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Artificial Intelligence & Accounting

by

Robert Jackson Kline

An Honors Capstone

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Dedication

This thesis paper is dedicated to my family for always loving and supporting me in all of my endeavors academically and athletically. My family consist of: my mother Jennifer Kline, my father Jim Kline, my brother Sam Kline, and my sister Lucie Kline. I love each and every one of you and am thankful for the impact you all have made on my life.

I would also like to take the opportunity to thank and dedicate this paper to all of my accounting professors at the University of Alabama-Huntsville. I appreciate each and every one of you all pouring knowledge into the students here at the university to help better prepare us for the real world that lies ahead.

Abstract

Over the years, the accounting profession has evolved greatly since its creation thousands of years prior. Arguably the most monumental reason for the amount of change and growth the industry has experienced is due to various technological advancements seen over the past few decades. The question posed in this paper relates to the analyzation of whether or not artificial intelligence is beneficial for the accounting industry or not. In this paper, I will present the potential negative and positive benefits associated with technology in general. I will also introduce the field of accounting and describe the diversity of positions offered within accounting and the evolution of the industry itself. Furthermore, I will relate the two topics of technology and accounting together and demonstrate how they are interrelated and have transformed into a coexistent state. Additionally, we will take a look at what the accounting industry is like in today's present age with the technology available to the industry and what this means for the profession moving forward. Finally, we will answer the question of whether or not this technological growth is vital or fatal for the profession of accounting.

Introduction

As seen throughout history, technology is an immensely powerful tool that has the capabilities to transform the way the world operates by revolutionizing industries through the artificial intelligence created. One example of technology's incredible power has been seen in the accounting industry, but frankly, it can be seen in most all industries across numerous platforms. However, for the sake of this paper, we will analyze its effects on the accounting industry. Artificial intelligence not only revolutionized the accounting profession by altering accountants' general activities and duties through the utilization of automation and computerization; furthermore, the technological growth seen over the past few decades has also changed the way people view accountants and the skills integral to become an accountant.

The accounting profession is incredibly diverse and has a reputation of being a safe, secure, well-paying job. You always hear that everyone needs accountants, no matter the type of industry, and that may be true because accounting is widely considered to be known as the language of business. Unfortunately, some people think accounting will become extinct in the near future due to the continued growth artificial intelligence.

Nevertheless, the industry of accounting has survived thus far due to its ability to adapt to its rapidly changing environment. One famous author describes adaptability best when she states, "Adaptability is the simple secret to survival" (Hagedorn 2004, 13). Although the accounting industry has been able to adapt and survive thus far, will they be able to in the future with even more technological developments on the rise? Let's find out.

Chapter 1: The Accounting Industry

The accounting industry is known to be very broad and encompassing in nature. There are numerous different types of sectors within the accounting field to enter into with a multitude of various job titles within each sector. In this section I am briefly going to outline and describe the different types of general entry-mid level accounting positions and their related tasks and responsibilities. Some of these tasks may be similar or even the same, but the goal of this section is to demonstrate how vast the accounting field is and can be. Lastly, this list of accounting positions is not all-encompassing. The list itself serves to lay the groundwork for a basic understanding of various types of positions in the accounting industry. It aims to demonstrate the flexibility and variety seen throughout the accounting world.

External Auditor

An external auditor is an accountant that audits other client companies' financial statements. Their job is to provide reasonable assurance to the users of their clients' financial statements that the statements are accurate. They are supposed to form a fair opinion about the statements themselves. They accomplish this task by performing tests, collecting evidence, determining materiality thresholds.

Internal Auditor

An internal auditor is an accountant that audits the company he or she works for. Their job is to keep their employers in check and make sure they are running a clean, ethical operation. Internal auditors perform tests and collect evidence just as external auditors do. However, internal auditors serve their employer company first and foremost and want to catch misstatements before the external auditors can see them. On the other hand, external auditors serve the users of the financial statements first and foremost.

Tax Specialist/Accountant

Clearly, a tax specialist accountant primarily focuses in the realm of tax. For an accountant that works in a public accounting firm, he or she primarily prepares tax returns for individuals and businesses and offers his or her client's any and all tax expertise. For an accountant who works at a private company, he or she primarily performs specifically tax work for her employer. This tax work could involve but is not limited to activities such as: federal and state tax compliance on a quarterly and annual basis, preparing various calculations for foreign tax credit and research and development, and managing and implementing tax software.

Public Accountant (CPA)

A certified public accountant, or CPA, is an accountant who has taken and passed the infamous CPA examination meaning they are qualified to perform accounting work for public companies. The accounting work CPAs primarily perform is related to tax, audit, and consultation. These accountants do not necessarily have an area of specialization. Instead, they do a little bit of everything. They consult and advise their client companies on various aspects of business, perform tax returns for individuals and companies, and also participate in audits of businesses.

