

EFFECTS OF USING ARTIFICIAL INTELLIGENCE ON THE CERTIFIED PUBLIC
ACCOUNTANT PROFESSION: EVIDENCE FROM ISTANBUL CERTIFIED
PUBLIC ACCOUNTANTS



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İSTANBUL, 2023

PLAGIARISM

In my opinion and to the best of my understanding, I certify that this thesis is entirely my own creation, based on my own research, and that it does not, save where appropriate attribution has been made in the text, contain any data that has already been released or authored by another individual in the past, or any content that has been approved for the awarding of another degree.

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ÖZET

İşletmelerin operasyonları, maliyet tasarrufları ve operasyonel verimliliklerin bir sonucu olarak rutin işleri giderek daha fazla üstlenmesi beklenen yapay zeka (AI) tarafından büyük ölçüde değiştiriliyor. Son yıllarda, yapay zekada, özellikle muhasebe mesleğiyle ilgili olarak, işlemler kağıt ve kalem kullanılarak manuel yapılan veri girişinden bilgisayar ve yazılım kullanılarak otomatik veri girişine kaydıran muazzam ilerleme kaydedilmiştir. Bu araştırma, İstanbul Serbest Muhasebeci Mali Müşavirler Odası (İSMMM) üyelerinin yapay zeka kullanımına ilişkin farkındalık düzeylerini ve algılarını araştırmayı amaçlamaktadır. Ayrıca kişisel özelliklerin muhasebecilerin farkındalık ve algı düzeyleri üzerindeki etkisinin önemini de incelemektedir. Araştırmada tımdengelimli bir yaklaşım ve nicel bir strateji kullanıldı. İstanbul Serbest Muhasebeci Mali Müşavirler Odası'nda (İSMMM) görev yapan toplam 155 serbest muhasebeci ve mali müşavirler anketi yanıtladı. Yanıtlara istatistiksel testler yapıldı ve çalışmanın amaçlarına göre sonuçlar elde edildi. Bağımsız örneklem t-testi ve ANOVA kullanılarak elde edilen sonuçlara göre, muhasebecilerin cinsiyet, yaş, eğitim düzeyi, deneyim yılı ve çalışma alanı gibi kişisel özelliklerinin farkındalık düzeyleri üzerinde anlamlı bir etkisinin olmadığı görülmüştür. Ayrıca elde edilen sonuçlardan İSMMM üyesi serbest muhasebeci ve mali müşavirlerin muhasebe alanında yapay zeka kullanımına ilişkin algılarında genel olarak olumlu tepkiler gösterdikleri ve muhasebede yapay zeka kullanımını destekledikleri sonucuna varılmıştır.

ANAHTAR KELİMELEER: Yapay Zeka, Mali Müşavir, İstanbul Serbest Muhasebeci ve Mali Müşavirler, Muhasebe mesleği.

ABSTRACT

Financial institutions' operations are being drastically altered by artificial intelligence (AI), which, as a result of operational efficiencies and savings of cost, is predicted to take over mundane jobs more and more. The field of AI has made great strides recently, especially in relation to the accounting industry, which has moved its focus from manual data entry using paper and pencil to automated data entry using computers and software. This research aims to study the level of awareness of the certified public accountants and their perceptions on the application of AI in the field of accounting in Istanbul. It also examines the significance of the effect of personal characteristics on the level of awareness and perceptions of members of Istanbul Chamber of Certified Public Accountants (Istanbul Serbest Muhasebeci Mali Müşavirler Odası / ISMMMO). In this study a deductive approach and a quantitative strategy were used. A questionnaire was shared with accountants working in Istanbul Chamber of Certified Public Accountants. 155 responses were gathered, statistical tests were conducted, and outcomes were obtained in keeping with the study's goals. In accordance with the results obtained using an independent sample t-test and ANOVA, it was discovered that accountants' individual traits, such as gender, age, education level, years of experience, and line of business, have little bearing on how aware they are of and how they perceive the usage of AI in the field of accounting. According to the study's findings, perceptions about the use of AI in accounting are supportive of its application in the industry. Accountants generally responded positively and optimistically.

KEY WORDS: Artificial Intelligence, Certified public accountant, Istanbul Chamber of Certified Public Accountants, Accounting profession.

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ABBREVIATIONS

AI – Artificial Intelligence

CPA – Certified Public Accountant

BMO – Bank of Montreal

AGI – Artificial General Intelligence

ML – Machine Learning

DL – Deep Learning

ANI – Artificial Narrow Intelligence

ASI – Artificial Super Intelligence

IDO – Insight Driven Organization

NLP – Natural Language Processing

SEE – State Economic Enterprises

IFRS – International Financial Reporting Standards

US GAAP – Generally Accepted Accounting Principles

AICPA – American Institute of Certified Public Accountants

IRS – Internal Revenue Service

NAIS – National Association of Independent Schools

ISMMO – Istanbul Serbest Muhasebeci Mali Müşavirler Odası

OCR – Optical Character Recognition

DARPA – Defense Advanced Research Projects Agency

ALPAC – Automatic Language Processing Advisory Committee

1.INTRODUCTION

1.1 Overview

A method for teaching a computer, a robot, or a product to think, learn, and make decisions akin to those made by people is known as artificial intelligence (AI). AI has received a great deal of press in recent years owing to its several goals, including knowledge representation, planning, natural language processing, learning, reasoning, realization, and the ability to move and manipulate objects. In other words, considering that to the rapid advancement of AI technology, AI has a practical impact on every part of the globe, ranging from basic labor substitution to gradually altering people's daily life. Tasks that previously were deemed to be difficult to complete, such those that need cognitive capacity, can now be automated thanks to AI technologies (McKinsey, 2017).

AI is improving appreciations to deep learning algorithms and large data research, from Deep Blue to Watson to AlphaGo and DeepMind. Nevertheless, despite the fact that the idea of AI is not new, there have recently been many rumors and doubts about it and its potential impact. AI is a broad phrase that refers to any technique that is used to allow computers to mimic human intelligence (Stancheva-Todorova, 2018). More specifically, it refers to a system's ability to do tasks that would otherwise rely on human intelligence. Cognitive technology (thinking technologies) is a branch of AI that is used to describe individual technologies that perform certain tasks to aid planning, reasoning from incomplete or ambiguous data, and learning are all examples of human intelligence. Due to the fast growth of AI tech, which is having an impact on practically every corner of the world and changing everything from basic labor replacement to progressively altering people's daily lives, it is inevitable that AI and automation will transform nearly all jobs to some level (Frank et al., 2019).

The development of double-entry accounting, which was made more than 500 years ago, was the most recent advancement in accounting. Automation has also replaced the old

methods of data input and bookkeeping. One of the sectors leading the 21st century automation revolution is accounting (Chukwuani et al., 2020).

The information and communications technology (ICT)-based innovations of the twenty-first century have transformed how many industries do business (Chukwuani et al., 2020), due to the rising demand and application of AI, substantial improvements have been made, particularly in accounting, resulting in the transition of paper-based accounting entries to software and computer entries. Owing to cost savings and operational efficiency, financial institution operations have swiftly altered with the introduction of AI; AI is projected to soon take over the basic responsibilities of financial institutions as well (Dilek et al., 2015).

Even while adoption varies by nation, accounting profession, and organization, the circumstance that accountants are embracing AI is the most compelling proof that the technology is applicable to and effective for accounting. According to University of Oxford research from 2015, as computers take over data analytics and number crunching, there is a 95% risk that accountants will lose their employment (Chukwudi et al., 2018). However, it was noted in the same article that as technology develops, some professions may disappear, and others will be created. This suggests that the demanding, time-consuming, and arduous components of accounting will be lessened by AI, increasing its efficiency.

1.2 Purpose of the study

The consequences of applying AI on the profession of certified public accountant as well as accounting profession are frequently overlooked topics, although previous study in this field has shed light on these impacts and the potential changes they may bring about. Firms, departments, regulators, instructors and authorities of accounting as well as other accounting stakeholders will all be impacted by AI and automation in general. Nevertheless, because of the potential shift in demand for their talents, accounting professionals will be the ones who would be most adversely affected by these developments. It is crucial to examine their viewpoints in order to establish whether these experts consider AI as an opportunity or as a threat. Their opinions could have an impact

on how widely AI is used in the accounting sector. The research area will be focused on Türkiye more specifically in Istanbul, In this thesis, the following research questions are addressed:

1. What are the accounting professionals' perspectives on the use of AI in accounting in Istanbul?
2. What is the level of awareness among accounting professionals in Istanbul regarding the use of AI in accounting?
3. Is there a significant effect of personal characteristics which includes gender, age, level of education, years of experience and area of work on the awareness of accountants on the use of AI in the field of accounting?
4. Is there a significant effect of personal characteristics which includes gender, age, level of education, years of experience and area of work on accountants' perceptions on the use and employment of AI in accounting?

1.3 Significance of the Study

By demonstrating how AI is being used in the field of certified public accounting, this study has the potential to raise awareness among accounting professionals in Istanbul about the usage of AI and the value of being ready for impending changes in the industry. Because it will shed light on accountants' perceptions of the application of AI in the field of accounting, which is a crucial element in the profession's effective endorsement of AI, this study will be especially beneficial to accountants, professional accounting bodies, accounting regulators, accounting firms, accounting academicians, and any organization with a finance function.

1.4 Objective of the Study

- To study the level of awareness of accountants on the use of AI in accounting.
- To study accountants' perceptions on the use and employment of AI in accounting.
- To examine the effect of personal characteristics on the awareness of accountants on the use of AI in accounting.
- To investigate the effect of personal characteristics on accountants' perceptions on the use of AI in accounting.

1.5 Methodology

The quantitative methodology was employed. This was accomplished by using a questionnaire in google from shared through ISMMMO with CPAs in Istanbul. This research study used a between-group design, an independent samples T-test, and a one-way between-group ANOVA to learn more about participants' levels of awareness and perspectives about the usage of AI in the previously mentioned area of accounting. Literature review was conducted using several search engines including google scholar, research gate and science direct.

1.6 Structure of the Study

This research study is divided into five sections. An outline of the study is provided in the first section with purpose of the study and the importance of it, besides the limitation of the research, moreover, there will be an extensive discussion over the idea of AI and how it relates to accounting. The second part is about literature review that includes previous studies about effect of AI in accounting and their findings. The third part collectively talks about research methodology and provides the inner workings pertaining the approach to the hypothesis reached, on the contrary the fourth part includes the discussion of findings and method of collecting data. The fifth and final parts covers recommendations for additional research, and a conclusion to the research study.

1.7 Understanding AI

John McCarthy came up with the term "artificial intelligence" to describe a research area in computer science that aims to build a machine with intelligence that can carry out a variety of tasks (Yadav et al., 2017). Additionally, it is a research area that focuses on the technical know-how for creating intelligent software and computers, as well as the study of programming computers to carry out activities more effectively and precisely than people. AI gives devices the ability to perform the activities that only the human brain expects. This also includes the capacity to learn, understand the context, make decisions, and think creatively (Chukwudi et al., 2018). AI is finding new applications in a variety of fields, including sophisticated processing tasks, massive data management, analyzing and

solving complex algorithms, and much more. The ability of a programmed technology to carry out tasks that would ordinarily be carried out by the human brain is another approach to define AI. The ability to gather information, make sound decisions, think creatively, and comprehend interpersonal interactions are some examples of these.

Making intelligent machines capable of acting in a manner akin to humans is the primary objective of AI.

A technique for using those technologies to solve business problems is called AI (Hunt, 1986). Knowledge plays a significant role in intelligence. Two tests were suggested by Alan Turing to assess whether machines could reason (Turing, 1950). The first test is to determine whether AI can have a conversation that sounds exactly like one with a human. The most recent tries to pass this test throughout the years may be seen in Siri and Cortana, yet the discrepancy motionless exists. The second test addresses the stopping issue, which is that because AI is prone to constant feedback, it might not be able to recognize when it is correct (Upchurch, 2018). Turing experiments, particularly the first one, have drawn criticism from some who think it is conceivable to create an intelligent computer that does not communicate in the same way that people do. His tests, notably the first, challenged the Turing test by arguing that while a machine may be intelligent, it may not be able to communicate with humans in a human-like manner (Taghizadeh et al., 2013). As a result, even if the "Turing test" is successful, a machine that can understand the meaning of these statements may not be considered intelligent.

Based on current research, Davenport and colleagues (2020) developed a framework with several dimensions (exposed in fig. 1 below) that sheds light on the current state and

potential future development of AI (Davenport et al., 2020).

Task automation technologies, deployed currently or to be deployed in the short to medium term	Analyze numbers	Digital form 1 – Controller of Numerical Data Business Use Case Kanetix IBM	Robot form 3 – Numerical Data Robot Business Use Case Café X Tippy Robot
	Analyze text, voice, faces, images	2 – Controller of Data Business Use Case Conversica Stitch Fix Replika	4 – Data Robot Business Use Case LoweBot 84.51/ Kroger Walmart/ Bossa Nova K5 from Knightscape
Context awareness technologies that <i>may</i> be deployed in the long term	Analyze numbers, text, voice, faces, image	Digital form 5 – Data Virtuoso Example Use Case Jarvis	Robot form 6 – Robot Expert Example Use Case Dorian

Figure.1 AI framework. Sourced from: (Davenport *et al.*, 2020).

The task automation stage of AI is likely to exist in the short- to medium-term future and is depicted by four cells in the upper part of Fig. 1. The context awareness applications depicted in the lower part of Fig. 1 (two cells) are only likely to be used in the long term due to the restrictions correlated with the current level of AI (if at all).

Cell 1: Numerical Data Controller

In Fig. 1, the first cell illustrates an area where AI excels: machine learning-based statistical analysis of numerical data. One common use of AI is the optimization of prices (Antonio, 2018). The strategies of pricing must achieve a balance between the two following conflicting objectives: keeping the price low enough to captivate customers and high enough to allow the business to turn a profit. Businesses utilize AI to examine enormous volumes of numerical data, including less intuitive predictor variables, to

determine the best pricing and then adjust them in real time. For instance, the Bank of Montreal (BMO) analyzes client data from all of its channels using IBM Interact to develop individualized product offerings. When a consumer phones the contact center after looking into mortgages on the BMO website, IBM Interact prioritizes the list of potential mortgage offers for the contact center support agent, effectively enhancing the capabilities of the agent and enabling more pertinent customer dialogues (Davenport *et al.*, 2020).

Cell 2: Controller of Data

Businesses can better understand their customers' wants and deliver better customer service by analyzing. With the help of deep learning neural networks, several AI applications can evaluate non-numeric data (in some cases after converting it to numeric data). These applications usually use speech and image recognition (Chui *et al.* 2018). The Stitch Fix business plan serves as an illustration. According to Wilson *et al.* (2016), Stitch Fix does not need its consumers to perform a formal shopping job before delivering clothing to them.

Cell 3: Numerical Data Robot

The AI uses in the third cell are similar to those in cell 1, with the exception that they are embedded in robots. As a result, these AI uses are precisely defined as robots that are responsible for processing numerical data inputs. Each barista at Café X is equipped with a \$25,000 six-axis animatronic arm that allows them to serve up to 120 coffee cups every hour. Orders are placed by customers using a touchscreen kiosk or an app; all inputs are numerical (Hochman 2018).

The intention is to improve baristas' abilities rather than to replace them.

Cell 4: Data Robot

The robotic form in this cell can process all forms of data, unlike cell 2 where it cannot (not just numeric data). The Lowe's Lowebot, for instance, can identify a product that a client is holding, check to see if it is in stock, and then follow the customer to the exact spot inside the store. This activity necessitates the ability to navigate indoor spaces as well as the interpretation and analysis of both numerical and non-numerical data. (Hullinger 2016).

Cell 5: Data Virtuoso

For such AI, the word "virtuoso" sounds suitable. Jarvis has sophisticated data analysis capabilities that can look at various data kinds. Such AI might eventually appear, and it would have excellent customer choice prediction capabilities. Additionally, it might function as a human-like agent and have high skill levels for handling customer care (Davenport *et al.*, 2020).

Cell 6: Robot Experts

A sophisticated AI might potentially be integrated into a mechanical form, like the AI Dorian from the television series *Almost Human* is an AI who can speak, read, and take the temperature of liquids. Like Jarvis, Dorian is capable of adjusting to several novel situations, and speaks many languages. According to futurists, such robot experts will eventually appear to function as companions and fulfill a variety of client wants. Such robots may even form emotional connections with (human) clients, replacing both human and animal partners (Davenport *et al.*, 2020).

AI can moreover be categorized in a variety of additional ways. Succeeding that, time forecasts grew significantly less accurate, and AI research changed its focus to developing AI systems that demonstrated intelligence in specific tasks in very confined domains. This "narrow AI" research has been very successful in many ways, and it has applications in many different domains of science and business. One finding from this research is the size of the gap between limited, task-specific AI and more all-encompassing, human-like intelligence (referred to as artificial general intelligence, or AGI, throughout this paper), which includes the ability to generalize across contexts and maintain a sense of self (Baum *et al.*, 2011). The majority of recent and current AI researchers simply do not have a specific research goal of creating AI with human-like general intelligence.

