Journal of Information System and Technology Management
JISTM
EISSN: 0128-1666
Volume 9 Issue 35 (June 2024) PP. 75-97
DOI: 10.35631/JISTM.935005

JOURNAL OF INFORMATION SYSTEM AND TECHNOLOGY MANAGEMENT(JISTM)
www.jistm.com

EVALUATING TECHNOLOGY ADOPTION RELEVANCE IN AUDIT AND NON-AUDIT FIRMS: A COMPARATIVE ANALYSIS

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Article Info:

Article history:
Received date: 18.04.2024
Revised date: 13.05.2024
Accepted date: 15.06.2024
Published date: 30.06.2024

To cite this document:

Shamsudin, A., Khan, M. N. A. A., & Jusoh, A. (2024). Evaluating Technology Adoption Relevance in Audit and Non-Audit Firms: A Comparative Analysis *Journal of Information System and Technology Management, 9* (35), 75-97.

DOI: 10.35631/JISTM.935005

Abstract:

Technology has substantially changed the accounting practice, impacting how financial information is processed, analysed, and reported. AI, RPA, and Big Data Analytics are not used very often, which could be a sign of problems that make them hard to adopt. The rankings for relevance and utilisation could demonstrate how practitioners see things rather than how people actually use them. It is necessary to understand the level of utilisation and relevancy of various types of technologies in accounting practices. The study aims to determine the current utilisation of technology in accounting practices and further outline the relevance of each technology specifically employed in both audit and non-audit firms. The current study is quantitative in nature and approached ten (10) practitioners, which consist of executives, managers, and senior management who are directly responsible for the process of preparing financial statements. The participants were requested to rank the relevance and current level of use of 17 types of technology established by the Malaysian Institute of Accountants (MIA). The findings ranked and assigned weightage to each item of technologies based on three (3) approaches. The most used and relevant technologies among audit and non-audit firms with scores over 90% are Microsoft Applications, Communication Technology, Mobile Applications, Fintech, Application Software, and Online Communication. However, the utilisation and relevancy of emerging technologies like Artificial Intelligence, XBRL, Robotic Process Automation, and Big Data Analytics remain relatively low, falling below 60%. If Weighted Cooke's Index approach to be applied, blockchain will be assigned the highest weightage among other technologies due to its rarity and significant potential benefit to the profession. The limited number of participants and the exclusive focus on specific professionals within the accounting field might limit the applicability of the findings. Future research should investigate the actual usage of these

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technologies on a broad scale to validate the results that have been gathered and comprehend the factors that impact the utilisation and importance of technology in the real-world accounting profession.

Keywords:

Accounting, Audit, Technology, Adoption and Relevance

Introduction

The rapid expansion and advanced shift of digitalization in this current economy have resulted in both strong competitiveness and creative innovation. Businesses must implement digital transformation into their day-to-day operations to sustain their existence and adaptability in this rapidly evolving marketplace (Al-Sabti, 2023). Big data, artificial intelligence, robotic process automation, blockchain, cloud computing, and the internet of things represent just some of the newly developed technologies that are driving the digital revolution. The emergence of this cutting-edge technology is being brought about by the abundant and excessive use of the internet, coupled with the increasing demand for secure, trusted, and transparent digital information and transactions. The swift growth of technology integration in company activities is substantial, and it has been applied in a wide range of industries, including healthcare, manufacturing, engineering, marketing, architecture, education, and, without exception, accounting.

The accounting profession nowadays demands compatible and appropriate digital tools, software, and technologies to assist the accountant's role in preparing financial reports and providing reliable information for stakeholders to make important decisions (Ahmad et al., 2024; Odunayo et al., 2023). There are more than 1.5 million SMEs in Malaysia, and when it comes to preparing their financial statements, these enterprises typically use the services of public practice accounting, which includes audit and audit firms. The main issues here is to what extent does the technologies are relevant for audit and non-audit to assist them in the financial statement's preparation process. Additionally, how far does the practitioners' employ technologies in their daily auditing and accounting activities. Additionally, to what extent do professionals use technology in the course of their routine auditing and accounting. In 2023, MIA established the Ethical Guidelines on Technology Usage for Public Practitioners. The guidelines focus more on potential risks of using technology and ethical requirements with regards of using technologies in serving the clients. The guideline further highlighted another four (4) common technologies utilised by audit and non-audit firms when providing services to clients, as shown in Figure 1.

The terms 'digital transformation' can be defined as the strategic and thoroughly executed enhancement of a company's processes, operations, skills, models, and methods to fully leverage the opportunities and advancements offered by digital technology (Phornlaphatrachakorn & Kalasindhu, 2021). Al-Sabti (2023) further defined 'digitisation' as a technical process in which electronic communication is applied to changes caused by rapid technological innovation. The main issue in the accounting profession itself, the utilisation of technologies still varies, especially among audit and non-audit firms, as there is a lack of common practice and established guidelines on the standardisation of technology implementation. It is quite difficult to set a standard for technology adoption as it involves a substantial amount of cost, requires technology experts, and demands management commitment to allocate sufficient resources for the adoption decision. Additionally, the

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variation in adoption rates between audit and non-audit firms can be explained by discrepancies in financial stability, willingness to adopt, preparedness levels, and the integration compatibility of various existing technologies inside each firm (Yigitbasioglu et al., 2023). The absence of standardisation of technology usage across firms could potentially impact the consistency and accuracy of financial reporting.

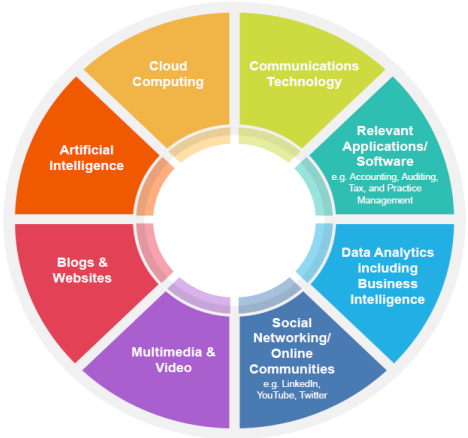

Figure 1: Common Technologies Used By Public Practitioners When Servicing Their Clients.