Cost Accountant

One can infer from the title that a cost accountant primarily operates in the realm of cost. A cost accountant employed by a company is responsible for recording, calculating, allocating, and analyzing various types of costs for his or her employer. There are a multitude of different activities cost accountants perform such as: keeping track of material and production costs, cost of sales, and overhead costs, comparing cost estimates to actual costs incurred and allocating them appropriately. Furthermore, one of their biggest roles is preparing cost reports to present to

management. These reports are summarizations of costs, and thus, it gives management a better picture of how their money is being spent. In return, this enhances the management's overall decision-making ability which is crucial in the business world.

Staff Accountant

A staff accountant can be thought of as an entry-level accountant who performs the majority of menial, daily accounting functions for their employer company. Staff accountants are essential, nonetheless, and are employed regularly by government agencies, accounting firms, private companies, and non-profit organizations. Their tasks involve but are not limited to: reconciliation of bank statements and balance sheet accounts, preparing and logging journal entries to numerous ledgers, and supporting and maintaining the accounts payable and accounts receivable accounts.

Financial Analyst

A financial analyst is not necessarily an accountant by degree; however, it is quite common for accountants to work as financial analysts for a company. Financial analysts specialize in the analyzation and interpretation of the financial well-being of companies. Their duties and responsibilities are related to financial statements. They analyze and interpret the financial statements of their company or of a client's company and advise either management or their client and appropriate decisions relating to their business. Their expertise is numerical in nature, and they understand precisely how the numbers operate in financial statements and what that entails for the company.

Government Contract Accountant

Government contract accounting is an entirely unique sphere of accounting. These accountants deal with contracts that follow specific principles, standards and regulations. There

are numerous types of contracts which are determined by various aspects. Some contracts revolve around a fixed price, some contracts relate to performance, and some contracts involve a mixture of both performance and price-based aspects. Government contract accountants' job encompasses the adhering and maintaining all of the various contracts for a particular contractor, and making sure appropriate regulations and standards are being followed and met. It is the government contract accountants' job to determine what costs are deemed allowable or unallowable for a particular contract. It is imperative for a government contract accountant to allocate costs appropriately depending on the type of contract he or she is dealing with.

Forensic Accountant

Forensic accounting deals with the utilization of accounting practices and investigative techniques to detect and prevent different types of business-related crimes. Forensic accountants perform audits, ensure compliance with federal and state tax regulations, and utilize accounting principles to prepare material for litigations if needed. Their job in court is to explain the financial nature of the alleged committed crimes to the court. Forensic accountants can be thought of as the police of the accounting industry. Forensic accounting is often used by the insurance industry to establish damages from claims.

Non-Profit Accountant

It is apparent from this title that non-profit accounting deals with the accounting practices involved around non-profit organizations. Will Kenton explains to his readers in his article what exactly a non-profit organization is when he states, "A nonprofit organization is a business that has been granted tax-exempt status by the Internal Revenue Service (IRS) because it furthers a social cause and provides a public benefit" (2020). As Kenton reveals, non-profit organizations are tax-exempt by the IRS and all of their revenue is donated towards achieving their

philanthropic goal. Thus, there are some exceptional circumstances involving non-profit accounting. Accountants who work for non-profit organizations design and implement systems of documenting and evaluating financial conditions and transactions of non-profits (Kenton 2020). Furthermore, these accountants aid in non-profit organizations financial decision-making.

Chapter 2: Technology: The Good, Bad, and Ugly

Technology is an immensely powerful tool that aims to innovate, create, and reinvent the way the world operates. It intends to make our lives easier through the use of our imagination as human beings to engineer something extraordinary for the betterment of ourselves and the rest of mankind. However, technologies intentions do not always work in the way they were intended, and there are some negative connotations associated with the idea of technology. Technology itself is not an evil concept; it just needs to be utilized appropriately and safely. This upcoming section is here to present to the reader the theory of the good, the bad, and the ugly of technology.

The Good

There is no denying the evident fact that our world is better off with all of the technology we as a human race possess. Technology provides its users the opportunity to spread love and positivity through video streaming outlets. People are able to stay connected and communicate instantaneously to their friends and family through the use of social media platforms. On its best side, technology makes our lives simpler by allowing people to read books, pay bills, and even attend school. Technology has provided new forms of entertainment with the creation of television, computers, video games, and streaming services like Netflix and Hulu. Technology has also provided for some things people may take for granted in the 21st century such as:

electricity, clean water, clothes, etc. Additionally, from a future businessman's perspective, technology has made things much smoother and easier within the business realm. The automation of various processes has expedited the speed and depth at which financial experts can analyze different aspects of their or their client's respective business or industry. Thus, it is apparent that when technology is used the right way, it can truly accomplish incredible things.

The Bad

Despite the tremendous benefits individuals can receive from technology, there are also negative effects that are associated with the advancement of technology. The ideology that engulfs the majority of the negative implications surrounding technological improvement can best be summarized by a quote from one of Albert Einstein's letters to his friend Otto Juliusburger where he states, "I fear the day that technology will surpass our human interaction. The world will have a generation full of idiots" (1948). Humans are beginning to become addicted to technology in a way. There is a growing need to feel connected and to be entertained by technology. Whether that means of connectedness or entertainment is through television, social media, video games, etc. the feeling is there, and it is troubling to say the least. While technology is a tremendous asset to help us stay connected and an exciting tool to entertain us during our spare time, I believe it is important that people never underestimate the power and the importance of human interaction and sophisticated people skills. In addition to the potential negative direction technology can lead us, there is unfortunately already some pretty horrible utilizations of technology.