1.7.1 History of AI

The topic of AI is growing more and more popular, with upbeat dreamers on the one hand and ominous doomsayers on the other. Although, the concept of AI was first proposed in the early 1950s, it took a long time for its various subcategories of functions to become a part of our daily life (Makridakis, 2017).

The Turing Test, which is method used to determine whether a machine is smart, was proposed in Turing's 1950 publication "Computer and Intelligence Science."

In 1952 to learn how to play checkers, Arthur Samuel developed a system of self-learning software. The Georgetown-IBM machine translation project began translating 60 selected Russian lines into English in 1954.

In 1956 Allen Newell and Herbert Simon deliver Logic Theory, the original reasoning program, and John McCarthy addresses the meeting as the founder of the AI we know today. McCarthy defined the term's vision and goals in his paper, "Dartmouth AI Summer Research Project."

John McCarthy wrote "Common Sense Programs" and created the AI programming language Lisp in 1958. In this article, a comprehensive AI system capable of learning much like humans was proposed. It is called Advice Taking.

In 1959 the general problem was developed by J.C. Shaw, Simon Herbert, and Allen Newell. Arthur Samuel created the term "machine learning" while he was employed by IBM.

One of the setbacks in the advancement of AI from 1974 to 1980 was a reduction in Defense Advanced Research Projects Agency (DARPA) funding for scholarly research. The "Lighthill Report" from the previous year and the prior ALPAC report are combined, setting up AI funding and delaying research. Research on AI has been put off as a result of the Automatic Language Processing Advisory Committee (ALPAC) report and the Lighthill Report from the previous year. "First AI Winter" is the name given to this period.

In 1987-1993 As computer technology advanced, more affordable alternatives emerged, causing the 1987 Lisp machinery (programming Language) market slump and "AI's second winter." During this time, expert systems were considered as a highly expensive systems to update and maintain. The Fifth Generation Computer Systems

(FGCS) project was abandoned by Japan in 1992 because it failed to meet the high standards set ten years earlier. After investing over \$1 billion in the strategic computing initiative in 1993 and falling far short of expectations, DARPA is shut down.

In 2005 Self-driving Stanley Vehicles triumphed in the major DARPA competition. The US army started purchasing autonomous robots in the same year, including "Big Dog" from Boston Dynamic and "PackBot" from iRobot.

Google advances speech recognition technology in 2008 and promotes the feature on the iPhone app.

Andrew Yan, the man behind the project of Google's deep learning brain, presented a neural network in 2012 that uses 10 million YouTube videos as a training set for deep learning algorithms. By learning to recognize a cat without being told what a cat is, the neural network helped usher in a new era for neural networks.

2014 Google produce the first autonomous vehicle to pass a state driving test. Finally, go professional and world champion Lee Sedol was defeated in 2016 by Google DeepMind's AlphaGo. The intricacy of the ancient Chinese game was viewed as a significant advancement in AI (Soma, J., & Shanker, Y., 2016).

1.7.2 The Structure of the AI

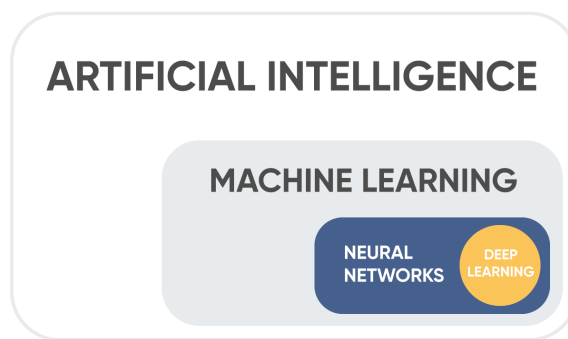


Figure 2.: The structure of the AI. Sourced from: (Serokell, 2020).

(Serokell, 2020) explained that the phrases AI, machine learning (ML), and deep learning (DL) have three distinct meanings, as seen in Figure 2:

The study of creating intelligent software or robots that come up with original solutions is known as AI.

- Machine learning permits a system to learn on its own and increase its knowledge without the need of pre-programmed neural networks that aid in problem-solving. It is an area of AI.

- Deep learning is defined as subset of machine learning (ML), which employs neural networks to examine variables with a structure like the neural network of the human brain.

1.7.3 The Stages of AI

The three stages of AI development are as follows:

- Artificial Narrow Intelligence (ANI) is a specific stage in the development of AI that limits the capabilities of existing implementations of AI to a single job (Goertzel & Pennachin, 2007). Artificial Narrow Intelligence is a phrase used to describe an the AI system configured to simply carry out a set of instructions on the data that has been provided. Artificial Narrow Intelligence does not imply useless software; rather, it just means that it was created for a particular set of activities.

- AGI Applying this stage in real life takes more time. At this point, AI approaches are functioning on a par with the human brain. (Wang & Goertzel, 2007). The term "artificial general intelligence" refers to an the AI system programmed to perfectly replicate human cognition and behavior. It is referred as "Full AI" and "Strong AI" by certain academics. It is, to put it simply, an AI system capable of fully functioning and making judgments like to those made by humans.

-Artificial Super Intelligence (ASI) is the highest stage of AI advancement at which the technology outperforms a naturally occurring human limitation. Super Intelligence is a term used to describe a system with AI that has been created so that it can mimic human intelligence and make decisions that are far superior to those of a person. Simply said, it is a system that is more advanced than human capacity.

1.7.4 Types of AI

Four categories of AI are as follows:

- Reactive machines

The most fundamental type of AI is just reactive and has no sense of the past or memory of what has happened in the past. It is configured to provide an output that is predictable given the input it receives. Reactive machines consistently respond in the same way to the same circumstances despite being incapable of learning from their actions or envisioning the past or the future. This type of intelligence involves the computer actively studying the outside world and reacting in accordance with its observations. These techniques let AI systems play particular games more effectively, but they are difficult to adapt to new scenarios or use in other contexts, and they are susceptible to manipulation. The best example of this kind of technology is Deep Blue, an IBM chess-playing supercomputer that defeated Garry Kasparov in the late 1990s (Hedstüch, 1990).

- Limited Memory

Limited memory AI gathers experiential knowledge by keeping an eye on actions or data and gaining knowledge from the past. This kind of AI uses historical, observational data along with pre-programmed knowledge to make predictions and complete difficult categorization tasks. At the moment, it is the kind of AI that is most frequently used. The self-driving automobile is an illustration of a memory limitation. Pre-programmed cars have a self-driving system that includes road markings like people lanes and traffic signal lights as well as other significant features like curves on the road. These basic tidbits of

historical knowledge are only passing observations. These are utilized during the change of the light signals or to avoid being hit by another vehicle (Johnson, 2020).

- Theory of Mind

This refers to the understanding that emotions and feelings have an impact on how other species behave in general. With the aid of this form of AI, machines will be able to make decisions that are real and human-like. Theory of mind When dealing with people, AI-enabled devices will be able to recognize, comprehend, and recall emotions in order to alter their behavior. There are still many difficulties with theory of mind AI since human communication includes such a fluid process of modifying behavior based on rapidly changing emotions. (Mar, 2021).

- Self-awareness

The most advanced AI is self-aware AI. Conversely, this type is an extension of the theory of mind, and it represents the pinnacle of AI advancement. Researchers in AI will create intelligent machines. The build of self-building machines is distant, the focus should be on memory comprehension, and the build should draw on prior learning. This kind of AI will also have needs, wants, and emotions.

1.7.5 Usage of AI in Different Areas

- Health Care

Healthcare AI has the ability to assist providers in many aspects of patient care and administrative processes, allowing them to expand on existing solutions and find answers more quickly. It is generally agreed that rather than completely replacing the work of doctors and other healthcare professionals, AI tools will complement and improve it. Recent successful applications of AI in healthcare are now possible thanks to the expansion of healthcare data accessibility and the quick development of big data analysis technology (Jiang et al., 2017). AI has been used extensively in the healthcare industry, including monitoring patient information and records, developing new medications, designing treatments, etc. (Khanna, 2018). Additionally, AI is enabling physicians to make decisions that are more effective and accurate, improving patient care overall.

The utilization of AI to medicine, particularly in the domain of imaging, is one of the most promising areas of health innovation. The use of AI as a case triage tool facilitates a doctor's examination of scans and images. Radiologists or cardiologists may use this data to identify the most important instances, avoid probable mistakes when reading electronic health records (EHRs), and formulate more precise diagnoses. (Kwo, 2021).

- E- Commerce

The e-commerce industry's embrace of AI technology is a crucial step toward corporate growth. A developing trend in this digital era is the use of AI in e-commerce. By using collected consumer and business data to drive wiser business decisions and more precisely predict the future, AI may help today's online merchants deliver a better customer experience to customers both on and off of their ecommerce websites. The evolution of e-commerce will be significantly accelerated by AI. E-commerce will have a wider development perspective with the utilization of the technologies of AI to close the gap between personalization and privacy. As a result, client relationship management will improve, and sales will be encouraged (Song et al., 2019).

The price of the product can change based on supply and demand using an approach called AI-enabled dynamic pricing. The fundamental issue that AI technology, which can handle enormous volumes of data quickly, has solved is the automatic pricing of a huge number of products. Advanced deep machine learning techniques enable AI to continuously monitor market dynamics and alter the competitive landscape in order to address the issue of optimal pricing (Song et al., 2019).

1.7.6 Examples of AI Applications

1.7.6.1 Expert System

A computer program known as an expert system employs AI techniques to simulate the judgments and actions of an individual or group with expertise and experience in a particular field. Frequently, expert systems are created to support human experts rather than to take their place. The ability of modest amounts of knowledge to enable intelligent decision-making, independently or in close collaboration with a human person, across a

wide range of disciplines has been proved by thousands of such systems. Since then, major advancements have been achieved in the comprehension and use of reasoning techniques other than logical deduction, such as analogies, model-based reasoning, and reasoning under uncertainty (Haton, 2006).

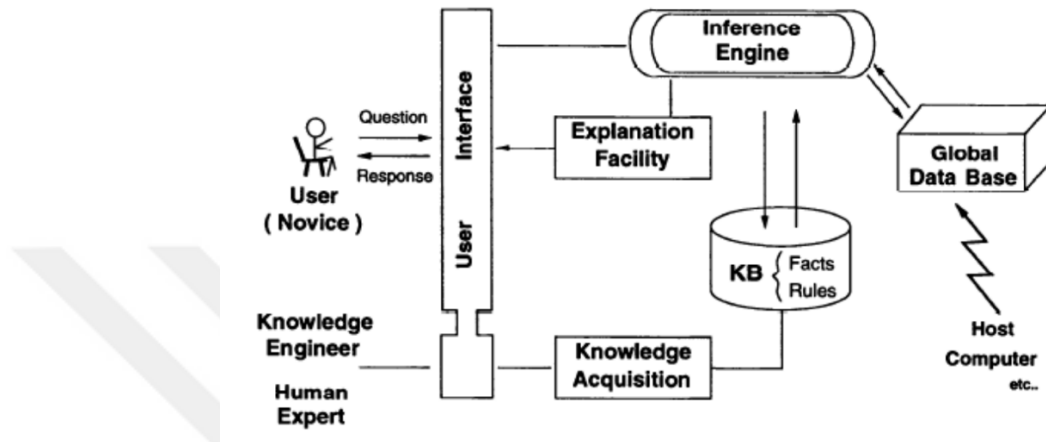


Figure 3. An expert system: one of the most successful AI products.

Sources from: (Mohammadi *et al.*, 2014)

Figure 3 shows the depicts the main important components of a rule-based expert system.

A user interface is used by the user to communicate with the system. Then, using both knowledge from experts and information pertinent to the issue being handled, an inference engine is employed to reason. A set of IF-THEN rules is a common way to convey expert knowledge. The user-supplied data as well as any inferences made from it in part (together with certainty measures) are included in the case-specific data. An uncomplicated forward chaining rule-based system will only have case-specific information in working memory. Example of expert system, cancer detection (CaDet) the CaDet computer program is made to aid primary care doctors in earlier cancer detection.

1.7.6.2 Neural Networks

According to Taghizadeh et al. neural networks are digital simulations of human brain neural structures that are artificially intelligent. To the contrary, electronic models of natural neural networks and models that deal with the many analytical modeling frequently employed by computer systems, which rely on the same pattern, learning and teaching mechanisms in neural networks mostly depend on experience (Chukwudi, 2018). Even the smallest animal brains can solve issues that modern computers, if not incapable of

addressing, at least have difficulty solving. Even though, what we consider common sense may be quite difficult to accomplish in a computer program. Each node in a neural network must be able to accept a large number of inputs, process them to determine the connections that must be created, and send outputs to the nodes identified in the previous phase (Shubhendu & Vijay, 2013). Application of neural network, facial recognition serves as effective surveillance systems, recognition software analyzes and matches digital photos with human faces (Kaushik, 2021). Additionally, the systems validate a human face and contrast it with the database's list of IDs.

1.7.6.3 Robotics

Robotics is the branch of science and technology concerned with the conception, development, and application of robots as a kind of AI. As a result, early robotics initiatives were more concerned with mechanical engineering than with intelligent behavior. Nonetheless, new generations of robots are being developed that incorporate AI methods for various aspects of their behavior, such as perception, reasoning in each situation to determine the best course of action, planning (and dynamic replanning) of actions to achieve a predetermined goal, and along with others (Haton, 2006). In continually changing situations, robots can adapt to both uncertain and inadequate knowledge. This can be accomplished by mimicking the learning process of a single wild organism or by using Evolutionary Robotics to apply selective reproduction to robot communities (Shubhendu & Vijay, 2013). Robotics is exemplified by Promobot, a business-focused robot that moves on its own and uses AI to interact with humans. It can respond to questions, recognize people, give information on the company's services, scan and complete paperwork, accept payments, and show advertisements.

1.7.6.4 Fuzzy Logic

A technique for processing variables called fuzzy logic allows for the processing of multiple potential truth values through a single variable. Fuzzy logic attempts to answer problems utilizing an unclosed, erroneous range of data and heuristics that allows the generation of a variety of precise conclusions. Zadeh created a fuzzy set theory in order to better depict everyday concepts like the set of 'tall persons.' Fuzzy logic is categorized as a subdivision of AI because it is a type of AI software (Dingle, 2011). Fuzzy logic has been

utilized by cameras, washing machines, and even stock trading software. There are numerous uses for fuzzy logic. A temperature control system, sometimes known as a thermostat, is the most basic example. Work that is predicated on a set of ambiguous guidelines. The most fascinating use of fuzzy logic is the interpretation it provides from the structure of intelligent beings' decision-making, particularly human intelligence (Taghizadeh et al., 2013).

1.7.6.5 Natural Language Processing

This broad phrase refers to a variety of activities such as automatic document indexing and retrieval, computer-aided translation, access to data bases or services, sentence interpretation and generation for man-machine dialog, and more. The important AI technological tool known as Natural Language Processing (Chukwudi, 2018), consequently, in order to process and communicate efficiently, the machine requires a comprehension of natural language. To understand the language or text being processed, these actions demand a broad body of knowledge and efficacious contextual reasoning procedures.

1.7.7 Different AI Job Impact Scenarios

When AI is implemented, there is a variety of possible outcomes, which are outlined below.

1.7.7.1 Displacement of Workers

Technology improves the effectiveness of human labor, yet big developments may have a negative effect on employment. As a result of this labor substitution obsolescence, many people are worried about "technology unemployment," which motivates studies to forecast how AI will affect employment (Frank et al., 2019). This process of obsolescence via labor substitution causes many to fear "technology unemployment" and spurs efforts to foresee the impact of AI on jobs. This is consistent with the gloomy scenario for how AI would affect society, according to which robots will completely replace people at work, demotivating people to do their jobs and giving computers full decision-making authority (Makridakis, 2017). Additionally, since robots would do all of the actual labor, people

would have more free time to engage in hobbies of their choice and pursue careers that interest them when they have the time. If a firm implements AI autonomously, that is, when the AI can do tasks without human aid, then job displacement is a highly possible. This level of AI development is presently underway.

1.7.7.2 Job Enhancement

The pragmatic view of AI's influence on labor aligns with the optimist viewpoint, claiming that computer's power would be harnessed and used to complement human abilities (Makridakis, 2017). One of the pragmatists, John Markoff (Markoff, 2016), claims that the field of AI can be two categories are separated: the first attempts to mimic human intelligence, and the second attempts to augment it by enhancing human capabilities by harnessing the power of computers. It is conceivable that the job augmentation scenario will occur if a corporation decides to implement supported and augmented intelligence. Given that augmented intelligence occurs when the business adopts new AI capabilities that completely alter its present business model, and assisted intelligence occurs when the business adopts new AI capabilities that help to improve its current business operations (e.g., performing rote, repetitive tasks). It is important to distinguish between the two terms (Garbuio & Lin, 2019). The optimistic attitude persists in believing that, despite the possibility of some labor being replaced by technology, the advantages will outweigh the disadvantages, even if studies conducted in response to these comments have revealed that the benefit is just transitory rather than permanent (Frank et al., 2019).