Source: Ethical Guidelines on Technology Usage for Public Practitioners, 2023 (Malaysian Institute of Accountants (MIA), 2023)

A study conducted by Chartered Accountants Australia and New Zealand revealed that the respondents of the survey perceive a comprehensive alteration in the job nature of accountants as a result of the implementation of Information Technology (IT) (Chartered Accountants Australia and New Zealand, 2016). In Malaysia, a regulatory body that governs professional accountants in Malaysia, Malaysian Institute of Accountants (MIA) established a MIA Digital Technology Blueprint in 2017 to prepare Malaysian Accountancy Profession for the Digital World. The blueprint suggests that practitioners utilise several technologies, including social media, Mobile Application, Cloud Computing, Extensible Business Reporting Language (XBRL), Big Data Analytics, Fintech, Automation, Cybersecurity Technology and Artificial Intelligence.

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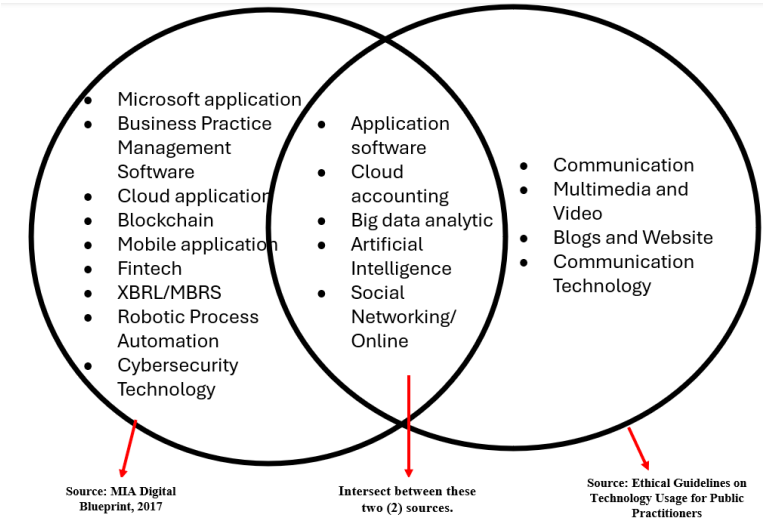

Figure 2: Digital Usage In Accounting Profession Model Developed For This Study.
Source:(Malaysian Institute of Accountants (MIA), 2016, 2023)

Figure 2 summarises the technologies that have been recommended by the regulator. Based on Malaysian Institute of Accountants (MIA) (2016) Digital Technology Blueprint, the suggested technologies include Microsoft Application, Business Practice Management Software, Cloud Application, Blockchain, Mobile Application, Fintech, XBRL, Robotic Process Automation, Cybersecurity Technology, Application Software, Cloud Accounting, Big Data Analytic and Artificial Intelligence meanwhile through Malaysian Institute of Accountants (MIA) (2023), they have added another four technologies include, Social Networking, Multimedia and Video, Blogs and Website and Communication Technology. Five (5) types of technologies have been highlighted in both sources indicates the importance of these technologies is crucial. Even though the regulators have proposed a list of technologies to be integrated into the financial statements' preparation process, the extent of usage of these technologies among public practitioners, especially audit and non-audit firms, still needs to be scrutinised and investigated further.

Therefore, the focus of our study is to evaluate the relevancy or importance level of each technology suggested by professional bodies in audit and non-audit firms based on the point of view of practitioners. It is imperative to investigate beyond the blueprint and guidelines, as the actual adoption and utilisation of these technologies require further examination to understand their real-world impact. To the best of the researcher's knowledge, there is no other available data publishing the ranking of the importance, relevance, or current usage of different types of technologies utilised in the accounting profession directly from a practitioner's perspective. Therefore, the present study aimed to assess the relevancy level of technology adoption in audit and non-audit firms based on experts' opinions. The present study also will assign weightage for respective technologies using three (3) different approaches; (1) Assign weightage score based Linear Opinion Pool, (2) Assign weightage score based on digital usage and relevancy level and (3) Assign weightage score using Weighted Cooke's Index.

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Literature Review

Digital Usage in the Accounting Profession.

The professional services sector was one of the most heavily affected by the digital revolution. In the accounting profession, professional services encompass audit firm and non-audit firms which include accounting firm, taxation firm, secretarial services and consultants. The advent of inventive technologies has profoundly changed the ways they engage with clients and disseminate information among their stakeholders (Cardinali et al., 2023; Saleh et al., 2023). The transformation process in accounting industry can be seen through their process of producing financial reports. As far as the researcher is aware, no other data has been published that ranks the significance, relevance, or present utilisation of various accounting profession technologies. Past literatures however have discussed the benefits of using those technologies by exploring how the technologies is being embedded into the current accounting and auditing system.

Previous researchers suggested that new technology and digital tools can automate conventional job procedures like invoice issuance and acceptance, minimising repetitive effort (Alnasrallah & Saleem, 2022; Gavrilova & Gurvitsh-Suits, 2020). Another study claimed that technology can reduce operating time, allowing them to spend more time on key accounting duties, problem-solving, and audit plans (Afroze & Aulad, 2020). Additionally, technology simplifies trade between two parties by validating transactions without manual reconciliation and aiding with data extraction from structured (sales invoices, customer receipts), semi-structured (bank statements), and unstructured documents (problems related to an abundance of accounting data in various formats) (Y. Li & Juma'h, 2022). In addition, practitioners can employ analytical methods to analyse debts and receivables. Several scholars believe that technology can automate jobs in real time, such as real-time inventory counting, asset accounting, and automated data collection (Gavrilova & Gurvitsh-Suits, 2020; Juma'h & Li, 2023).

