data Set

As companies have continued to incorporate emerging technology into their own business operations, auditors must handle larger amounts of data sets to derive their audit evidence. While this increased information was intended to bolster a company's efficiency and monitoring, its usefulness cannot be fully realized if auditor's lack the ability to derive value and meaning from the increased data (Chung-Lien et al., 2020). Dogar and Scorte (2023) articulated that the vast amount of data that auditors must work with has surpassed their current capabilities.

Updates on Audit Policy

Policymakers are another source of added pressure on auditors. The constant release of regulatory changes and statutory requirements related to the extent of auditing testing requires reworking past procedures. Auditors must remain diligent in ensuring adherence to new standards (Mpofu, 2023; Westermann et al., 2015).

The contemporary responsibilities of junior auditors have not experienced significant changes. Tasks assigned to new audit staff continue to consist of repetitive audit procedures. However, other elements, such as insufficient firm training, a vastly growing corporate world, and constant regulatory changes, present increasing challenges to their current role.

Impact of AI on Junior Auditors

The effect of AI on the auditing career is expected to focus on the junior level. AI's current capabilities have the greatest overlap with tasks commonly given to new audit staff. The technology's other functions, such as providing recommendations, will also be most impactful on inexperienced auditors.

Automation of Repetitive Tasks

Among the various impacts that AI can have on the field of auditing, the one most anticipated is automation. AI has the ability to automate the repetitive tasks often performed by first-year auditors. The audit procedures that are regularly assigned to new audit staff, those that are structured and routinely completed, are more likely to be relegated to intelligent systems. Dogar and Scorte (2023) have identified around 39% of audit tasks that could be automatized. General audit areas where further automation could be applied include "data extraction and analysis, risk assessment, fraud detection, sampling, document review, compliance testing…[and] performing analysis" (Dogar & Scorte, 2023, p. 408). With further research and development, audit tasks related to unstructured data have the potential to be performed by AI as well. Kend and Nguyen (2020) suggested that intelligent systems can be trained to identify and extract key audit information from emails and contacts. AI's automating capabilities could positively impact the role of new auditors. The automation of time-consuming, tedious tasks would decrease the workload given to junior auditors, allowing them to focus on activities that

require more judgment and decision-making (Boritz & Stratopoulos, 2023; Saunders et al., 2023). Early-career auditors may find more fulfillment in completing procedures that require more critical thinking. A lightened workload would also allow for a greater work-life balance, mitigating stress among new hires. The automation of audit tasks could have a positive impact on new auditors through increased time to focus on more complex tasks and reduced working hours.

Aid in Decision-Making

Not only will AI give young auditors the time to focus on strategic initiatives, but the technology is also anticipated to aid in the decision-making process of these tasks. AI can function as a prescriptive mechanism as it can provide useful analytics and evaluate scenarios to inform the auditor's professional opinion (Boritz & Stratopoulos, 2023; Estep, 2023; Mpofu, 2023). This may be especially impactful on inexperienced auditors that are not well acquainted with auditing rules and regulations. Recently, auditing firms have begun to provide their staff with AI tools to aid in the performance of audit procedures. Fedyk et al. (2022) stated that there are up to 40 practical AI tools available. These tools can provide various services including the identification of patterns within documents and the collection of applicable data (Mpofu, 2023). Tiron-Tudor and Deli (2022) specifically mentioned the development of AI chatbots to help novice auditors in finding the relevant auditing standards, regulations, and practices.

Using AI-generated insights may not only influence an auditor's judgment but also enhance it. As a human auditor must consistently evaluate the validity of the work completed by AI, their capabilities in recognizing inaccuracies or errors in assumptions made will develop. The unintended upskilling that results from working with intelligent systems could prepare newer

auditors to take on more complex tasks and may even help them acquire the skills needed for

upper-level positions (Kend & Nguyen, 2020).

Skillset Evolution

As reflected with the adoption of previous technology, young auditors will need to adapt

their skillsets to facilitate the integration of AI. In recent years, there has been a growing demand

for auditors with knowledge in AI, data analytics, data science, and programming (Efe, 2023).

As more firms adopt AI tools and systems within their processes, the need for staff members that

can support AI's incorporation increases. Since 2010, the demand for individuals with AI

expertise has gone up by 462% (Dogar & Scorte, 2023). If novice auditors are unable to fulfill

this need, firms will continue to prioritize hiring individuals with solely AI expertise. Fedyk et al.