1.7.7.3 Nothing to Change

Another possibility, the doubting scenario, assumes that AI is not viable and will never become a threat to humans (Makridakis, 2017). According to a perspective that takes into account everything discussed above, technology creates uncertainty because it directly affects abilities rather than the overall activity. Notwithstanding, it's important to break down jobs into skills in order to understand how technology is affecting different professions (Oluwaseunlafu Ologe, 2020). Therefore, a thorough structure that links certain skill sets to career mobility and entire urban workforces may be able to reconcile divergent points of view (Frank et al., 2019).

1.8 The Accounting Profession

In Türkiye, the progress of the profession of accounting existed since 1923, the year of the establishment of the new republic. Auditors were working within the government departments, and management accountants were employed by the government enterprises. The advanced system of the accounting profession was then imported and introduced in the new republic from the European countries. The source of the majority of advancements imported were from France and Germany that were then adapted to the accounting system within the government entities. It was specifically adapted to the State Economic Enterprises (SEE'S) which are the local and central units of the government. It was adapted for the purpose of starting an organized and productive system that will benefit the republic on several basis especially economically in the long term.

One of a profession's most fundamental characteristics is its body of knowledge, which allows it a justifiable claim to competence, autonomy, control over labor, professional powers, and other things. Simply put, their expertise in respective disciplines comes from their knowledge (Hines, 1989). The agents or carriers of this institutionalized knowledge are professionals. Accounting's professional standing is thus contingent on the profession's public wing, even though the American Institute of Certified Public Accountants (AICPA) has just a fraction of its members actively engaged in public practice (Reiter & Williams, 2012). A profession must have a body of knowledge, but Freidson notes in his study, which Baszanger examined, that this body of information can undergo considerable changes in how it is applied and carried out (Baszanger, 1988). This could explain why accountants' job descriptions are always changing; the position of an accountant was substantially different 20 years ago than it is now, and accountants will almost certainly be performing a completely different role in another 20 years (Greenman, 2017). Even when work is shifted to computers, professionals frequently need licenses to practice, which may call for human control. For example, only doctors with a license are permitted to practice medicine, and only lawyers with a license are permitted to practice law; as a result, social and professional standards may take precedence over technological feasibility (Sako, 2020).

Abbott and Freidson in their articles reviewed by Reiter and Williams explain that after a profession has attained professional status, it begins to gather different related duties within that professional distinction's roof. Consequently, taxation and information services have been offered by accountants as a supplementary service to auditing in the United States. These activities are wrapped in the ideological mantle of the profession for a marketing advantage when provided by CPA, even though both services can be obtained from non-accountants as well (Reiter & Williams, 2012). Identification of transactions and their recording through journal entries in accordance with a widely accepted framework, such as International Financial Reporting Standards (IFRS) or Generally Accepted Accounting Principles in the United States, is crucially important (US GAAP). Financial statements conclude the accounting process. They are often based on the organization's historical performance as documented in journal entries throughout time. The stakeholders in the company rely on them when making decisions. Auditors are required since these accounting procedures are performed by staff members of a company's accounting or finance department. External auditors must adhere to certain requirements in their supervisory position, including independence, objectivity, and integrity. While the regulator and external auditor both undertake comparable responsibilities, namely verifying financial statements, they each serve distinct interests. It is the duty of the external auditor to confirm that the financial records are prepared in line with the aforementioned widely accepted accounting standards, give an accurate picture of the company's financial position and performance, and are suitable for use by stakeholders in making decisions. The regulator aims to protect financial stability and the interests of investors (Petkov, 2019).

An accountant must make a lot of decisions throughout the course of their employment based on technical accounting knowledge, accounting standards, and other factors, legislation, and experience. Prior to registering a transaction as a liability and doing calculations, for example, the financial accountant must first ascertain whether the item or transaction satisfies the definition of a liability. Once this is done, the books must be updated to reflect the change. All of this shows that accountants are essential to the accounting process and that they cannot be replaced by AI (Li & Zheng, 2018).

According to Shaffer and colleagues., AI will have a significant impact on bookkeeping, auditing, and risk management, while financial reporting and tax accounting will have a modest impact, however, financial planning and management accounting will have little impact (Shaffer et al., 2020). Interpreting financial data and facilitating internal decision-making or assisting management in determining whether a line of business or product would be lucrative, are the main responsibilities of management accountants. Consequently, due to the high level of cognitive thinking and capacity required, this function may not be successfully filled by AI (Shaffer et al., 2020). Budgeting, measuring, and assessing management performance are requirements elicitation that fall within the purview of management accountants (Li & Zheng, 2018). While AI technologies may be used to foresee developments and supply management accountants with data to work with, they cannot fully and completely replace the management accountant's job (Li & Zheng, 2018).

Throughout history, there was a clear rate of development in the economy due to the financial developments established. It was suggested that existence of the accounting profession and the financial developments results in economic growth. This is due to the elevated level of organization and production caused by the implementation of developed financial systems. This in turn is also beneficial of the job opportunities creation. The growth of economy results in an increased demand of the financial services which result in more demand on the accounting professionals and more job opportunities. Thus, countries with a wide range financial institutions and organization and an increased level of financial systems development will have a better economy compared to other countries that lack to the accounting professionals and financial institutions (Şamiloğlu and Savas, 2010).

1.8.1 Certified Public Accountant

"Certified Public Accountant" is the official title given to all qualified accountants who were able to successfully pass the Uniform CPA Examination. In order to obtain the license for public attestation, auditing views on financial accounts, CPAs must additionally satisfy experience criteria and extra state educational requirements. Furthermore, state boards of accountancy issue CPAs their licenses. A small number of States count public accounting experience as a college degree, despite the fact that the vast majority of States

require CPA candidates to have a college degree (Borisova & Bekhteneva, 2015). Furthermore, CPAs are required to follow an ethical conduct of a very high standards. The lack of moral character is one of the aspects that could be considered as an ethics violation which in turn will results in the loss of the License. The high standards of ethics set are one of the reasons why individuals might become hesitant to join the field and become CPA's (Res, 2022).

In Turkey a law was set and established for the independent accountancy, sworn-in CPA's, and CPA's considering auditing and accounting as professions. Moreover, it defines individuals who provide services within the mentioned fields as professionals. This Law numbered 3568 was first established and implemented in 1989. The purpose of this law is to ensure the smooth and reliable function of business operations as well as transactions. It also aims to audit and assess the outcomes of those business operations and provide the relevant parties and authorities with reliable facts concerning the operations (Toraman). The CPA industry is dramatically changing. The profession's reputation has significantly improved. CPAs are now looked upon as respected professionals and are directing huge organizations, initiating new entrepreneurial projects, and building private practices that handle much more than tax returns (Borisova & Bekhteneva, 2015).

1.8.2 Istanbul Chamber of Certified Public Accountant (ISMMMO)

The certified public accounting law dated 13 June 1989, No. 3568, gave Turkish Accountants a new identity. Istanbul's accountants were grouped together under the name of ISMMMO, a chamber that has some of the greatest membership in Türkiye.

The main goals of the Chamber are to provide an organizational structure for all professional accountants, to support and promote the activities and interests of the accountancy profession, to protect the reputation of the profession and ensure that all of its members abide by the Code of Ethics, as well as to promote the members' ongoing professional development and keep them informed on matters pertaining to accounting, auditing, and other business-related topics. The number of CPAs in Türkiye are 113,554, and in Istanbul 45,773.

1.9 Current Applications of AI in Accounting

For a very long time, successful applications of AI used to the financial function; one example is Cisco's 2011 virtual closure process, which was able to prepare consolidated financial statements and balance the books throughout the year, at any time to support quick decision-making (Petkov, 2019). In the substantive test phase, duties including modifying depreciation and amortization calculations, keeping track of general ledger transactions, and analyzing loan agreements and contracts are typical. The main impact of AI, according to Kokina and Davenport, will be on audit jobs that were previously handled manually but are now automated (Kokina & Davenport, 2017). With the use of AI, auditors can broaden their scope beyond the financial statements and include information from other sources, such as news feeds, social media, and so on, with financial data. Despite the fact that it has been noted that having too much information at an auditor's disposal could lead to poor judgment, (Upkong et al., 2019).

Applying AI in accounting has a number of challenges, including a lack of experience in the early stages of its adoption. Additionally, the field of AI in accounting is still in its infancy, and the AI employed to date is mostly weak AI that drives automation. Lack of "know-how" regarding its application is one of the problems preventing AI in accounting from developing to the point where it may fundamentally alter accounting and lead to changes in accounting standards (Luo et al., 2018). Another challenge is that incorporating AI technology requires a big change in strategy, a high level of expenditure, and a gradual return on investment for an organization's accounting processes. There are higher expectations for accountants since they must combine their accounting knowledge with information technology abilities in order to function effectively in the current environment. University curricula haven't yet begun to change, though, in order to keep up with the demand for degrees in accounting. Due to the management of sensitive data, AI and other developing technologies frequently pose security vulnerabilities (Rîndașu, 2017). As humans are responsible for teaching AI, there is also a risk that it will reflect human prejudices and biases (Moll & Yigitbasioglu, 2019).

AI's usage in accounting has been hindered or constrained, and it seems that some people are reluctant to modify long-standing habits, which is to be expected with any significant shift. Researchers from the fields of accounting and computer science should work together on cross-disciplinary research to close this gap since there is one (Stancheva-Todorova, 2018). A strong cooperation between accounting experts, IT employees, and AI program developers is required for the effective development of AI in the accounting profession.

1.9.1 The Application of AI in the Big Four

Newly developed financial robots by the Big Four accounting companies can independently recognize data, enter payments, and produce financial reports. It is anticipated that these financial robots would replace entry-level accounting clerks, enabling business managers without accounting expertise to make defensible judgments based on basic accounting data (Bullock, 2017).

- **Deloitte:**

Deloitte has created many AI-enabled processes during the last ten years. For instance, their system for document inspection automates the challenging and time-consuming process of evaluating contracts and retrieving all pertinent data. With the help of this technology, it is now possible to recover crucial information from documents like contracts, invoices, financial statements, and meeting minutes in as little as half the time (Faggella, 2020).

Numerous sophisticated technology-based apps have been developed by Deloitte. As an illustration, Deloitte created the insight-driven organization (IDO) structure to assist companies attain their strategic objective. IDO enables initiatives to be expanded across the firm and has a bigger impact on the business by establishing long-term competitive advantage from existing data assets and translating rising data volumes into quantifiable business value (Zhang et al., 2020). IDO can help not only executives but all employees accomplish clairvoyant-like decision-making by lowering decision costs while increasing decision speed and quality (Deloitte, 2018).

- Price waterhouse Coopers (PwC):

PwC offers a broad selection of sector- and industry-specific data and analytics solutions. For instance, PwC collects data, evaluates the status of each company's files, looks at sample balance sheets, and transforms data into tax bases using robotic process automation (RPA) technology. These methods simplify the process of creating and amending tax returns, submitting tax payments, and answering questions from related parties (PwC, 2017).

To enhance operational efficiency, automation levels, and audit quality, PwC established its own AI audit lab. Using AI technology's capacity to compile thorough data and information for rapid and accurate analysis (Zhang et al., 2020).

- Ernst & Young (EY):

EY has identified a number of industries as having the highest importance, including financial services, biological sciences, retail and consumer goods, health, electric and utilities, the public sector, and government. EY is committed to creating an industry solutions portfolio built on innovation and injection. EY is presently building a variety of assets, products, and accelerators powered by its big data platform for each of these key industries (Candela, 2018). EY created its own unique Robotic Process Automation (RPA) technology system to support audits. Without changing the current infrastructure and systems, this leverages robots that replicate human behaviors to automate repetitive jobs across many business applications. Using this technology, data analytics, internal control evaluation, and audit request tracking are all possible uses for an audit (Faggella, 2020).

EY has also introduced computer vision-based AI that enables flying drones to track inventory during the auditing process (EY, 2017). Drones will make it possible for more information to be gathered and evaluated throughout the audit, allowing the auditor to concentrate for more risky areas rather than physically counting inventory. The auditors may use their thoughts to address issues that are more strategy- or judgment-orientated, while the drones can monitor and physically inspect the evidence. This project has not yet been put into practice and is still in the investigation and creation stage, nevertheless, it is a promising technology that provides us with a glimpse of the potential for auditing to develop in the future. (Faggella, 2020). In 2022, a quickly evolving technology called drone

auditing will be extensively used for internal audit execution. Drones the size of microscopic insects that are accessible and easy to use for the internal audit profession may be available soon. Natural language processing NLP technology is also used by EY in a number of its business operations. Instead of going through all of the current lease contracts, for instance, EY utilizes NLP to extract information when the Internal Revenue Service (IRS) releases a new lease regulation, and a human-in-the-loop to confirm the results. (Zhang et al., 2020).

- **KPMG:**

The Global Expert Insight Center provides local teams with extra resources, and KPMG's core operations have a significant focus on data and analysis. In order to help clients with specific data concerns including privacy, security, and forensics, within its member organizations, KPMG is actively extending the scope of its data and analytics service offerings. It is also expanding its present offerings into other markets. By combining its expertise in tax, advising, and audit with its digital investments, KPMG helps clients change their businesses by utilizing its value delivery strategy and trustworthy information (Zhang et al., 2020).

KPMG have created their own line of AI products, known as KPMG Ignite. A few products in KPMG's AI portfolio include a document compliance review engine, an anomalous event predictor, and a call center analytics engine. The AI-powered call center analytics engine can recognize keywords, sentiment, and foresee future trends as it creates a transcript of client calls. An AI model that predicts future business events is also used by the AI anomalous event prediction tool. Furthermore, the document compliance evaluation engine scans the content and extracts the relevant information, using technology that is similar to that employed at some of the other Big Four businesses (Faggella, 2019).

1.9.2 Used of AI in Accounting in Developing Countries

A study was carried out in Nigeria to find out how much knowledge Nigerian accounting professionals had about the use of AI in accounting, how they felt about it, and whether any of their unique qualities affected how they felt. The study's findings show that Nigerian accounting professionals are very knowledgeable about the application of AI in accounting, though most of their understanding is theoretical at this point because many Nigerian businesses have not yet made the transition to using AI in their accounting procedures. The percentage of accountants who admitted that AI is presently being employed in their business (13.7%) serves as evidence of this (Oluwaseunlafu Ologe, 2020). According to accountants, AI will be helpful in accounting and improve accountants' effectiveness. They also expressed high support for and a desire to work with AI. In general, accountants had positive attitudes and perspectives about the use of AI in accounting. The study also found that Nigerian accounting professionals are less worried about losing their jobs to AI.

In Romania, a study was made to analyze accounting practitioners' perceptions of the major benefits and limitations of utilizing solutions that are based on AI in the accounting processes, furthermore, determine whether the increased usage of AI would raise the pressure on professionals to be replaced. According to (Banta et al., 2022), accountants rated virtually all the benefits and obstacles as having above-average relevance; yet there is no statistical significance detected in the variations existed between AI users and non-users. Furthermore, the greater part of respondents do not see AI as a threat to their employability as long as they continue to increase their knowledge and abilities to use AI-based technology effectively. Moreover, the findings of this study are relevant both domestically and internationally because they provide insight into the awareness of accounting professionals, which creates an image of further interference from both business and technological areas given the development prospects for such businesses in Romania.

In South Korea, a study was made to discuss about the instance of Korea implementing cutting-edge accounting technologies.

Technologies are employed to gather and produce accounting data and information. Others are used to increase the openness and dependability of accounting quality, while some are used to give quality information to help practitioners make effective decisions. By merging Big Data technology and accounting AI, Korean businesses have created programs that process accounting data. A fintech start-up like WebCash, for instance, uses a technology that can automatically gather transaction data and produce the financial statements for the company (Yoon, 2020). The local governments of South Korea use this automation system to collect the various data required for tax adjustments, automatically complete important forms, and even automatically check tax report data for inaccuracies. Additionally, the Korean accounting software provider Douzone has been filing for patents for Big Data-based accounting AI technologies. Audit on demand is a feasible option, and the auditing process is becoming timelier and more transparent. In Korean markets, accounting technologies are employed frequently to read and extract a large number of complex documents pertaining to important organizational tasks, such as mergers and acquisitions, leases, and so on. This research is significant because it offers instances of how these technologies have been used in real-world settings, allowing accountants to consider how to manage and use them well. Additionally, this study starts the process of businesses figuring out how to effectively incorporate new technologies. It's time to consider the skills that human accountants require.

