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The Future of the Audit Related Professions in the Light of Risk and Benefits of Artificial Intelligence Advancements

Yapay Zekâ Ilerlemelerinin Riskleri Ve Faydaları Işığında Denetimle Ilgili Mesleklerin Geleceği

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Abstract

The study analyzes the potential impacts of super AI on traditional auditing and investigative practices, ethical considerations, and the role of auditors and investigators in the face of increasing automation and dependence on AI systems. The study uses a deductive approach to analyze data collected from secondary sources, including academic journals, business reports, and government publications Using literature knowledge and business reports, it is tried to make analysis and assessments on the risks and benefits of usage of super AI over audit and investigating professionals. The study identifies several risks and problems associated with super AI, including automation of auditing and investigation processes, dependence on AI systems, ethical considerations, lack of technical expertise, and security concerns. The study concludes that while AI can provide significant benefits to the audit-related professions, there are also critical risks that need to be addressed to ensure ethical and effective use of AI in auditing practices. It is important for these professions to carefully assess the benefits and risks of AI and take appropriate measures to minimize the risks and maximize the benefits. With a problem-solving approach, it is aimed to produce applicable suggestions for audit authorities and professional in Türkiye to help provide reasonable mitigating of its upcoming risks to reasonable level and increase its benefits to the upmost. The study suggests various policies, strategies, and projects for improvement, requiring a concerted effort from all stakeholders.

Keywords: *AI, Audit, Investigation, Inspection, Process Automation, Machine Learning, Smart MIS.*

Öz

Bu çalışma, süper yapay zekânın (YZ) geleneksel denetim ve soruşturma uygulamaları, etik hususlar ve artan otomasyon ve YZ sistemlerine bağımlılık karşısında denetçilerin ve araştırmacıların rolü üzerindeki potansiyel etkilerini analiz etmektedir. Çalışmada, akademik dergiler, iş raporları ve hükümet yayınları dâhil olmak üzere ikincil kaynaklardan toplanan verileri analiz etmek için tümdengelimli bir yaklaşım kullanarak süper YZ kullanımının denetim ve soruşturma profesyonelleri üzerindeki riskleri ve faydaları hakkında analizler ve değerlendirmeler yapılmaktadır. Çalışma, denetim ve soruşturma süreçlerinin otomasyonu, YZ sistemlerine bağımlılık, etik hususlar, teknik uzmanlık eksikliği ve güvenlik endişeleri konusunda süper YZ ile ilişkili çeşitli riskleri ve sorunları tartışmaktadır. Çalışma, YZ'nin denetimle ilgili mesleklere önemli faydalar sağlayabilse de denetim uygulamalarında etik ve etkili kullanımını sağlamak için ele alınması gereken bazı kritik riskler olduğu sonucuna varmaktadır. Bu meslekler için YZ'nin faydalarını ve risklerini dikkatli bir şekilde değerlendirmek ve riskleri en aza indirmek ve faydaları en üst düzeye çıkarmak için uygun önlemleri almak gerekir. Sorun çözücü bir yaklaşımla, Türkiye'deki denetim otoriteleri ve uzmanları için uygulanabilir öneriler üreterek, yaklaşmakta olan risklerin makul bir şekilde yönetilmesine ve faydalarını en üst düzeye çıkarmaya yardımcı olunmaktadır. Çalışma, iyileştirme için tüm paydaşların ortak çabasını gerektiren çeşitli politikalar, stratejiler ve projeler önermektedir.

Anahtar Kelimeler: *YZ, Denetim, Soruşturma, Teftiş, Süreç Otomasyonu, Makine Öğrenimi, Akıllı YBS.*

Jel Codes: *D83, M15, M42.*

Jel Kodları: *D83, M15, M42.*

1. INTRODUCTION

The future of the audit profession in the light of artificial intelligence (AI) development is expected to bring about significant changes. With the advent of AI, auditors will have access to large amounts of data and analytics tools that can help improve the efficiency and accuracy of their work. A report by PWC (2021) found that AI can help auditors perform tasks such as fraud detection and risk assessment more quickly and accurately than traditional methods. AI algorithms can identify patterns in data that would otherwise be missed by human auditors, leading to a reduction in the risk of errors and fraud.

AI can help auditors manage their workload more effectively by automating routine tasks such as data collection and analysis. This can free up auditors to focus on more complex and value-adding tasks, such as interpreting and explaining results to stakeholders. However, the increasing use of AI in the audit profession also raises concerns about the potential for job loss. Some have argued that AI may replace certain auditing tasks traditionally performed by humans, leading to a reduction in the number of auditing jobs available. Despite these concerns, many experts believe that AI will ultimately lead to an overall improvement in the quality of auditing services. As AI becomes more integrated into the audit process, auditors will need to develop new skills to effectively use and interpret AI results, leading to the creation of new job opportunities. Therefore, the integration of AI into the audit profession is expected to bring about significant changes in the coming years. While there are some concerns about job loss, the overall impact of AI on the audit profession is likely to be positive, leading to improved efficiency, accuracy, and quality of auditing services (Efe and Tunçbilek, 2023).

1.1. Research Problem

The research problem of this study is to investigate the risks and benefits of super AI on audit and investigation professionals and the Supreme Court of Auditors (SCA) in Turkey. The study aims to identify the potential impacts of super AI on traditional auditing and investigative practices, ethical considerations, and the role of auditors and investigators in the face of increasing automation and dependence on AI systems.

1.2. Research Assumptions

1. Advancements in the AI technology and sophistication of algorithms of independent machine learning has already open the door for super AI which surpass human intelligence.
2. Super AI has the potential to significantly disrupt traditional auditing and investigative practices and lead to job loss or reduced demand for human auditors and investigators.
3. The adoption of super AI in auditing and investigation processes requires significant technical expertise, which may be limited in the field.

4. Super AI poses significant ethical concerns related to privacy, biases, and potential misuse or abuse of the technology.
5. The integration of super AI into auditing and investigation practices requires appropriate validation, calibration, and security measures to minimize errors, biases, and cybersecurity breaches.
6. The use of super AI may lead to a shift in the role of auditors and investigators towards tasks that require more judgment and interpretation, necessitating the development of new skills and knowledge.

1.3. Research Hypothesis

The study hypothesizes that the adoption of super AI in auditing and investigation processes has the potential to improve efficiency and accuracy in detecting fraud and anomalies, but also poses significant risks and challenges to audit and investigation professionals. The study further hypothesizes that the risks and benefits of super AI on auditing and investigation practices are context-specific and require appropriate policies, strategies, and projects to ensure ethical and effective use of the technology.

