Information Management and Business Review (ISSN 2220-3796)
Vol. 17, No. 1, pp. 126-136, 2025

Emerging Technologies Revolutionizing the Accounting Profession–Practical Applications

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Abstract: Digital transformation is reshaping all sectors with the rapid emergence of new technologies that have garnered significant attention in recent years, and the accounting profession is no exception to this paradigm shift. The profession, however, has been slower in adopting emerging technologies due to practitioners' lack of awareness of the latest advancements, a shortage of technology-accounting experts, and concerns about the quality of financial reports generated using these technologies. Emphasizing the benefits and applications of these technologies is crucial for helping accountants and auditors understand better their potential to improve daily tasks and workflows. Therefore, this study aims to explore the evolution of digital usage in the accounting profession while investigating various technological advancements and their advantages and practical applications. The findings revealed the progression of digital usage in the accounting profession, tracing key milestones from the Pre-Computer Era to the introduction of computers, the emergence of the internet and ultimately to IR 4.0, which has driven the advancement of emerging technologies such as big data, AI, RPA, blockchain, XBRL and cloud-based software. The researcher also highlights the practical uses of these technologies, which include estimation and valuation, analysis and management, automation, integration and accessibility, control and updates and authentication. The results are hoped to inspire industry players to embrace new technologies and provide top management with valuable insights for making well-informed decisions about technology selection and investment.

Keywords: *Emerging Technologies, Cutting-edge technologies, Digitalization Accounting, Accounting Technology, Accounting Profession*

1. Introduction

In the era of the Fourth Industrial Revolution (IR 4.0), accounting methods and practices are evolving significantly due to the emergence of cutting-edge technologies (Malaysian Institute of Accountants (MIA), 2017). Accounting industries are giving priority to technology due to their ability to automate most accounting methods and practices in multiple areas such as marketing, administration, and decision-making guidance and particularly able to perform financial analysis for the organization (Estep et al., 2023; Mihai & Dutescu, 2022; Phornlaphatrachakorn, 2020). As businesses strive to meet customer demands, they are increasingly embracing the digital era to enhance customer service and accelerate transactions and processes. Businesses are willing to allocate some amount of money to invest in information and communication technology (ICT) in line with the extensive use of the Internet in their daily business activities. To achieve this goal, businesses are eagerly embracing new cutting-edge technologies such as artificial intelligence, big data, robotic process automation, cloud-based software and blockchain. These technologies will complement the existing ones such as Microsoft applications, mobile applications, social networking, blogs, websites and communication technology (Shamsudin et al., 2024).

Despite the numerous benefits of technology, the accounting profession has often been criticized for lagging behind other industries in its adoption (Afroze & Aulad, 2020; Gavrilova & Gurvitsh-Suits, 2020; Omar et al., 2017). Many practitioners remain unaware of the ongoing evolution of technologies within the profession, and firms often lack the necessary expertise to fully integrate these advancements (Lestari et al., 2019). Digital adoption in developing countries varies significantly, with some regions progressing slower than desired. For instance, Saudi Arabia reports ongoing advancements but acknowledges that their adoption levels have yet to reach their targets (Alnasrallah & Saleem, 2022). In Bangladesh, the adoption process has been slow and disrupted due to strict compliance with accounting standards (Afroze & Aulad, 2020). Similarly, in Romania, implementation efforts have stagnated due to financial constraints, as digital adoption requires substantial investment (Vărzaru, 2022). In Estonia, awareness of emerging technologies like AI is relatively high, with 82%

aware of AI and 54% aware of big data, yet only 11% have adopted AI in the profession (Gavrilova & Gurvitsh-Suits, 2020).