Digital Usage or Adoption of Technologies Measurement

There are various ways found to measure the level of digital usage or digital adoption from past research. Some of the researchers measure digital usage or adoption in an organisation using binary coding denoted as '1' for 'adopted or used' or '0' for 'not adopt or not use' or 'NA' for 'not applicable' (Gutierrez et al., 2015; Tiwari et al., 2023). According to Mnif & Znazen (2023), they introduced the 'NA' coding score to avoid penalising those organisations whose information or adoption is not relevant to them. There are few researchers who have utilised Likert scales, either five (5) or seven (7), to explore the level of usage experience and level of agreement towards certain statements related to technology adoption in different contexts (Agarwal, 2023; Basloom et al., 2022; Ghobakhloo et al., 2011; Marrucci et al., 2023). A number of studies also investigate the level of digital utilisation using descriptive analysis, examining factors such as the present state of acceptance, the present phase of implementation, and the future intention of employing the technology (Agarwal, 2023; Oliveira et al., 2014).

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Table 1: Various Measurements Of Digital Usage Or Adoption From Previous Literatures

Study	Technology Context	Measurement
Tiwari et al. (2023)	E-invoicing adoption.	Use Binary Coding, Where '1' for 'YES' and '0' for 'NO'
Agarwal (2023)	AI Adoption Status	Descriptive Analysis only. 1-Fully adopted, 2-Partially adopted, 3-In process, 4-Under planning, 5-No plan to adopt, 6-Never heard or thought about it
	AI adoption	Likert scale 1 to 7 ranging from 1 ="Strongly Agree" to 5 = "Strongly Disagree."
Marrucci et al. (2023)	IR4.0 degree of Implementation	Likert scale 1 to 7 Where 1=Completely Agree – 7= Completely Disagree
Basloom et al. (2022)	IT Usage.	Likert scale 1 to 7, Where 1 represents 'Strongly Disagree' while 7 represents 'Strongly Agree'
Gutierrez et al. (2015)	Cloud computing adoption	Use Binary Coding, Use '1'or '0' for adoption status
Oliveira et al. (2014)	Cloud computing adoption	Categorical Scales. Not considering; Currently evaluating (e.g., in a pilot study); Have evaluated, but do not plan to adopt this technology; Have evaluated and plan to adopt this technology; Have already adopted services, infrastructure or platforms of cloud computing.
Ghobakhloo et al. (2011)	Computer and information systems experience	Based on few statements on AI adoption, respondents need to provide opinion based 5 Likert Scale 1-No experience 2-Little experience 3-Average experience 4-Good experience 5-Excellent experience

Techniques and Methods used in Expert Judgment studies.

The assignment of weightage technique is widely being used in across fields software certification, finance, manufacturing, accounting, engineering, and risk management. To accurately represent the importance or relevance of different tools, we need to assign weights. Unweighted measurements assume all tools are equally significant, which is unrealistic in most industries. Weighting allows for a more nuanced picture that reflects the true situation. Therefore, the targeted variables need to go through another process which requires expert judgment for additional evidence (Colson & Cooke, 2017). These experts are required to provide some scores and weightage based on his personal experience, assessment and judgement.

There are several ways to assign ranking and weightage to the variables measured. Analysis of Variance Method (ANOVA) and relative weight method have been used to provide ranking and priorities scores for determining the most relevant factors for utilising software in software development industries (Zhang & Pham, 2000). The other study applied Disc Saidin method that offers a unique approach to evaluate disclosure practices which focuses on less frequently disclosed items (Mazzi et al., 2017). A linear opinion pool method was used to aggregate diverse opinions or conjectures from experts to obtain a single approximation (Clemen, 2008). On the other hand, Dscore configurations has been applied to assign weightage for disclosure item through Cooke's method and partial compliance (Devalle et al., 2016). Clemen (2008) also claimed that Cooke's Classical Method is the only method that combining probabilities and information scores of variables to calculate for the weightage. The other study employed

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weighted and unweighted Cooke's Index for disclosure item related to financial instruments in financial reports (Mnif & Znazen, 2023). The Cooke's Index have been used to prevent institutions from being penalised for not disclosing items which are not related and relevant to them. However, there is no specific or uniform method and no basic underlying basic rules for which method to be utilised to perform weightage calculation as individuals can interpret the weights in multiple ways (Clemen, 2008).

Research Methodology

Demographic of Participants/ Experts

The practitioners in the accounting industry are indeed considered experts due to their continuous professional development and training, which enhance their competencies over time (Jasanoff, 2003). The research indicates that practitioners undergo various experiential phases, evolving from beginners to experts in terms of knowledge and competencies. However, insights from a study by Murphy & Hassall (2019) suggest a nuanced relationship between expertise and experience. While there is a positive correlation between expertise and experience initially, this relationship may become negative at higher levels of experience, possibly due to factors like overconfidence or outdated knowledge.

Considering both perspectives, researchers ensure that selected experts possess comprehensive knowledge in preparing financial reports, enabling them to accurately assess the use and relevance of specific technologies in their daily tasks. These experts are required to have at least a bachelor's degree in accountancy and a minimum of 3 years of industry-specific experience, aligning with MIA requirements of gaining 3 years working experience to become a chartered accountant (Malaysian Institute of Accountants (MIA), 2024). Notably, partners or directors of firms are not included in the selection process, aligning with the insights provided by Murphy & Hassall (2019), which caution against overreliance on individuals in high-ranking positions due to potential biases or outdated knowledge.

The present study approached 42 practitioners in audit and non-audit firms from December 2023 until February 2024. Out of 42 experts, only 10 experts responded and expressed their willingness to participate in evaluating the digital usage and technology relevancy level in the profession. Those practitioners who rejected the invitation and reluctant to participate as they claim there are quite busy with their current task due to peak period. Clemen (2008) reviewed studies that utilised Cooke's Classical model and discovered that 23 out of 45 studies relied on 10 experts or lower, and additional 9 studies have less than 20 panel experts. Colson & Cooke (2017) further reviewed studies related to independent expert judgment between the year 2006 to 2015, and they revealed that on average, the studies involved experts panel of 4 to 21 considering 7 to 17 calibration variables. Therefore, the present study is within the range of appropriate number of experts, which is 10 and involving 17 variables (17 types of technologies) in this expert judgment study. Although the number of experts maybe limited, it is still feasible to gain valuable insights via out of sample assessment (Clemen, 2008).