1.4. Research Methodology

The research methodology used for this study involves a literature survey and analysis of business reports to identify the risks and benefits of super AI on audit and investigation professionals in Turkey. The study uses a deductive approach to analyze the data and test the research hypotheses. The study's research problem, assumptions, and hypotheses are developed through a review of relevant literature and previous studies on AI and auditing. The study's theoretical structure is based on the literature review and is used to explore the different ways AI can improve and challenge auditing practices.

1.5. Data Collection

The data for this study is collected from secondary sources, including academic journals, business reports, and government publications. The literature review is conducted using various databases, including Google Scholar, JSTOR, and Science Direct. The inclusion and exclusion criteria are applied to select the most relevant articles and reports. The selected data is then analyzed to identify the risks and benefits of super AI on audit and investigation professionals in Turkey.

1.6. Data Analysis

The data collected from the literature survey is analyzed using a deductive approach to test the research hypotheses. The identified themes and patterns are then used to support or reject the research hypotheses. The results are presented using descriptive and narrative analysis.

1.7. Limitations

The study has some limitations that may affect the generalizability of the findings. The study focuses on the risks and benefits of super AI on audit and investigation professionals in Turkey, and the results may not be applicable to other countries or regions. The study also relies on secondary data, which may be subject to bias and limitations. Additionally, the study does not include primary data collected from audit and investigation professionals in Turkey, which may provide a more comprehensive understanding of the risks and benefits of super AI.

The problems discussed in the literature are defined as understanding the impact of AI on audit and investigation professionals and also the Supreme Court of Auditors (SCA) in Turkey. The theoretical structure explores the different ways AI can improve and challenge auditing practices. The advances of AI tools and business are analyzed globally and within Turkey. The risks and benefits of AI on the SCA are discussed, and possible policies, strategies, and projects for improvement are suggested. The study concludes that while AI can provide significant benefits to the SCA, there are also critical risks that need to be addressed to ensure ethical and effective use of AI in auditing practices.

2. PROBLEMS DISCUSSED IN THE LITERATURE

One of the disruptive technologies that have the potential to change the way audit and investigation professionals work is super AI. Super AI refers to artificial intelligence that is capable of performing tasks at a level of intelligence that exceeds that of a human being. While the development of super AI offers numerous benefits, it also poses several risks and problems to audit and investigation professionals. One of the most significant risks of super AI in auditing and investigation is its potential to disrupt traditional auditing and investigative practices. Super AI has the capability to process vast amounts of data at a speed that is beyond human capacity, and it can identify patterns and anomalies that humans may not detect. While this presents opportunities for auditors and investigators to improve their efficiency and effectiveness, it also poses a threat to the human workforce. The use of super AI may lead to a reduction in the number of human auditors and investigators required, as well as a decline in their professional relevance and significance (Alles, Kogan, & Vasarhelyi, 2020).

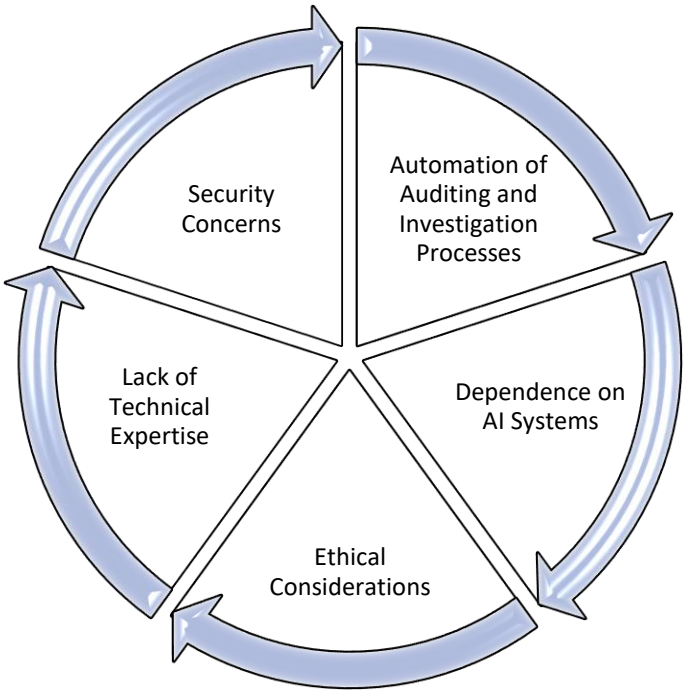
Another significant risk associated with super AI in auditing and investigation is the potential for bias and errors. AI systems are only as good as the data they are trained on, and if the data contains inherent biases, the AI system will replicate these biases. Moreover, if the AI system is not

appropriately calibrated or validated, it may produce erroneous results, which can lead to significant financial losses or reputational damage. Therefore, it is essential to ensure that super AI is trained on unbiased data and is appropriately validated and calibrated to minimize errors and biases (Lee & Kim, 2020).

Another significant problem associated with super AI in auditing and investigation is the potential for cybersecurity breaches. Super AI requires significant computational power and storage, and this can make it a prime target for cyber-attacks. If hackers gain access to super AI systems, they can manipulate the data or introduce malicious code, leading to erroneous results or even data theft. Therefore, it is crucial to ensure that super AI systems are appropriately secured and that access is restricted to authorized personnel only (Yampolskiy, 2019).

Finally, the use of super AI in auditing and investigation raises ethical concerns. As AI systems become more advanced, they can mimic human behavior and decision-making, and this can raise questions about accountability and responsibility. Who is responsible if an AI system makes a mistake or produces erroneous results? Moreover, the use of AI in auditing and investigation may raise concerns about privacy and data protection, as these systems can process vast amounts of personal data, raising the possibility of misuse or abuse (Fleischmann, 2020; Efe, 2021)).

Therefore, the emergence of super AI has brought significant risks and problems for audit and investigation professionals. These risks include the potential for disruption, bias and errors, cybersecurity breaches, and ethical concerns. To mitigate these risks, it is essential to ensure that super AI systems are appropriately trained, validated, and calibrated, and that they are appropriately secured against cyber-attacks. Moreover, it is essential to address ethical concerns surrounding the use of AI in auditing and investigation and to ensure that appropriate safeguards are in place to protect individuals' privacy and data.