In Indonesia, the use of emerging technologies among SMEs remains unrealistic, as even basic accounting software has not been widely adopted (Inayatulloh et al., 2021). Comparatively, Malaysia has shown more progress in digital adoption within the accounting profession, albeit at a gradual pace. For example, Omar et al. (2017) Note that fewer than 20 companies, or approximately 1%, disclosed AI adoption in their annual reports. However, Syed Ibrahim et al. (2022) Highlighted that post-COVID-19, technology disclosure in annual reports has become more robust and significant. According to the MIA report, AI adoption among accounting professionals increased from 13% in 2017 to 22% in 2019. Similarly, big data usage rose from 21% in 2017 to 45% in 2019, reaching 69% in 2022 (Malaysian Institute of Accountants (MIA), 2017, 2023a; MIA Professional Practices & Technical Team, 2020).

It can be argued that the profession is beginning to embrace cutting-edge technologies in accounting and auditing processes, reflecting a gradual shift toward digital adoption. While these advancements hold great promise, questions remain regarding the credibility, quality and security of financial reports produced using digital tools (Vărzaru, 2022). Furthermore, with the increasing development of technology tailored to meet the needs of accountants and auditors, there is a growing need to understand how these solutions can be effectively utilized to transform the profession and enhance its processes. Therefore, the present study aims to explore the evolution of digital usage in the accounting profession while investigating various technological advancements and their advantages and practical applications. This study may encourage industry players to explore new technologies while providing top management with valuable insights to make informed decisions on technology selection and investment, ensuring efficient resource allocation.

2. Evolution of Digital Usage in the Accounting Profession

Technology adoption has become a major attention in the accounting profession, particularly with the surge in digital transformation in recent years. (Alnasrallah & Saleem, 2022; Bosi, 2021). Technology has profoundly reshaped the accounting industry over the past few decades, evolving from a supporting tool to an essential driver in financial practices (Ceruzzi, 2003; Meservy et al., 1992; Shamsudin et al., 2024). The accounting profession, which has existed for centuries (Perry, 1996; Zhang et al., 2021), initially relied on the introduction of the double-entry principle, introduced by Luca Pacioli in 1494, published in 'Summa De Arithmetica Geometria Proportioni et Proportionalita' in Venice, Italy (Peters & Emery, 1978). Although the double-entry principle has long served as the foundation of accounting practices, its application in a purely manual, nontechnological environment- relying on handwritten records and physical documentation- has been subject to significant criticism (Zhang et al., 2021). The criticism is not solely questioning the fundamental validity of the system but rather its lack of flexibility as this will impact reporting quality in fulfilling modern business needs.

During the Pre-computer Era (14th century to 1980s), the accounting and auditing processes relied heavily on basic tools such as calculators and typewriters, with most work done manually using handwriting in physical documents, and ledgers were maintained in a physical book (Peters and Emery, 1978). The manual process was very time-consuming and prone to mistakes and errors (AbuAkel & Ibrahim, 2023). Such errors and inefficiencies could deteriorate audit and reporting quality as the high error risk and lack of precision reduce the reliability of financial statements.

In the Early Computerization Era between the 1980s and 1990s, when computers were first introduced, they were only affordable to large businesses and firms due to budget and expert constraints (Ceruzzi, 2003). Businesses and firms initially attempted to use personal computers (PCs) and basic software to streamline bookkeeping, manage large volumes of transactions and decrease time spent on manual tasks like basic calculations (Meservy et al., 1992). According to Cardinali et al. (2023), even though data was stored digitally, it was often printed out and stored physically which introduced risks related to data accessibility and security. As a result, accountants and auditors are still relying on manual handling of digitized data which still carries errors and redundancy.

In the early 1990s, the emergence of the internet allowed the improvement of features in the accounting and auditing process as it allows information sharing, global communication, and online services like digital trading and e-commerce (Bosi, 2021; Koh et al., 2024). This digital shift allowed accountants and auditors to move from using basic tools to software applications for recording, processing, storing, and analyzing data (Hsiung & Wang, 2022; Shamsudin et al., 2024). These advancements enhanced financial statements produced to be more accurate, timely and easily accessible records, supporting higher reliability and transparency in financial reporting. By the 2000s, the widespread adoption of the Internet significantly accelerated the digital transformation in accounting and auditing. Communication technologies like email, messenger and other online communication platforms such as video conferencing, Google Meet and Webex have gained attention from time to time for simplifying the communication process between accountants, auditors and clients (Malaysian Institute of Accountants (MIA), 2023b; Shamsudin et al., 2024).