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Table 2: Demographic Profile of Participants

Participants	Position	Types of firms	Years of Working Experience	States/ Location/Region
1	Auditor	Audit firm	3-5 years	Johor
2	Senior Auditor	Audit firm	6-10 years	Johor
3	Senior Auditor	Audit firm	6-10 years	Kedah
4	Senior Auditor	Audit firm	6-10 years	Kuala Lumpur
5	Tax Assistant Manager	Non-audit firm	11-20 years	Kuala Lumpur
6	Audit Manager	Audit firm	11-20 years	Kelantan
7	Accountant	Audit firm	3-5 years	Negeri Sembilan
8	Senior Accountant	Non-audit firm	6-10 years	Perak
9	Senior Accountant	Non-audit firm	6-10 years	Selangor
10	Audit Manager	Audit firm	11-20 years	Pahang

Development of Questionnaires

Table 3: Questionnaire Structure

Types of Technologies	Section A	Section B	Section C
Application Software *(Accounting Software/ Auditing Software/ Company Secretary Software/ Taxation Software)*	Please indicate scores for the following new technologies and digital tools that are currently being used by your organization: The scores are represented by the following: 1 - not used at all 2 - rarely used 3 - occasionally used 4 - frequently used 5 - used all the time	Please indicate the relevancy level of the following new technologies and digital tools that you think are necessary to be employed in your organisation. 1 - not relevant at all 2 - less relevant 3 - not sure 4 - relevant 5 - strongly relevant	Kindly specify the names of the technologies and digital tools that you are currently employing or relevant to being employed
Cloud-based software			
Cloud based application *(eg:Google drive, Onedrive)*			
Big data analytics *(data analytics tools)*			
Artificial Intelligence			
Microsoft Application *(eg: Ms Words, Excel, Power Point)*			
Business Practice Management Software			
Blockchain *(eg:e-invoicing)*			
Mobile application *(eg:scanner apps)*			
Fintech *(eg:online banking/e-wallet)*			
Malaysian Business Reporting System (MBRS) (*Extensible Business Reporting Language (XBRL))*			
Robotic Process Automation (RPA)			
Cybersecurity Technology			
Social Networking/ Online Communication *(eg:Webex, google meet, Facebook)*			
Multimedia and Videos			
Blogs and Website			
Communication Technology *(eg:Whatsapp, Telegram, email)*			

According to M. Li & Smidts (2003), they highlighted seven (7) ranking criteria to determine ranking level including cost, benefit, credibility, experience, repeatability, validation and relevancy. The present study utilised two (2) of the ranking criteria as it is seeming to be reasonable to the context of accounting profession which are experience of usage and relevancy of the use of the technology in the profession. The questions are being adapted from (Agarwal,

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2023; Ghobakhloo et al., 2011; M. Li & Smidts, 2003; Mohamed, 2010). The reliability score using Cohen's Kappa are 0.314 for relevance score and 0.583 for digital usage score indicates the items measured are having fair and moderate level of agreement for reliability. To increase reliability score, future research can increase number of experts, if possible, to get more robust assessment. There are three (3) sections in the Questionnaire; Section A: Current Usage of New Technologies and Digital Tools in Your Organisation; Section B: Relevancy Level of New Technologies and Digital Tools in Your Organisation; and Section C: Details of New Technologies and Digital Tools Used in Your Organisation, the content of the questionnaire can be summarised as follows. The experts were required to rate the digital usage level, relevancy level and give example of technologies currently being used by them.

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Research Methodology Process

The current study is quantitative in nature and utilised six (6) steps to perform the ranking technology processes and weight assignment, and it is presented in Figure 3.