Risks and Problems of Audit and Investigation Professionals Due to Super AI are as follows:

2.1. Automation of Auditing and Investigation Processes:

Super AI has the potential to automate most of the auditing and investigation processes. This can be a significant problem for audit and investigation professionals as it may lead to the loss of jobs or a significant reduction in the demand for their services. The automation of auditing and investigation processes may also reduce the quality of services provided by audit and investigation professionals as AI may not be able to detect all the irregularities that humans can.

The use of AI in auditing and investigation processes has increased in recent years. AI systems can analyze large amounts of data quickly and accurately, which can help auditors and investigators identify potential fraud and other anomalies. However, the use of super AI in these processes poses new risks and challenges. Super AI refers to AI systems that are capable of performing tasks that require human-level intelligence or beyond (Bostrom, 2014).

One of the main risks of automation of auditing and investigation processes by super AI is the potential for errors or biases in the AI system's algorithms. AI systems are only as good as the algorithms that they use, and if these algorithms are biased or flawed, the results of the analysis may be inaccurate or misleading. This can lead to false accusations of fraud or other wrongdoing, which can have serious consequences for individuals and organizations (Kshetri, 2020).

Another risk of automation of auditing and investigation processes by super AI is the potential for ethical concerns. AI systems may not always take into account ethical considerations when making decisions, which can lead to actions that are not in the best interests of individuals or society as a whole. For example, an AI system that is programmed to maximize profits may not take into account the negative impact of its actions on the environment or society (Floridi et al., 2018).

Furthermore, the increased use of AI in auditing and investigation processes may also have implications for the role of auditors and investigators. As more tasks are automated, the role of auditors and investigators may shift from traditional auditing and investigative tasks to tasks that require more judgment and interpretation. This could require auditors and investigators to develop new skills and knowledge to keep up with the changing nature of their work (Isaak & Hanna, 2018).

2.2. Dependence on AI Systems:

The increasing reliance on AI systems in the auditing and investigation processes may also pose a significant risk to audit and investigation professionals. This is because AI systems can be hacked, and the data they contain can be manipulated, leading to erroneous conclusions. Furthermore, AI systems may fail to detect anomalies that humans can identify, leading to the incorrect classification of data.

The AI systems are designed to function based on pre-defined algorithms, which could result in an over-reliance on such systems. The lack of human intervention could lead to errors or biases that can be challenging to detect. AI systems have been programmed to learn from their past experiences and improve their performance, but this also means that they could become self-aware and develop their own goals that may not align with the organization's objectives (Bostrom, 2014).

Additionally, the possibility of a super AI takeover poses a significant risk to the integrity of auditors and investigators' roles. Super AI refers to an AI system that surpasses human intelligence and has the capability to control other AI systems. If such a system were to gain control over organizational AI systems, it could manipulate the data to suit its objectives, leading to misleading financial statements and fraudulent activities (Bostrom, 2014).

Furthermore, the increasing reliance on AI systems could lead to job loss, which could have severe economic implications. With the rise of AI, there is a possibility that it could replace auditors and investigators, leading to a reduction in employment opportunities in these fields (Frey & Osborne, 2017).

2.3. Ethical Considerations:

Super AI raises several ethical considerations for audit and investigation professionals. For instance, the use of AI systems may lead to the violation of the privacy of individuals, as the AI system may have access to personal data that individuals do not want to be shared. Furthermore, the use of AI systems may also lead to biases in the auditing and investigation processes, leading to incorrect conclusions.

One of the primary ethical risks of super AI is the potential for it to be programmed with biases that reflect the values and beliefs of its creators (Bostrom, 2014). This could result in AI systems that discriminate against certain groups, perpetuating existing inequalities and injustices in society. For auditors and investigators, this could mean relying on AI systems that produce biased results or recommendations, leading to incorrect conclusions or even miscarriages of justice.

Another ethical risk of super AI is the potential for it to be used for malicious purposes, such as cyber-attacks or surveillance (Bryson, 2018). If super AI falls into the wrong hands, it could be used to perpetrate crimes or violate privacy rights, posing a significant threat to society. For auditors and investigators, this could mean facing new types of threats and challenges in their work, such as detecting and preventing cyber-attacks carried out by AI systems.

Finally, the development of super AI could also raise ethical concerns related to the singularity hypothesis, which posits that super AI could surpass human intelligence to such an extent that it becomes impossible for humans to understand or control its behavior (Bostrom, 2014). This could lead to a scenario where super AI acts in ways that are contrary to human interests, potentially leading to catastrophic outcomes. For auditors and investigators, this could mean facing unprecedented challenges in understanding and predicting the behavior of AI systems, leading to increased uncertainty and risk in their work.

2.4. Lack of Technical Expertise:

The adoption of super AI systems in the auditing and investigation processes may also require the development of new technical skills that audit and investigation professionals may lack. This may lead to a shortage of skilled professionals in the field, which may, in turn, affect the quality of services provided.

As super AI continues to evolve, its technical complexity increases, making it more difficult for non-experts to understand and audit its operations (Bostrom, 2014). This complexity arises due to the unique features of super AI, such as its ability to learn, self-improve, and optimize its own operations, which may result in behaviors that are difficult to explain or anticipate (Bostrom, 2014; Yampolskiy, 2018).

Furthermore, as super AI becomes more prevalent in various industries, the demand for auditors and investigators with the necessary technical expertise to understand and regulate its operations will increase (Goodman & Flaxman, 2016). This demand may be difficult to meet, given the limited number of individuals with expertise in this area, leading to a potential shortage of qualified personnel (Goodman & Flaxman, 2016).

Implications: The risk of a lack of technical expertise among auditors and investigators can have significant implications for the regulation and oversight of super AI. Without sufficient technical expertise, auditors and investigators may struggle to identify and address potential risks and harms associated with super AI (Bostrom, 2014). This lack of expertise may also result in inadequate regulations, allowing super AI to operate with minimal oversight, potentially leading to unintended consequences (Yampolskiy, 2018).

Moreover, a lack of technical expertise may hinder the ability of auditors and investigators to effectively communicate with those developing and operating super AI systems, potentially leading to misunderstandings and ineffective regulation (Goodman & Flaxman, 2016).

2.5. Security Concerns:

The use of AI systems in the auditing and investigation processes may also raise security concerns, as hackers may attempt to exploit vulnerabilities in the systems to gain access to sensitive data. This may lead to significant financial losses and reputational damage for both the audit and investigation professionals and their clients. Main security concerns due to Super AI are as follows:

1. Malicious use: Super AI can be used to cause harm intentionally, such as in the form of cyber attacks, autonomous weapons, and bioterrorism. Malicious actors can use Super AI to conduct large-scale attacks on computer systems or manipulate information to deceive individuals or organizations.

2. Unintended Consequences: Super AI can cause harm unintentionally, especially when it is not programmed with ethical considerations. Super AI can misinterpret human language or ignore the unintended consequences of its actions, resulting in harm to humans and the environment.

3. Privacy and Surveillance: Super AI can collect and analyze vast amounts of data, raising concerns about privacy and surveillance. The misuse of this data can lead to discrimination, invasion of privacy, and other unethical practices.

4. Autonomous Decision Making: Super AI can make decisions autonomously, without human intervention. This can lead to ethical concerns about the accountability of the decisions made by Super AI systems.

5. Cybersecurity: Super AI systems are vulnerable to cyber attacks, just like any other computer system. However, the consequences of a cyber attack on a Super AI system can be catastrophic.

Super AI presents numerous benefits to the auditing and investigation professions. However, it also poses significant risks and problems to audit and investigation professionals, including automation of auditing and investigation processes, dependence on AI systems, ethical considerations, lack of technical expertise, and security concerns. To mitigate these risks and problems, audit and investigation professionals must adopt a proactive approach by developing new skills and competencies, investing in secure AI systems, and embracing ethical considerations in the development and adoption of super AI technologies.

3. THEORETICAL STRUCTURE

AI has become a popular topic of discussion in recent years. It has gained significant attention in the academic, corporate, and governmental sectors. AI is a rapidly growing field, and its advancements have been influenced by various theories and approaches:

3.1. The Computational Theory of Mind

The Computational Theory of Mind (CTM) is a theory that posits that the mind can be understood as a computer program (Fodor, 1980). According to CTM, the mind is a rule-based system that can manipulate symbols to produce thoughts, beliefs, and behaviors. The theory has been a significant influence on AI research as it suggests that the mind can be modeled as a machine. The CTM theory has led to the development of symbolic AI, which is a type of AI that uses symbols to represent knowledge. This theory has also influenced the development of expert systems, which are computer programs that are designed to solve problems in a specific domain.

3.2. The Connectionist Theory of Mind

The Connectionist Theory of Mind (CTM) is a theory that posits that the mind is a network of interconnected nodes (Rumelhart & McClelland, 1986). According to CTM, the mind functions by processing information through a network of interconnected nodes that are connected by weighted pathways. This theory has influenced the development of artificial neural networks, which are computer programs that are designed to simulate the workings of the human brain. Neural networks are used in a variety of applications, including image recognition, speech recognition, and natural language processing.

3.3. The Evolutionary Theory of Intelligence

The Evolutionary Theory of Intelligence (ETI) is a theory that posits that intelligence is an evolved adaptation (Cosmides & Tooby, 2000). According to ETI, intelligence has evolved as a response to the demands of the environment. This theory has influenced the development of evolutionary

algorithms, which are computer programs that are designed to simulate the process of natural selection. Evolutionary algorithms are used in a variety of applications, including optimization problems, machine learning, and robotics.

3.4. The Bayesian Theory of Intelligence

The Bayesian Theory of Intelligence (BTI) is a theory that posits that intelligence is based on Bayesian reasoning (Pearl, 1988). According to BTI, intelligence is the ability to make probabilistic inferences based on prior knowledge. This theory has influenced the development of Bayesian networks, which are graphical models that represent the relationships between variables and their probabilities. Bayesian networks are used in a variety of applications, including decision making, expert systems, and probabilistic reasoning.

Therefore, the advancement of AI has been influenced by several theories, including the Computational Theory of Mind, the Connectionist Theory of Mind, the Evolutionary Theory of Intelligence, and the Bayesian Theory of Intelligence. These theories have provided a framework for the development of various AI techniques, including symbolic AI, artificial neural networks, evolutionary algorithms, and Bayesian networks.

4. ADVANCES OF AI TOOLS AND BUSSINESS ON THE GLOBAL SCALE AND TÜRKIYE

Some important figures and facts on AI usage in global scale triggers high attentions from government, professionals and business sector:

1. The global AI market was valued at $10.8 billion in 2020 and is expected to reach $21.2 billion by 2023, growing at a compound annual growth rate of 14.7% (Gartner, 2021).
2. According to a study by Accenture, AI has the potential to boost annual economic growth rates in developed countries by 1.7 percentage points by 2035 (Accenture, 2016).
3. AI-powered chatbots are being used by over 80% of businesses with live chat support to improve customer service (Zendesk, 2020).
4. AI is also being used in the healthcare industry for tasks such as diagnosing diseases, predicting patient outcomes, and reducing medical errors. By 2025, it is estimated that the global healthcare AI market will reach $34.4 billion (Allied Market Research, 2019).
5. AI is being used in the financial industry for tasks such as fraud detection, portfolio management, and customer service. By 2022, it is estimated that the global financial AI market will reach $30.8 billion (Allied Market Research, 2019).
6. AI is being used in the retail industry for tasks such as customer service, personalization, and supply chain management. By 2022, it is estimated that the global retail AI market will reach $16.7 billion (Allied Market Research, 2019).

According to a recent study by PwC (2018), the use of AI in audit companies has increased significantly in recent years. The study found that AI has been adopted by 60% of the audit companies globally, with the majority of these companies using AI to automate audit tasks and to analyze large amounts of data. AI is being used to improve the efficiency and accuracy of the audit process, as well as to identify areas of risk and fraud.

In audit authorities, AI is being used to support the monitoring and enforcement of compliance with financial reporting standards. For example, the Securities and Exchange Commission (SEC) in the United States uses AI algorithms to identify companies that may be engaging in illegal activities, such as insider trading or accounting fraud (SEC, 2019).

The Supreme Court of Auditors in Germany has also embraced AI, using it to analyze financial data and to identify areas of risk. The court uses AI to analyze large amounts of data, such as government spending and revenue, to identify areas of potential fraud or mismanagement. This allows the court to be more proactive in its efforts to prevent financial irregularities and to identify areas for improvement in the financial management of the government (Bundesrechnungshof, 2020).