The increasing use of software and tools in accounting and auditing processes has been accompanied by research into more complex technologies. Studies on advanced technologies such as artificial intelligence (AI), began as early as the 1990s at Brigham Young University (Meservy et al., 1992). Research on internet-based protocols, including secure, expert systems, algorithm-based records and early concepts of blockchain smart contracts also began in the 1990s (Szabo, 1997). The rise of the internet has fueled the need for technologies beyond existing software for analysis, sharing and integration. The Fourth Industrial Revolution has accelerated the development of cutting-edge technologies, including big data, AI, robotic process automation (RPA), cloud computing and blockchain, all driving significant business changes (Mbizi et al., 2022; Shahzad et al., 2023). The Digital Transformation Initiative (DTI) launched by the World Economic Forum in 2016, aimed to unlock technology potential across industries such as automotive, healthcare and logistics. The World Economic Forum (2016) Advocated the expansion of digital transformation across sectors such as platform economies and professional services. Similarly, Davos (2017) Emphasized the pivotal role of technology in transforming business models, fostering intelligent automation, enhancing digital agility and empowering talent.

The development of accounting and auditing software keeps evolving along with the demand for real-time data access and timely information for stakeholders. Consequently, cloud-based software and tools have been introduced, offering real-time access to client data, enhanced collaboration, secure data storage, support for remote work and automation of tasks like invoicing and payroll thereby enhancing the quality of reporting (Adjei et al., 2021; Kamal et al., 2023; Ria, 2023). Cloud-based applications like Google Drive, Dropbox and OneDrive are also used in the profession to facilitate secure file storage, easy access and efficient sharing of documents among team members and clients (Malaysian Institute of Accountants (MIA), 2017, 2023b; Romney et al., 2021; Shamsudin et al., 2024). As more and more advanced cloud-based accounting software is developed, accountants use more comprehensive accounting and auditing software such as SAP, Oracle, SQL, Xero, QuickBooks Online, Sage, MYOB, Audit Command Language (ACL), CCH Prosystem fx and Audit Express (Romney et al., 2021; Shamsudin et al., 2024). Advanced software supports the need of the industry for reliable, real-time financial data, for better accessibility and flexibility.

In Malaysia, MIA has actively promoted the adoption of technology in the accounting profession since 2016. This initiative began with the introduction of MIA Digital Technology Blueprint and was further reinforced in 2023 through the establishment of Ethical Guidelines on Technology Usage for Public Practitioners (Malaysian Institute of Accountants (MIA), 2017, 2023b). The accounting industry is encouraged to embrace a wide spectrum of technologies. The MIA highlights several widely adopted tools, including communication platforms, application software, data analytics, social networking, multimedia and video platforms, blogs, websites, and cloud computing. Additionally, the MIA underscores the significance of emerging technologies such as artificial intelligence, robotic process automation, big data analytics and blockchain in transforming the profession (MIA Professional Practices & Technical Team, 2020).

3. Digital Usage in the Accounting Profession

According to the Oxford Dictionary, ‘usage’ can be defined as ‘do something with an object or adopt a method or consume to serve for a purpose, meanwhile ‘digital’ can be defined as ‘relating to the use of computer technology or device or system that using digits’ (Hawkins, 2020). Therefore, digital usage refers to the

application or adoption of computer-based technologies, systems or devices to perform tasks, serve specific purposes or achieve desired outcomes. Digital usage exists when the firm employs various types of technologies in their accounting or auditing process to produce the end of the product which is the financial reports. The accounting and auditing process involves classifying, recording, summarizing, analyzing, adjusting, audit planning, risk assessment, substantive testing, test of control and other related activities. The following section will explore how digital usage is practically implemented in the accounting profession and the benefits it offers in enhancing these processes.