According to a Malaysian study on the application and effects of AI in accounting, the main objective of using AI-based accounting software is to save invoices digitally and reduce the need to print hard copies. The results of this study have demonstrated that AI is a disruptive technology that is not just used by major global tech corporations and blue-chip businesses (Lee & Tajudeen, 2020). In fact, it's crucial that both small and large organizations think about implementing AI for their accounting procedures. Organizations who anticipate making investments in AI technology in the near future will benefit greatly from the findings of this study. The report produced by the current study is a trustworthy source of information for parties interested in reaping the rewards of adopting AI. Organizations who anticipate making investments in AI technology in the near future will benefit greatly from the findings of this study. The report produced by the current study is

a trustworthy source of information for parties interested in reaping the rewards of adopting AI. The size of the samples is one of the study's limitations, which restricts it even though there is plenty to be gained from it. Due to Malaysia's still low adoption of AI-based accounting software, the tiny sampling was unavoidable.

A study was carried out in Bangladesh to get perspectives from professionals on the use of AI in the accounting and auditing industries of developing countries like Bangladesh. Although there are global accounting firms in Bangladesh that employ AI, there is still a long way to go until AI is widely used in all audit and accounting firms and entirely changes the sector. The research reveals some difficulties in the application of AI. For instance, many accounting professionals concurred that the expense of developing, acquiring, and maintaining systems, as well as teaching newbies, is extremely high. Due to its poor economic standing, Bangladesh still has a shortage in the means and financial capacity to fully spread and implement current technology on par with other nations. According to the findings, Bangladesh's use of AI is mostly influenced by three factors. These are clear concepts among audit professionals on the use of AI, the computerization of audit job, and the transformation of auditor expertise.

In Türkiye, A study was conducted on AI and its effects on the accounting profession, including potential and dangers for Türkiye by Gacar (2019). One might discuss the digitalization phenomena in Türkiye, particularly as it relates to tax collecting. Turkish society is currently undergoing significant upheaval. Online tax collection can be done more quickly. Regarding the recording, classification, summarizing, analysis, and reporting functions of accounting, it does not appear possible to discuss a development. The tax-oriented accounting strategy in Türkiye, the high cost of technology use, the incompatibility of business practices with technology, the regular changes in accounting legislation, and a host of other factors are some of the explanations for this. As a result, while it is true that AI technology has an impact on the accounting profession, it is also true that this impact is currently very little when it comes to the Turkish accounting industry. Future research should focus on doing case studies with accounting businesses

that use AI applications, for instance, to determine how well-adapted Turkish professional accountants are to modern technology.

1.9.3 AI Adoption in Türkiye

The "Digital Türkiye " vision and Türkiye's "National Technology Move," two significant projects that were launched in recent years that seek to turn Türkiye into a digital nation, serve as the foundation for the publication of the country's AI National Strategy (Özdemir, 2021). In this context, Türkiye has declared that indigenization of essential technologies has become a crucial political goal in order to improve social welfare and simultaneously reinforce its national security, taking into account the most recent global economic and structural backdrop. It is further stated that as part of the "National Technology Move," Türkiye opposes the monopolization of scientific and technological advancements and seeks to strengthen its economic and technological independence while also enhancing its competitiveness globally and implementing practices and policies that will result in advancements in crucial technologies.

The National AI Strategy 2021-2025 has been adopted by Türkiye, and on August 20, 2021, the Presidential Circular No. 2021/18 on the "National AI Strategy 2021-2025," which was created in cooperation with the ministry of industry and technology and the digital transformation office of the presidency of the republic of Türkiye, and with the active participation of all relevant stakeholders, came into effect (Ersin & Necipoglu, 2021). Band Türkiye has joined the ranks of countries with an AI policy with the publishing of the National AI Strategy (NAIS), which is the country's first national strategy paper on the subject, moreover, Strategy was developed in a participative manner, many parties, including official institutions, academics, professional organizations, the commercial sector, NGOs, and international organizations, contributed to the overall study. Some priorities have been established in accordance with national policies and needs in order to accomplish the vision such as: Supporting Research, Entrepreneurship, and Innovation by Educating AI Experts and Maximizing Employment in the Domain, Increasing Access to High-Quality Data and Infrastructure, Regulating to Promote Socioeconomic Change.

1.10 AI's Impact on Accountants

In light of the all the processes automation of accounting, intelligent decision-making, and sharing of accounting services on the one hand, and the significant replacement of procedural accounting basic work by accounting information systems on the other, the role of accounting personnel will change from being the basis, procedure, and repeatability of accounting work to more valuable and professional work. The number of accounting employees is projected to decline due to rising information and labor expenses, as well as the use of big data in areas like financial shared services centers; possibly the majority of entry-level accounting employees will go the way of the dinosaurs (Li & Zheng, 2018).

When gifted minds are given the opportunity to reach their full potential and are not burdened with tedious jobs, a revolution will occur that will benefit both professionals and their clients. By adopting AI to automate tedious tasks, accountants can focus their energies wisely and creatively. They can study data collected by AI and extract actual value from it through insights and business intelligence by applying their knowledge and experience. As an alternative, they can interact more closely with organizations and people, taking the time to learn about their needs and offering specialized solutions.

1.10.1 AI's Impact on Accounting in Major Areas

Reports state that automating these procedures is a financially viable replacement for some accounting operations, which are currently being replaced. AI will have an impact on a large number of employments in the paralegal industry, mortgage origination, and general accountancy services. Bank reconciliation, payroll, invoice classification, income tax preparation, inventory management, and other tasks that need data gathering and processing have long been automated; AI, on the other hand, takes this automation a step further (Shaffer *et al.*, 2020). By utilizing intelligent accounting technology in the age of AI, fundamental and the productivity of accounting work can be increased by automating repetitive tasks and deconstructing intricate accounting procedures. The caliber of

accounting data can be enhanced using AI technology. Accounting data is the most important thing for businesses, and its quality is especially important. A key criterion for evaluating the quality of accounting information is whether it is timely and accurate.

Stancheva-Todorova (2018) proposed four areas (job displacement, education and training, new duties and obligations, and new skills) where AI will have an impact on accounting (task displacement, education and training, new tasks and roles, and new skills). The researcher identified one extra area of influence based on the literature study and expanded on the other four. The next sections go through each of these five topics.

1.10.2 Performance Enhancement

To assess the possibility for job displacement in the accounting industry due to the use of AI, Stancheva-Todorova contends that the actions of an accountant must be dissected. Some chores are simple to automate, while others are not. Accounting and auditing, according to Abdolmohammadi (1991), are a combination of structured and unstructured work, and while social and creative intelligence are vital, other tasks do not require such inventiveness. 400 audit jobs are described by the author, who contends that some of them are unstructured and rely on scant or confusing data, making them inappropriate for AI applications (Abdolmohammadi, 1991). Kokina and Davenport (2017) claim that while many audit processes are repetitive and structured, understanding an organization's performance, both financial and non-financial, requires a significant amount of unstructured and structured data. As a result, auditing is a good candidate for AI and data analytics.

As already said, the effects of AI on employment are typically restricted to particular jobs rather than the entire profession. As a result, rather than being catastrophic and sudden, job losses caused by AI in accounting and auditing are more likely to be gradual and negligible.

1.10.3 Improvement of Performance

Accounting professionals can greatly benefit from the abilities of intelligent systems. By giving employees access to better and more affordable data, enhancing the depth of their data analysis, and freeing up their time to focus on higher-value tasks, the ability of AI technology to support business decision-making processes can be improved by supplying fresh information (Stancheva-Todorova, 2018). With the assistance of AI, accountants will have more time for client satisfaction and data analysis and interpretation (Shaffer *et al.*, 2020). AI has also been found to improve internal and external reporting, use less paper, and increase the accuracy of financial data, all of which have a favorable impact on accounting procedures (Chukwudi *et al.*, 2018).

1.10.4 New Tasks/Changes to Existing Tasks

The link that accountants would have with data professionals, IT specialists, and others would result in a rise in accounting duties and positions even if AI resulted in job losses in the accounting industry. These positions would not be restricted to those in accounting and finance (Rîndașu, 2017). The only jobs left in accounting, according to Kokina and Davenport's predictions from 2017, will be managing intelligent machines, working with vendors to develop new AI technologies, evaluating the efficacy of AI technologies, developing client relationships, analyzing financial data, and managing accounting tasks that systems cannot automate. Due to the emergence of new technology-dependent jobs and changes in skill sets for using new technologies, as well as new technology research and development, the employment of accountants has expanded (Peng & Chang, 2019).

The accounting-related tasks themselves would also change. According to Gamage (2016), the new skills they have in data analytics, technology, and financial planning will cause accountants' work to shift. Not only will they be expected to produce historical financial data, but they will also be expected to behave strategically and pro-actively while at work. The accounting industry will change, and accountants will evolve into a kind of "professional hybrid" through working with financial institutions.

1.10.5 Adoption of New Competencies

Future requirements for success as an accountant are anticipated to alter from those of today (Kokina & Davenport, 2017). Accountants now need new skills that were probably not necessary a few years ago. Big data analytical skills, machine learning expertise, skills in leadership, communication, and critical thinking are among the attributes listed by Stancheva-Todorova (2018) (eye contact, self-assurance, presentation abilities, etc.). Shaffer et al. (2020) assert that the accounting industry has changed and will continue to change as a result of AI technology, hence it is necessary to educate accountants. Auditors must acquire training in cognitive technologies, which can sharpen and broaden their expertise and considerably improve data processing and analysis. Financial and tax accountants should learn how to use optical character recognition (OCR), which can considerably reduce the time needed to manually collect data from paper documents by 75%. The management, computer, decision-making, forecasting, and analytical capabilities of accountants should be strengthened, claim Li and Zheng (2018).

Additionally, businesses are responsible for retraining their employees on a constant basis to stay current with innovation (Stancheva-Todorova, 2018). Retraining seasoned accountants getting through their aversion to change will be a big challenge (Shaffer *et al.*, 2020). As these developments occur, an ability of an accountant to comprehend and explain data and trends gains greater importance than his or her ability to perform routine tasks such as recording or vouching. Accountants would need to have a broad range of skills, including technical accounting expertise, data analysis, technology adoption, and workplace training (Shi, 2020).

1.10.6 Accounting Education and Training

The accounting profession would need to reform, and educators would need to be a big part of it. It is crucial that the educational system transforms to fit the modern world we live in. School curricula should be created in a way that they represent the qualities needed by the future workforce, such as creative capabilities (Stancheva-Todorova, 2018). Researchers have highlighted the necessity of colleges acting as a bridge between aspiring

accountants and the industry by offering accounting students that are knowledgeable necessary to build IT skills, even if such knowledge is solely theoretical (Rîndașu, 2017).

Accounting instructors are responsible for the profession's prompt response to the coming transformation. As technical accounting knowledge alone becomes increasingly insufficient, accounting education would need to accept a more multidisciplinary approach, incorporating knowledge from fields like statistics, computer science, information systems, engineering, and big data, among others. The only way to guarantee that future accounting graduates will have successful employment in the coming years is to close the gap between industry and accounting education (Stancheva- Todorova, 2018).

Nowadays, a lot of accounting programs don't effectively educate students for the workforce. The new role of the accountant will require strong communication abilities and a comprehensive knowledge of business, which are more likely to be present in more senior accountants. The fourth revolution, which may considerably reduce the demand for entry-level accountants, is likely to have the biggest influence on the highly regimented and repetitive entry employment of accounting graduates. All of this raises the following concern: If possibilities for entry-level accountants are limited, how can young accountants acquire accounting experience? (Kokina & Davenport, 2017).

2. LITERATURE REVIEW

According to a report in the Harvard Commercial Review by Davenport & Ronanki (2018), businesses should consider AI in terms of business competencies rather than technical expertise. In general, AI may help organizations accomplish three key objectives: automating internal procedures, learning through data analysis, and connecting with clients and staff.

Chukwuani & Egiyi (2020) studied how AI would affect the accounting industry. By doing so, they showed how much progress had been made in automating the accounting process. In their final section, they covered the role that accountants play in modern automation and how accountants in the twenty-first century can adjust to the industry's widespread automation. Chukwuani & Egiyi some of their recommended was that Accounting companies and accountants should work to increase their knowledge of AI since this will help them perform various accounting activities more effectively and save certain unnecessary accounting costs, plus if AI and accounting researchers start cooperating across disciplinary boundaries, research on AI for any accounting problem will be improved.

Big data and AI technology's issues and future prospects in educational research, public policy, and business were discussed by Luan et al. in (2020), these include industry, policy, and education in accounting and auditing. They contend that academia, policymakers, and professionals from a variety of disciplines must respond to the innovations and challenges brought about by the AI and big data revolution. It was also noted that the scientific, policy, and business communities all share a number of overlapping areas of interest in order to effectively collaborate and fully realize the promise of the AI and big data developments. These shared interests necessitate a collaborative approach, but the main barrier to that is these groups' lack of vision as well as their lack of the requisite expertise and abilities.

Ologe(2020), discussed a study that observed the awareness level and perceptions on the application of AI in accounting across accounting professionals within the field, It also investigated at how accountants' particular traits might affect how they perceive the employment of AI in accounting. According to the study, accounting professionals in Nigeria are well aware of the application of AI, but their knowledge is primarily theoretical and comes from media and personal readings. The majority of accounting professionals favor the development of AI in accounting and express little concern about job displacement as a result of AI, giving the profession a generally positive outlook on its use. The study's findings also showed that in order for accountants to keep up with changing business needs, there is a need for reform in accounting education and ongoing professional growth.

Chukwudi et al. (2018) presented the effects of AI on accounting tasks through survey-based descriptive research. This study found that the use of AI improved the efficiency with which accounting tasks were carried out by accounting businesses in Southeast Nigeria. With accordance to the study's conclusions, it is encouraged that accountants and accounting companies constantly increase their understanding of AI due to the fact that doing so will improve the performance of accounting tasks and reduce some associated costs.

The usage of AI is not limited to large firms, according to a study by Lee & Tajudeen (2020) on the adoption of various AI-based accounting software by Malaysian firms. Additionally, they found that businesses were utilizing AI-based accounting software to fully automate information collecting and save invoice photographs. Organizations that want to invest in AI technology in the near future might benefit greatly from the findings of this study. The study's report is a trustworthy source of information for those interested in reaping the rewards of adopting AI. Now, organizations may use this information as a guide to help them decide better whether to invest in AI software in the future, especially for accounting-related tasks.

The numerous applications of AI were grouped into four areas by Kokina & Davenport (2017), and the level of intelligence obtained by the technology was further

divided into eight categories. Applications include those for number analysis, word and image comprehension, digital task execution, and physical task execution. The categories for intelligence levels are self-aware intelligence, context awareness & learning, repetitive task automation, and human support. The self-aware intelligence level has not yet been attained by any AI applications, however employing the other three levels of intelligence, many accounting and auditing activities can be completed.

Makridakis (2017) observed into the current and upcoming developments in AI as well as the potential for robots to develop true intelligence. Major theories and possible outcomes of how AI might alter human existence were highlighted in the study. The evolution of the field and profession of accounting and auditing is a critical example of how AI may change the human environment. There are two advantages to overcoming this obstacle. First, the risks are clearly acknowledged, and second, there is plenty of time to discuss the matter and take sensible measures to address it.

According to Zhang et al. (2020), a thorough review of current enhancements in AI, Big Data, and Machine Learning is offered, along with a look at how the accounting profession has changed in reaction to various technological improvements. The inherent difficulties and advantages that modern technology provide to accounting practitioners and educators are also discussed. The study portrays the integration of AI technology, blockchain, and accounting as extensive and complex. However, accounting professionals (practitioners, instructors, and students) are expected to expand their use of technology skills in order to improve accounting operations. The top accounting firms are embracing these new technologies and difficulties. Zhang et al. advised that it is crucial to emphasize that graduates must possess the necessary qualities in order to adapt to present and future technological developments and even to create them. As a result, instructors should strongly encourage liberal education while simultaneously encouraging and giving pupils the chance to use these cutting-edge tools.

Zemánková (2019), introduce AI's usage in auditing and accounting in a paper, with a focus on the recently popular blockchain technology. Zemánková claimed, based on the research, that the use of AI in accounting and auditing has the potential to greatly increase efficiency, reduce error rates, and give accountants and auditors more time to concentrate on challenging and valuable tasks rather than time-consuming, repetitive, and rule-based ones. Moreover, a new generation of auditing based on continuous assurance is being created as a result of all the properties of blockchain. Professional audit standards, however, are not prepared to incorporate these modern trends into the established audit process, which could lead to issues with audit files and the performance of the entire audit judgment. Unfortunately, the future will undoubtedly pose new problems and hazards, but they will also undoubtedly lead to further ideas, potential possibilities, and practical fixes.