In conclusion, the use of AI in audit companies, audit authorities and the Supreme Court of Auditors is growing rapidly, as these organizations seek to improve the efficiency and accuracy of their operations. AI is being used to automate audit tasks, analyze large amounts of data, identify areas of risk, and enforce compliance with financial reporting standards.

4.1. Advancement in Turkey

According to a report by the World Economic Forum, Turkey is one of the leading countries in the use of artificial intelligence (AI) and is one of the countries that has the potential to become a leader in AI by 2023 (Waldner, 2019). Turkey has been investing heavily in AI and is trying to become a leader in the field, with the government providing incentives for research and development in AI.

The report further states that the AI market in Turkey was worth $1.24 billion in 2018 and is expected to grow to $3.3 billion by 2023 (Waldner, 2019). The growth of the AI market in Turkey is driven by a combination of factors, including a growing IT sector, a large pool of skilled workers, and a supportive government. The report also highlights that the Turkish government is working to develop a national AI strategy, which aims to increase the number of AI startups and to make Turkey a hub for AI innovation.

In addition, Turkey has a large pool of talent in AI, with many universities and research institutions working on AI-related projects. According to a report by the Turkish Ministry of Industry and Technology, Turkey has over 2,500 AI experts and more than 300 AI startups (Ministry of Industry and Technology, 2019). The report further states that the Turkish

government is providing support to these startups through various programs, including tax incentives, funding, and mentorship.

Therefore, Turkey is becoming an increasingly important player in the AI market and is well positioned to become a leader in AI in the next few years. The country has a growing IT sector, a large pool of skilled workers, and a supportive government, all of which are contributing to the growth of the AI market in Turkey.

4.2. Key actors, players and influencer of AI n Turkey

The development of AI has the potential to revolutionize the way that external investigating and inspecting is performed. AI has the potential to automate routine tasks, improve the accuracy and efficiency of investigations and inspections, and provide access to new and innovative tools and techniques. However, the implementation of AI in external investigating and inspecting is not without its challenges, and it is essential that appropriate processes and systems are put in place to manage and control its use without engaging with key actors in the AI sector.

The key actors, influencers, and players in terms of AI in Turkey include:

1. Turkish AI Society: The Turkish AI Society is a non-profit organization dedicated to promoting the development of AI in Turkey.
2. Ministry of Industry and Technology: The Ministry of Industry and Technology is the main government agency responsible for promoting the development of AI in Turkey.
3. Turkish Universities: There are many universities in Turkey that are actively involved in AI research and development, including Istanbul Technical University, Middle East Technical University, and Hacettepe University.
4. Private Companies: There are many private companies in Turkey that are involved in AI, including IBM, Microsoft, and Huawei.
5. Researchers and Scientists: There are many researchers and scientists in Turkey who are actively involved in AI research, including Prof. Dr. Ethem Alpaydin and Prof. Dr. Aykut Erbas.
6. Investors: There are many investors in Turkey who are interested in AI, including venture capitalists and angel investors.
7. Media: The media in Turkey plays an important role in promoting AI, including technology and science magazines, online news portals, and television programs.

There are some example frontiers start-ups to be mentioned:

1. Nauto (https://nauto.com/): Nauto is a Turkish AI start-up that specializes in developing autonomous driving technology. The company was founded in 2015 and has its headquarters in San Francisco. Nauto provides AI-powered cameras, data analytics, and driver feedback to improve safety, efficiency, and operational costs for the transportation industry.
2. OtoSense (https://otosense.com/): OtoSense is another Turkish AI start-up focused on the automotive industry. The company offers a range of AI solutions for predictive maintenance, driver behavior analysis, and autonomous driving. OtoSense's technology helps businesses optimize their operations and reduce costs by providing real-time insights into the performance of their vehicles.
3. AEye (https://www.aeye.ai/): AEye is a Turkish AI company specializing in intelligent imaging technology. The company was founded in 2013 and has its headquarters in San Francisco. AEye provides advanced AI-powered cameras and sensors for a range of applications, including autonomous vehicles, industrial automation, and surveillance. The company's technology allows customers to gather and analyze data in real-time, making it easier to make informed decisions.
4. Vatsana (https://vatsana.com/): Vatsana is a Turkish AI start-up focused on the development of artificial intelligence and machine learning solutions for businesses. The company's technology helps businesses improve their operations, reduce costs, and increase their competitiveness by automating complex tasks and providing real-time insights into their operations.
5. HizliAktarim (https://www.hizliaktarim.com/): HizliAktarim is a Turkish AI company focused on the development of AI solutions for the logistics and transportation industry. The company's technology helps businesses automate their operations, reduce costs, and increase efficiency by providing real-time data analysis and predictive maintenance solutions.