The Ugly

As we are aware, the world we live in can sometimes be a disgusting and evil place, and sadly enough, when technology is not applied as it is supposed to be, for the betterment of

ourselves and for society, there can be some ugly outcomes such as: pornography, the black market, genocide, gun violence, terrorism, etc. The inherent cause of the evil nature of the outcomes aforementioned is the reality that there are some sick, twisted people who live in this world that possess a skewed set of morals and values. However, technology is often used as a means of advancing, enhancing, and spreading these terrible actions. It is imperative that people do their part to stop the spread of horrific uses of technology the best they can.

Chapter 3: The History of Accounting

To become familiar with what exactly accounting is, let's start with a brief overview of what precisely is the point of accounting itself. According to source found online, "Accounting is designed to accumulate and report on financial information about the performance, position, and cash flows of a business. This information is then used to reach decisions about how to manage the business" (Bragg 2019). Now, this might seem like a fairly modern definition of accounting; however, the interesting thing is that this is and has been the sole basis of accounting ever since its inception thousands of years ago. The purpose of this first section is to present a timeline up until the 20th century about the history of the idea of accounting and the profession itself.

Ancient Mesopotamia

The first evidence of accounting in history comes around 7,500 BC in Ancient Mesopotamia, better known today as the Middle Eastern countries of Iraq, Kuwait, and eastern Syria. During this time, accounting was mainly utilized to record crop and herd growth. Some of the techniques used back then still serve as the basis to determine a shortage or surplus of crops today. Furthermore, the ancient Mesopotamians took advantage of the use of small clay objects as a means of record keeping according to an online source: "Mesopotamians were using small

clay objects as counters for keeping account of goods. Each object represented particular quantities of different types of commodities, such as food, clothing, and even labor” (A Brief History. . . 2018). Record keeping became essential to the Mesopotamians thousands of years ago, and it set the stage for the growth of the industry and profession known as accounting.

Roman Empire

Later in history, accounting appears during the reign of the Roman Empire under the rule of Emperor Augustus. Accounting continued to evolve under Augustus, as he kept an account of his financial dealings in a manuscript called, “The Deeds of the Divine Augustus.” In the manuscript, “It listed such quantities as distributions to the people, grants of land, building of temples, money to military veterans, religious offerings, and money spent on theatrical shows and gladiator events” (History of Accounting. . . 2019). It is apparent that Emperor Augustus used this manuscript for decision-making purposes. This further supports the claim that the primary goal of accounting is to ultimately aid in the decision-making process of individuals in positions of power. Additionally, it is believed that during this time period, Roman historians also recorded information such as: taxes, public revenues, slaves, and freedmen.

Middle Ages

In the 13th century, Europe made the change from their previously established barter system to a newfound monetary system, where goods and services were exchanged with legitimate forms of currency. The currency was then recognized as payment for the agreed upon goods and services, and the two parties’ respective needs were then ultimately met. As a result of the monetary system in Europe, merchants began relying upon bookkeeping to keep record of their business dealings. This began the birth of the double-entry bookkeeping system known today in the accounting profession. According to a source found online, “This is when double-

entry bookkeeping got its start, which is when a debit and credit value is entered for each transaction by the accountant. . . . It provided them with constant information about their businesses that they could use in decision-making to grow their business as they saw fit” (History of Accounting. . . 2019). Coincidentally, the double-entry bookkeeping system was a monumental step for the accounting profession. It coined the concept of a debit and a credit for each transaction which is how people understand accounting today. Another important fact about the double-entry bookkeeping system is that it created primitive forms of what is known today as the income statement and the balance sheet. Furthermore, it also further solidified the notion that accounting’s primary purpose is to serve as a decision-making tool.

The Father of Accounting: Luca Pacioli

As aforementioned, the monetary system in 13th century Europe first paved the way for the double-entry bookkeeping concept individuals know today; however, it was not documented until 1494 by a man named Luca Pacioli in his 27 page treatise within his work titled, “Summa de Arithmetica, Geometria, Proportioni et Proportionalitia” (Summary of Arithmetic, Geometry, Proportion and Proportionality). The short treatise is known as, “Particularis de Computis et Scripturis” (Details of Calculation and Recording). According to an article found online, “Pacioli’s book became the reference text and teaching tool on the subjects of bookkeeping and accounting for the next several hundred years. This was the first time that symbols for plus and minus appeared in a printed book. This book was the first known published work on the topic of double-entry bookkeeping” (History of Accounting. . . 2019). There is definitely a reason why Pacioli is commonly referred to as, ‘The Father of Accounting.’ His influence on the accounting profession stretches far and wide. His ideas within not only contained documentation of debits and credits and the double-entry bookkeeping system which helped merchants improve the

efficiency of their businesses, but through his work, he was able to introduce concepts such as accounting cycles, ledgers, inventories, liabilities, assets, etc. The work of Pacioli truly contributed to astronomical advancements of the accounting profession and industry.

16th Century – 18th Century

Throughout these years, there were a few minor contributions to the history of accounting that are worth mentioning. As time went on, small changes were made to the previously established double-entry bookkeeping system. These changes are evident when examining the East India Company, which was later known as a British joint-stock company. According to Jim Wilkinson, “[t]he East India Company develops invested capital and dividend distribution during the 17th century. This also created the need for a change in financial accounting and managerial accounting” (2019). These were two separate presentations performed by the East India Company. The presentation regarding dividends and capital distribution was utilized to gain investors. On the other hand, the second presentation was an attempt to improve business efficiencies. Their contributions left a long-lasting impact on the accounting world with the creation of dividend distribution and the segregation of managerial and financial accounting.

18th Century – Late 19th Century

During this time period, the height of the well-known Industrial Revolution was well under way, thus there was a focus on the business world that had never been experienced so far in history. This enhanced priority towards the business realm is explained in an article found online where it states, “During the Industrial Revolution, accounting really took off as industrial companies sought out to gain financing and maintain efficiency through operations. Several of the double-entry accounting methods was truly developed in this area” (Wilkinson 2019). Businesses were focused on improving their operations in their quest to climb to the top of the

corporate ladder, and accounting was an integral part of that climb. An additional noteworthy event during this timeframe was the creation of the first accounting organization in New York in 1887. Today that organization is more famously known as the American Institute of Certified Public Accountants (AICPA). Nine years later, the AICPA developed the title and license of the Certified Public Accountant (CPA) in the year 1896. The creation of the AICPA was tremendous for the accounting industry as it gave the profession a governing body to lead them into the future. Furthermore, the development of the CPA license was also integral to the accounting profession as the license is still regarded today as an extremely prestigious honor for accountants across the United States.

Chapter 4: Accounting in the 1900s

Now that we have a solid understanding regarding the history of accounting and the accounting industry itself and all it encompasses, let's dive into what accountants used to be and what the profession used to be like. It is imperative to analyze and address the accounting realm's past to later identify how drastically different the present is and future will be for the accounting profession. This upcoming section is going to recognize what accounting was like prior to the technological advancements and computerization that has engulfed the industry in more recent years, but also, we will analyze a time frame following the firm establishment of the industry itself. We will analyze what accountants' duties and responsibilities used to be. The time period we are analyzing will primarily be involving the early through mid-20th century, as we have previously outlined the history of accounting from its humble beginnings thousands of years ago all the way up until the start of the 20th century.

Following the foundation of the AICPA and the CPA license, as well as the booming business effects of the Industrial Revolution of centuries prior, the accounting profession had established itself in the world, and it was apparent that it was going to be here to stay for the long haul. Once established, newly created accounting firms and previously established businesses began hiring accountants to perform whatever job they were hired to do. Whether it was the position of a CPA accountant, an auditor, a staff accountant, etc. the jobs were in place and the work was just beginning. For the purposes of explaining what accountants' daily responsibilities and duties used to be during this time, I am going to use three examples of accountants for generalities. The three types of accountants I am going to use are going to be analyzing will be: staff accountants, auditors, and tax accountants. These three types of accountants are some of the most common types of accountants. These duties and responsibilities I am going to reveal are by no means whatsoever all-encompassing, but they will provide us with a general understanding of what accounting as a whole used to look like.

Staff Accounting

Before the computerization and automation of much of the accounting profession, staff accountants' primary duties and responsibilities are to keep up with the day-to-day accounting functions of a company. Manually inputted all of the journal entries into what is called a journal. Each debit and each credit were manually entered in by the accountant. Each account (cash, accounts receivable, accounts payable, etc.) had its own separate journal that could cover multiple pages of journals filled with various entries stretching across the fiscal period. From there, each journal entry for each account was transferred over into the general ledger, which contained all of the journal entries for every single type of account. After the journal entries and general ledgers were completed, financial statements were made manually using the entries from

the general ledger. This process was extremely tedious and had a high risk for the possibility of human error which in return would compromise the validity and accuracy of the financial statements themselves. To put into perspective just how delicate this process really was to the potential for error, an article online explains, “Accuracy in posting was very important, since a mistake (or improperly calculated number) could result in hours of recalculation. Searching for an accounting error could be like looking for a needle in a haystack” (Haus 2019).

Auditor

Now, let’s examine the life of an auditor during the 20th century prior to the automation of the accounting profession. An auditors’ primary duties and responsibilities involve the determination of a fair opinion about the financial well-being of a client company or of his or her employer company by providing reasonable assurance as to his or her opinion. A major aspect of auditing involves the performing of tests, the collection of evidence, and the writing of reports to summarize their findings. Similar to what life was like for staff accountants, all of this work the auditors had to do was manual as well. Every test that was performed and piece of evidence that was collected was manual. This method of auditing was time-consuming and subject to potential human error. Furthermore, all of the reports that needed to be written up summarizing their findings after the completion of an audit had to be typed out on a typewriter by someone else specializing in typing. Again, this process of reporting their findings was not efficient whatsoever and was subject to potential human error during the typing of the report. Making errors while using a typewriter was an extreme hassle because there was no delete key on a typewriter. Once an error was made, the person typing had to restart the entire page.

Tax Accountant

Lastly, we will take a brief dive into what a tax accountant's life was like working in the 20th century. A tax accountant's primary duties and responsibilities involved mainly the preparation of individual and company tax returns and the adherence to state and federal tax regulations. Regarding the preparation of tax returns, all returns were prepared manually by the accountant himself. Any and all research regarding federal or state tax regulations had to be done using paper, hard-back books. This made a tax accountant's job much more time-consuming and tedious to complete.

As you can see, life as accountants involved a lot of manual number crunching, research, and calculations. During the 20th century, the account profession as a whole was tedious, monotonous, and highly subject to human error.

Chapter 5: The Relationship Between Technology and Accounting

Technology and accounting have been the two main ideologies discussed thus far in this paper, and now it is time to bring the two together to demonstrate how they are interrelated. Technology is a methodology to aid the ails of the previously inefficient and time-consuming accounting profession. Technology's ultimate purpose is to help make the world a better, simpler place. It accomplishes that job within the accounting profession by basically eliminating many of the manual processes of the 20th century that have been previously discussed in this paper. The technological advancements made in the accounting profession have expedited the previously mundane and manual processes, and, in return, created an overall more efficient method of performing all sectors of accounting. Accounting utilizes technology to strive to fulfill its purpose of helping make the decision-making process smoother and simpler by presenting facts

about the financial state of a certain topic, business, individual, etc. In this next section, I will address some of the paramount types of artificial intelligence that have transformed the accounting industry over the past few decades.

Cloud-Based Systems

Cloud-based systems have redefined the way information is stored. They have become the filing cabinets of the 21st century. Instead of manual retrieval and management of information such as journal entries, client information, and records of previous reports, cloud-based systems have created the capability for all types of information to be stored on a singular, comprehensive system online in digital format. The benefits from the usage of cloud-based systems can be seen in this quote when it states, “Distributing accounting information to different branches within your company will also become a breeze. Moreover, using simple and ready-to-go cloud-based systems will significantly reduce information technology and file-keeping expenses” (Ross 2018). It is apparent that cloud-based systems have provided the accounting industry with numerous benefits including: the ease of the storage of information, decreased expenses for companies, and the simple access and sharing ability of all types of technology between individuals.

Various Types of Software

Additionally, various types of software have revolutionized the way accounting is performed. Alongside the creation of computers and the internet came the invention of software designed to automate the accounting profession. There are a couple types of software available to businesses. Many accounting firms have utilized software like UltraTax to computerize tax returns for individuals and businesses. On the other hand, small and medium-sized businesses

across a wide variety of industries have introduced software such as Quickbooks or Peachtree to automate the majority of their accounting functions. An article online expands upon some of the ability's software like Quickbooks can offer a company when they explain that they, "[o]ffer on-premises accounting applications as well as cloud-based versions that accept business payments, manage and pay bills, and payroll functions" (Use of Technology. . . 2018). Accounting software has entirely digitized nearly all general accounting functions like recording journal entries, paying vendors, reconciling bank statements, etc.

ERP Systems

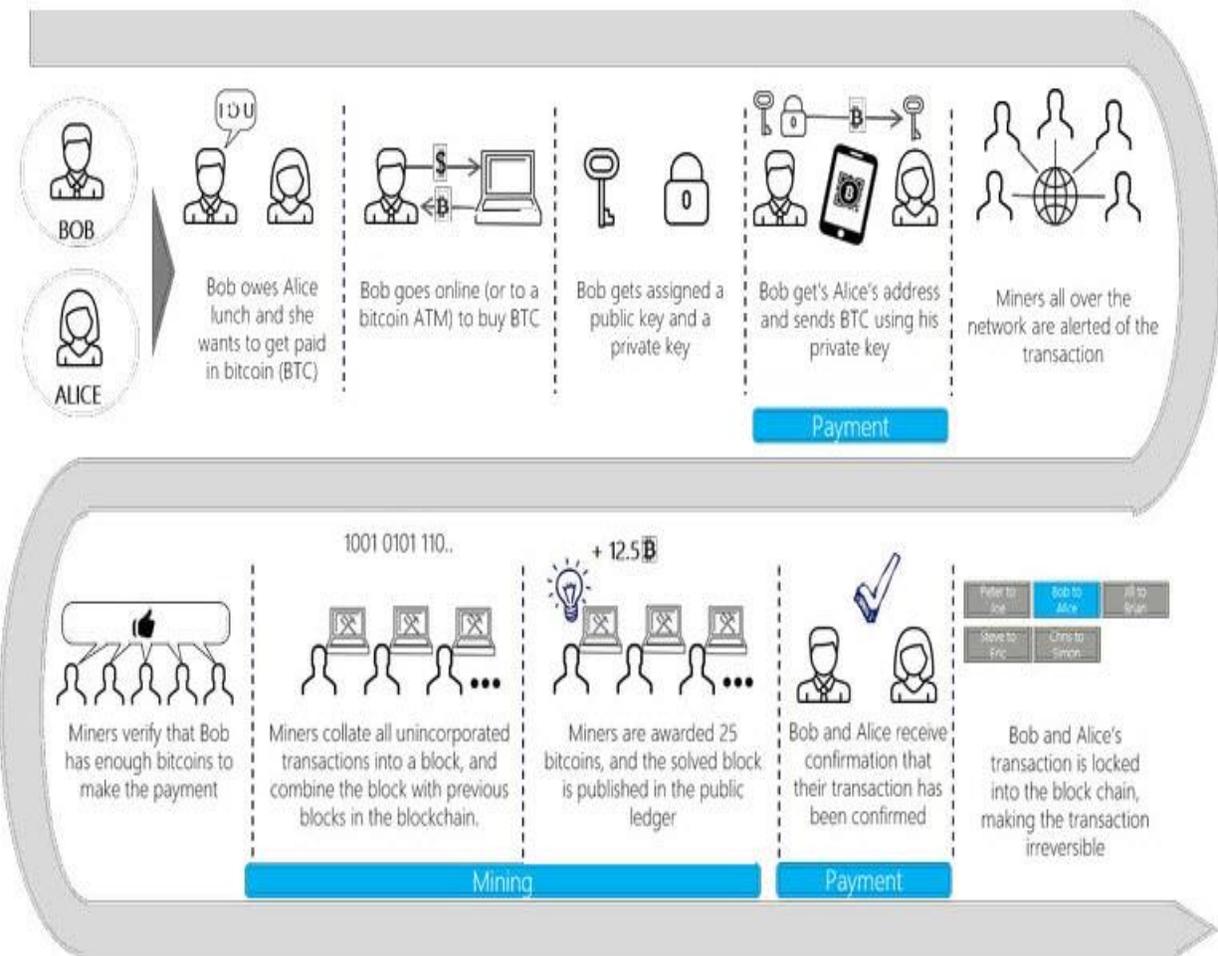
Similar to the implementation of accounting software like Quickbooks and Peachtree for small to medium-sized companies, larger companies have thrived off of the creation of enterprise resource planning (ERP) systems like SAP and Oracle. ERP systems are complex by design and nature. They are web-based systems that remotely integrate all types of information about a business with the purpose being to enhance decision-making and planning. According to an article found online, they describe ERP systems as this: "You can think of an enterprise resource planning system as the glue that binds together the different computer systems for a large organization. Without an ERP application, each department would have its system optimized for its specific tasks" (Enterprise. . . 2019). ERP systems often allow a company to become more self-aware of the overall state of their business by combining purchasing, sales, marketing, finance, production, human resources, and more. Additionally, ERP systems also have the capability to decrease costly duplication of information for companies. However, there are some potential negative side effects that accompany the implementation of ERP systems: "An ERP system doesn't always eliminate inefficiencies within the business. The company needs to rethink the way it's organized, or else it will end up with incompatible technology" (Enterprise. .

. 2019). It is imperative for companies to properly integrate ERP systems. Unfortunately, often times companies are scared of a change this large to their processes and are reluctant to completely abandon their dated ways which are subsequently incompatible with the new software. ERP systems have the aptitude to eliminate inefficiencies within a company by integrating multiple aspects of a business to become more self-aware for decision-making and planning, but these systems demand a significant commitment to change and adapt to their method of organization and integration with little room for a companies' established processes.

Blockchain

The most recent technological advancement seen in recent years relating to accounting is a foreign concept to most individuals called blockchain. Blockchain is a newfound method of keeping a record of sequential transactions through the payment of cryptocurrency, like Bitcoin. Blockchain is defined as: “a digital ledger created to capture transactions conducted among various parties in a network. It is a peer-to-peer, internet-based distributed ledger which includes all transactions since its creation” (Raphael 2020). Once these transactions are created in this block, or set of transactions, they are immutable and permanent, thus creating a clear, concise audit trail that is easily traceable. Figure 1 (Raphael 2020) provides a simple example of how the blockchain process works in the real world:

Figure 1:



In summary, Bob and Alice exchange Bitcoin currency online through a set of secure, private keys. Meanwhile, miners validate the transactions and record them on the block ledger. As a result, this has created a trail of transactions. Miners are individuals who validate new transactions and record them on the blockchain global ledger. Miners are able to accomplish this feat through the usage of a complex mathematical problem based on a cryptographic hash algorithm. (Cosset 2018). The invention of blockchain has the capabilities to completely transform the way accounting is handled as well as a wide range of other industries with the possibility of real-time debt settlement, an irreversible ledger, and a worldwide distributable record of transactions. In the accounting field, blockchain artificial intelligence will most

drastically impact the auditing profession. Auditors will need to reinvent how audits are performed with a clear audit trail already in place for them. Potential changes that may be seen in the auditing profession as a result of blockchain technology are elaborated upon in this quote:

“However, even for such transactions, the CPA auditor needs to consider the risk that the information is inaccurate due to error or fraud. This will present new challenges because a blockchain likely would not be controlled by the entity being audited. The CPA auditor will need to extract the data from the blockchain and also consider whether it is reliable. This process may include considering general information technology controls (GITCs) related to the blockchain environment. It also may require the CPA auditor to understand and assess the reliability of the consensus protocol for the specific blockchain. This assessment may need to include consideration of whether the protocol could be manipulated” (Raphael 2020).

Auditors will need to evaluate the reliability and validity of the blockchain as the chain itself is not going to be something controlled by the auditors’ client’s company. New types of tests will need to be performed in audits, and auditors will need to develop a deeper understanding of the ins and outs of the blockchain and study its potential inefficiencies that could possibly be subject to potential fraud and error.

Chapter 6: Accounting in the Present

Throughout this paper, the history and evolution of accounting has been outlined in great detail, and now, it is time to dive into what the accounting field looks like now. The manual processes of old have been replaced by automation and computerization.

No longer do the creation of financial statements drag on for weeks with intense number-crunching from the hand-written, three-inch-thick binder known as the general ledger. Additionally, people typing audit reports do not have to use a typewriter and restart when they make a grammatical error. Furthermore, tax accountants do not study hard-back paper books on various tax legislation, and they most certainly do not manually hand-write every single tax return during the accountants' busy tax season in the months of January-April.

Instead, the accounting profession as a whole is no longer fits the stereotype as a group introverts with thick glasses who sit at their desks all day and punch numbers into their calculators. Perhaps 40 years ago that stereotype was accurate, but now, the number-crunching accountants are known for is a thing of the past. Due to the rapid advancements made in technology over the last few decades, artificial intelligence now handles many of the accountants of old's previous day-to-day operations involving basic arithmetic. Thus, the manual processes of old which were highly subject to potential human error are now nearly free from error as a result of the more reliable technology in place. According to Ann Agnes Pepe, she put it best regarding the evolution of technology within the accounting field when she states, "As our knowledge of technology increased so has the accountant's ability to analyze statistical values. Technology advancements have enhanced the accountant's ability to interpret data efficiently and effectively. He/she now has the ability to interpret the language of business with such ease that the accountant has become a corporation's most trusted business advisor" (2011).

Everything is virtual now, and because of the ease of access and the speed at which financial information can be formed, there is more information in the accounting realm than ever before. Accountants are able to perform analytical procedures and create reports involving complex equations with the help of computers that would not have been possible 40-50 years prior. As a

result of the automation and computerization both relieving accountants' mathematical obligations and providing more information to companies about the financial state of their respective business, accountants adapted in an effort to survive. When examining Figure 2, which comes from Accounting Today, we are able to see the type of work accounting firms of all sizes perform and the percentages of each sector of work whether it is tax, audit, or consultation.

Figure 2:

2014 Size by Revenue		Firm	Net Revenue— U.S. Only (In \$ millions)	Partners	Professionals	U.S. Offices	Percentage of Total Revenue from Accounting and Auditing/Taxes/ Management Consulting and Other
BIG FOUR							
1		Deloitte	\$ 14,908.0	3,030	50,562	107	29/18/53
2		PwC	\$ 11,724.0	2,691	33,024	72	41/28/31
3		Ernst & Young	\$ 9,900.0	2,700	26,100	80	36/29/35
4		KPMG ⁽¹⁾	\$ 6,870.0	1,813	20,113	101	34/28/38
NATIONAL/REGIONAL⁽²⁾							
5		McGladrey	\$ 1,470.7	644	5,075	75	41/36/23
6		Grant Thornton	\$ 1,382.5	529	4,692	57	41/28/31
7		BDO	\$ 833.0	346	2,967	52	58/32/10
8		Crowe Horwath	\$ 686.6	257	2,315	29	28/24/48
9		CBIZ/Mayer Hoffman McCann ⁽³⁾	\$ 600.0	429	1,832	103	30/35/35
10		CliftonLarsonAllen	\$ 598.4	225	3,245	29	40/33/27
LOCAL							
50		Frank, Rimerman + Co.	\$ 70.2	23	267	5	27/62/11
75		Freed Maxick CPAs	\$ 45.5	35	240	4	38/38/24

⁽¹⁾ KPMG's office figure comprises business offices, as opposed to every physical location.

⁽²⁾ Only the six largest national/regional firms are listed.

⁽³⁾ Office figures are for CBIZ; MHM has 34 offices.

Source: Data from Accounting Today (www.accountingtoday.com).

It is apparent that consultation for the most part takes up at least one-third or more of the entirety of the work accountants perform on a regular basis. Accountants are consistently working with

clients on a daily basis regarding financial decisions for their respective companies. The need for number-crunching has been taken care of by artificial intelligence, but technology cannot replace human interaction and conversation. That is where accountants are beginning to thrive as they are using the increased data and information provided to them by the advancements made in technology to better advise and serve their clientele.

Additionally, technology has changed the way long-standing accounting services like tax returns and audits are done. Previously monotonous and mundane activities that were essentially entirely completed manually, now involve aspects of technology to revolutionize these activities.

Regarding tax, the only major change involving returns of the 20th century and the ones we see accountants complete in the present 21st century, is the fact that these returns are now completed virtually through the use of special software like UltraTax, for example. As long as American citizens and companies have to file and pay yearly tax returns, accountants will always be the ones to aid in the preparation of these returns. However, nowadays the speed the accountants can finish completing a given return is expedited due to the virtual software in place.

In terms of the auditing profession, as alluded to previously in this essay, the technology of blockchain has already begun transforming the type of work auditors will be performing. While blockchain provides an irreversible and universal audit trail for all transactions, there are still so major concerns surrounding this new type of technology. Some of the challenges facing blockchain can be described by this quote, “However, the auditor may or may not be able to determine the product that was delivered by solely evaluating information on the Bitcoin blockchain. Therefore, recording a transaction in a blockchain may or may not provide sufficient appropriate audit evidence related to the nature of the transaction” (Raphael 2020). In other words, just because a transaction exists on the chain does not necessarily confirm the legality or

validity of the transaction itself. Auditors need to now invent new ways to test the blockchain's accuracy. However, even though blockchain is drastically changing and creating a new wave of auditing, this does not take away from some of their more established activities like the fact that auditors still need to perform tests based on management's estimates in the financial statements and that they still need to take error and fraud into consideration regarding accepting potential clients.

Chapter 7: Is Artificial Intelligence Beneficial for the Accounting Industry?

There's no denying that artificial intelligence has been the main catalyst for the change over the past few decades within the accounting field. There has been a lot of change due to technologies like various software, cloud-based systems, ERP systems, and blockchain. The question of whether this is good for the accounting industry comes with a complicated answer.

Change is a concept that can be scary to many individuals. The act of changing requires something or someone to become different. This is exactly what the accounting profession has done, but it is also equally as scary to remain the same and not change. Change enables growth, and in all industries, including accounting, growth is vital to long-term survival. It has become different due to artificial intelligence. Number-crunching and IT skills are a thing of the past, and now that technology has created a surplus of additional information available at accountants' disposal, they are no longer needed for arithmetic, yet instead they are needed for the analyzation of all of the additional data so that they can advise clients and businesses appropriately on their respective business ventures. Furthermore, the potential for human error is minimized through the use of highly accurate technology to calculate account balances.

Thus, to answer the question of whether or not artificial intelligence is, 'good' for the accounting industry, in my opinion, I would say it is a good thing. While technological advancements bring about a significant amount of change, I believe that change is a good thing despite the uncertainty that comes with it. As aforementioned in the previous paragraph, it is equally or arguably even more terrifying to become complacent and not change.

As a result of the technological change experienced by the accounting industry, processes of the past have become automated and computerized, more information is available at accountants' fingertips, information is stored on a cloud-based system, ERP systems are able to integrate different departments within a business which in return improves overall decision-making and planning, and finally, blockchain has created an entirely exciting, newfound type of potential industry for auditors to enter into. So, while all of this is different from the past; different is okay because change is essential for the growth of the accounting industry.

Conclusion

Throughout this paper, there have been two main topics discussed: technology and accounting. Facts have been presented about the positive and negative effects caused by technology. Author R.S. Amblee describes technology best when she states, “Technological evolution is the result of our own desire to lead a better life” (2001, 39). Unfortunately, technology does not always work out how it is supposed to and there are some negative connotations that accompany the positive outcomes technological advancement is designed to bring about.

Furthermore, we have analyzed the accounting industry as a whole and been able to see how vast the profession stretches and how much it has grown since its creation thousands of years ago. Much of the growth the accounting field has experienced, especially during the late 20th and early 21st centuries, is attributable to the artificial intelligence invented in an effort to automate and computerize the industry.

Lastly, it is evident that the accounting industry has been able to survive and adapt to the new wave of activities and responsibilities that have formed because of the technology within the field thus far. However, there is still more work to be done regarding adaptability and the new potential effects of artificial intelligence like blockchain.

In conclusion, artificial intelligence and accounting are interrelated in a variety of ways, and the combination of the two topics has been an overall positive experience. The two have developed a coexistent relationship over the past few decades, and while there has been a significant amount of change that has resulted from artificial intelligence, change is a good thing, not something the accounting industry needs to be scared of. The accounting profession did not belong in their previous number-crunching, introverted ways, and they needed to change and

adapt to the new wave of technology. Fortunately, they were able to do so thus far, and I am confident that they will continue to do so even amidst the uncertainty that lies ahead.

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Jack:

My congratulations to you for a job very well done. Your manuscript seems concise, accurate, and perceptive. Further, I like your writing style; you write well. You have brought out issues that the recent graduates will face on the CPA Exam and in their practices.

Please consider this email as conveying enthusiastic approval of your work.

Sincerely,

Dr. Gene Bryson