The research by Upkong et al. (2018) examines the nature of accounting and auditing challenges and the necessity of implementing AI technology in the field. The discussion of current accounting issues, especially auditing, could be helpful for new AI development. The research was conducted utilizing secondary quantitative data and a descriptive survey research technique. The aim of the survey was to find, record, assess, and report the conditions between and among variables. Analysis' findings indicate that integrating AI will make it easier to change the auditing process. The following categories: materiality and risk analysis, internal control assessment, audit planning, evidence assessment, contracting, particular account analysis, choosing an opinion, report issuance, and internal auditing were found to need revisions.

In her study paper from 2018, Todorova (2018) sought to shed light on some of the present issues the accounting profession is facing as well as some possible future directions for it in the age of AI. Illuminating some potential trends for AI development in the future. Evaluation of accounting education should also take into consideration modern, intelligent technology and their useful commercial applications. Todorova claims that because AI is already having an impact on and will continue to have an impact on the function of the accountant, it is imperative for accounting educators to change the way they think and enhance the required skills and competencies that are related to smart technologies and their improved commercial uses. To revise accounting curricula and better prepare

graduates for successful careers, there is still more work to be done. Besides, they must consider how the new technologies will affect financial reporting standards and the transparency of the data outputs produced by the usage of machine learning models due to the risks connected with AI applications.

Greenman (2017), main study was about investigating the impact of AI on the accounting profession. According to his study, the list goes on: investing websites are replacing human financial advisors in the field of investing, legal software is replacing lawyers in the field of law. The phenomena of new technologies affecting the labor does not exempt the accounting profession. Accounting firms have not gone out of business as a result of the usage of tax filing software; rather, it changed the volume of tax returns that an accountant could file. Quick Books just shifted the emphasis from manual entry using paper and pencil to automated entry using computers and software, not reducing the revenue of accountants. AI in the accounting industry won't replace accountants; rather, it will shift the emphasis.

Mohammad et al (2020), made research about how AI changes the future of accounting industry. And its primary aim is on how AI will affect accountants in the future, More specifically, the next generation of accountants. The study's objectives are to evaluate the consequences of the adoption of AI-based accounting systems, provide an explanation of how it has altered the world of accounting professionals, and provide policymakers with pertinent recommendations. The findings of a qualitative document analysis on AI in the accounting sector make up the study. The study concludes that an automated system powered by AI can take the place of the significant worries that practicing accountants in the modern world have. To escape this destiny, accountants must adapt to the constantly evolving corporate environment as well as the usage of information technology. The study recommended that accountants and accounting firms stay up to date on ongoing advances in AI in their field in order to improve the performance and effectiveness of accounting functions. This will eventually result in a decrease in accounting costs to the firm and will also add value to the accounting industry by directing accountants' attention away from existing monotonous tasks and toward data-driven and analytics-based decisions.

Ucoglu (2020), established current machine learning applications in accounting and auditing. In the field of computer science known as "machine learning," patterns are found in vast volumes of data and predictions are made about what will happen in the future. Machine learning has seen an increase in use in the accounting and auditing fields in recent years. This research aims to investigate the most recent machine learning applications in accounting and auditing, with a particular emphasis on the Big Four corporations. The development of several machine learning technologies by the Big Four businesses, which are utilized for data analysis, risk assessment, information extraction from documents, and fully automated audits, has been established (only in specific areas, such as cash audit). The Big Four corporations are still growing their portfolio of machine learning initiatives in order to take advantage of the benefits. On the other hand, implementing machine learning technologies in accounting and auditing should also consider the ethical issues and the hazards of security and privacy violations. Due to the profession's fast change, accounting and auditing firms must now be subject to ethical and governmental oversight.

The primary focus of Adiloglu and Gungor's (2019) study on the effect of digitization on the audit profession was an assessment of independent audit firms in Türkiye. The exploratory program is designed to gain a deeper understanding of how digitization affects the tools and practices utilized by the audit profession. Nearly all audit firms have been found to provide independent audit and tax audit services. (95 and 85%, respectively). Next are issues in financial services and internal audit. (respectively 61% and 45%). Only the Big Four make the necessary infrastructure and human resource investments in addition to offering these services. Only 24 businesses train their personnel for IT / IT audits in spite of all these technological advancements. Only the Big Four offer their employees training in digital technologies. Consequently, as a result of digitalization. Information technology has becoming more significant. However, the audit companies have not yet invested in these areas as needed. 90% of audit firms do not offer services in these fields and do not invest in infrastructure or personnel.

Tiberius and Hirth (2019), research was about impacts of digitization on auditing: a delphi study for Germany. In this study, a panel of German auditors, auditing university professors, regulators, and IT experts of auditing software generated and evaluated 20 predictions regarding the future of auditing connected to automating digital procedures. The outcome scenario demonstrated that the respondents did not anticipate significant changes to the auditing practice during the course of the following five to 10 years. The results show that experts do not anticipate a significant influence of technology advancement on their industry. These results are remarkable given the radical changes that digitalization has brought about throughout the majority of global established industries, including Germany.

In a study (Askary et al., 2018) about AI and the dependability of accounting information, it was demonstrated that by using AI to strengthen internal control systems, quality accounting information may be created. And this may be done by combining the experience of the accounting profession with that of AI, which would aid in the application of internal control systems and the functional development of software. The following are some ways that this research has advanced understanding. First, this study brought up the topic of employing AI to strengthen internal control systems and provide high-quality accounting information. Second, to do this, a partnership between the accounting industry and AI expertise is needed to create software that performs as well as existing software programs for certain internal control systems. By making recommendations based on the current control environment, AI solutions enable the creation of novel control approaches, objectives, and methodologies.

Li (2020) wrote an essay titled "Analysis on the Impact of AI Development on Accounting. First and foremost, the financial staff needs to understand and have a conceptual comprehension of financial issues. Second, they must address and manage problems using pertinent financial instruments. Thirdly, they need to set up a sound and advantageous strategy for managing the finances of the business. AI's entry into financial management will result in significant change and influence. The cognition and conduct of present financial work will change due to related financial accounting employees. The

focus of the essay is on an investigation of the effects of AI on financial labor, which supports the sector's change mode in financial accounting. Making the switch to management accounting now will help the accounting industry grow sustainably and steadily increase the bar for how well business financial processing is managed. AI is employed as a technique to support the effective, knowledgeable, and automated development of financial accounting with the help of the intelligentization of accounting. Understanding the simultaneous financial accounting monitoring and detection as well as intelligent data sharing and interaction is crucial. The financial accounting work form and information management platform must be optimized, and ongoing promotion of the swift and intelligent development.

The goal of Jayaseelan's (2021) study on “study on the scope of AI in accounting” is to determine how AI affects the development of accounting strategies for improved business performance. The organization must implement AI as one of its core resources because it will improve commerce in the near future. For the creation of every method and management system, AI must be applied. A strategy plan created and carried out by AI will be very successful in helping the firm realize its vision. AI controls and monitors the company's operations by examining each step of a strategy's implementation and fixing any errors. Recently, AI and people have collaborated to accomplish the objectives of the organization. AI is not just a tool or technology for managers and privileged leaders; it is more like a collaborator that controls and leads the organization through an effective and operative strategic management. The right time has come for the authorities to authorize and delegate part of their duties to AI.

Gacar (2019), conducted study on AI and the effects of AI on accounting profession in Türkiye. The digital transformation has a big impact on accounting, a crucial company function. The accounting industry is going through a digital change thanks to technology like e-invoices, interactive tax offices, and e-declarations. In this situation, the more technologically savvy business sector can anticipate that the accounting experts will incorporate this data into the accounting procedures by having a working knowledge of and familiarity with new technologies. The implications of AI, one of the information

technologies, on the accounting profession are examined in this paper, along with the opportunities and risks it will present in Türkiye. There are also 21 centuries recommendations for accounting professionals. Gacar concluded that AI technology has an impact on the accounting profession, it is also true that this impact is currently very little when it comes to the Turkish accounting industry.

3. RESEARCH METHODOLOGY

3.1 Overview

This chapter, research philosophy and approach, strategy used for research, data collection and its source, population and sample size, ethical issues and access limitations, and nature of data and data analysis approach are all discussed in detail. The questionnaire that used in this research it was taken from a research by Shraon Ologe, with approval to use it in this research.

3.2 Research Approach

Deductive reasoning is the method employed in this study. This is in compliance with philosophy and positivism. Thus, research hypothesis or theory was developed, and the research strategy was designed in order to be able to test whether the proposed hypothesis is accepted or not. The research strategy was designed to test the correlation between the different variable in this research. This study's primary objective is to determine whether the characteristics of accountants have a significant influence on their awareness of the use of AI in the accounting business. This supports the fact that a theory should be set before obtaining data as it is important to specify the objective of every research and the theories that will be investigated.

The primary goal of this study is to determine how knowledgeable accountants are about using AI and what they think about its potential applications in accounting. This is also correlated with understanding the effect of the personal characteristics and its correlation with their perceptions and level of awareness. This was done by designing a well-structured methodology as well as quantifiable variables that can be used for statistical tests for data analysis.

This research is a descriptive and analytical research. The descriptive part of the research was covering the part of which was describing the level accountants' awareness level on the use of AI in the field of accounting as well as their perceptions on its employment and use. The analytical part was covering the part of the research in which was focusing on investigating the correlation between accountants' characteristics and their awareness and perceptions on the use of AI.

3.3 Research Strategy

A research study is usually decided according to several factors including research questions, aims and available resources. The strategy used in this research the quantitative strategy. This was done by using a questionnaire that complies with the deductive approach of the research. The questionnaire was Shared with CPAs in Istanbul and 155 responses received. The purpose of collecting data on their awareness level and perceptions on the application of AI in the field of accounting as mentioned earlier.

The reason why the quantitative strategy was applied to this research is due to the relatively high sample size of this research. As the researcher aimed to obtain data from a relatively large number of accountants across several area and different characteristics as well as the fact that it is a less-time consuming strategy. It is also beneficial to obtain more generalizable results on a larger scale. Another advantage of the quantitative strategy is that trend of data can be analyzed which can lead to some facts that would explain respondents answers. The main limitation of this strategy is the fact that an in-depth insights cannot be obtained, this is due to the fact that participants who responds to the questionnaires are only able to respond according to what is available within the

questionnaire. Which in turn will prevent the researcher from understanding the underlying reasons of their answers to the questionnaire.

A differential study was design was used in this research. Accountants who are the participants of this study were divided into several groups according to specific characteristics which includes gender, age, years of experience, level of education and area of accounting. Those groups were compared using a between-group design.

3.4 Collection of Data

3.4.1 Data Source

The method used in collecting data in this research is a monomethod is this is research used only the quantitative strategy. Furthermore, the only instrument used to collect data was the questionnaire designed in compliance with the objectives of the research. The questionnaire was created digitally using Google Forms. A link was created and was shared with the chambers of CPAs. The questionnaire used for the purpose of the study was obtained from a research dissertation presented for the requirement of the master's degree conducted by Sharon Oluwaseunlafunml Ologe under the supervision of Godwin Agbo at Griffith Collage Dublin. It was investigating accountants perceptions on the application and implementation of AI in the field of accounting in Nigeria. The researcher contacted the university that has published the thesis and requested the permission to use the questionnaire used in the dissertation. The request was accepted under the condition of referring to the source of the questionnaire "the author and the University" in the research conducted. The researcher started the process of collecting data by sharing the link with accountants (CPA's) working in an organization called in Istanbul called İstanbul Serbest Muhasebeci Mali Müşavirler Odası (ISMMMO).

The questionnaire used in this research was divided into three main sections, each contains specific information that will contribute to final results of the study. Section 1 was designed to collect information of the characteristics of participants. This is including gender, age, level of education, area of work, and work experience (in years). This was followed by a brief definition of AI in order to make the idea clearer for the participants.

Section 2 was focusing on collecting data on the participants awareness on AI and the source of it. And finally, section 3 was concerning the perceptions of participants on the employment of AI in the field of accounting. This was done by introducing some questions in a Likert scale format. Questions can all be found in a copy of the full questionnaire in the appendix.

3.4.2 Population and Sample Size

The population targeted in this study were the CPAs in Istanbul working across several areas within the field including financial accounting/ reporting, internal auditing, external auditing, management accounting, tax accounting, advisory/ consulting and other areas. More specifically, it was targeting members of working at Istanbul Serbest Muhasebeci Mali Müşavirler Odası (ISMMMO).

The suitable sample size for the study was calculated using a statistical formula called the Cochran formula ($n_0 = Z^2pq / e^2$) (Qualtrics,2022). Where e stands for the margin of error (5%), Z stands for the confidence interval (95%), p stands for the population size and q is (1-p). It is used to calculate the ideal sample size for unknown or large populations. Since the targeted population number was 45,773, the researcher was able to calculate the ideal sample size of the study. Using the mentioned formula, and according to the population size (45,773), it was observed that the minimum sample size required for the study is 381. Thus, the number of responses in this study (155) is not considered ideal.

3.4.3 Access and Ethical Issues

At the beginning of the questionnaire, and before filling out the form, an introduction was added to explain the aim of the study. The group of participants who were targeted in this study and who will be asked to fill out the questionnaire was also mentioned. It was stated that it is entirely voluntary to take part in this study and the replies of respondents will be kept completely confidential. It was also stated that data collected will be solely used for this research study. Further, no personal questions or information were requested in which makes responses completely anonymous. They were also informed that completing the questionnaire will be considered as an informed agreement by the participant to the study's use of the information they provide. An email address of the research supervisor was also provided if participants have concerns about the study.

3.4.4 Nature of Data

Data collected from the study were categorized into sections. Section 1 covering personal characteristics of participants including age, gender, level of education, years of experience and area of work were nominal. Section 2 which focuses on whether participants are aware of the discussion surrounding AI in accounting and its source was also nominal. An a “yes or no” option was given as a response. With regards to section 3, data were collected from a Likert scale in which was used to investigate accountants’ perceptions on the implementation of AI in accounting.

3.4.5 Measures

In this research, there were two main parts of measures which are dependent variables and independent variables. The dependent variable in this research was the perceptions of accountants on the use of AI in the field of accounting. it was measure by 15 items on a 5-point Likert scale that includes four levels of perceptions which are strongly agree, agree, neutral, disagree and strongly disagree. Independent variables were the personal characteristics of accountants as listed below:

- Gender – it is divided into two groups which are male and female.
- Age – it is divided into five age groups (20-30 years, 31-40 years, 41-50 years, 51-60 years, and 61 and above).
- Level of education - it is divided into three groups which are Ph.D., Master’s, and Bachelor’s.
- Area of accounting – it is divided into seven groups which are financial accounting/ reporting, internal auditing, external auditing, management accounting, tax accounting, advisory/ consulting, and other areas that are not mentioned.
- Work experience – it is divided into five groups (less than 5 years, 5-10 years, 10-15 years, 15-20 years, more than 20 years).

3.4.6 Hypothesis Development

Hypothesis 1

H0: Accountants' awareness of the usage of AI in accounting is unaffected by their gender.

HA: The awareness of accountants towards the application of AI in accounting is significantly influenced by gender.

Hypothesis 2

H0: There is no discernible difference in accountants' awareness of the use of AI in accounting based on their age.

HA: There is a considerable age difference in accountants' awareness of the usage of AI in accounting.

Hypothesis 3

H0: Accountants' awareness of the usage of AI in accounting is unaffected by their level of education.

HA: Accounting professionals' awareness of using AI is substantially influenced by their level of education.

Hypothesis 4

H0: Depending on the type of accounting they undertake, there is no discernible difference in the awareness of employing AI in accounting among accountants.

HA: The accountants' sector in accounting has a considerable impact on accountants' understanding of the application of AI.

Hypothesis 5

H0: There is no discernible difference in accountants' awareness of the use of AI in accounting based on years of experience.

HA: The accountants' years of experience have a significant impact on their awareness of the use of AI.

Hypothesis 6

H0: The perceptions of accountants about the usage of AI are unaffected by gender.

HA: Gender has a considerable impact on accountants' perceptions about the deployment of AI.

Hypothesis 7

H0: There is no discernible difference in accountants' perceptions of the use of artificial intelligence in accounting based on their age.

HA: Accountants' perceptions of the use of AI in accounting differ significantly depending on their age.

Hypothesis 8

H0: Accountants' perceptions about the use of artificial intelligence in accounting are unaffected by their level of education.

HA: The level of education has a considerable impact on accountants' perceptions regarding the use of AI.

Hypothesis 9

H0: There is no substantial difference in accountants' perceptions about the application of AI in accounting dependent on the sort of accounting they undertake.

HA: The perspectives of the use of AI are heavily influenced by the accountants' sector in accounting.

Hypothesis 10

H0: The opinions of accountants towards the use of AI in accounting are not significantly different based on years of expertise.

HA: The accountants' perspectives toward the use of AI are significantly influenced by their years of expertise.