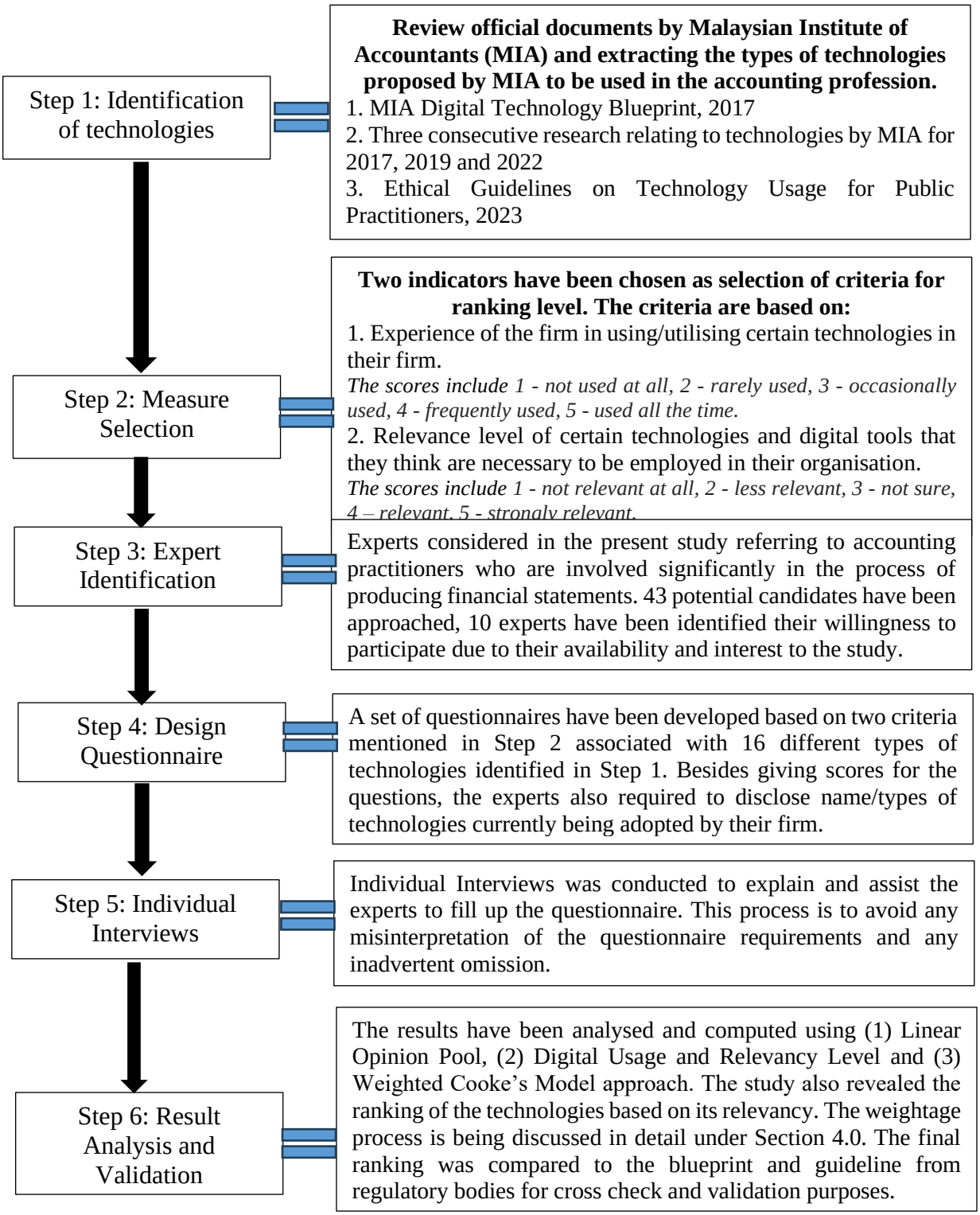

Figure 3: Research Methodology Process.

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Findings and Discussions

The need to understand the differences in technology use among audit and non-audit firms drives researchers to identify the technologies most needed by the accounting profession. This requires an in-depth analysis to determine the ranking of technologies that suit the needs of the industry and then set appropriate weights for each technology discussed. By understanding the priorities of technology in the accounting profession, firms can make strategic decisions about appropriate technology investments and implementations. The present study aims to assess the relevancy level of technology adoption in audit and non-audit firms based on experts' opinion. The researcher highlighted three (3) different alternatives to assign weightage for the 17 technologies that have been discussed in earlier sections including (1) Assign weightage score based Linear Opinion Pool Method, (2) Assign weightage score based on digital usage and relevancy level and (3) Assign weightage score using Weighted Cooke's Index.

Alternative 1: Assign Weightage Score Based On Linear Opinion Pool Method.

The first alternative applied 'Linear Opinion Pool Method' as we collected and aggregated scores from all respondents to derive a collective score and assessment about relevancy of each technology by the experts. Linear opinion Pool is when someone combined individuals' opinion or belief to a single consensus opinion by assigning weight to the opinion (Romeijn, 2020). Zhang & Pham (2000) ranked the factors adopting technologies in software development industries, where a higher priority value signifies greater ranking. The researcher is having opinion that assigning higher ranking indicates the factors need to be considered as the most important among others.

Based on Table 4 above, the experts rank 100% relevance for Microsoft Application and Mobile Application to be utilised in the process of preparing financial statements. Therefore, the researcher assigned 5 weightage score for these two (2) technologies. The second group of technologies which gives a substantial high relevancy level of between 98% to 90% include Communication Technology, Application Software, Online Communication, Fintech and Cloud Based Application. Experts rank moderate level of relevancy between 88% to 70% for technologies including Multimedia and Videos, Cloud Based Software, Blogs and Website and Cybersecurity Technology. The importance of Blockchain technology and Business Practice Management Software was slightly lower as the expert rank their relevancy at only 66% and therefore, we group these two and assigned score of 2. Surprisingly, the experts rank the emerging technologies such as Big Data Analytics, Robotic Process Automation, XBRL and Artificial Intelligence as the lowest relevance and therefore the researcher grouped these technologies and assigned score 1 for these four (4) emerging technologies. This scenario requires further investigation as the experts may not fully understand about the potential benefits and potential application of these new technologies in assisting profession during the financial statements' preparation process.

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Name Of Technologies	Total Score of Relevancy Level	Relevancy Level %	Ranking Level	Weightage Score Assigned	Final Grouping
Microsoft Application	50.00	100.00	1	5	Top-tier technologies
Mobile application	50.00	100.00	2	5	
Communication Technology	49.00	98.00	3	4	Advanced technologies
Application Software	49.00	98.00	4	4	
Online Communication	46.00	92.00	5	4	
Fintech	45.00	90.00	6	4	
Cloud based application	45.00	90.00	7	4	
Multimedia and Videos	44.00	88.00	8	3	Digital Content and Security
Cloud-based software	41.00	82.00	9	3	
Blogs and Website	38.00	76.00	10	3	
Cybersecurity Technology	35.00	70.00	11	3	
Business Practice Mgt Software	33.00	66.00	12	2	Specialised solutions
Blockchain	33.00	66.00	13	2	
Big data analytics	28.00	56.00	14	1	Cutting-edge technologies
Robotic Process Automation	27.00	54.00	15	1	
XBRL	26.00	52.00	16	1	
Artificial Intelligence	23.00	46.00	17	1	

Table 4: Weightage Score Assigned Based on Expert's Opinion on the Relevancy Level for Each Technology.

As a summary, we can categorise the above technologies based on five categories as the relevancy scores were fall within the similar range and the nature and characteristics of the technologies are verging on the same. The five categories are **top-tier technologies, advanced technologies, digital content and security, specialised solutions, and cutting-edge technologies.** The first category, top-tier technologies, contained Microsoft application and mobile application, while the second group, advanced technologies, include communication technology, application software, online communication, fintech and cloud-based applications. Multimedia and videos, cloud-based software, blogs and website and cybersecurity technologies are under digital content and security categories meanwhile business practice management software and blockchain are classified under specialised solutions. The final category, the cutting-edge technologies group shadowed big data analytics, robotic process automation, XBRL and artificial intelligence.