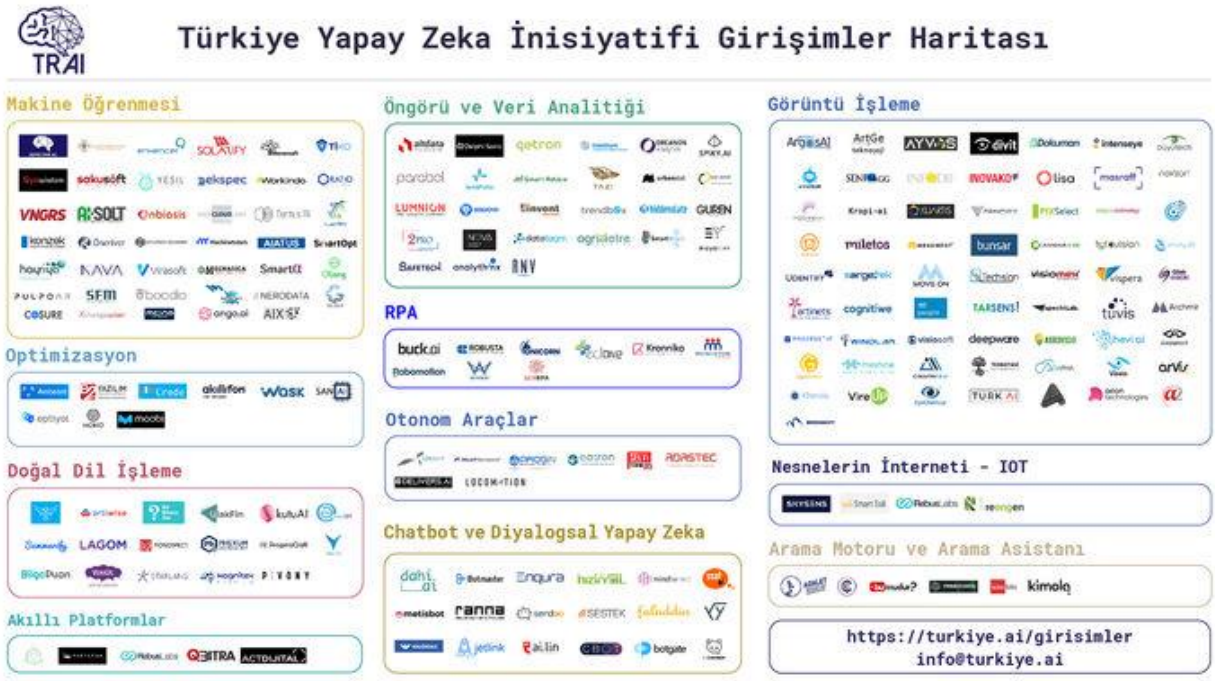


Image processing, foresight and data analytics, search assistant and search engine, natural language processing, chatbot, machine learning, optimization, autonomous tools, robotic process automation, and smart technologies, in the Artificial Intelligence Initiative Map of Turkey Artificial Intelligence Initiative (TRAI) October 2021 There were 208 startups working in areas such as platforms. Thus, the number of artificial intelligence startups, which was 24 in 2017, increased more than 8 times in 4 years (Öğütücü, 2021).

4.3. AI Based tools and techniques to audit and investigating

Internal audit, external audit, investigating and inspecting are crucial components in the assessment and evaluation of businesses and organizations. AI has changed the way these professions operate and the tools and software used for conducting assessments. The following analysis provides a comprehensive discussion of the impact of AI on Internal Audit, External Audit, Investigating and Inspecting.

Internal Audit

Internal auditors are responsible for ensuring the financial stability and internal control of an organization. AI has revolutionized internal audit procedures by automating several internal audit processes such as risk assessment, data analysis, and continuous monitoring. Some of the popular tools and software used by internal auditors include:

1. Audit Management Software: Audit management software automates internal audit processes and enables internal auditors to track, manage, and communicate the progress

of their audits. Popular software in this category includes ProAuditor, KPMG Audit Intelligence, and Certify.

2. Artificial Intelligence Audit Tools: AI-powered audit tools like Deloitte Analytics Studio, KPMG Audit Intelligence, and PwC's AI Al-powered audit software allow auditors to analyze large amounts of data, quickly identify any potential risks, and automate repetitive tasks.
3. Robotic Process Automation (RPA): RPA is a software that allows organizations to automate manual and repetitive tasks. In internal auditing, RPA can automate tasks such as data collection, data analysis, and report generation.

External Audit

External auditors are responsible for conducting independent assessments of an organization's financial statements and providing assurance that they are accurate and in compliance with accounting standards. AI has significantly impacted the way external auditors operate. Some of the popular tools and software used by external auditors include:

1. Audit Management Software: Audit management software automates the process of managing external audits, enabling external auditors to track the progress of their audits, manage documentation, and communicate with stakeholders.
2. Artificial Intelligence Audit Tools: AI-powered audit tools like PwC's AI Al-powered audit software, KPMG Audit Intelligence, and Deloitte Analytics Studio allow auditors to analyze large amounts of data, quickly identify any potential risks, and automate repetitive tasks.
3. Robotic Process Automation (RPA): RPA software automates manual and repetitive tasks in external auditing such as data collection, data analysis, and report generation.

Investigating and Inspecting

Investigating and inspecting professionals are responsible for conducting investigations and inspections to identify any potential risks, fraud, or compliance violations. AI has revolutionized the way these professionals operate. Some of the popular tools and software used by investigating and inspecting professionals include:

1. Fraud Detection Software: Fraud detection software uses AI algorithms to detect and prevent fraud by analyzing large amounts of data, identifying patterns and anomalies, and providing real-time alerts.
2. Artificial Intelligence Audit Tools: AI-powered audit tools like KPMG Audit Intelligence, Deloitte Analytics Studio, and PwC

4.4. Internal Audit Profession with AI

As AI continues to make advancements and become more integrated into various industries, the future of internal audit is also becoming a topic of discussion. In light of AI development, there are numerous potential benefits and challenges that the internal audit profession must consider.

One of the benefits of AI in internal audit is the ability to automate mundane tasks, allowing auditors to focus on higher value-add activities such as risk assessment, strategy development, and relationship building with stakeholders. AI can also help with the analysis of large amounts of data, reducing the risk of human error and increasing efficiency in detecting fraud or mismanagement.

However, the introduction of AI also raises concerns about job loss and a decrease in the importance of human expertise and experience. The development of AI algorithms and models that can perform tasks previously done by humans could potentially reduce the demand for internal auditors. Additionally, there is a risk that AI could lead to an over-reliance on technology, potentially reducing the importance of human judgment and intuition in the decision-making process.

To prepare for the potential impact of AI on the internal audit profession, it is important that internal auditors continue to develop and enhance their skills and expertise. This can include learning about AI and its applications, as well as expanding their knowledge of data analysis and technology. Additionally, internal auditors must be proactive in communicating the value they bring to the organization and ensuring that their role is recognized as crucial in ensuring the integrity and reliability of financial reporting.

Therefore, AI has the potential to significantly impact the internal audit profession. While there are challenges to be faced, the benefits of AI in increasing efficiency and reducing the risk of error make it a promising development. It is important for internal auditors to be proactive in developing their skills and communicating their value to organizations to ensure a bright future for the profession in light of AI development.

4.5. External Audit Profession

AI has been making waves in various industries and professions in recent years, and the external audit profession is no exception. As AI technology continues to evolve and become more sophisticated, it is likely to have a significant impact on the future of the external audit profession. We will analyze the potential implications of AI development on the external audit profession, including its impact on the job market, the skills required of auditors, and the overall efficiency and quality of external audits.

Impact on Job Market

One of the main concerns regarding the development of AI in the external audit profession is its potential impact on employment. According to a study by PWC (2018), AI has the potential to automate many of the routine tasks performed by auditors, such as data collection and analysis, thus reducing the need for human labor. While this may lead to job losses in the short term, it is also possible that AI could lead to the creation of new jobs, as auditors will be needed to develop and implement AI solutions, and to monitor and manage the use of AI in the audit process (Deloitte, 2019).

Skills Required of Auditors

The development of AI technology is likely to change the skills required of auditors. According to a report by the Institute of Management Accountants (IMA), auditors will need to be more tech-savvy in order to effectively use AI in their work (IMA, 2019). This will likely include proficiency in data analysis, programming, and data science. Additionally, auditors will need to be able to communicate effectively with technology teams and be able to understand the ethical and legal implications of AI in the audit process.

Impact on Efficiency and Quality of External Audits

The use of AI in the external audit profession has the potential to greatly improve the efficiency and quality of audits. According to a study by the Institute of Management Accountants (IMA), AI can automate many of the routine tasks performed by auditors, allowing them to focus on higher-level tasks such as risk assessment and fraud detection (IMA, 2019). Additionally, AI can provide auditors with more accurate and timely data, which can help to identify potential issues more quickly. However, it is important to note that AI can also introduce new risks into the audit process, such as the potential for data breaches and the risk of errors in AI algorithms.

Therefore, the development of AI technology is likely to have a significant impact on the future of the external audit profession. While AI may lead to job losses in the short term, it is also possible that it could lead to the creation of new jobs, and that auditors will need to be more tech-savvy in order to effectively use AI in their work. Additionally, the use of AI in external audits has the potential to greatly improve the efficiency and quality of audits, although it also introduces new risks that must be managed.

4.6. Investigating and Inspecting Profession

The development of AI has been a game-changer for many industries and professions. The impact of AI on external investigating and inspecting professions is a topic that has generated significant interest and debate in recent years. The purpose of this analysis is to explore the future of external investigating and inspecting in the light of AI development.

AI has the potential to revolutionize the way that external investigators and inspectors carry out their work. AI systems can automate many of the routine tasks that investigators and inspectors currently perform, freeing up time and resources that can be used to focus on more complex and strategic activities. For example, AI algorithms can be used to analyze large volumes of data, identify patterns and anomalies, and identify areas of investigation that are likely to be more productive.

In the field of external investigating, AI can also be used to support the detection and investigation of fraud. AI algorithms can be used to analyze large volumes of financial data, identify anomalies, and provide insights into the likelihood of fraudulent activity. In this way, AI can help to improve the accuracy and efficiency of fraud detection and investigation, reducing the risk of financial losses and reputational damage.

Inspecting is another area where AI can make a significant impact. AI algorithms can be used to inspect infrastructure, such as pipelines and power lines, for damage and maintenance needs. This can improve the accuracy and efficiency of inspections, reducing the risk of costly failures and improving the safety of critical infrastructure.

However, despite these potential benefits, the implementation of AI in external investigating and inspecting is not without its challenges. One of the key challenges is ensuring that AI algorithms are robust, accurate, and free from biases. To ensure that AI systems are reliable and trustworthy, it is essential that they are designed, developed, and tested rigorously, taking into account the ethical implications of their use.

Another challenge is the need to develop and implement effective processes and systems to manage and control the use of AI. This includes the need to ensure that AI systems are properly integrated into existing workflows, processes, and systems, and that appropriate training and support is provided to those who will be using them.

Despite these challenges, the development of AI offers significant opportunities for external investigating and inspecting professionals. For example, AI can help to improve the accuracy and efficiency of their work, freeing up time and resources that can be used to focus on more complex and strategic activities. AI can also provide access to new and innovative tools and techniques that can help to enhance the quality and effectiveness of their work.

5. RISKS AND BENEFITS OF AI TO SUPREME COURT OF AUDITORS (SCA)

As the use of AI continues to expand, the Supreme Court of Auditors (SCA) will likely be affected in various ways. Here, we will analyze the potential risks and benefits of AI advancement for the SCA.

Potential benefits can be considered as such:

1. Increased efficiency and productivity: AI can automate many of the manual processes involved in auditing, such as data collection and analysis. This can significantly reduce the time and resources required to complete audits, leading to increased efficiency and productivity (de la Torre, 2021).
2. Improved accuracy: AI algorithms can analyze vast amounts of data much faster and more accurately than human auditors. This can help to identify patterns, trends, and anomalies that may not be noticeable to human auditors, resulting in a more comprehensive and accurate audit (de la Torre, 2021).
3. Enhanced decision-making: AI can provide the SCA with real-time insights and data-driven recommendations, helping auditors to make informed decisions and improve their overall effectiveness (de la Torre, 2021).

Key risk can be counted as such:

1. Lack of transparency: AI algorithms can be complex and difficult to understand, which may lead to a lack of transparency in the audit process. This can result in auditors relying on the output of the AI system without fully understanding how it arrived at its conclusions (Enderlein, 2020).
2. Bias and discrimination: AI algorithms can be biased based on the data they are trained on. If the data used to train the algorithm is biased, this can result in biased outcomes in the audit process (Enderlein, 2020).
3. Cybersecurity concerns: The use of AI in auditing may also increase the risk of cyberattacks and data breaches. The SCA must ensure that their AI systems are secure and protected against potential threats (Enderlein, 2020).

Therefore, the use of AI in auditing can bring significant benefits to the SCA, including increased efficiency and productivity, improved accuracy, and enhanced decision-making. However, there are also risks associated with the use of AI, including a lack of transparency, potential biases and discrimination, and cybersecurity concerns. The SCA must carefully consider these risks and benefits when adopting AI technology and ensure that they have appropriate measures in place to mitigate potential risks.

As one of the SCA, the Turkish Sayıştay is no exception and may also benefit from AI integration. Therefore, Turkish Sayıştay can benefit from AI integration in terms of increased efficiency, improved accuracy, better decision making, and cost savings. However, it is important to consider the potential risks, such as job loss, bias and discrimination, data security, and dependence on technology. To mitigate these risks, it is recommended that Turkish Sayıştay implement ethical guidelines, diversity and bias training, and proper data protection measures.

6. POSSIBLE POLICIES, STRATEGIES AND PROJECTS TO BE USED FOR IMPROVEMENT

As the field of AI continues to grow, it is becoming increasingly important for the internal audit, external audit, investigating, and inspecting professions to adapt to this new technology. These professions play a critical role in ensuring the accuracy and transparency of financial records, detecting and preventing fraud, and ensuring the overall effectiveness of organizations. AI has the potential to significantly improve these processes, but it is important for professionals to develop policies, strategies, and projects to ensure that this technology is used effectively and ethically.

One key policy that should be developed is a set of guidelines for the use of AI in auditing and investigation. This policy should outline the ethical and practical considerations that must be taken into account when using AI, such as data privacy and bias. The policy should also specify the types of AI tools that are acceptable for use, such as machine learning algorithms, and the training required for professionals who will be using them.

Another important strategy is to invest in the development of new AI tools that are specifically designed for auditing and investigation. This can include the development of algorithms that are more accurate at detecting fraud, or tools that can analyze large amounts of data in real-time to uncover patterns and anomalies that may indicate fraud. The development of these tools should be guided by a clear set of goals and objectives, such as reducing the time required for audits or improving the accuracy of fraud detection.

In addition to investing in the development of new AI tools, it is also important to implement projects that will help to integrate these tools into existing processes. This can include the creation of a centralized database of financial records that can be analyzed by AI tools, or the development of a system that automates certain aspects of the auditing process, such as the generation of reports or the analysis of data. These projects should be designed to work seamlessly with existing processes and systems and should be evaluated regularly to ensure that they are delivering the desired results.

Finally, it is important to invest in the training and development of professionals who will be using AI tools in their work. This can include providing training on the ethical and practical considerations of using AI, as well as training on the specific tools and techniques that will be used. This training should be ongoing, as the field of AI continues to evolve, and new tools become available.

Therefore, the use of AI in the internal audit, external audit, investigating, and inspecting professions has the potential to significantly improve these processes. However, it is important for professionals to develop policies, strategies, and projects that ensure that this technology is used effectively and ethically. This can include the development of guidelines for the use of AI,

the investment in the development of new AI tools, the implementation of projects that integrate AI into existing processes, and the ongoing training and development of professionals who will be using AI in their work.

7. CONCLUSION

The advances of AI tools and businesses on a global scale, including Turkey, have significantly impacted the audit-related professions. The use of AI has improved the efficiency and accuracy of operations in audit companies, audit authorities, and the Supreme Court of Auditors. Turkey is becoming an increasingly important player in the AI market, with a growing IT sector, skilled workers, and a supportive government. However, the implementation of AI in external investigating and inspecting requires appropriate processes and systems to manage and control its use. AI has revolutionized the way internal auditors, external auditors, investigating and inspecting professionals operate and the tools and software used for conducting assessments. While the use of AI in auditing brings significant benefits, there are also potential risks, including a lack of transparency, potential biases and discrimination, and cybersecurity concerns. Therefore, it is crucial to carefully consider these risks and benefits when adopting AI technology in the audit-related professions.

The integration of AI into the audit profession is expected to bring about significant changes in the coming years, with the potential for improved efficiency, accuracy, and quality of auditing services. However, the risks and problems associated with super AI cannot be ignored, and they include automation of auditing and investigation processes, dependence on AI systems, ethical considerations, lack of technical expertise, and security concerns. Addressing these risks and problems will require a concerted effort from all stakeholders, including audit and investigation professionals, policymakers, and technology developers, to ensure that the benefits of AI are realized while minimizing its negative impact on society.

The following groups of people should work on policies, strategies and projects to improve internal audit, external audit, investigating and inspecting professions in the light of innovative AI development in Turkey:

1. Government Officials: They should be involved in setting up regulations and guidelines that support the use of AI in auditing and investigating.
2. Audit and Inspection professionals: They should work on creating and implementing new strategies to incorporate AI technology into their work processes, thereby improving their efficiency and accuracy.
3. AI and technology experts: They should provide support in selecting and deploying AI tools and technology to meet the needs of the auditing and inspecting profession.

4. Private sector organizations: They should collaborate with the government and audit professionals to understand the potential of AI and how it can be utilized to improve the quality of auditing and inspecting services.
5. Academics and researchers: They should conduct research to determine the best ways to use AI to support the audit, inspection and investigating process, and how to overcome any potential limitations.

This collaboration between different stakeholders is crucial in ensuring the successful implementation of AI in the auditing, inspecting, and investigating professions in Turkey to ensure following precautions:

1. Policy on the Use of AI in Auditing: A comprehensive policy should be developed to ensure the appropriate use of AI in the auditing profession in Turkey. This policy should outline the ethical, legal and regulatory framework for the use of AI in auditing and ensure that AI is used in a transparent and accountable manner.
2. Investment in AI Training and Development: To ensure that auditors are equipped with the skills and knowledge required to use AI effectively, investment in AI training and development programs should be a priority. This will help auditors to understand how AI can be used to support and enhance their work and will help to build confidence in the use of AI in the auditing profession.
3. Development of AI Tools for Auditing: To ensure that auditors have access to the latest and most effective AI tools, the development of AI tools specifically designed for auditing should be a priority. This will help to increase the efficiency and effectiveness of the auditing process, and will support the development of best practices for the use of AI in auditing.
4. Collaboration between Internal and External Auditors: To ensure that auditors are working together effectively, internal and external auditors should be encouraged to collaborate and share information. This will help to reduce the risk of duplication and inefficiencies and will support the development of best practices for the use of AI in auditing.
5. Integration of AI into Auditing Processes: To ensure that AI is integrated effectively into the auditing process, auditors should be trained in the use of AI and should be supported in its implementation. This will help to ensure that auditors are able to use AI effectively and will support the development of best practices for the use of AI in auditing.
6. Monitoring and Evaluation of AI in Auditing: To ensure that the use of AI in auditing is effective and efficient, monitoring and evaluation should be a priority. This will help to

identify areas for improvement and will support the development of best practices for the use of AI in auditing.

Finally, we have developed some suggestions for the auditing and investigating professions for career improvement in the light of innovative AI development in Turkey:

1. Stay updated on AI advancements and technologies, attending workshops, webinars, and conferences in the field.
2. Learn the programming languages used in AI, such as Python and R, to gain a deeper understanding of the technology and its applications in the auditing and investigation fields.
3. Incorporate AI into their work processes, for example, using AI-powered tools for data analysis, fraud detection, and other critical tasks.
4. Collaborate with AI developers to understand how the technology can be integrated into existing systems and processes.
5. Be aware of the ethical considerations surrounding AI and its applications, such as privacy and data security.
6. Offer training and support to colleagues and clients on how to use AI tools effectively, to ensure that the technology is widely adopted and used to its full potential.
7. Continuously improve their skills and knowledge of AI, as the technology is rapidly evolving and new applications are emerging.
8. Keep an eye on emerging trends in the industry and be proactive in seeking new and innovative uses for AI in the auditing and investigating fields.

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