3.4.7 Approach to Data Analysis

Statistical methods were used for the analysis of data as the strategy used in this research is a quantitative strategy. JASP software was used for data analysis. Data were first gathered and then encoded into JASP. An Independent t-test was then used to examine gender effect on accountants' awareness. This is because it has only two groups which are "Male or Female". The significance of the effect of other characteristics including age, years of experience, level of education and area of work on the accountants' awareness on the use of AI was analyzed using a one-way analysis of variance (ANOVA).

4. PRESENTATION AND DISCUSSION OF FINDINGS

4.1 Overview

On this page, the statistical analysis of data collected for the study is represented and discussed. Data were examined utilizing Excel and JASP. Descriptive statistics were conducted for some of the questions. Independent t-test and ANOVA test for variance were used to examine the significance in effect of participants characteristics on the use of AI.

4.2 Findings

4.2.1 Response

The questionnaire that was created for the purpose of the study was administered for 45 days, starting from July 7th to September 3rd. The total number of responses gathered was 155 responses which were all valid to be used to in data analysis.

4.2.2 Characteristics of Respondents

Table 1 shows the characteristics of participants who successfully submitted full responses. With regards to gender, 51.6% of participants were male, and 48.4% were female. It was clearly illustrated that the majority of participants (48.4%) were within age group of 41-50 years, 9.7% were within the age group of 20-30 years, 23.3% were within the age group of 31-40 years, 14.8% were within the age group of 51-60 years, and a percentage of only 3.9 were within the group age $61 \leq$ years. This is in compliance with the participants' year of experience as the group that had the highest number of participants (48.4%) was the > 20 Years group. 4.5% of participants had less than 5 years of experience, 12.9% had 5-10 years of experience, and 24.5% had 15-20 years of experience. In terms of participants level of education, the majority (51.6%) were working with a bachelor's degree. However, the percentage of participants who are working with master's degree was also high of 43.2%, and only 5.2% of them had a Ph.D. qualification.

With respect to their area of specialization as shown in **table 1**, out of the 155 participants, 32.9% works within the area of Financial Accounting/ Reporting, 1.9% work within the area of Internal Auditing, 3.9% work within the area of External Auditing, 5.8% work within the area of Management Accounting, 21.3% work within the area of Tax Accounting, 19.4% work within the area of Advisory/Consultants, and 14.8% work in other areas.

Table 1. Individual Participants' Characteristics

		N	%
Gender	Female	80	51.6
	Male	75	48.4
	Total	155	100.0
Age	20-30	15	9.7
	31-40	36	23.2
	41-50	75	48.4
	51-60	23	14.8
	61 ≤	6	3.9
	Total	155	100.0
Highest Level of Education	Ph.D.	8	5.2
	Master's	67	43.2
	Bachelor's	80	51.6
	Total	155	100.0
Area of Accounting Specialization	Financial Accounting / Reporting	51	32.9
	Internal Auditing	3	1.9
	External Auditing	6	3.9
	Management Accounting	9	5.8
	Tax Accounting	33	21.3
	Advisory / Consulting	30	19.4
	Other	23	14.8
	Total	155	100.0
Work Experience	< 5 Years	7	4.5
	5 – 10 Years	20	12.9
	10 – 15 Years	15	9.7
	15 – 20 Years	38	24.5
	> 20 Years	75	48.4
	Total	155	100.0

4.2.3 Awareness Level of Participants on the Use of AI Within the Field of Accounting

According to the data collected, 79.4% of participants were aware of the discussions surrounding the use of AI, and 20.6% of them were not aware of the discussions surrounding the use of AI as shown in **Table 2**. With regards to how they became aware of AI, the majority of them (50.3%) stated that their source of information was from personal readings. 34.8% from social media, 31% from publications provided by their professional body, 9% stated that they were aware of AI because it is currently being used at their workplace, and 29% from other sources.

Table 2. Participants' level of awareness regarding the employment of AI

		N	%
Discussions surrounding The use of AI?	Yes	123	79.4
	No	32	20.6
	Total	155	100.0
How did you become Aware of it?	Social Media	54	34.8
	Personal readings	78	50.3
	Publications from my professional body	48	31
	AI is currently being used at my workplace	14	9
	Other	45	29
	Total	155	100.0

4.2.4 Perceptions of Participants on the use of AI and its Impact

According to data shown in table 3, there was a broad disagreement on the statement that AI reduces the motivation of accountants with a percentage of 52.9 of disagreement and 24.5 of strong disagreement. The rest of the responses were distributed as follows, 3.9 % strongly agreed, 11% agreed, and 7.7% were neutral about it. This is consistent with the next statement that AI has useful applications in accounting as there was a remarkable agreement by the participants on the statement of 80.6%. 12.9% were

neutral about the statement, 2.6% disagreed, and 3.9% strongly disagreed. The statement that AI capabilities are superior to the capabilities of human accountants also received a major agreement of 60%. 12.9% were neutral about the statement, and a remarkable number of disagreements of 27.9%. A significant number of participants of 84.5% agreed that AI will contribute to improving the way accountants carry out their work. 10.3% had a neutral perception about it, and 5.1% disagreed with it. Likewise, there was a significant agreement of 88.4% submitted by participants that AI will contribute to reducing the time accountants spend on repetitive tasks. 7.7% were neutral about it and a total disagreement of 3.9%.

A similar rate of agreement of 84.5% that AI will allow accountants to concentrate more on strategic roles within the workplace. Only 9% were neutral about it and a total of 6.5% disagreed as presented in table 3. The application of AI in accounting will result in the creation of new roles in the field received a rate of agreement of 88.4% which is one of the highest rates recorded. 9% had a neutral opinion about it, and 2.6% disagreed with it. They also agreed to the fact that accountants might be required to start developing new skills to help them adapt to new AI trends with a rate of 90.3% which is also amongst the highest rates of agreement recorded. 6.5% of them were neutral about it, and 3.2% disagreed. With regards to accounting curriculums in universities, 90.3% agreed that it should include appropriate IT skills, 4.5% had neutral opinion, and 5.1% disagreed. 90.3% of them also agreed that curriculums of accounting in universities must highly focus on consulting the strategic areas of accounting not only focusing on the technical accounting knowledge, 3.9% agreed had a neutral opinion, and 5.8% disagreed. 23.3% agreed that AI will take over the job of human accountants in the near future, 13.5% had a neutral opinion about it, and 63.2% which are the majority disagreed with the statement.

7.8% stated that they agree that they are worried that AI might take over them in their job, 9% were neutral about it, while the majority of participants (83.2%) stated that they disagree with it. There was a significant rate of agreement of 85.2% submitted by participants that they support AI development within the field, 9.7% of them were neutral about it, and 5.2% disagreed with the statement. They also agreed that they are excited

about the changes that AI will bring to the accounting profession with a rate of 78.7%, 11.6% had a neutral opinion, and 9.6% disagreed. 69.1% agreed that they are highly prepared to work parallel to AI, 17.4% had a neutral opinion, and 13.6% disagreed with the statement as shown in table 3.

Table 3. Participants' perceptions on the application of artificial intelligence and its effects.

	Strongly Agree n(%)	Agree n(%)	Neutral n(%)	Disagree n(%)	Strongly Disagree n(%)
AI in accounting reduces the motivation of accountants	6(3.9)	17(11)	12(7.7)	82(52.9)	38(24.5)
AI has useful applications in accounting	58(37.4)	67(43.2)	20(12.9)	4(2.6)	6(3.9)
AI capabilities are superior to the capabilities of human accountants	35(22.6)	58(37.4)	20(12.9)	38(24.5)	4(2.6)
AI will improve the way accountants carry out their work	49(31.6)	82(52.9)	16(10.3)	7(4.5)	1(0.6)
AI will reduce the time accountants spend on repetitive tasks	71(45.8)	66(42.6)	12(7.7)	2(1.3)	4(2.6)
AI will allow accountants to focus on more strategic roles in the work place	71(45.8)	60(38.7)	14(9)	6(3.9)	4(2.6)
The use of AI in accounting will lead to the emergence of new roles in the accounting profession	57(36.8)	80(51.6)	14(9)	2(1.3)	2(1.3)

Accountants would need to develop new skills to adapt to new AI trends	65(41.9)	75(48.4)	10(6.5)	2(1.3)	3(1.9)
Accounting curriculums in universities should include appropriate IT skills	88(56.8)	52(33.5)	7(4.5)	3(1.9)	5(3.2)
Accounting curriculums in universities should focus more on consulting the strategic areas of accounting not just technical accounting knowledge	84(54.2)	56(36.1)	6(3.9)	5(3.2)	4(2.6)
Human accountants will be replaced by AI in the foreseeable future	8(5.2)	28(18.1)	21(13.5)	82(52.9)	16(10.3)
I am worried that AI could replace me in my job	2(1.3)	10(6.5)	14(9)	102(65.8)	27(17.4)
I support the development of AI in accounting	53(34.2)	79(51)	15(9.7)	6(3.9)	2(1.3)
I am excited about the changes that AI will bring to the accounting profession	47(30.3)	75(48.4)	18(11.6)	12(7.7)	3(1.9)
I am adequately prepared to work alongside AI	37(23.9)	70(45.2)	27(17.4)	17(11)	4(2.6)

4.2.5 Perceptions of Participants on the Potential Applications of AI and Accountants' Skills

Perceptions on the potential application of AI were variable. However, the highest three potential applications that received the highest number of Responses were the analysis of large volume of structured and unstructured data of 76.8% (N=119), automation of

repetitive tasks of 76.1% (N=118), identifying and extracting relevant information from documents of 67.1% (N=104). Fraud detection also received a relevantly elevated number of responses of 63.9% (N=99), Forecasting Revenue, Cash Flows, etc. 57.4% (N=89), and other applications 16.1% (N=25).

Technology literacy, the use of information technologies, business advisory skills, and interpretation of financial information received the highest number of responses in terms of the most important skills for accountants of 71% (N=110), 80% (N=124), 74.8% (N=116), and 83.2% (N=129) respectively. Communication skills also received a relatively high number of responses of 56.1% (N=67), relationship building 47.7% (N=74), and other skills 10.3% (N=16).

Table 4. Applications of AI and accounting expertise.

		N	%
Which of the following potential applications of AI do you think would be the most useful to accountants?	Fraud detection	99	63.9
	Forecasting Revenue, Cash flows, etc.	89	57.4
	Analysis of large volumes of	119	76.8
	Structured and unstructured data		
	Automation of repetitive tasks	118	76.1
	Identifying and extracting relevant information from documents	104	67.1
	Other	25	16.1
Which of the following skills do you consider most important for accountants today?	Technological literacy	110	71
	The use of information technologies	124	80
	Business Advisory Skills	116	74.8
	Communication skills	87	56.1
	Relationship Building	74	47.7
	Interpretation of Financial Information	129	83.2

Other

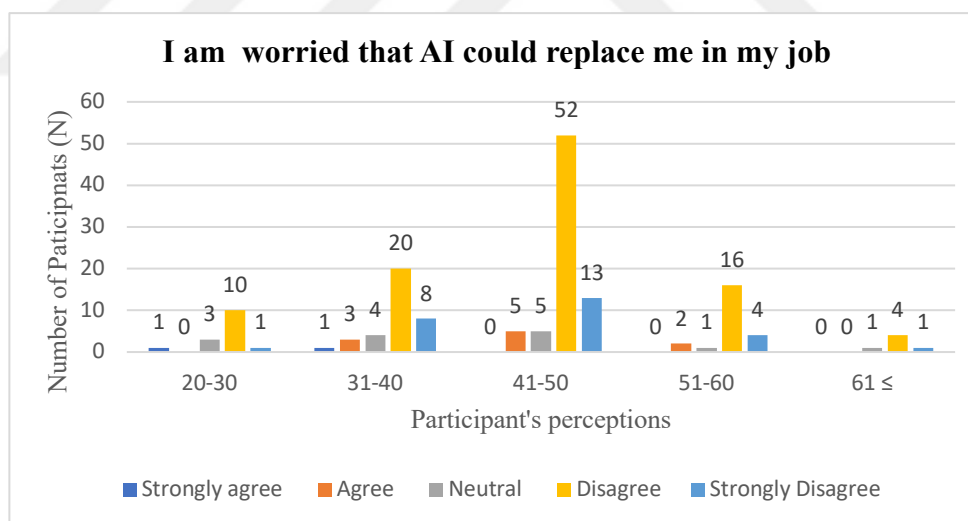
16

10.3

4.2.6 Perceptions of participants on the use of AI in Association with Personal Characteristics

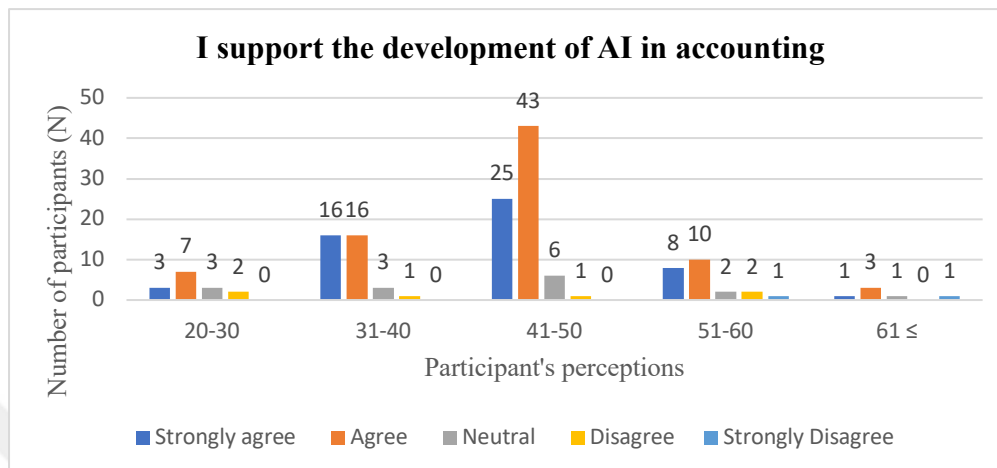
It was clearly observed that the highest number of participants who disagree to the following statement that they are worried that there is a possibility that AI might replace them in their job were aged between 41-50 years (N=52). This is possibly due to the fact that older participants have more years of experience which in turn results in a better understanding to the profession and the effectiveness of the application of AI in the field. Other participants who disagree with statement are distributed among the rest ages.

Figure.4 According to age, the number of participants who are concerned that AI may replace them in their employment.



According to data in figure 5, the majority of participants who agreed that they support AI development in accounting were aged between 41-50 (N=68). Other participants who support the development of AI in accounting were distributed among the rest of the group ages.

Figure 5. The number of participants who support the advancement of artificial intelligence in accounting.



It was clearly shown in figure 6 that the majority of participants who showed disagreement with the statement that they are worried that AI might replace them in their job had an experience in accounting for more than 20 years (N = 56). Others were distributed among other years of experience groups. This would suggest that accountants with a higher number of years of experience would have more awareness of the use of AI in accounting.

Figure 6. According to years of work experience, the percentage of participants who are concerned that AI may replace them in their position.