(2022) stated that in the years following AI adoption within audit firms the percentage of AI-

related employees rose 0.29%, from 0.08% to 0.37%. Junior auditors who have experience with

and are trained in using CAATs are more equipped to promptly adopt the use of AI tools than

those who are inexperienced (Boritz & Stratopoulos, 2023). Management would prefer to hire

first-year auditors who understand either AI or audit data analytics (ADA) as upskilling new

hires without technological knowledge requires more investment and effort from the firm (Fedyk

et al, 2022).

While there is an increased demand for first-year auditors with technical, AI-related

expertise, skills revolving around interpersonal interactions and critical analysis are still valued,

possibly more than before. Bressler and Pence (2019) implied that management hopes for junior

auditors to demonstrate greater proficiency in communicating with colleagues and working

collaboratively with their peers and seniors. These skills are even more applicable in the

contemporary workplace as technology has the propensity to isolate workers and hinder

communication. As AI automation will push new auditors to perform audit tasks with more complexity, the ability to adapt quickly is essential for those entering the field (Efe, 2023). Other skills, such as intuition and creativity, will continue to remain relevant in the profession as they cannot be fully replicated by AI (Doger & Scorte, 2023).

<div align="center">**Challenges and Concerns**</div>

The positive implications of AI within audit are overshadowed by its expected consequences. A majority of the concerns relate to the technology's effect on the opportunities and capabilities of junior auditors. Ethical considerations also suggest that caution is needed when adopting AI.

Job Displacement

The adoption of AI has been shown to have a productive impact on auditing firms and on the industry overall. However, these improvements may be at the expense of new auditors who could be displaced by the emerging technology. Fedyk et al. (2022) predicted that there will be "a decrease of 5.7 percent in the number of junior accounting employees three years later and an even larger decrease of 11.8 percent four years later" (p. 37). The reduction in the audit workforce is concentrated at the junior level as AI is more likely to automate structured and repetitive analytical tasks that were previously performed by first-year auditors (Boritz & Stratopoulos, 2023; Brender et al., 2019).

While most researchers are concerned with the job displacement effect of AI, others have argued that AI may instead provide support for understaffed audit firms. Auditor turnover is a pressing issue in the current audit landscape. The Illinois CPA Society noted that the average annual turnover rate for CPA firms is 13.4% higher than the national average (Kmet 2018 as

cited by Knechel et al., 2021). Rather than replace the current workforce, intelligent systems may take on roles that audit firms have faced difficulty in staffing.

As AI is still in the early phases of adoption, auditors are instrumental to its successful implementation. Goto (2023) indicated that auditors will play a critical role in the integration of AI systems through supporting data scientists and guiding the development of the technology. Instead of completely replacing junior level auditors, AI is more likely to augment or assist the role of auditor rather than completely overtake their position an autonomous technology (Dogar & Scorte, 2023). AI's transformative effect on the role will require new audit staff to take on more complex, high-value tasks (Karmańska, 2022).

Deskilling Effect

Some experts have suggested that AI will contribute to a loss in individual effectiveness which could exacerbate auditor turnover. Employees highly dependent on AI have shown lower ability in performing assessments (Boritz & Stratopoulos, 2023). First-year auditors, who rely on AI tools, may be less effective at higher-level audit analysis as their understanding of the audit process may not be as in-depth compared to their predecessors. The substantial decrease in time spent completing manual procedures may result in novice audit staff lacking the necessary expertise for intricate tasks such as risk assessment and fraud detection.

The elimination of gradual learning opportunities may result in entry-level auditors feeling overwhelmed by the complexity of their assignments. New audit staff who perceive their workload to be unmanageable are more likely to leave the profession (Fedyk et al., 2023; Knechel et al., 2021). Without a progressive method for upskilling new hires, audit firms may face increased difficulty in employee retention, a long-standing issue within the audit workplace (Seethamraju & Hecimovic, 2023).

Ethical Issues

There are various ethical issues to be considered in the adoption of AI as it relates to the auditing profession. Public trust is an essential component of the occupation and cannot be maintained if the auditor does not adhere to certain moral standards. The integration of AI may complicate an auditor's capability to adequately fulfill those principles.