Table 5: Comparison Of Results With Other Research Findings

Name of Technologies	Ranking Level based on its relevancy *(the present study)*	MIA Research 2017 (current usage)	MIA Research 2019 (current usage)	MIA Research 2022 (current usage)
Microsoft Application	1	97%	98%	-
Mobile application	2	-	-	75%
Communication Technology	3	-	-	75%

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Application Software	4	92%	95%	-
Online Communication	5	-	-	75%
Fintech	6	24%	-	-
Cloud based application	7	-	-	-
Multimedia and Videos	8	-	-	-
Cloud-based software	9	62%	60%	-
Blogs and Website	10	-	-	-
Cybersecurity Technology	11	-	-	73%
Business Practice Mgt Software	12	20%	40%	-
Blockchain	13	-	-	-
Big data analytics	14	21%	45%	69%
Robotic Process Automation	15	-	-	70%
XBRL	16	-	-	-
Artificial Intelligence	17	13%	22%	-

Table 5 above shows a comparison of the present study ranking results with MIA findings. The symbol of a dash '-' in Table above indicates the absence of publicly accessible data about the corresponding usage of technologies in the respective years. Overall, the results of the present study seem to align with the findings of MIA research, indicating that the technology relevance is greater in the upper row of the table and decreases across the lower row.

Alternative 2: Assign Weightage Score Based On Digital Usage And Relevancy Level.
The second alternative was inspired by research done by (Devalle et al., 2016; Mnif & Znazen, 2023). The study calculates the weightage of item disclosure in financial statements by dividing total items disclosed by the financial institution with maximum number of possible items applicable to that institution. The present study applies the same idea in calculating the weightage through total scores of current digital usages by the analysed groups divided by or total expected digital usage of technology (total relevancy) that should be used in the firm. It can be computed using the formula below.

$$a_i = \frac{\sum_{j=1}^{n} d_i}{\sum_{j=1}^{n} x_i}$$

Where,

a_i = *Weight attributed to each item of technology*
j = *Firm analysed*
i = *Item of technology analysed*
d_i = *Score of 1 if i of the company j is used all the time, 0 if i of the company j is not used at all*
x_i = *Score of 1 if i of the company j is strongly relevant, 0 if i of the company j is not relevant at all*

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In other words, the formula can be simplified as follows.

$$a_i = \frac{\textit{Number of scores in which the technology has been used by the analysed groups}}{\textit{Number of scores in which the technology is relevant and expected to be used in the firm}}$$

Table 6: Weightage Score Assigned Based on Expert's Opinion on the Digital Usage and Relevancy Level for Each Technology.

Name of Technologies	Total Score		Total Score (in 0 to 1 range scale)		Weightage (ai)
	Digital Usage	Relevancy Level	Digital Usage	Relevancy Level	
Microsoft Application	50	50	1.00	1.00	1.00
Communication Technology	49	49	0.98	0.98	1.00
Fintech	43	45	0.86	0.90	0.96
Mobile application	47	50	0.94	1.00	0.94
Application Software	46	49	0.92	0.98	0.94
Social Networking	43	46	0.86	0.92	0.93
Multimedia and Videos	40	44	0.80	0.88	0.91
Cloud based application	39	45	0.78	0.90	0.87
Blogs and Website	32	38	0.64	0.76	0.84
Cybersecurity Technology	26	35	0.52	0.70	0.74
Cloud-based software	30	41	0.60	0.82	0.73
Artificial Intelligence	16	23	0.32	0.46	0.70
Big data analytics	18	28	0.36	0.56	0.64
Business Practice Mgt Software	21	33	0.42	0.66	0.64
Robotic Process Automation	17	27	0.34	0.54	0.63
XBRL	14	26	0.28	0.52	0.54
Blockchain	17	33	0.34	0.66	0.52

For example, weightage for artificial intelligence can be computed as follows. Please refer Table 6. Using formula,

$$a_i = \frac{\sum_{j=1}^{n} d_i}{\sum_{j=1}^{n} x_i} \qquad a_i = \frac{16}{23} = 0.70 \quad OR \quad a_i = \frac{0.32}{0.46} = 0.70$$

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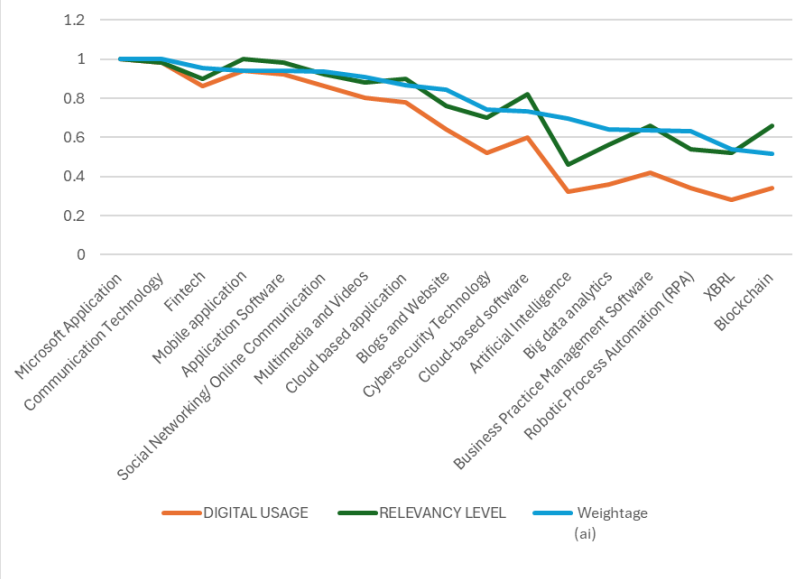

Figure 4: Expert's Opinion on Relevancy Level and Current Digital Usage for Each Technology

The details weightage for each of technology can be seen from Table 6. The highest weightage, a_i=1.00, was assigned for Microsoft Application and Communication Technology as these two (2) technologies was seen to be most relevant ranked by the experts. Fintech, Mobile application, Application Software, Social Networking and Multimedia and Videos was weighted quite high with the weightage range from 0.91 to 0.96 as the utilisation of these technologies is quite significant which parallel to the firms' need and they have been seen as essential technologies to be utilised in the firms. The practitioners do believe that these technologies can assist them tremendously in producing financial reports. XBRL and Blockchain were seen to be at the bottom of the list and possess lowest weightage among the rest of the technologies. The other emerging technologies such as Cloud based software, Artificial Intelligence, Big Data Analytics and Robotic Process Automation reported moderate level of weightage computed as a_i=0.73, a_i=0.70, a_i=0.64, and a_i=0.63 respectively. The patterns of digital usage, relevance level and weightage computed can be seen in Figure 4.

Alternative 3: Assign Weightage Score Using Weighted Cooke's Index.

Weighted Cooke's Index value the rarity of technology and thus assign high weightage to those items of technology that are infrequently used by the organisation. In contrast, lowest weightage will be assigned to those technologies that are commonly utilised by the majority of the organisation. By allocating high weightage to technologies that are rarely used, it allows organisations to focus on the development and use of less conventional technologies that possibly have great potential to provide better benefits in the accounting and auditing processes. Meanwhile, giving low weightage to frequently used technologies help prevent excessive allocation of resources (money, manpower, and time) and encourages organisations to explore alternative technologies that may provide higher added value.

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The formula of using Weighted Cooke's Index is as follows.

$$w_i = 1 - \frac{\sum_{j=1}^{n} d_i}{\sum_{j=1}^{n} x_i}$$

Where,

w_i = *Weight attributed to each item of technology*
j = *Firm analysed*
i = *Item of technology analysed*
d_i = *Score of 1 if i of the company j is used all the time, 0 if i of the company j is not used at all*
x_i = *Score of 1 if i of the company j is strongly relevant, 0 if i of the company j is not relevant at all*

In other words, the formula can be simplified as follows.

$$w_i = 1 - \frac{\textit{Number of scores in which the technology has been used by the analysed groups}}{\textit{Number of scores in which the technology is relevant and expected to be used in the firm}}$$

Table 7: Weightage Score Assigned Based on Weighted Cooke's Index

Name of Technologies	Total Score		Total Score (in 0 to 1 range scale)		Weightage (Wi)
	Digital Usage	Relevancy Level	Digital Usage	Relevancy Level	
Blockchain	17	33	0.34	0.66	0.48
XBRL	14	26	0.28	0.52	0.46
Robotic Process Automation	17	27	0.34	0.54	0.37
Business Practice Mgt Software	21	33	0.42	0.66	0.36
Big data analytics	18	28	0.36	0.56	0.36
Artificial Intelligence	16	23	0.32	0.46	0.30
Cloud-based software	30	41	0.60	0.82	0.27
Cybersecurity Technology	26	35	0.52	0.70	0.26
Blogs and Website	32	38	0.64	0.76	0.16
Cloud based application	39	45	0.78	0.90	0.13
Multimedia and Videos	40	44	0.80	0.88	0.09
Social Networking	43	46	0.86	0.92	0.07
Application Software	46	49	0.92	0.98	0.06
Mobile application	47	50	0.94	1.00	0.06
Fintech	43	45	0.86	0.90	0.04
Microsoft Application	50	50	1.00	1.00	-
Communication Technology	49	49	0.98	0.98	-

For example, weightage for blockchain technology can be computed as follows. Please refer Table 7.

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Using formula,

$$w_i = 1 - \frac{\sum_{j=1}^{n} d_i}{\sum_{j=1}^{n} x_i} \qquad w_i = 1 - \frac{17}{33} = 0.48 \quad OR \quad w_i = 1 - \frac{0.34}{0.66} = 0.48$$

Based on this illustration, it is evident that blockchain technology received the largest percentage in comparison to the remaining technologies. If a company incorporates blockchain technology into its accounting or auditing procedures, a higher weightage indicates higher levels of digital utilisation of the blockchain. In other words, the company exhibits a higher level of digital usage in comparison to its rivals, owing to its adoption of newer and more advanced technologies relative to other firms operating within the same industry.

If the third alternative is chosen, it is likely that the two technologies at the bottom of the list, namely Microsoft Applications and Communication Technologies, will have to be excluded and no weightage need to be assigned. This is due to all firms (with digital adoption scores ranging from 98% to 100%) already using it, which therefore does not reflect differences between firms when we discuss digital adoption as these two technologies are already used by all firms. Therefore, their exclusion will make room for other technologies that may need more attention or support to be prioritised in implementation.

Example Of Technologies Currently Adopted In Audit And Non-Audit Firms.

There is no standardise or common practice to which types of technologies should be used or the best vendor to subscribe, enrolled or collaborate by the firms to assist them in preparing financial reports. The lack of uniformity sometimes provide room for the user of accounting information to debate on the quality of financial reports produced. The table 8 below shows some examples of technologies currently being adopted, disclosed by the experts and these examples might gave us some preliminary insight of the technological landscape within the accounting profession.

Conclusion

The current research has achieved its objective to assess the relevancy level of technology adoption in audit and non-audit firms based on experts' opinions by disclosing three different methods of ranking the technologies in the profession. The present study proposed three (3) methods to rank technologies in accounting profession considering (1) Linear Opinion Pool for weightage assignment, (2) considering both digital usage and relevancy level for weightage calculation and (3) Weighted Cooke's Index. The experts ranked the most important technologies to the lesser importance according to this order; Microsoft Application, Mobile Application, Communication Technology, Application Software, online Communication, Fintech, Cloud-based Application, Multimedia and Videos, Cloud-based Software, Blogs and Website, Cybersecurity Technology, Business practice Management Software, Blockchain, Big Data Analytics, Robotic Process Automation, XBRL and Artificial Intelligence. The first

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Table 8: Example Of Technologies Currently Adopted In Audit And Non-Audit Firm

No	Name of technology	Respondent1	Respondent 2	Respondent 3	Respondent 4	Respondent 5	Respondent 6	Respondent 7	Respondent8	Respondent 9	Respondent 10
1	Application Software	UBS accounting, Access UBS Accounting, Brasstax	UBS accountingAccess UBS Accounting Brasstax, Accounting Software S2000	Autocount, Auditsme	AXP Software	Monthly tax deduction software	SAGE UBS Accounting Software	Accounting-ABSS, Audit-Profix Engagement, Tax-YGL	SQL Accounting Software, Autocount Accounting Software, Million Accounting Software	MYOB, ABSS, CCH	1space (Insight) - Auditing software
2	Cloud-based software			A cloud file server	Bitrix	Global Advantage	Personal cloud (network)				
3	Cloud based application		Google drive	Google Drive	Bitrix	One drive, Sharepoint	One Drive	Onedrive Dropbox	Google Drive, Dropbox	Google drive	One Drive
4	Big data analytics						Data Visualisation Tools, ACL				
5	Artificial Intelligence						Automated Data Analysis, Fraud Detection Algorithm				
6	Microsoft Application	Words, Excel	Words, Excel	Words, Excel	Words, Excel, Powerpoint	Words, Excel, Powerpoint VBA	Words, Excel	Words, Excel	Words, Excel, Powerpoint Outlook	Words, Excel, Powerpoint Teams	Words, Excel
7	Business Practice Mgt Software				Bitrix	SAP	ACL Analytics, Caseware IDEA				
8	Blockchain				Xero	Finance function. Not relevant to our department	Smart Contracts Automated Auditing, Immutable Audit trails			MYOB, ABSS	
9	Mobile application	Scanner apps	PDF Scanner	Cam Scanner	Bitrix	Mobile work apps for most office application		Various apps	Cam Scanner, PDF Apps, Dropbox Apps	Cam Scanner	Scanner apps

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No	Name of technology	Respondent1	Respondent 2	Respondent 3	Respondent 4	Respondent5	Respondent 6	Respondent 7	Respondent8	Respondent 9	Respondent10
10	Fintech		Online banking, E-wallet	Maybank2u, Touch N Go E-wallet		Online banking	Online Banking	Online banking, E-wallet	Touch N Go E-wallet	CIMB Clicks, Go Bank Islam, Touch N Go E Wallet,	
11	XBRL						Digital Financial Statements, Real time Data Access				
12	Robotic Process Automation (RPA)				Bitrix	UiPath	Data Extraction and Analysis, Bank Reconciliation				
13	Cybersecurity Technology			Network Security, Cloud file server security		Multifactor Authenticator App	Encryption Technology, Vulnerability Scanning Tools			MACFEE	
14	Social Networking/ Online Communication		Google Meet	Webex, Zoom	Bitrix	Webex, Teams, Zoom, LinkedIn, Facebook	Google Meet, LinkedIn, Gmail, Whatsapp	Teams, Google Meet, Zoom	Google, Facebook, Instagram, X, Tik Tok	Google Meet, Facebook, Telegram, Tik Tok, Instagram	Google meet, Zoom meeting
15	Multimedia and Videos				Bitrix	Deloitte E-Learning	Risk Assessment, Audit Committee Presentation			Filmora, Capcut, Wondershare, Tik Tok	
16	Blogs and Website				Company Website	Deloitte Webpage	adibazhar.com		Google		
17	Communication Technology	Email, Whatsapp	Gmail, Whatsapp, Telegram	Skype, whatsapp, Gmail	Bitrix, Whatsapp, Email	Teams, Email	Email, Whatsapp	Whatsapp	Email, Whatsapp	Gmail, Whatsapp, Telegram	Email, Whatsapp

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method proposed assigned weights using an ordinal scale, while the second method proposed a numerical scale. The third method, however, assigns weightage in descending order and proposes a numerical scale as per Cooke's method, which believes and values the rarity of digital usage levels and distinct levels of digital usage among different firms.

The present study also disclosed some examples of technologies currently being used by the firms. The inconsistency of utilisation of different technologies across audit firms and non-audit firms requires researcher to understand which technology require the most by the profession. A thorough analysis of various factors, including organisational culture, leadership priorities, resource availability, regulatory constraints, technological infrastructure, workforce skills, perceived benefits and risks, competitive pressures, and industry dynamics, is necessary to comprehend the technology that is most essential for the profession. The absence of standardisation in the utilisation of technology may result in disparities in the quality, credibility, and reliability of financial statements since different firms may adopt distinct technologies with varying levels of effectiveness and compatibility. Hence, the establishment of industry standards and guidelines for the adoption of technology and the selection of vendors could improve quality, transparency, uniformity, and reliability in financial reporting procedures.

The study was conducted without limitation. Despite efforts to select experts with comprehensive knowledge and experience, there may still be inherent biases in the selection process. For example, experts who agree to participate in the study may have certain characteristics or perspectives that differ from those who decline, potentially skewing the results. However, the idea from the current study might be expanded to a large number of samples of audit and non-audit firms in future to gain more generalisable results and deep understanding of the overall current practices in audit and non-audit firm particularly in developing country, like Malaysia. Furthermore, future researcher should analyse the best time to distribute questionnaire to the practitioners and avoid for peak period. This research will help promote standardization in the use of technology throughout the accounting sector and improve the efficiency and effectiveness of the firms' operations. Additionally, by knowing technology priorities, firms can also develop better job development strategies to support professional and industry needs. By gaining an in-depth understanding of the most important technology in the accounting profession, the next step is to take strategic and concerted action to ensure successful technology implementation and maximum benefit to the firm and the accounting professional as a whole.

Acknowledgement
The author conducted the study as part of her PhD research, with the assistance of her supervisors. The PhD research is financially supported by Universiti Teknologi Mara (UiTM) and the Ministry of Higher Education of Malaysia.

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