Accounting Information System (AIS)

An accounting information system (AIS) can be defined as a complex system that is integrated and linked within departments to exercise respective accounting functions. (Siqani et al., 2019). AIS function involves collecting data for input, processing and storing data and subsequently producing sufficient and quality accounting information as output for users to make quality decision (Siqani et al., 2019). The designed system and software technologies should be able to document all the activities and procedures involved in assembling all the data in conjunction with the financial statements, and the system and technology should be intended to provide high-quality financial reports (Setiawan et al., 2021). According to Shamsudin et al. (2024), AIS encompasses various application software such as accounting software, auditing software, company secretary software and taxation software which are utilized within the public sector.

Cloud Accounting

Cloud accounting refers to the practice of accessing accounting software and related resources through an internet connection enabling operations on a demand-driven basis (Adjei et al., 2021; Lestari et al., 2019). Another study defined cloud accounting as a web-based accounting software that enables users to access financial data from any location and at any time, as long as there is an internet connection. (Kamal et al., 2023). It may be accessed through various devices such as PCs, laptops, smartphones, tablets and iPads. Cloud-based software enables continuous access to our work which requires a dependable connected database, ensuring seamless accessibility, engagement and interaction from everywhere (Adjei et al., 2021; Polenova et al., 2019). In other words, cloud accounting encompasses cloud-based application software such as cloud-based accounting software, auditing software, company secretary software and taxation software in which these applications can be accessed at any time and from any location, provided there is an internet connection. Cloud technologies are widely used among accountants and auditors as they help the audit and accounting staff to directly liaise with the partners to get a fast response on certain critical issues.(Polenova et al., 2019).

Cloud-based technology enables the integration of accounting data within an organization while also facilitating access to external resources like legal acts, government planning documents and public engagement platforms, subject to specified usage restrictions (Polenova et al., 2019). While the financial data is highly accessible, access is restricted exclusively to authorized individuals with specific usernames and passwords. (Polenova et al., 2019; Romney et al., 2021). Shared databases improved storage security and lowered storage costs for users as the existing application software requires additional costs for firms that deal with substantial amounts of data that exceed certain capacity or storage limits (Ahmad et al., 2024).

Artificial Intelligence (AI)

Artificial intelligence (AI) is a form of intelligence demonstrated by machines, in contrast to that exhibited by human beings (Cutting & Cutting-Decelle, 2021; Mihai & Dutescu, 2022). In simpler terms, AI can be described as the application of computerized technologies to perform tasks that would typically require human intelligence (Estep et al., 2023). Machine learning is a crucial component of AI, where computer algorithms are continuously updated based on experience and input data which is then analyzed and processed within the system (Mihai & Dutescu, 2022). Intelligent machines have the capabilities to cater to and rearrange information queries, analyze trends within data and independently carry out evaluations of multiple domains like revenues, inventories, client commitment, fraudulent circumstances and other relevant entries (Ahmad et al., 2024). Specifically, deep learning is a subset of machine learning that employs multiple layers within various types of neural networks to model complex patterns and representations of data (Mihai & Dutescu, 2022). According to Adeoye et al. (2023), Natural Language Processing under AI was ranked highest as it allows quick interactions along datasets in auditing processes. AI through intelligent document processing can be used to extract data from structured documents (e.g.: sales invoices, receipts to customers), semi-structured

documents (e.g.: bank statements, receipts from suppliers and unstructured documents (e.g.: email, PDF documents such as tenancy agreements, scanned written documents) (Mihai & Dutescu, 2022).

AI-based on financial reporting perspectives can be defined as a data mining tool logically structured and computerized based on programmed algorithms to analyze patterns and anomalies within financial data sets to improve auditing and accounting processes through identification of risk areas, automation and authorization of documents at an impressive rate (Adeoye et al., 2023). AI has been widely used by numerous industries like banking, healthcare, manufacturing, retail and audit firms is no exception (Adeoye et al., 2023; Chitturu et al., 2017; Estep et al., 2023). Some companies utilize AI for simple functions such as automation and repetitious processing but some of them utilize it for complex duties. In the future, AI is expected to resolve more complicated and complex accounting problems with the use of fuzzy logic, neural networks and other techniques which yet to be utilized in the accounting profession (Afroze & Aulad, 2020).

Blockchain

Blockchain can be defined as Distributed Ledger Technology (DLT) which stores data in block form and sequentially adds the blocks to the chain. (Swan, 2015). It refers to an interconnected and decentralized digital ledger that safeguards a complete record of every single transaction administered among servers in a network in real-time. (Ahmad et al., 2024). In accounting, the most popular type of blockchain technology besides Fintech, Cryptocurrency and Smart Contracts is Distributed Ledger Technology (DLT) (Zhang et al., 2021). Under DLT, data is stored in a chain of blocks and involves two mechanisms: Fractional Accounting Transactions (FAT) and Hierarchical Accounting Transactions Execution (HATE).

The use of blockchain in the accounting profession involves the application of smart ledgers, which function as distributed ledgers for transactions (data) stored in blocks. These ledgers are integrated across users using cryptographic validation, designed to be unbreakable for modification. Importantly, they adhere to accounting information recording standards and regulations, ensuring real-time accuracy and compliance (Juma'h & Li, 2023; Liu, 2018). According to Zhang et al. (2021), traditionally, only two records needed to be created related to the purchase transaction. The first process is related to purchase activity (T-Purchase) which involves recognition of purchase and accounts payable and the second is recording payment of the debt which involves recognition of cash and reduction of accounts payable (T-payment). The integration of blockchain technology will fractionate the transaction procedures. When placing an order (T-purchase), it needs to verify the authenticity of purchasing decisions by checking the current inventory level with the inventory departments (T-inventory). Then, the supplier will provide external confirmation regarding the availability of the ordered product (T-availability). Once the product availability is confirmed, the finance department is promptly notified to initiate the payment process (T-payment). Experts see the potential of this technology to be further used for user authentication, cybersecurity technology development, and some other new applications (Ahmad et al., 2024).

Big Data Analytics

Practitioners use big data in a variety of ways, and one of its functions is for analysis. If practitioners find inconsistencies between data analyzed via big data and company reports, this raises their concerns about possible errors in the financial reports (Saleh et al., 2023). Both internal and external auditors in Canada are at the leading edge of accounting applications of big data, particularly when dealing with large corporations whose ledgers contain billions of transactions (Saleh et al., 2023). The auditors additionally acknowledged that big data enables the identification of potential fraud risk areas, detection of anomalies, and identification of areas that are not typically covered by traditional auditing methods. Furthermore, it facilitates the integration of both financial and non-financial data, enables comparisons and computes costs before presenting outcomes to users within organizations. The growth of the internet and mobile applications further streamlined access to accounting data as evidenced by the increasing adoption of cloud accounting (Polenova et al., 2019). Additionally, big data analysis enhances the identification of anomalies, possible errors and issues that may have been overlooked in the conventional audit process (Saleh et al., 2023).

Robotic Process Automation (RPA)

Robotic Process Automation (RPA) in accounting refers to the use of software robots or "bots" to automate repetitive and rule-based tasks within the accounting function. In Taiwan, robotic process automation is used

by Big 4 accounting firms including Analytical Process Automation (APA) to enhance and increase the quality of audit works (Hsiung & Wang, 2022). Shamsudin et al. (2024) discovered that RPA is also used in audit and non-audit firms for data extraction and analysis and perform bank reconciliation. RPA is used to validate input before entering into application software. It is also utilized for asset management, arrangement of financing and tax formulation (Hsiung & Wang, 2022).

Extensible Business Reporting Language (XBRL)

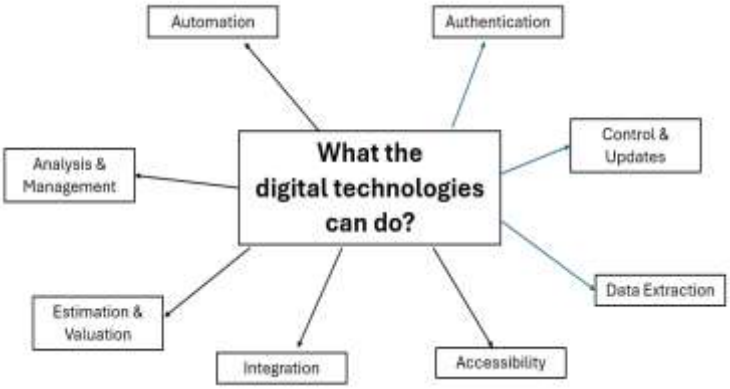
Extensible Business Reporting Language (XBRL) was originally known as Extensible Financial Reporting Mark-up Language (XFRML). However, its name was changed to XBRL to better encompass the broader scope of corporate reporting which includes not only financial reports but also a variety of other reports. This change was made to reflect the understanding that corporate reporting extends beyond financial statements. (Ghani et al., 2014). The researcher further explained that XBRL is related to Hyper Text Mark-up Language (HTML) in that it utilizes Extensible Mark-up Language (XML) schemas within a relational database. Previously, there were inefficiencies in filing annual returns and financial reports, as all submissions were made in hardcopy form. With the shift toward a digital world, hardcopy submissions for FS, AR, and EA are no longer ideal. As such, there is a need for a more digitalized and readable format to facilitate data interoperability. (Uyob et al., 2022). As a result, the emergence of XBRL as an electronic platform addresses these shortcomings as traditional reporting struggles to convert paper-based data into valuable information (Ilias et al., 2019).

XBRL helps to centralize data submitted to regulators (Ilias et al., 2020, 2021), reduce the possibility of re-keying of data (Ilias et al., 2019), increase information transparency, ease the submission of tax filing and serve as a better analytical tool for investors (Ilias et al., 2020). The increasing importance of technology in the accounting profession and the growing adoption of XBRL by businesses in Malaysia make XBRL one of the solutions for analytical financial data purposes.

4. Practical application of digital usage in the accounting profession

In the previous section, we provided definitions and a brief overview of emerging technologies such as cloud computing, blockchain, big data, AI, RPA and XBRL. This section examines how these digital innovations enhance and improve current accounting and auditing processes. Cardinali et al. (2023) through their qualitative studies conducted among professional service firms, observed that digitalization has fundamentally altered how clients interact with accountants and auditors. Previously, clients would make requests, such as "Please do this account for me." Now they pose more strategic and advisory-oriented questions, such as, "How can I respond to the crisis?" or "Where can I improve the company's profit?" This shift underscores a significant change in the role of accountants and auditors who are now expected to provide more strategic, advisory services rather than solely perform traditional accounting tasks. Figure 1 below summarizes the practical applications of digitalization in the accounting profession. Digital technologies play a crucial role in various accounting functions including estimation and valuation, analysis and management, automation, integration and accessibility, control and updates and authentication.

Figure 1: Summary of Practical Applications of Digital Technology in the accounting profession



In **estimation and valuation**, AI has revolutionized various processes, including estimating insurance claim loss reserves and analyzing customer reviews on company products for warranty provisions (Estep et al., 2023). Additionally, AI aids in budgeting, forecasting taxes and forecasting investments (Gavrilova & Gurvitsh-Suits, 2020). According to Hsiung & Wang (2022), RPA also facilitates estimation and valuation, when particularly the tool is applied in tax formulation.

For **analysis and management**, AI plays a significant role in cost and budget management as well as the flexible allocation among responsibility centers in manufacturing. (Vărzaru, 2022). Furthermore, AI assists in analyzing accounts receivable and payable, along with costs and expenses, highlighting its analytical capabilities. (Gavrilova & Gurvitsh-Suits, 2020). Besides AI, blockchain technology is crucial for data structure and information management. (Zhang et al., 2021). RPA also plays a role and can be used for reviewing investment projects and arranging financing, showcasing its role in financial (Hsiung & Wang, 2022). In general, IT is employed to review, analyze, and sort financial data. (Phornlaphatrachakorn & Kalasindhu, 2021).

Automation in accounting is significantly enhanced by AI which simplifies accounting documents and aids audit program development and sample size determination (Afroze & Aulad, 2020; Vărzaru, 2022). AI also facilitates the issuance and acceptance of invoices (Gavrilova & Gurvitsh-Suits, 2020). Additionally, big data technology is pivotal in fraud detection. (Mittal et al., 2021). Generally, technology is employed to generate accounting information automatically across various domains such as warehouses, sales, manufacturing, trading, and personnel (Lestari et al., 2019). Advancements in technology may result in greater identification of fraudulent activities and more correct account calculations, raising the quality of financial reports (Odunayo et al., 2023).

Integration and accessibility of accounting data are achieved through cloud accounting as it facilitates resource sharing and data center requirements (Ria, 2023). CA is also able to link accounting data with planning documents, regulatory legal acts and public records. (Polenova et al., 2019). The integration function also can be seen through the usage of AIS and blockchain. AIS helps integrate data within departments (Siqani et al., 2019), while Blockchain enables the sharing of knowledge and control over content and performance (Zhang et al., 2021), ensuring ongoing access and a continuous working mode (Adjei et al., 2021; Lestari et al., 2019; Polenova et al., 2019). AI has exceptional capabilities in data extraction, effectively processing information from various types of documents. These include structured documents like sales invoices, semi-structured documents like bank statements and unstructured documents like emails and scanned written documents (Mihai & Dutescu, 2022).

Control and updates are managed by CA, ensuring secure data storage and facilitating easy configuration. (Ahmad et al., 2024; Ria, 2023). Besides, CA ensures that software versions are constantly up to date. (Polenova et al., 2019). Other than that, RPA is used for financial asset management and budget implementation monitoring, adding another layer of control to financial management. (Hsiung & Wang, 2022), while blockchain monitors and observes accounting ledger performance to ensure adherence to accounting standards (Zhang et al., 2021). AI is also used for internal control evaluation and real-time inventory counting. (Afroze & Aulad, 2020; Gavrilova & Gurvitsh-Suits, 2020), with the intent to apply the technology for fraud detection (Mittal et al., 2021).

Finally, **authentication** in accounting is bolstered by RPA which validates input into existing accounting information systems (Mihai & Dutescu, 2022)And blockchain, which verifies accounting records (Zhang et al., 2021). AI further facilitates fraud detection through artificial neural networks (Afroze & Aulad, 2020). These integrated digital technologies streamline and enhance the accuracy and efficiency of accounting functions, contributing to more effective and reliable financial management. Technology has significant positive effects on public enterprises as it helps to improve decision-making processes, financial reporting quality, and control systems, increase performance and facilitation in transaction processing (Siqani et al., 2019).

Interdependence between Different Types of Technologies in the Accounting Profession

Digitalization of the accounting profession is not a standalone process. To accomplish certain tasks, AI and non-AI technologies like blockchains and cloud computing are typically used in tandem (Estep et al., 2023). This aligns with the findings of Hsiung & Wang (2022) who argued that the effective use of RPA should be

complemented by blockchain and Internet of Things (IoT) technologies. They highlighted the "Financial Blockchain Correspondence Service" developed by the Financial Regulatory Commission of the Ministry of Finance in Taiwan, as an example of such integration. The combination of these technologies provides a comprehensive and integrated solution, allowing the accounting process to be carried out faster, more accurately and securely. The contention is further supported by Odunayo et al. (2023) who highlighted that it is not possible to rely on a single technology alone; the utilization of one technology should be supplemented by another. For example, blockchain technology is indispensable, but it requires the integration of cloud-based apps and accounting information systems to achieve full functionality (Zhang et al., 2021). The combination of several technologies is crucial to enhance the robustness and adaptability of the developed technology, as well as to facilitate convenient access and improved management of data stored in the blockchain via cloud-based apps. An accountant cannot rely on just one technology as the use of a single technology will have an impact on other aspects as well.

Therefore, conducting comprehensive research that encompasses all relevant technologies is essential. The impact of adopting technology on financial reporting quality varies. For example, Firm A may exclusively use AI which can automate data analysis and improve accuracy. Firm B may rely solely on cloud computing which enhances accessibility and data storage efficiency. Firm C might implement both RPA and blockchain which can streamline repetitive tasks and ensure data integrity. Each technology influences financial reporting in distinct ways, underscoring the importance of examining their varied impacts across different firms. Technologies cannot operate effectively in isolation; instead; their integration often yields synergistic benefits that improve overall efficiency and accuracy. For instance, combining AI with blockchain can enhance data verification and analysis processes. Similarly, integrating RPA with cloud computing can optimize data sharing and management while enabling flexible data processing. Therefore, a comprehensive analysis requires a deep understanding of how these technologies interact and complement one another.

5. Conclusion

In conclusion, IR 4.0 has revolutionized the accounting profession, driven by the emergence of technologies such as artificial intelligence, big data, robotic process automation, cloud-based software, XBRL and blockchain to complement the existing technologies such as AIS. These technological advancements offer significant potential to automate processes, enhance financial analysis and support decision-making. However, challenges remain, including limited awareness, expertise gaps, and concerns regarding the credibility and security of digitally generated financial reports. As the accounting profession increasingly adopts these innovations, it is crucial to investigate their practical applications and benefits. Such evidence can help encourage practitioners to embrace the latest technologies and integrate them into their workflows.

The early sections of this paper traced the evolution of digital usage in accounting, from the Pre-Computer Era (14th century–1980s) with double-entry bookkeeping, to the Early Computerisation Era (1980s–1990s), when larger businesses adopted computers and basic software. The emergence of the internet in the 1990s revolutionized global communication, online services, digital trading and advanced technologies, prompting extensive research into new tools for the accounting profession. Since 2016, the Fourth Industrial Revolution (IR 4.0) has catalyzed significant transformations, introducing technologies like big data, AI, RPA and cloud-based software. These innovations have fundamentally reshaped accounting and auditing practices.

This paper provides an overview of digital adoption in accounting, starting with AIS and extending to emerging technologies such as cloud accounting, AI, blockchain, big data, RPA and XBRL. The researchers highlight the practical applications of these technologies, offering insights into their role in enhancing efficiency and accuracy within accounting and auditing processes. Moreover, the study emphasizes that no single technology operates in isolation; instead, each complements and integrates with others to achieve their intended functions within these practices.

The findings and discussion of this study aim to encourage industry players to embrace new technologies and provide top management valuable insights for making informed decisions about technology selection and investment, thereby ensuring optimal resource allocation. However, this research has two primary limitations. First, it is a descriptive review based on relevant papers sourced from Scopus, which may lack the depth and

rigor of a systematic literature review. Future research could address this limitation by adopting a systematic literature review approach to provide a more structured and comprehensive analysis of the topic. Second, as emerging technologies represent a relatively new area within the accounting profession, this study relies solely on secondary data, which may not fully capture the practical applications or challenges encountered by practitioners. To address this gap, qualitative research methods, such as interviews with industry professionals, are recommended to gain deeper insights and provide a more nuanced understanding to complement the findings of this descriptive review.

Acknowledgements. The study was conducted as part of the first author's PhD research, under the guidance of her supervisors. The PhD research is financially supported by Universiti Teknologi MARA (UiTM) and the Ministry of Higher Education, Malaysia, while the publication expenses are self-funded by the researcher.

Disclosure of Interests. The authors declare no conflict of interest.

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