Independence

The auditor's autonomy is an essential ethical standard in audit. As AI technology will be used to provide suggestions and influence the type of procedures conducted, experts are concerned about the auditors' ability to make objective and fair judgments (Munoko et al., 2020). The auditor's independence is a fundamental principle within auditing, so any possible threat, whether in fact or appearance, should be properly addressed (Louwers et al. 2023). This is a greater concern for inexperienced or beginner auditors who would be unfamiliar with the auditing processes and would be more susceptible to possible biases imbedded within the technology (Munoko et al., 2020). In order to safeguard against biases within intelligent systems, regulators within the U.S. have passed legislation related to AI documentation. Both New York and California have passed laws requiring assessments of decision-making systems (Oduro et al., 2022). In early 2022, the Algorithmic Accountability Act was presented in U.S. Congress that mandates developers to evaluate the impact of their systems.

Benevolence

Moreover, researchers caution that AI presents a risk to the ethical principle of benevolence, an essential concept within auditing. A fundamental aspect in the philosophy of auditing is that auditors should be acting with the well-being of the stakeholders in mind (Louwers et al., 2023). When auditors act in opposition to this principle, fraud and other ethical

violations occur. Auditors may decide to collude with clients to mislead the public for financial

gain (e.g. WorldCom and Enron). With this in mind, experts have questioned as to how standard

setters can ensure that AI technology will be used for the benefit of the general public over the

benefit of a single individual (Munoko et al., 2020). Without the development of clear

guidelines, abuse of this technology will be difficult to monitor. Even if one individual is not

manipulating the AI systems for their personal gain, questions have been raised as to how the

technology will balance maximizing the profits of the firm while minimizing negative effects on

society (Efe, 2023).

Accountability

Another fundamental auditing principle at risk is accountability. Munoko et al. (2020)

suggested in their article that the fusion of AI and auditor decision-making causes ambiguity as

to who should take responsibility in situations where a litigation occurs. On one hand, a person

could argue that the auditor, the user, should be held responsibility is there is a misapplication of

the technology. However, another could contend that the software developer should also be

partly blamed for any biases within the system that led to the ultimate misjudgment. As the

implementation of AI creates shared responsibility, regulators should consider the process for

evaluating who should be held accountable for missteps in the use of AI (Munoko, 2023;

Munoko et al, 2020).

The transformative integration of AI in the auditing field is accompanied by various

challenges. As AI will eventually take over routine tasks, junior employees face possible

displacement. Current methodology will also need to be reworked to properly integrate the

technology within the auditing process and regulate the ethical impacts of AI.

Adoption and Resistance

Effectively adopting AI in the audit field mainly depends on action from both audit firms and regulators. The implementation process will be met with resistance from various groups. However, understanding and anticipating the hesitation may allow for more timely integration of AI.

Adoption

Integrating AI within the auditing process will require companies and professional auditing bodies to develop a robust strategy. Audit firms should construct a plan of implementation that aligns with their strategic goals and considers the cost of AI and its effect on new auditors. Regulators must consider changing relevant aspects of auditing methodology and practice to adapt to the dynamic environment.

Industry

Auditing firms must deal with several considerations when introducing AI into their operations. Almufadda and Almezeini (2022) suggested that corporations should focus on ensuring that the implementation of AI will improve at least one, if not more, of the company's core missions. This can be done by setting tangible goals and benefits to be accomplished. Goto (2023) provides a dynamic business model that audit firms can follow to develop and incorporate AI data analytics. The model is built on the strategies enacted by the Big 4 firms and further research. Additionally, enterprises must consider the costs of adopting AI within their overall strategy. Expenses will be greater in the initial phases of implementation, which requires management to determine how much they will invest in the emerging technology (Goto, 2023). Researchers have indicated that adoption may be more feasible for larger corporations that have the necessary resources to fund the expenditures related to AI, whereas smaller to mid-sized

firms should be more cautious in the timing and extent to which they incorporate new technological systems (Karmańska, 2022; Rikhardsson et al., 2022).

The amount in which a corporation invests into AI will be irrelevant if organizations do not also plan to develop auditors with the skillset to utilize the advanced technology. For junior auditors, corporations and educational institutions must alter the training and tasks offered to offset the possible deskilling effect of AI (Karmańska, 2022). Companies must strategize as to the entry-level tasks that can be given to beginning auditors if AI is to take over the routine tasks that were previously completed by such employees.

Regulators

Regulators play an important role in the adoption of AI in the auditing industry. Various studies have indicated that the current auditing framework limits the adoption of AI within auditing (Kend & Nguyen, 2020; Mpofu, 2023). While AI has the ability to conduct full populations auditing, the required risk-based methodologies do not encourage it. Present frameworks detail that auditors use statistical and non-statistical sampling to derive reasonable conclusions about the whole population (Louwers et al., 2023). Some regulators argue that current standards provide enough latitude for the current stages of AI adoption, but the overall consensus is that auditing frameworks, especially in regard to materiality and risk factors, will need adjustments to provide clear guidance as to the incorporation of AI (Kend & Nguyen, 2020; Mpofu, 2023).

There currently exists a tension between audit firms and standard setters as both parties are relying on the other to inform their management of AI integration. Regulators are waiting for more firms to adopt AI systems to guide the formulation of regulations, while firms are waiting on regulators to release guidelines before investing vast amounts of time and money into the

integration (Seethamraju & Hecimovic, 2023). In practice, audit firms and standard setters will

need to work together to properly facilitate the adoption of AI.

Resistance

As with the implementation of any emerging technology, the adoption of AI within the

auditing field does not occur without some resistance. Clients of auditing firms may express

concern over AI if proper cyber protection is not implemented. Auditors, both at the senior and

junior level, may be anxious due to the potential for displacement or the increasing complexity of

their roles without adequate training.

Clients

Some clients are hesitant for audit firms to adopt such advanced technology due to the

threat of cyber-attacks. Corporations who rely on cloud computing are vulnerable to hackers

stealing organizational data (Thottoli, 2022). Unless firms have the necessary security systems in

place to protect client information, clients may not be supportive of increased reliance on

intelligent systems (Boritz & Strapoulos, 2023). There is a greater prevalence of cyber security

threats as businesses integrate more technology without ensuring that proper protection exists for

sensitive information (Efe, 2023).

Though AI is expected to decrease long-term costs for audit firms, clients are concerned

that these savings will not be passed on through a reduction in audit fees. Firms may even

increase their prices citing the use of advanced systems and increased accuracy to justify raising

costs (Kend & Nguyen, 2020). Clients are unsure if the inclusion of AI in the auditing process

will have a positive effect on their operations.

Staff Auditors

Current audit staff may resist the implementation of AI. Some auditors resist the adoption as it requires them to perform extra tasks. In addition to their regular work, staff auditors must either learn or construct a new process to incorporate the use of AI tools (Lien et al., 2020). Regardless of whether the use of AI tools will increase auditor efficiency, it will take effort to learn, and individuals are most drawn to what they are familiar with (Holmes & Douglass, 2022). The mental space needed may be even more difficult to give during busy season contributing to slower incorporation of AI (Booker et al., 2023). For auditing employees that have a substantial amount of experience within the field, businesses should enact incentives. Fedyk et al. (2022) described a company that offered its employees incentives that are based on the employee's performance metrics related to their use of the AI tools.

Additionally, staff are hesitant to trust the input of AI tools over human auditors. Mpofu (2023) indicated that auditors are not likely to take into consideration computer-generated advice. The mistrust in the analyses is likely due to doubt in the proficiency of machine intelligence to perform judgment-based activities (Commerford et al., 2022). This phenomenon is referred to as "algorithm aversion" where auditors discount computer-generated estimates, especially concerning complex valuations (Mpofu, 2023).

Managers

Although there are greater concerns of the effects of AI on junior auditing staff, managers are also cautious in the adoption of the emerging technology. Senior leadership is concerned about the lack of explainability regarding the advanced technology, also known as AI's black box nature (Efe, 2023; Estep, 2023). The inability to understand and communicate the process in which AI made specific inferences would be detrimental to the creation of audit reports. An

essential requirement within the auditing process is the documentation of conclusions and the

audit evidence used as the basis (Zhang et al., 2022). Fulfilling this requirement would be

difficult if auditors are unable to explain the contributions of AI in making audit conclusions.

Managers may also experience greater difficulty in adapting to the use of new

technology. As they are accustomed to more traditional methods of the audit process, senior-

level auditors may be slower in learning how to work with intelligent systems and express

greater aversion to AI's implementation (Holmes & Douglass, 2022). As higher-level employees

are more involved with complicated judgments and estimates, their perception of the beneficial

effects of AI on their work may be low. Seethamraju and Hecimovic (2023) indicated that

perceived benefits are one of the driving factors for AI adoption. If auditing professionals do not

believe that machine intelligence applications will be advantageous to their work, then they are

not likely to utilize the technology. Managers' perception of AI can cause resistance to further

advancements with implementation.

Future Outlook

As AI technology is constantly evolving, it is important to be aware of which

developments will be most relevant to the audit. Recent advancements related to explaining AI

decisions or establishing ethical practices are expected to be most significant. Government

regulations are also adapting to monitor responsible usage of intelligent systems.

Explainable AI

In an effort to address the black box nature of AI, there have been recent developments in

Explainable Artificial Intelligence (XAI) in auditing. The Defense Advanced Research Projects

Agency (DARPA) defined XAI as techniques that "produce explainable models that when

combined with effective explanation techniques, enable end-users to understand, appropriately

trust, and effectively manage the emerging generation of AI systems" (DARPA, 2016, p. 5).

Zhang et al. (2022) suggested that XAI techniques could be employed by auditing firms to

improve understanding of AI applications and aid in the fulfillment of documentation

requirements. XAI would enable auditors to answer various questions such as what ML

algorithm is being used, how the algorithm works, what is the overall performance of the model,

etc. Another impact of XAI techniques include the decrease in susceptibility to biases within the

technology. If auditors are able to understand the AI analytical process, then they are more likely

to spot areas where the intelligent system used improper assumptions (Douglass & Holmes,

2022).

Digital Ethics

Along with the rise of technological innovation has been the increase in discussions of

digital ethics. Digital ethics refers to the moral principles relevant in the utilization of digital

applications (Fülöp et al., 2023). As previously touched upon, the use of intelligent systems has

numerous ethical implications, especially in a field that relies upon the reputation of its

professions. As AI applications develop, it becomes more apparent to experts that a framework

for ethical AI use is necessary. The corporate world becomes more dynamic with the

involvement of intelligent systems requiring greater guidance on ensuring the integrity of high-

level management (Munoko et al., 2020). Junior auditors could become involved in the creation

of ethical standards within the industry. They could provide support through continuous

feedback of the effects of AI or even guide developers as to where manipulation is most likely to

occur.

Updates on AI Governance

Regulations concerning the adoption of AI within audit firms are constantly evolving. Standard setters frequently release updated guidance on ethical applications of intelligent systems. As transparency is one of the main concerns, detailed disclosure is required as to when AI is being used in audit engagements and how it is being utilized (Munoko et al., 2020). Audit firms are encouraged to give descriptions on the decisions influenced by AI and the internal control processes for ensuring the validity of these decisions (Piper, 2023). A more recent topic within discussions of AI governance is the promotion of AI literacy. AI literacy is defined as the "skills, knowledge, and understanding that allows providers, users, and affected persons...to make an informed deployment of AI systems" (Piper, 2023, p. 8). Regulatory bodies are now not only focusing on setting rules but are also taking proactive steps to ensure that all stakeholders involved with AI possess the necessary knowledge to navigate its complexities.

<div align="center">

Recommendations for Junior Auditors

</div>

Junior auditors concerned over AI's impact on their career can take actions to ensure that the technological shift will be a positive experience. They can pursue a variety of professional paths to enhance their skillset. Along with improving one's technical abilities, understanding the ethical implications of intelligent systems can also increase the competitiveness of early-career auditors.

Opportunities to Develop Skills

As job displacement is a viable possibility, it is important for junior auditors to consider opportunities to adapt their skills and roles. In the process of integrating emerging technology, audit firms form organizational task units to research and develop AI tools (Goto, 2023). While these units will mainly consist of senior-level employees, junior auditors will also take part in the

process to provide support through pilot testing and adoption. Junior staff with an inclination towards data analytics are more likely to be chosen or asked to be involved with the organizational unit. Participating in these operations allows an employee to be exposed to the emerging technology, which would be advantageous for the future of their career. Additionally, audit firms are building new career paths for auditors to develop data analytics expertise and further transform the auditing profession. Possible roles include data security accountant, systems integrator, and cybercrime accountant (Almufadda & Almezeini, 2022). New audit staff should be open to these resources provided by the firm and be intentional about participating.

The Certified Public Accountant (CPA) exam, which is a common professional goal among early-career auditors, has adapted to include the assessment of informational technology skills (Ng, 2023). While topics on digital skills has been included throughout all CPA sections, junior audit staff now have the opportunity to earn a specialized certification on information systems and controls (Tysiac, 2020 as cited by Ng, 2023). Obtaining professional recognition on technology skills can increase one's competitiveness in the contemporary audit workforce.

If there are no internal opportunities for skill development, young auditors should conduct personal research into data science related workshops or conferences. Engaging in professional development seminars will allow new auditors to remain competitive within the transforming digital environment (Dogar & Scorte, 2023). Ideally, novice auditors should search for webinars that specifically discuss the integration of AI within auditing, but a greater understanding of computer programming could also be useful. Learning fundamental programming languages, such as Python and R, could help in cultivating the right mindset to learn audit-related technology (Efe, 2023).

Awareness of Ethical Implications

While it is important for junior auditors to know the benefits related to AI, it is even more

crucial that they are aware of where AI can fall short, especially in terms of ethical

considerations. As the audit industry is still within the early stages of AI adoption, ethical

guidelines and standards surrounding AI have not been fully developed. The lack of such

regulations may result in both intentional and unintentional consequences (Munoko et al., 2020).

Upholding ethics and moral behavior are pivotal to the audit profession. If they are not

maintained, the reputation of the career may once again be damaged, and auditors will lose the

trust of the public. Junior auditors have a significant role in safeguarding the profession's future

in this new era of public auditing. As the main users of the emerging technology, they should be

conscious of possible compromises to the ethics that are fundamental to the audit career (Efe,

2023). They can also inform the development of governance over the technology. By providing

insights to areas where internal controls or standards are lacking, young auditors can facilitate

the transformation of the career while maintaining its fundamental values.

Conclusion

In conclusion, the exponential growth and widespread incorporation of AI into the field

of auditing have raised significant concerns regarding its impact on the future of the new

professionals entering the field. This paper has explored the multifaceted ways in which AI is

influencing auditing practices, bringing exposure on the nuanced transformations occurring in

the roles and responsibilities of junior auditors. Rather than displacing junior auditors, AI is

reshaping their functions, emphasizing the interdependent relationship between human experts

and technological advancements.

The profound impact of AI on the auditing landscape results in both opportunities and challenges. On one hand, AI presents the prospect of enhancing efficiency, accuracy, and analytical capabilities within the auditing process, thereby enabling young auditors to focus on more strategic and value-added tasks. On the other hand, it introduces complexities related to ethical considerations, data privacy, and the potential for algorithmic biases, necessitating a thoughtful and proactive approach to mitigate these challenges.

Successfully navigating the evolving landscape of AI-augmented auditing demands a concerted effort from various stakeholders. Proactive measures are essential to ensure a seamless and responsible integration of AI technologies into auditing practices. This involves comprehensive training programs for auditors to upskill and adapt to the evolving technological landscape, coupled with robust regulatory frameworks that safeguard against potential risks and ethical dilemmas associated with AI implementation in auditing.

In essence, the coexistence of AI and junior auditors can elevate the auditing profession to new standards. Early-career professionals should embrace the transformative power of AI in auditing instead of rejecting it. By proactively involving themselves in opportunities to enhance their skills, junior auditors can remain competitive in the rapidly advancing digital era.

References

Almufadda, G., & Almezeini, N. A. (2022). Artificial intelligence applications in the auditing

profession: A literature review. *Journal of Emerging Technologies in Accounting, 19*(2),

29-42. https://doi.org/10.2308/JETA-2020-083

Booker, D. D., Pelzer, J. R. E., & Richardson, J. R. (2023). Integrating data analytics into the

auditing curriculum: Insights and perceptions from early-career auditors. *Journal of*

Accounting Education, 64, 1-13. https://doi.org/10.1016/j.jaccedu.2023.100856

Boritz, J. E., & Stratopoulos, T. C. (2023). AI and the accounting profession: Views from

industry and academia. *The Journal of Information Systems, 37*(3), 1-9.

https://doi.org/10.2308/ISYS-2023-054

Brender, N., Gauthier, M., Morin, J., & Salihi, A. (2019). The potential impact of blockchain

technology on audit practice. *Journal of Strategic Innovation and Sustainability, 14*(2),

35-59.

https://go.openathens.net/redirector/liberty.edu?url=https://www.proquest.com/scholarly-

journals/potential-impact-blockchain-technology-on-audit/docview/2305775259/se-2

Bressler, L., & Pence, D. (2019). Skills needed by new accounting graduates in a rapidly

changing technological environment. *Journal of Organizational Psychology, 19*(2), 50-

59.

https://go.openathens.net/redirector/liberty.edu?url=https://www.proquest.com/scholarly-

journals/skills-needed-new-accounting-graduates-rapidly/docview/2277978380/se-2

Chung-Lien, P., Yu-Chun, P., Xu, Z., Chen, Z., Lin, Y., Qiu, J., Lin, Z., & Li, J. (2020).

Accounting, auditing, accountability: Key insights from a multidisciplinary review of AI

and big data literature. *IOP Conference Series.Materials Science and Engineering, 806*(1), 1-5. https://doi.org/10.1088/1757-899X/806/1/012018

Commerford, B. P., Dennis, S. A., Joe, J. R., & Ulla, J. W. (2022). Man versus machine: Complex estimates and auditor reliance on artificial intelligence. *Journal of Accounting Research, 60*(1), 171–201. https://doi.org/10.1111/1475-679X.12407

Dogar, C., & Scorte, C. M. (2023). Artificial intelligence and jobs' future prospects in accounting and financial auditing. *Economic Science Series, 32*(1), 403–416. https://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=169989432&site=ehost-live&scope=site

Dotel, R. P. (2020). Artificial intelligence: Preparing for the future of audit. *International Journal of Government Auditing, 47*(4), 32–34. https://go.openathens.net/redirector/liberty.edu?url=https://www.proquest.com/scholarly-journals/artificial-intelligence-preparing-future-audit/docview/2468575008/se-2

Efe, A. (2023). The future of the audit related professions in the light of risk and benefits of artificial intelligence advancements. *Pamukkale Üniversitesi İşletme Araştırmaları Dergisi, 10*(2), 424-450. https://doi.org/10.47097/piar.1259538

Estep, C., Griffith, E. E., & MacKenzie, N. L. (2023). How do financial executives respond to the use of artificial intelligence in financial reporting and auditing? *Review of Accounting Studies*, https://doi.org/10.1007/s11142-023-09771-y

Fedyk, A., Hodson, J., Khimich, N., & Fedyk, T. (2022). Is artificial intelligence improving the audit process? *Review of Accounting Studies, 27*(3), 938-985. https://doi.org/10.1007/s11142-022-09697-x

Fülöp, M. T., Topor, D. I., Constantin, A. I., Cifuentes-Faura, J., & Măgdaș, N. (2023). Ethical

concerns associated with artificial intelligence in the accounting profession: A curse or a

blessing? *Journal of Business Economics and Management, 24*(2), 387-404.

https://doi.org/10.3846/jbem.2023.19251

Goto, M. (2023). Anticipatory innovation of professional services: The case of auditing and

artificial intelligence. *Research Policy, 52*(8), 104828.

https://doi.org/10.1016/j.respol.2023.104828

Hardies, K. (2023). A survival analysis of organizational turnover in the auditing profession.

MAB, 97(1/2), 5-16. https://doi.org/10.5117/mab.97.90216

Holmes, A. F., & Douglass, A. (2022). Artificial intelligence: Reshaping the accounting

profession and the disruption to accounting education. *Journal of Emerging Technologies

in Accounting, 19*(1), 53–68. https://doi.org/10.2308/JETA-2020-054

Imoniana, J. O., Filho, D. C. N., Cornacchione, E. B., Reginato, L., & Benetti, C. (2023). Impact

of technological advancements on auditing of financial statements. *European Research

Studies, 26*(4), 131.

https://link.gale.com/apps/doc/A772343830/GBIB?u=vic_liberty&sid=summon&xid=45

2e38e5

Karmańska, A. (2022). Artificial intelligence in audit. *Research Papers of the Wroclaw

University of Economics, 66*(4), 87–99. https://doi.org/10.15611/pn.2022.4.06

Kend, M., & Nguyen, L. A. (2020). Big data analytics and other emerging technologies: The

impact on the Australian audit and assurance profession. *Australian Accounting Review,

30*(4), 269-282. https://doi.org/10.1111/auar.12305

Knechel, W. R., Mao, J., Qi, B., & Zhuang, Z. (2021). Is there a brain drain in auditing? the

    determinants and consequences of auditors leaving public accounting. *Contemporary*

    Accounting Research, 38(4), 2461-2495. https://doi.org/10.1111/1911-3846.12702

Lazăr Pleșa, T., Popescu, C., & Pleșa, I. T. (2023). From digitization to artificial intelligence in

    external public audit. *Valahian Journal of Economic Studies, 14*(1), 47–59.

    https://doi.org/10.2478/vjes-2023-0006

Louwers, T.J., Bagley, P.L., Blay, A.D., Strawser, J.R., & Thibodeau, J.C. (2023). *Auditing &*

    assurance services. McGraw Hill.

Mpofu, F. Y. (2023). The application of artificial intelligence in external auditing and its

    implications on audit quality? A review of the ongoing debates. *International Journal of*

    Research in Business and Social Science, 12(9), 496-512.

    https://doi.org/10.20525/ijrbs.vl2i9.2737

Munoko, I., Brown-Liburd, H. L., & Vasarhelyi, M. (2020). The ethical implications of using

    artificial intelligence in auditing. *Journal of Business Ethics, 167*(2), 209-234.

    https://doi.org/10.1007/s10551-019-04407-1

Ng, C. (2023). Teaching advanced data analytics, robotic process automation, and artificial

    intelligence in a graduate accounting program. *Journal of Emerging Technologies in*

    Accounting, 20(1), 223-243. https://doi.org/10.2308/JETA-2022-025

Oduro, S., Moss, E., & Metcalf, J. (2022). Obligations to assess: Recent trends in AI

    accountability regulations. *Patterns, 3*(11), 100608-100608.

    https://doi.org/10.1016/j.patter.2022.100608

Perdana, A., Lee, W. E., & Mui Kim, C. (2023). Prototyping and implementing robotic process

    automation in accounting firms: Benefits, challenges, and opportunities to audit

automation. *International Journal of Accounting Information Systems*, 51, 100641.

https://doi.org/10.1016/j.accinf.2023.100641

Piper, D. (2023). Regulatory update: Developments in artificial intelligence governance. *Journal of Internet Law, 27*(1), 1–16.

https://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=164967945&site=ehost-live&scope=site

Rikhardsson, P., Thórisson, K.,R., Bergthorsson, G., & Batt, C. (2022). Artificial intelligence and auditing in small- and medium-sized firms: Expectations and applications. *AI Magazine, 43*(3), 323-336. https://doi.org/10.1002/aaai.12066

Saunders, K. K., Keune, M. B., & Hawkins, E. M. (2023). More than making copies: Survey evidence on the work of novice auditors. *Auditing: A Journal of Practice and Theory, 35*(3), 131-156. https://doi.org/10.2308/AJPT-2020-124

Seethamraju, R., & Hecimovic, A. (2023). Adoption of artificial intelligence in auditing: An exploratory study. *Australian Journal of Management, 48*(4), 780-800.

https://doi.org/10.1177/03128962221108440

Thottoli, M. M., Essia, R. A., & Thomas, K. V. (2022). Emerging technology and auditing practice: analysis for future directions. *European Journal of Management Studies, 27*(1), 99-119. https://doi.org/10.1108/EJMS-06-2021-0058

Tiron-Tudor, A., & Deliu, D. (2022). Reflections on the human-algorithm complex duality perspectives in the auditing process. *Qualitative Research in Accounting and Management, 19*(3), 255-285. https://doi.org/10.1108/QRAM-04-2021-0059

Vasarhelyi, M. A., Moffitt, K. C., Stewart, T., & Sunderland, D. (2023). Large language models:

An emerging technology in accounting. *Journal of Emerging Technologies in*

Accounting, 20(2), 1–10. https://doi.org/10.2308/JETA-2023-047

Westermann, K. D., Bedard, J. C., & Earley, C. E. (2015). Learning the "craft" of auditing: A

dynamic view of auditors' on-the-job learning. *Contemporary Accounting Research,*

32(3), 864-896. https://doi.org/10.1111/1911-3846.12107

Zhang, A. C., Cho, S., & Vasarhelyi, M. (2022). Explainable artificial intelligence (XAI) in

auditing. *International Journal of Accounting Information Systems,* 46.

https://doi.org/10.1016/j.accinf.2022.100572