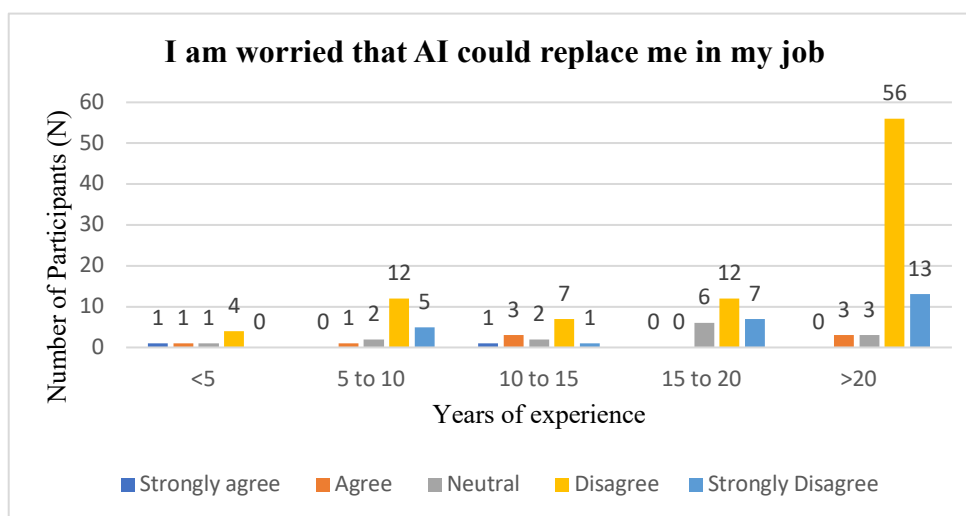
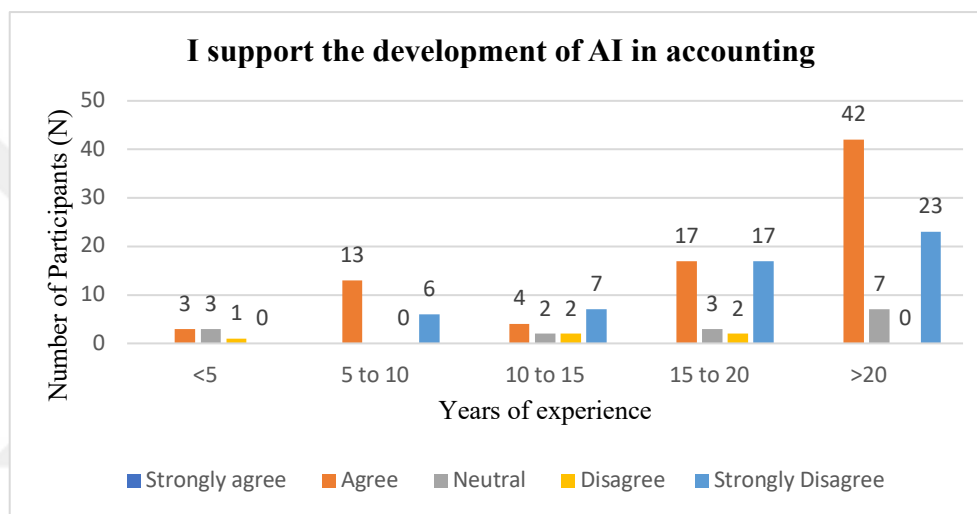


Figure 7 illustrates the correlation between the perceptions of accountants on supporting the development of AI in accounting. Accountants who have an experience of

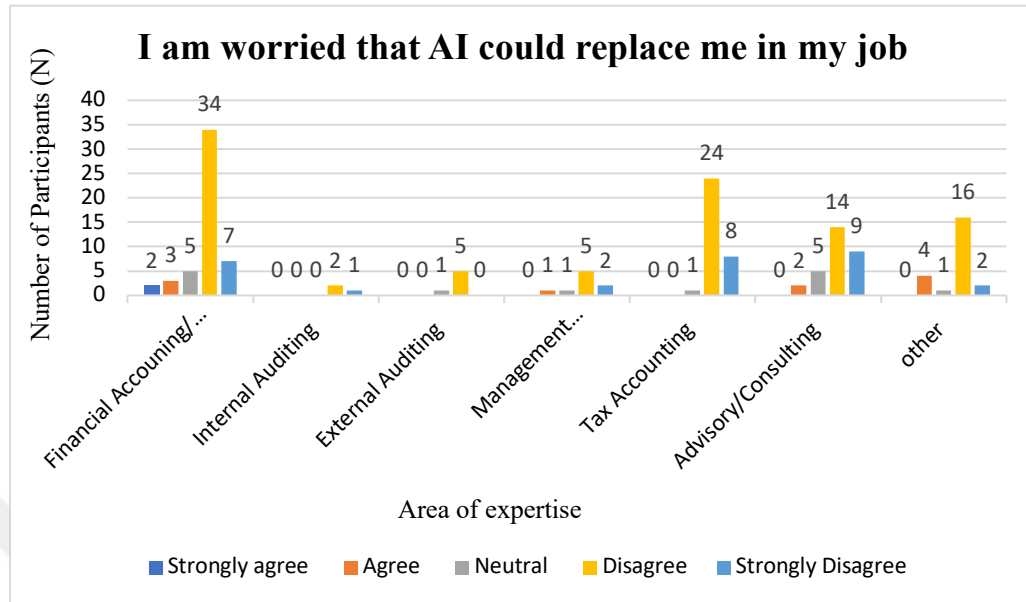
more than 20 years make up the majority of participants who agreed to support the development of AI (N = 42). However, they also had the highest rate of disagreement (N=23). Accountants who have an experience of 15 – 20 years and 5 – 10 years also have a relatively high rate of agreement (N = 17, and N = 13) respectively.

Figure 7. According to years of experience, the number of participants who support the growth of AI in accounting.



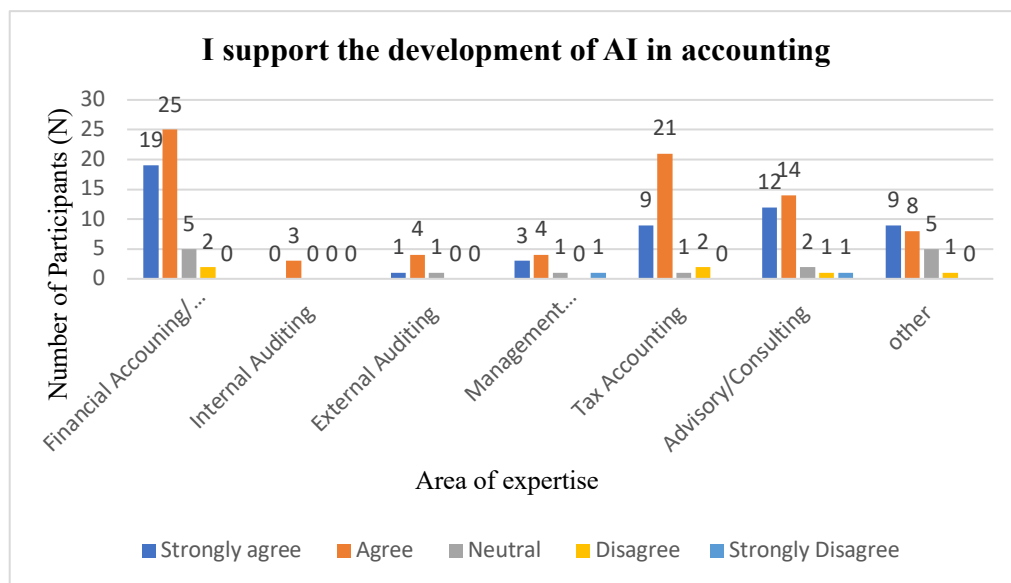
As illustrated in figure 8, participants who are not worried that AI might replace them in their job works in financial accounting/ reporting and tax accounting of (N = 41 and N = 32) respectively. The majority from all areas of work stated that they are not worried about their jobs with regards to the implementation AI in their field. This in turn showed a high level of awareness of participants on the use of AI within the field of accounting.

Figure 8. The number of participants who are worried that artificial intelligence could replace them in their job, based on their area of expertise.



As presented in figure 9, Accountants who work in the financial accounting/ reporting area and the tax accounting area have the highest rate of agreement on supporting the implementation of AI development within the field (N = 25, and N = 21) Respectively.

Figure 9. The number of participants who support the advancement of artificial intelligence in accounting based on their area of expertise.



4.2.7 Hypothesis testing

4.2.7.1 Hypothesis 1 - Impact of gender on accountants' awareness of AI application in accounting.

H0: Accountants' awareness of the usage of AI in accounting is unaffected by their gender.

HA: The awareness of accountants towards the application of AI in accounting is significantly influenced by gender.

Hypothesis 1 examines the effect of gender on the accountants' awareness on the use of AI. Data were collected and descriptive statistics were conducted as shown in **table 5** that includes number of participants, mean, and standard deviation. An independent t-test was carried out in order to investigate the significance of gender effect. According to statistical results obtained, ($t(77.5) = 0.403$), $p = 0.688$, and compared to $\alpha = 0.05$, gender effect on the awareness of accountants on the application of AI was not significant. However, as observed and presented in table 5, women ($M = 40$, $SD = 33.941$) showed more awareness on the use of AI in accounting than males ($M = 37.5$, $SD = 30.406$). Thus, the null hypothesis stating that "Gender has no impact on accountants' awareness on the use of AI in accounting" is accepted.

Table 5. Descriptive data on how gender affects how accountants see the use of AI.

	N	Mean	SD
Male	75	37.5	30.406
Female	80	40	33.941

4.2.7.2 One-way Analysis of Variance (ANOVA)

ANOVA test was used in order to examine the significance individual's characteristics effect on their perceptions on the implementation of AI for sets of data who have more than two levels.

4.2.7.3 Hypothesis 2 - The discernible age difference in accountants' awareness of the use of AI in accounting.

H0: There is no discernible difference in accountants' awareness of the use of AI in accounting based on their age.

HA: There is a considerable age difference in accountants' awareness of the usage of AI in accounting.

Hypothesis 2 focuses on investigating the palpable deviation in accountants' awareness on the employment of AI in accounting in association with their age. Variance of data was examined using a one-way analysis of variance test (ANOVA) for the five age groups presented in table 1. Table 6 illustrates data of the mean and standard deviation of the five groups. It is clearly shown that age group of 41 – 50 years ($M = 37.5$, $SD = 27.6$) are more aware of the application and use of AI compared to other groups (20 – 30 years $M = 7$, $SD = 5.7$, 31 – 40 years $M = 18.5$, $SD = 16.3$, 41-50 years $M = 37.5$, $SD = 27.6$, 51 – 60 years $M = 11.5$, $SD = 12.02$, and $61 \leq$ years $M = 3$, $SD = 4.24$). According to the results of ANOVA ($p = 0.525$) compared to $\alpha = 0.05$, there was no significant effect of age on accountants' perceptions on the employment of AI. it indicates age does not affect accountants' perceptions. Thus, the null hypothesis “There is no palpable deviation in accountants' awareness based on their age” is accepted.

Table 6. Descriptive statistics on the obvious variation in accountants' perceptions on the use of AI.

	N	Mean	SD
20-30	14	7	5.7
31-40	37	18.5	16.3
41-50	75	37.5	27.6
51-60	23	11.5	12.02
61 ≤	6	3	4.24

4.2.7.4 Hypothesis 3 – The impact of education level on accountants' awareness of using AI in accounting

H0: Accountants' awareness of the usage of AI in accounting is unaffected by their level of education.

HA: Accounting professionals' awareness of using AI is substantially influenced by their level of education.

Hypothesis 3 examines the effect of the level of education on the accountants' perceptions on the use of AI in accounting. Participants were grouped into three groups as shown in table 7 (Ph.D., Master's, and Bachelor's). It was observed that among all groups, participants with a bachelor's degree ($M = 40$, $SD = 29.7$) are more aware of the importance of use of AI in accounting compared to other groups (Ph.D. $M = 4$, $SD = 5.7$, and Master's $M = 33.5$, $SD = 28.9$). ANOVA test was used to test the effect of education level significance. According to the results ($p = 0.274$) compared to $\alpha = 0.05$, it was observed that there is no significance in the effect of the level of education of accountants. This illustrates that accountants' level of education does not affect their perceptions on the use of AI in accounting. Thus, the null hypothesis stating that "Accountants' awareness on the use of AI in accounting are unaffected by their level of education" is accepted.

Table 7. The impact of education level on accountants' opinions of using AI

	N	Mean	SD
Ph.D.	8	4	5.7
Master's	67	33.5	28.9
Bachelor's	77	40	29.7

4.2.7.5 Hypothesis 4 – Accountants' awareness of the usage of AI in accounting variation depending on the type of accounting they undertake.

H0: Depending on the type of accounting they undertake, there is no discernible difference in the awareness of employing AI in accounting among accountants.

HA: The accountants' sector in accounting has a considerable impact on accountants' understanding of the application of AI.

Hypothesis 4 investigates the area of work of accountants effect on the variation in their perceptions on the application of AI within the field. Participants were grouped into 7 groups (Financial Accounting/ Reporting, Internal Auditing, External Auditing, Management Accounting, Tax Accounting, Advisory/ Consulting, and other) as shown in table 8. It was observed that among all groups, accountants who work in the financial accounting/ reporting area were more open to the use of AI in accounting ($M = 25.5$, $SD = 16.26$) compared to other groups (Internal Auditing $M = 1.5$, $SD = 0.71$, External Auditing $M = 3$, $SD = 2.83$, Management Accounting $M = 4.5$, $SD = 6.36$, Tax Accounting $M = 16.5$, $SD = 16.26$, Advisory/ Consulting $M = 15$, $SD = 16.97$, and other work area $M = 11.5$, $SD = 6.36$). According to data obtained by ANOVA to examine the significance of the effect of work area on the perceptions of accountants' on the use of AI in accounting ($p = 0.169$) and in comparison to $\alpha = 0.05$, there is no significant effect of the area of work. Accordingly, the null hypothesis that suggest "There is no significant variation in accountants' awareness on using AI in accounting based on the type of accounting they do" is accepted.

Table 8. The impact of the accountants' line of work on how they see the usage of AI.

	N	Mean	SD
Financial Accounting/ Reporting	51	25.5	16.26
Internal Auditing	3	1.5	0.71
External Auditing	6	3	2.83
Management Accounting	9	4.5	6.36
Tax Accounting	33	16.5	16.26
Advisory/Consulting	30	15	16.97
other	23	11.5	6.36

4.2.7.6 Hypothesis 5 – The difference in accountants' awareness of the use of AI in accounting based on years of experience.

H0: There is no discernible difference in accountants' awareness of the use of AI in accounting based on years of experience.

HA: The accountants' years of experience have a significant impact on their awareness of the use of AI.

Hypothesis 5 investigates the effect of years of work experience on the accountants' perceptions on the employment of AI in accounting. Accountants were grouped into five groups according to their work experience number of years (less than 5 years, 5 – 10 years, 10 – 15 years, 15 – 20 years, and more than 20 years) . It was clearly observed that accountants who have more than 20 years of experience are more aware of the uses and applications of AI in accounting ($M = 37.5$, $SD = 31.82$) in comparison to other groups (less than 5 years $M = 3.5$, $SD = 2.12$, 5 – 10 years $M = 10$, $SD = 8.49$, 10 – 15 years $M = 7.5$, $SD = 4.95$, and 15 – 20 years $M = 19$, $SD = 18.38$). According to ANOVA results ($P = 0.949$), and in comparison to $\alpha = 0.05$, there is no significant effect observed of number of years of experience on the accountants' perceptions on the implementation of AI in accounting. Therefore, the null hypothesis stating that “Based on years of experience, there is no significant difference in accountants' awareness on the employment of AI in accounting” is accepted.

Table 9. The impact of experience years on accountants' thoughts of using AI.

	N	Mean	SD
less than 5 years	7	3.5	2.12
5 - 10 years	20	10	8.49
10 - 15 years	15	7.5	4.95
15 - 20 years	38	19	18.38
More than 20 years	75	37.5	31.82

4.2.7.7 Hypothesis 6 – Impact of gender on accountants' perceptions about using AI in accounting.

H0: The perceptions of accountants about the usage of AI are unaffected by gender.

HA: Gender has a considerable impact on accountants' perceptions about the deployment of AI.

Hypothesis 6 is examining the effect of gender on accountants' perceptions on the implementation of AI within the field. Data were collected and descriptive statistics were conducted in order to acquire the mean (M) and Standard deviation (SD) of both groups, male and female as shown in table 10. According to the mean values shown in table 10, males (M = 15, SD = 14.93) and females (M.= 16, SD = 15.6) were illustrating a very similar perceptions on the use of AI in accounting. An independent t-test was also conducted to investigate the significance of gender effect on the perceptions of accountants' ($t(77.5) = 0.293$), $P = 0.39$, compared to $\alpha = 0.05$. In accordance with the results acquired, the effect of gender is not significant accountants' perceptions. Thus, the null hypothesis "Gender has no impact on accountants' perceptions on the use of AI" is accepted.

Table 10. Descriptive statistics on the relationship between perceptions of accountants and gender.

	N	Mean	SD
Male	75	15	14.93
Female	80	16	15.6

4.2.7.8 Hypothesis 7 – Age influences how accountants view the application of AI in accounting.

H0: There is no discernible difference in accountants' perceptions of the use of artificial intelligence in accounting based on their age.

HA: Accountants' perceptions of the use of AI in accounting differ significantly depending on their age.

Hypothesis 7 is testing the impact of age on accountants' perceptions on the use of AI in the accounting field. Descriptive statistics were conducted as shown in table 11 using available data from responses submitted by the accountants. It was clearly observed that accountants within the age group 41- 50 years ($M = 15$, $SD = 16.54$) have more favorable perceptions on the use of AI in accounting in comparison to other groups. ANOVA test was conducted to examine effect of age significance. According to the results ($P = 0.12$) compared to $\alpha = 0.05$, there is no significant effect of age on the accountants perceptions on the use of AI. Therefore, the null hypothesis "There is no palpable deviation in accountants' perceptions about the employment of AI in accounting based on their age" is accepted.

Table 11. Descriptive statistics on the relationship between the age of accountants and how they view the application of AI in accounting.

	N	Mean	SD
20-30	14	3	3
31-40	37	7.2	7.19
41-50	75	15	16.54
51-60	23	4.6	3.65
61 ≤	6	1.2	1.64

4.2.7.9 Hypothesis 8 – Education level influences how accountants view the usage of AI in accounting.

H0: Accountants' perceptions about the use of artificial intelligence in accounting are unaffected by their level of education.

HA: The level of education has a considerable impact on accountants' perceptions regarding the use of AI.

Hypothesis 8 is investigating the effect of the level of education on the perceptions of accountants' on the use of AI in accounting. Descriptive data were conducted for the 3 education levels (Ph.D., Master's, and Bachelor's) as shown in table 12. It was clearly

observed that accountants' with a bachelor's degree ($M = 15.4$, $SD = 13.76$) have similar perceptions to accountants' with a master's degree ($M = 14$, $SD = 14.09$). ANOVA test was conducted to investigate the effect of education level significance. According to the results ($P = 0.16$), and compared to $\alpha = 0.05$, there was no significant effect of the level of education on accountants' perceptions on the use and employment of AI in the field of accounting. Thus, the null hypothesis "Accountants' perceptions about the usage of AI in accounting are unaffected by their level of education" is accepted.

Table 12. Descriptive statistics on the relationship between educational attainment and accountants' opinions on the application of artificial intelligence in accounting.

	N	Mean	SD
Ph.D.	8	1.6	3.049
Master's	67	14	14.09
Bachelor's	77	15.4	13.76

4.2.7.10 Hypothesis 9 – Accountants' perspectives of the application of AI in accounting are influenced by their level of experience.

H₀: There is no significant variation in accountants' perceptions about the application of AI in accounting based on years of experience.

H_A: There is significant variation in accountants' perceptions about the application of AI in accounting based on years of experience.

Hypothesis 9 is examining the significance of the effect of years of experience on the accountants' perceptions on the use of AI in accounting. Descriptive data were conducted as shown in table 13, and it was observed that accountants who have an experience of more than 20 years had the highest mean value of 15 and a standard deviation of 13.95, which indicates that they have a better understanding of the topic and its applications compared to other groups. ANOVA test was conducted to test the significance of the effect of years of experience on the perceptions of accountants. According to the results ($P = 0.062$), and compared to $\alpha = 0.05$, there is no significant effect of years of experience on accountants' perceptions. Thus, the null hypothesis "There is no significant variation in accountants'

perceptions about the application of AI in accounting-based years of experience” is accepted.

Table 13. Descriptive statistics demonstrating the relationship between years of experience and accountants' perceptions of the usage of artificial intelligence in accounting.

	N	Mean	SD
less than 5 years	7	1.4	1.52
5 - 10 years	20	3.8	4.32
10 - 15 years	15	3	3.08
15 - 20 years	38	7.4	7.16
More than 20 years	75	15	13.95

4.2.7.11 Hypothesis 10 – Area of employment influences how accountants view the application of AI in accounting.

H0: The opinions of accountants towards the use of AI in accounting are not significantly different based on years of expertise.

HA: The accountants' perspectives toward the use of AI are significantly influenced by their years of expertise.

Hypothesis 10 is testing the impact of area of work on accountants' perceptions on the use of AI in accounting. Descriptive data were conducted and illustrated in table 14. According to data in table 14, it is clearly shown that accountants who work within the financial accounting/ reporting department ($M = 10.4$, $SD = 9.76$) had more favor perceptions compared to other groups. ANOVA test was conducted to test the significance of data. according to the results ($P = 0.11$), and compared to $\alpha = 0.05$ it was observed that area of work does not have a significant effect on accountants perceptions on the use of AI in accounting. Therefore, the null hypothesis “Based on area of work, there is no significant difference in accountants' perceptions on the employment of AI in accounting” is accepted.

Table 14. Descriptive statistics on the relationship between the accountants' perceptions of the usage of AI in accounting and their field of employment.

	N	Mean	SD
Financial Accounting/ Reporting	51	10.4	9.76
Internal Auditing	3	0.6	0.89
External Auditing	6	1.2	2.17
Management Accounting	9	2	1.87
Tax Accounting	33	6.8	6.02
Advisory/Consulting	30	6	6.08
other	23	4.4	4.28

4.3 Discussion

The objective of the study was to examine accountants' awareness level on the use of AI in the field. Furthermore, it was also investigating the perceptions of accountants on the use and employment of AI in the accounting field. This was followed by analysis of the effect of personal characteristics on the awareness of accountants as well as their perceptions on the use and employment of AI in accounting. Ten hypothesis were tested using two different statistical test which are independent sample t-test and one-way analysis of variance (ANOVA).

4.3.1 Level of Awareness on the Use of AI in Accounting

One of the important objectives of the study is to study the awareness level of accountants on using AI within the field. Thus, is due to the fact the technology has become one of the important aspects in every workplace and is replacing humans. According to the data gathered and the results conducted, the majority of accountants illustrated an elevated level of awareness (79.4%) on the use of AI. This complies with the results of a study conducted by (Peng and Change, 2019) at Chaoyang University of Technology investigating whether the application of AI would result in replacing accounting professions. It was observed that 75% of participants had awareness on the use of AI in their field, and 70% of them are aware of the fact that AI might replace human professionals in the field. Most of the accountants became aware of AI in accounting through personal reading (50.3%) followed by social media (34.8%). This also supports the fact that accounting professionals are aware of all the changes happening in the field with all

developments in technology. Which in turn is encouraging them to increase their knowledge and awareness by personal readings and through observing the subject on social media and other possible sources. Only 9% of accountants stated that AI is currently being used their workplace. Which in turn led to the fact that most of the accounting professionals have the required awareness as well as the theoretical knowledge of the use of artificial accounting in the field but they lack the practical knowledge in experience. This would be an encouraging point to start looking for courses that would enhance their knowledge and awareness level on AI, which should be offered by the professional bodies of each sector within a country and all over the world. It also correlates with the fact that 31% of accountants stated that they became aware of the use of AI in the field by publications offered by their professional bodies. It suggests that professional bodies are focusing on increasing theoretical knowledge and awareness rather than focusing on enhancing the practical knowledge and experience.

4.3.2 Perceptions of Accountants on the Use of AI in Accounting

This research study aims also to analyze accountants' perceptions on the use of AI in accounting. According to accountants' perceptions, the majority of them (77.4%) did not agree with the statement that AI would decrease the motivation of accounting professionals. This leads to a closure that the majority of accountants have the motivation for AI to be implemented and applied in the field of accounting. This complies the second statement that AI has useful applications in accounting with 80.6% agreements. However, some of them (27%) disagreed to the fact that AI capabilities are superior to human accounting professionals. At the same time, 60% of them which makes the majority agree with statement. This would suggest that there will always be a percentage of individuals who will need more awareness on the applications and uses of AI as 27% is not a small percentage and should be considered. They also showed a remarkable support for the employment of AI in accounting, agreeing to the statement that AI will contribute to enhancing the way accountants carry out their work with 84.5%. They also believe that it will lower the time accounting professionals spend on repetitive tasks with 88.4%. This means that accounting professionals are aware of the advantages of the implementation of AI in in the field as it gets work done with the least effort and time required. This in turn

lead to allowing accounting professionals to focus on more strategic roles in the workplace and always think of carrying out work with the least effort and time possible as well as to highest standards and quality of work.

Accountants who participated in this study were also open to the fact that many new roles will emerge to the field with the use of AI as they showed an elevated agreement rate of 88.4%. This will also encourage accounting professionals to start developing the requires skills need for the use of AI which they also showed a broad agreement on. This would lead to the fact that accounting professionals are open to adapt to new work environment and learn new skills that will primarily benefit them in the long run. They think that the use of information technologies, business advisory skills, and technological literacy skills respectively are considered the most important skills for accountants nowadays. This correlates with the curriculum that has been taught in universities as accountants (90.3%) support the implementation of appropriate IT skills courses to prepare students for the next era of technology in the workplace. they also agree that universities should pay more attention to the strategic area of accounting not only the technical accounting knowledge, as its technical knowledge will not become as important as the strategic areas of accounting in the near future. Thus, students should have more awareness on the strategic areas of accounting.

Only 23.3% of accountants agree that AI will take over the work of human accountants. However, the majority of them (83.2%) are not worried that AI could take over them in their job. This means that they still believe in the special capabilities of humans and support the technological evolution at the same time. They also support the development of AI, and they are excited to the changes AI will bring. All these perceptions are great evidence that accountants are looking forward for the next technological level of AI in their field. they also think that they are prepared to work alongside AI. Accordingly, accountants believe that AI will become a very useful tool in analyzing large volumes of structured and unstructured data, the automation of repetitive tasks as well as the identification and extraction of relevant information. This is correlated with their belief that AI will reduce the time and effort required to complete tasks.

Overall, accountants who participated in this study illustrated positive perceptions on working alongside AI. They also support adapting to new skills and types of work and are excited for new evolution of AI.

4.3.3 The effect of accountants' characteristics on their awareness on the use of AI in accounting

Another crucial objective of the study is to examine the effect of personal characteristics on the awareness of accountants on the use of AI in accounting. According to the statistical results obtained using the gathered data, gender has no significant effect on accountants' awareness. This leads to the fact that awareness of the use of AI is not correlated with gender by any means. As nowadays, technology is available to everybody, and many sources of knowledge are also widely available. With regards to age, it was also observed that age does not have a significant effect on accountants' awareness. Thus, professionals of all ages should use the appropriate resources available to enhance their knowledge. As these sources are not limited to one age group. Level of education also does not illustrate a significant impact on the awareness level of accountants. This supports the fact that universities should adjust their curriculum and start focusing more on teaching IT skills that will benefit students to adapt to new technologies in the workplace. It also suggests that awareness and knowledge of AI is more of a personal effort than a level of education which complies with the fact that the majority of accountants stated that they became aware of the use of AI accounting through personal readings and social media respectively. With regards to years of experience, it also does not show a significant effect on the awareness of accountants on the application of AI in the accounting field. This is explained by the fact that AI is a new evolving technology, thus years of experience would not have a remarkable effect on the awareness of accountants. Area of work similarly does not have a significant effect on the awareness of accountants on the application of AI within the field. Which also correlates with the fact mentioned above that it is a new evolving technology to the whole field.

4.3.4 The Effect of Accountants' Characteristics on their Perceptions on the Use of AI in Accounting.

The significance of the effect of personal characteristics on the perceptions of accountants on the application of AI was also tested using ANOVA and the independent sample t-test. According to the results obtained, gender has no significant effect on accountants' perceptions. Which also correlates with previous results discussed, as gender effect on accountants' awareness was also observed not significant. With regards to age, it also does not illustrate a significant effect on accountants' perceptions. The significance of the effect of the level of education was not significant as well as years of experience and area of work. This would also suggest that perceptions of accountants are correlated clearly with their awareness, thus it all related to the level of awareness accountants have on the subject.

5. CONCLUSION AND DISCUSSION

5.1 Conclusion

Technology has become an important part in every life aspect and will continue to evolve. Thus, every individual should acquire the required awareness and knowledge of the different uses and applications of technology nowadays, especially within the workplace. Accordingly, technology in accounting will continue to evolve. This research has investigated accountants' awareness level on the application of AI in the workplace. According to the results, it was observed that the majority of accountants participated in the study were aware of the implementation of AI aspects within the field. Moreover, their perceptions on the use of AI in accounting were measured. With reference to the data collected, accountants illustrated an overall positive perception. Relating to the hypothesis that were tested, there were no significant correlation observed between the personal characteristics of accountants and their awareness level on the implementation of AI within the field of accounting. Likewise, there was no significant correlation observed between accountants' personal characteristics and their perception on the implementation of AI in the accounting. Results indicated that accountants are open to the implementation of AI in the workplace and they are excited for the new advanced work environment with all its opportunities. And with reference to the rapid changes happening within the workplace regarding AI, Accountants should increase their awareness regarding application of AI within their field. It is also the professional bodies responsibility to raise awareness and implement courses that increases accountants' knowledge on as well as focusing on highlighting the future impact of these technologies in the field positively.

5.2 Contributions and Limitation of the Research

This research study contributed to examining the accountants' awareness level as well as their perception on the implementation of AI within the field of accounting. It was also assessing the significance of personal characteristics effect on both accountants' awareness level and perceptions. According to the best of researcher knowledge, data on the effect of personal characteristics on the level of awareness as well as accountants' perceptions are inconsistent. Thus, doing this study is thought to contribute to reaching

more consistent answers as well as encouraging other researchers to conduct further research on the subject.

Research limitations can be summarized as follows:

1. One of the main limitations to the study was that the questionnaire used is a self-reported tool. Hence, answers obtained might not be very accurate, due to the fact that some participants might misinterpret some of the questions. This in turn will affect the reliability of statistical tests conducted and results obtained.
2. The questionnaire was only administered to accountants working in Istanbul and was not distributed on a large scale in the country.
3. Perceptions submitted by accountants might not be reliable due to the fact that questions will be interpreted based on personal knowledge and assessments.

5.3 Recommendation for Future

Further research should examine the perceptions and perspectives of accounting clients with regards to AI use in accounting since this study only examined the observation and views of certified public accounting. Additional study should examine the perceptions and opinions of accounting students at various Istanbul universities to learn more about how they feel about the application of AI in accounting.

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Appendix

Effects of using Artificial Intelligence on the Certified Public Accountant Profession.

Dear Participants, this survey is part of a study on “The Effects of Artificial Intelligence Use on Financial Advisory Profession” conducted within the scope of the Accounting and Finance Graduate Program at Yeditepe University Social Sciences Institute.

Your answers will only be used within the scope of this study. Thank you very much for taking the time to answer the questionnaire and supporting our study.

*** Required**

1. Gender*

- ☐ Male
- ☐ Female

2. Age*

- ☐ 20 - 30 years
- ☐ 31 - 40 years
- ☐ 41 - 50 years
- ☐ 51 - 60 years
- ☐ 61 and above
- ☐ Other:

3. Highest Level of Education*

- ☐ Ph.D
- ☐ Master's degree
- ☐ bachelor's degree
- ☐

4. What area of Accounting do you currently work in?*

- ☐ Financial Accounting/Reporting
- ☐ Internal Auditing
- ☐ External Auditing
- ☐ Management Accounting
- ☐ Tax Accounting
- ☐ Advisory/Consulting
- ☐ Other:

5. Work Experience (in years)*

- ☐ Less than 5 years
- ☐ 5-10 years
- ☐ 10-15 years
- ☐ 15-20 years
- ☐ More than 20 years

Section B

Artificial intelligence, or AI, refers to a system's or machine's ability to do tasks that would ordinarily need the intelligence of a human person, such as decision making, speech recognition, and visual perception.

In accounting, artificial intelligence (AI) refers to a system that is capable of doing activities that would ordinarily need the intelligence of a human accountant.

Artificial Intelligence is currently being widely discussed in Accounting.

6. Are you aware of the discussions surrounding the use of AI in the Accounting Profession? *

- ☐ Yes
- ☐ No

7. How did you become aware of this? (Choose all that apply) *

From the media

- ☐ Social media
- ☐ I was taught in school
- ☐ From my personal readings
- ☐ Publications from my professional body
- ☐ Artificial Intelligence is currently being used at my workplace o N/A
- ☐ Other

Section C

Please indicate the extent to which you agree or disagree with each of the following statements by clicking on the appropriate boxes

8. Will artificial intelligence in Accounting reduce the motivation of the accountants*

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral

- ☐ Disagree
- ☐ Strongly Disagree

9. Artificial Intelligence has useful applications in Accounting*

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

10. Artificial Intelligence capabilities are superior to the capabilities of human accountants*

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

11. Artificial Intelligence will improve the way accountants carry out their work*

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

12. Artificial Intelligence will reduce the time accountants spend on repetitive tasks*

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

13. Artificial Intelligence will allow accountants to focus on more strategic roles in the workplace*

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree

- ☐ Strongly Disagree

14. The use of artificial intelligence in accounting will lead to the emergence of new roles in the accounting profession*

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

15. Accountants would need to develop new skills to adapt to new AI trends*

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

16. Accounting curriculums in universities should include appropriate IT skills*

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

17. Accounting curriculums in universities should focus more on the consulting and strategic areas of accounting and not just technical accounting knowledge*

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

18. Human Accountants will be replaced by Artificial Intelligence in the foreseeable future*

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree

- ☐ Strongly Disagree

19. I am worried that Artificial Intelligence could replace me in my job*

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

20. I support the development of Artificial Intelligence in Accounting*

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

21. I am excited about the changes that Artificial intelligence will bring to the accounting profession*

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

22. I am adequately prepared to work alongside Artificial Intelligence*

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree

23. Which of the following potential applications of AI do you think would be most useful to Accountants? (Choose all that apply)*

- ☐ Fraud Detection

- Forecasting Revenue, cash flows, etc
- Analysis of large volumes of structured and unstructured data o Automation of repetitive tasks
- Identifying and extracting relevant information from documents o Interacting with clients
- Other:

24. Which of the following skills do you consider most important for accountants today?
(Choose all that apply)*

- Technological Literacy
- Business advisory skills
- Communication skills
- Relationship Building
- Interpretation of Financial Information
- Other: