


**TECHNOLOGICAL TRANSFORMATION OF ACCOUNTING – NEED FOR FIRMS TO ADD
TECHNOLOGY TRAINING EMPLOYEE SKILL SETS**

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ARTICLE INFO	ABSTRACT
<p>Article history:</p> <p>Received 18 August 2023</p> <p>Accepted 22 November 2023</p>	<p>Purpose: The objective of this study is to determine the impact of the ineffective use of technology by accounting firms on employee skill sets.</p> <p>Theoretical framework: This study will focus on exploring the relationship between the use of technology in the accounting profession and employee training for both accounting and technology skills.</p>
<p>Keywords:</p> <p>Blended Learning; Management Education; Executive Education; Bibliometric Analysis; Management and Business Education.</p>	<p>Design/Methodology/Approach: A flexible research design with qualitative methods (specifically, a case study) was used in this study. Data collection methods for the study included interviews and surveys of accountants in the intermountain region of the United States at a regional accounting firm. Triangulation helped to create potency and legitimacy of the study by comparing the results from the multiple data sources of surveys, interviews, literature reviews, and quantitative summaries.</p> <p>Findings: The findings from the study confirm the existence of problems identified in this study and provide information to the current body of knowledge concerning the ineffective use of technology at an accounting firm due to a difference between traditional accounting skills and technology skills. Six themes emerged: 1) technology is essential for accountants to effectively perform their jobs, 2) support from the leadership of an accounting firms is essential for successful technology use, 3) in-house and internal IT staff are critical for successful technology use, 4) different generations of accountants perceive and use technology differently, 5) clients are a major driver of an accounting firm’s technology, and 6) the audit profession has and is changing dramatically due to technology.</p>
	<p>Research, Practical & Social implications: The study confirms the existence of problems identified in this study and provide information to the current body of knowledge concerning the ineffective use of technology at an accounting firm due to a difference between traditional accounting skills and technology skills.</p> <p>Originality/Value: The value of this study provides support on technology skill sets for accounting professionals that will help the accounting profession be better prepared to source and train staff accountants with the necessary skills to capitalize on the unfolding technology transformation. This, may in turn, help accounting firms produce better services and products.</p> <p>Doi: https://doi.org/10.26668/businessreview/2023.v8i12.3858</p>

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TRANSFORMAÇÃO TECNOLÓGICA DA CONTABILIDADE – NECESSIDADE DE AS EMPRESAS ADICIONAREM CONJUNTOS DE HABILIDADES DE FUNCIONÁRIOS DE TREINAMENTO TECNOLÓGICO

RESUMO

Objetivo: O objetivo deste estudo é determinar o impacto do uso ineficaz da tecnologia pelas empresas de contabilidade no conjunto de habilidades dos funcionários.

Enquadramento teórico: Este estudo centrar-se-á na exploração da relação entre o uso da tecnologia na profissão contabilística e a formação dos funcionários em competências contabilísticas e tecnológicas.

Desenho/Metodologia/Abordagem: Um desenho de pesquisa flexível com métodos qualitativos (especificamente, um estudo de caso) foi utilizado neste estudo. Os métodos de coleta de dados para o estudo incluíram entrevistas e pesquisas com contadores na região montanhosa dos Estados Unidos em uma empresa de contabilidade regional. A triangulação ajudou a criar potência e legitimidade ao estudo, comparando os resultados das múltiplas fontes de dados de pesquisas, entrevistas, revisão da literatura e resumos quantitativos.

Constatações: As conclusões do estudo confirmam a existência de problemas identificados neste estudo e fornecem informações ao conhecimento atual sobre o uso ineficaz da tecnologia em uma empresa de contabilidade devido a uma diferença entre as habilidades contábeis tradicionais e as habilidades tecnológicas. Surgiram seis temas: 1) a tecnologia é essencial para que os contabilistas desempenhem eficazmente o seu trabalho, 2) o apoio da liderança de uma empresa de contabilidade é essencial para o uso bem-sucedido da tecnologia, 3) a equipe interna e interna de TI é crítica para o uso bem-sucedido da tecnologia, 4) diferentes gerações de contadores percebem e usam a tecnologia de maneira diferente, 5) os clientes são os principais impulsionadores da tecnologia de uma empresa de contabilidade e 6) a profissão de auditoria mudou e está mudando dramaticamente devido à tecnologia.

Implicações de pesquisa, práticas e sociais: O estudo confirma a existência de problemas identificados neste estudo e fornece informações ao corpo atual de conhecimento sobre o uso ineficaz da tecnologia em uma empresa de contabilidade devido a uma diferença entre as habilidades contábeis tradicionais e as habilidades tecnológicas.

Originalidade/Valor: O valor deste estudo fornece suporte em conjuntos de habilidades tecnológicas para profissionais de contabilidade que ajudarão a profissão contábil a estar melhor preparada para contratar e treinar contadores com as habilidades necessárias para capitalizar o desdobramento da transformação tecnológica. Isto, por sua vez, pode ajudar as empresas de contabilidade a produzir melhores serviços e produtos.

Palavras-chave: Ensino Híbrido, Educação Gerencial, Educação Executiva, Análise Bibliométrica, Gestão e Educação Empresarial.

TRANSFORMACIÓN TECNOLÓGICA DE LA CONTABILIDAD: NECESIDAD DE LAS EMPRESAS DE AGREGAR CONJUNTOS DE HABILIDADES DE FORMACIÓN TECNOLÓGICA DE LOS EMPLEADOS

RESUMEN

Propósito: El objetivo de este estudio es determinar el impacto del uso ineficaz de la tecnología por parte de las empresas contables en las habilidades de los empleados.

Marco teórico: Este estudio se centrará en explorar la relación entre el uso de la tecnología en la profesión contable y la capacitación de los empleados tanto en habilidades contables como tecnológicas.

Diseño/Metodología/Enfoque: En este estudio se utilizó un diseño de investigación flexible con métodos cualitativos (específicamente, un estudio de caso). Los métodos de recopilación de datos para el estudio incluyeron entrevistas y encuestas a contadores en la región entre montañas de los Estados Unidos en una firma de contabilidad regional. La triangulación ayudó a crear potencia y legitimidad del estudio al comparar los resultados de múltiples fuentes de datos de encuestas, entrevistas, revisión de literatura y resúmenes cuantitativos.

Hallazgos: Los hallazgos del estudio confirman la existencia de problemas identificados en este estudio y brindan información al conjunto actual de conocimientos sobre el uso ineficaz de la tecnología en una firma de contabilidad debido a una diferencia entre las habilidades contables tradicionales y las habilidades tecnológicas. Surgieron seis temas: 1) la tecnología es esencial para que los contadores realicen su trabajo de manera efectiva, 2) el apoyo del liderazgo de una empresa de contabilidad es esencial para el uso exitoso de la tecnología, 3) el personal de TI interno e interno es fundamental para el uso exitoso de la tecnología, 4) diferentes generaciones de contadores perciben y utilizan la tecnología de manera diferente, 5) los clientes son un importante impulsor de la tecnología de una firma de contabilidad, y 6) la profesión de auditoría ha cambiado y está cambiando dramáticamente debido a la tecnología.

Implicaciones prácticas, sociales y de investigación: El estudio confirma la existencia de los problemas identificados en este estudio y proporciona información al conjunto actual de conocimientos sobre el uso ineficaz

de la tecnología en una empresa de contabilidad debido a una diferencia entre las habilidades contables tradicionales y las habilidades tecnológicas.

Originalidad/Valor: El valor de este estudio brinda apoyo sobre conjuntos de habilidades tecnológicas para los profesionales de la contabilidad que ayudarán a la profesión contable a estar mejor preparada para contratar y capacitar a contadores con las habilidades necesarias para capitalizar la transformación tecnológica que se está desarrollando. Esto, a su vez, puede ayudar a las empresas de contabilidad a producir mejores servicios y productos.

Palabras clave: Aprendizaje Semipresencial, Educación Gerencial, Educación Ejecutiva, Análisis Bibliométrico, Gestión y Educación Empresarial.

INTRODUCTION

Technology is changing the world (Al-Htaybat et al., 2018). Businesses use technology to make better decisions, increase efficiency, and manage risk (Qiang, 2019). Businesses leverage technology to compete and remain at the forefront of their industry (Seshadrinathan and Chandra, 2021). The accounting industry is no exception. Per the CPA Journal (2019), the accounting profession is on the cusp of arguably its greatest transformation because of technology. Accordingly, accounting firms will need to ensure their accountants possess technology skills to capitalize on the development and application of technology in business and the accounting industry.

Training is one of the basic keys to developing and improving humans (Al Khawaldeh, 2023). Evaluating the effectiveness of the current training structure for a particular organization has become an area of emphasis recently (Sivathanu & Radhika, 2023). Researchers have studied how certain technologies will impact relevant skills needed by accountants. Fewer studies, however, focus on exploring the overall use of technology in the accounting profession and how an ineffective use of this technology may be forcing accounting firms to train for both accounting and technology skills. Research on this broader issue of effective technology skill sets for accounting professionals will help the accounting profession be better prepared to source and train staff accountants with the necessary skills to capitalize on the unfolding technology transformation, which in turn may help accounting firms produce better services and products. This study focused on the issue of effective technology skill sets for accounting professionals and is organized as follows: first, a review of the professional and academic literature pertinent to the study is presented; second, the rationale of the research method of the study; and third, a presentation of the findings, conclusions, and recommendations for further research are offered.

LITERATURE REVIEW

The literature review was conducted using professional and academic literature to discover how technology is transforming the accounting industry, resulting in accounting firms adding technology training to their employees' skill sets. To that end, Lin and Hazelbaker (2019) state due to technology, accountants must now also know computer programming, and knowledge related to data sharing, data creation, data analytics, and data mining, in addition to traditional accounting skills. Where once accountants could master their profession by applying Generally Accepted Accounting Principles (GAAP) and tax codes, now they also need to know how to utilize technology effectively because technology is transforming the business world and the accounting profession. Per Qiang (2019), expectations for accounting professionals have changed; accountants should ideally possess database management and analysis skills in addition to accounting skills to utilize technology effectively. Accordingly, to be competitive in today's world, Certified Public Accountants (CPAs) need to revisit their roles and responsibilities and add technical and digital skills to their accounting skill set (Drew, 2019).

Noting that technology is transforming the accounting profession, the literature review presents research observing two distinct skill sets needed for accountants to effectively use technology: traditional and technology skills. Al-Htaybat et al. (2018) support this observation with their findings that there are two types of skills needed in an accounting firm: classic and contemporary. Classic skills consist of traditional accounting skills, while contemporary skills include technology-related novel skills (Al-Htaybat et al., 2018). Rîndaşu (2017) finds the future accounting role involves a blend of traditional accounting skills and technology-related skills. Moore and Felo (2022) find accountants need technology plus accounting skills, and in response, accounting schools are offering joint accounting and analytics degrees. Gardner and Bryson (2020) offer technology innovation is disrupting accounting and has changed everyday accounting tasks. Further, the authors opine technology is forcing auditors to be deskilled and retooled to include technology. As a result, accounting skills have shifted, and accountants need to reskill to learn software and hardware skills. Finally, Abdennadher et al. (2022) offer because of technology developments, accountants and auditors need to transition from classic roles to modern roles, which require new technology skill sets.

As evidence of this materialization of accountant professionals' need for two types of distinct skill sets, governing bodies have started to include more technology requirements in licensing and schooling for accountants. For example, CPA exams are changing to focus more on technology in response to higher educational institutions' calling for more data analytics

skills (Moore & Felo, 2022). Additionally, the curriculum for accounting programs is changing. Lin and Hazelbaker (2019) opine for accounting students, even one semester of technology training will increase productivity through the more efficient use of technology. However, Al-Htaybat et al. (2018) posit educators will not be able to keep up with the pace of technology, and as a result, accounting firms will have to teach needed technology skills.

The technology skills accountants need are not isolated products but instead include a wide range of products, which complicates and compounds the problem. For example, Moore and Felo (2022) discuss how the accounting profession is undergoing radical technology changes and, in response, must add technology skills that will include more data analysis skills. Zhang et al. (2017) support Moore and Felo's findings and argue that a company's most valuable asset is its data, and accountants must learn how to use data if the accounting industry is going to remain competitive.

Marrone and Hazelton (2019) find artificial intelligence (AI) and analytics are transforming the accounting industry. Further, they find it imperative accounting firms engage in a full range of technology to optimize its benefits (Marrone and Hazelton (2019)). Li and Vasarhelyi (2018) add accounting and auditing are changing due to advances in data analysis and AI. Meskovic et al. (2018) contribute to the research and find accountants must use both their existing skills and acquire new ones to participate in transformative artificial intelligence technology. Rîndaşu (2017) discusses how accountants need to increase their skills to exploit new technology effectively. The authors opine the Big Four are training in technology, but accountants don't have enough skills or knowledge of big data, and they need to develop these new skills. Further, Rîndaşu (2017) specifically finds accountants have below-average cloud knowledge, and while they are familiar with this technology, they are not mastering it.

Schmitz and Leoni (2019) speak about the need for blockchain skills when they find that a new generation of accountants with blockchain skills is needed to address the new technology effectively. Seshadrinathan and Chandra (2021) support Schmitz and Leoni by finding the Big Four are using blockchain technology. Seshadrinathan and Chandra (2021) further assert only when accountants are reskilled to work with blockchain can firms hope to utilize the new technology fully.

Buchheit et al. (2020) address the increasing need for data visualization skills in their research comparing large and small accounting firms' data visualization usage. Per Buchheit et al. (2020), large accounting firms adopt data visualization technology earlier, while smaller firms do not. As found by Buchheit et al.(2020), even though smaller firms know of the benefits

of data visualizations, these firms experience low usage rates due to resource constraints, such as the time and expertise necessary to learn how to efficiently use data visualization technology.

Finally, Kokina and Blanchette (2019) find organizations need to train accountants in technology skills more effectively to decrease reliance on IT so they can use robotic process automation. The authors find using bots to collect stats and perform calculations has limitations because the accountants claimed the technology is too complex and hard to document on a granular level. The authors offer that accountants need increased technology skills, including more coding skills, to use the technology effectively.

The literature also noted skill set distinctions between larger and smaller accounting firms. Damerji and Salimi (2021) state that large multinational accounting firms are using technology, but accounting education to teach this technology to accountants is behind. Appelbaum et al. (2017) find smaller firms do not use technology to the same degree as larger ones mainly because smaller firms do not have the same financial and human resources. In response, firms are teaching and retraining for technology but remain far behind the curve. Ma et al. (2021) contribute to this discovery by finding smaller firms are more resource-constrained, so they use less sophisticated technology and more general technology. Further, smaller firms cannot get customized technology like the Big Four (Ma et al., 2021). As a result, the authors find only 25% of small firms are investing in technology.

In summary, the literature found technology is transforming the accounting industry and that accountants will need both traditional accounting skills as well as technology-related novel skills. As noted by Al-Htaybat et al. (2018), a lack of technology skills stops accounting firms from finding financial fraud using technology, thereby evidencing a gap between the skills possessed by accountants and the required skills. Further, the authors opine technology is transforming the skills accountants need. To quantify the issue, Qiang (2019) adds from their study eight out of ten CFOs in Singapore report they have difficulty hiring enough accounting professionals equipped with the needed technology skills for the job, and the skills gap is widening with time. Because of this gap, CFOs in Singapore are hiring data scientists to solve the technology issue; however, in return, they find data scientists know technology but do not know accounting, which creates a new problem (Qiang, 2019).

METHODOLOGY

The research methodology for this study was a flexible research design using qualitative methods; specifically, a case study design was used. A flexible design was used due to its more

adaptive, responsive, and adjustable nature and the common use of interviews and surveys as data collection methods. According to Yin (2003), it is better to make a single case study when the researcher wants to study, for example, a person or a group of people. Also, the researcher can question old theoretical relationships and explore new ones when a single case study is used (Ying, 2003). Triangulation helped to create potency and legitimacy of the study by comparing the results from the multiple data sources of surveys, interviews, literature reviews, and quantitative summaries.

In addition to the literature review, data collection methods for the study included interviews and surveys of accountants in the intermountain region of the United States at a regional accounting firm, Accounting Firm X (AFX). To qualify for participation, a candidate had to be currently employed at an accounting firm and be either a CPA (or license equivalent, i.e., a Certified Management Accountant) or a staff member with an accounting degree and working in the accounting industry. Each participant constituted one unit of analysis for the study. The selected sampling methods were purposive sampling for interviews and volunteer sampling for email surveys.

Interviews were conducted over the electronic visual communication platform, Teams, while the surveys were administered via email using SurveyMonkey. The data collected for the study was categorized, organized, and stored in a secure password-protected file. Codification is the primary method in this study to organize data collected from interviews and surveys to structure the emerging themes. Once initial interviews and surveys were completed, member checking was used to confirm the findings and give the participants the opportunity to clarify, affirm, and add to the findings as needed.

The primary analysis method was qualitative data analysis using themes to identify, analyze, and describe patterns. The analysis began with a review, organization, and analysis of the relevant literature and then built to an analysis of the data from interviews and surveys. During this process, codification was utilized to create categories of data to increase the study data's overall analyzability. Triangulation was employed to coordinate and converge the information from the different sources to increase the study's validity. Additionally, limited quantitative analysis was performed to add statistical analysis and provide another data source for triangulation.

To conduct the interviews, a review of available CPAs and staff accountants was completed with a lead partner at AFX. Attempts were made to select a broad and diverse group, including both management and staff accountants. With approval from AFX, invitations were

then extended to 16 individuals. Eleven individuals responded they were willing to participate, and 10 ultimately participated. A demographic representation of the interviewees is presented in Table 1. For the surveys, an email with a link to the survey was sent to all employees of AFX. A demographic representation of survey participants is in Table 2.

Table 1: Demographical Summary of Interviewees

Interviewee Demographics Summary						
Interviewee	Mgmt. vs. Staff	Yr. in Industry	Highest Education	License	Accounting Degree	Generation
I1	Mgmt.	13	Masters	CPA	Act Dgr	Millennial
I2	Staff	3.5	Bachelors	None	Act Dgr	Z
I3	Staff	2.5	Bachelors	None	Act Dgr	Z
I4	Mgmt.	20	Bachelors	CPA	Act Dgr	X
I5	Staff	3.5	Bachelors	None	Act Dgr	Millennial
I6	Staff	1.5	Bachelors	None	Act Dgr	Z
I7	Mgmt.	16	Masters	CPA	Act Dgr	Millennial
I8	Mgmt.	17	Masters	CPA	Act Dgr	Millennial
I9	Staff	0.5	Bachelors	None	Act Dgr	Z
I10	Staff	6	Masters	CPA	Act Dgr	Z
Interviewee Demographic Statistics						
	Tot Mgmt.	Min Yrs. in Ind	Bachelors	CPA	Act Dgr	Baby Boom
	4	0.5	6	5	10	0
	40%	Max Years in Ind	60%	50%	100%	0%
	Tot Staff	20	Masters	CMA	No Act Dgr	Gen X
	6	Ave Years in Ind	4	0	0	1
	60%	8.35	40%	0%	0%	10%
			Doctorate	None		Millennial
			0	5		4
			0%	50%		40%
						Gen Z
						5
						50%
Tot Participants	10	10	10	10	10	10

Source: Fetzer, T. H., Gibson, Y. S., and Kuhn, J. R. (2023, Field Work).

Table 2: Demographical Summary of Survey Respondents

Interviewee Demographics Summary						
Survey Respondent	Mgmt. vs Staff	Yr. in Industry	Highest Education	License	Accounting Degree	Generation
S2	Mgmt.	6-10	Masters	CPA	Act Dgr	Millennial
S3	Mgmt.	11-15	Bachelors	CPA	Act Dgr	Millennial
S4	Mgmt.	>15	Masters	CPA	Act Dgr	Millennial
S5	Staff	1-5	Masters	CPA	Act Dgr	Z
S6	Mgmt.	>15	Masters	CPA	Act Dgr	Millennial
S7	Mgmt.	6-10	Masters	CPA	Act Dgr	Millennial
S8	Mgmt.	6-10	Other	Other	Act Dgr	X
S9	Staff	<1	Masters	None	Act Dgr	Z
S10	Staff	1-5	Bachelors	None	Act Dgr	Z
S11	Mgmt.	1-5	Masters	CPA	Act Dgr	Z
S12	Staff	11-15	Bachelors	None	Act Dgr	Millennial
S13	Staff	1-5	Bachelors	None	Act Dgr	Z
S15	Staff	1-5	Masters	None	Act Dgr	Z
S16	Staff	11-15	Masters	CPA	Act Dgr	Millennial
S17	Staff	6-10	Bachelors	None	Act Dgr	BB
S19	Mgmt.	1-5	Bachelors	None	Act Dgr	Z
S20	Mgmt.	11-15	Masters	None	Act Dgr	X
S21	Mgmt.	>15	Bachelors	CPA	Act Dgr	X
S22	Mgmt.	6-10	Bachelors	CPA	Act Dgr	Millennial
Note: Respondents S1, S14, and S18 were removed from the data pool for not meeting the eligibility criteria.						
Interviewee Demographic Statistics						
	Tot Mgmt.	*Min Yrs. in Ind	Bachelors	CPA	Act Dgr	Baby Boom
	11	0.5	9	10	19	1
	58%	*Max Years in Ind	47%	53%	100%	5%
	Tot Staff	17.5	Masters	CMA-Other	No Act Dgr	Gen X
	8	*Ave Years in Ind	10	1	0	3
	42%	8.58	53%	5%	0%	16%
	* assumes mid-point in age range to calculate min, max & ave.		Doctorate	None		Millennial
			0	8		8
			0%	42%		42%
						Gen Z
						7
						37%

Demographical Summary of Interviewees

Source: Fetzer, T. H., Gibson, Y. S., and Kuhn, J. R. (2023, Field Work).

RESULTS AND DISCUSSION

The data from the interviews and surveys were analyzed. This analysis identified clusters of connected keywords, which, when reviewed, revealed six major themes related to how the ineffective use of technology is transforming the accounting practice, resulting in the need for accounting firms to add technology training to employee skill sets. A detailed discussion of each theme is as follows.

Theme 1: Technology is a Tool Essential for an Accountant to do Their Job Effectively.

A common and boisterous theme prevalent to all participants was technology is an essential tool for an accountant to effectively do their job. This theme transcended interview questions and survey questions and emerged in diverse answers across different questions. While the scope of technology tools and the magnitude and means to achieve technological efficiency varied by the respondent, the theme, nonetheless, resonated throughout the investigation at various levels. The most boisterous participants' findings are as follows.

Per Interviewee Four (I4), technology is the lifeblood of the accounting profession. It helps generate more output for the same or fewer inputs, which creates essential value and savings for the customers. Interviewee Six (I6) added technology improves convenience, efficiency, and quality, while Interviewee Eight (I8) revealed technology streamlines processes, which increases efficiency and profitability. I8 explained it would be impossible to do their job without technology. Specifically, I8 says, "Without technology, I don't know that we'd be able to perform our job. Using and interacting with technology all the time, other than I think human interaction and conversations, we definitely depend on technology to do what we do."

While participants agreed technology was essential to their job, the definition of technology varied among participants. As discussed below under Theme 4, major generational differences appeared regarding technology. Older generations (Baby Boomers, Gen X, and some Millennials) define technology in more general broad terms, while younger generations (some Millennials and Gen Z) are more specific. For example, I8 (a Millennial) defines technology as automated software and specific products such as Microsoft Office. Interviewee Seven (I7), also a Millennial, defines technology as electronic devices to automate tasks and cites specific components such as laptops, the internet, and peripheral devices. Comparatively, the younger generations include similar general definitions of tech but add more specific items to the definition. For example, Interviewee Two (I2) discusses common software such as Teams and Excel but includes the audit-specific software Advanced Flow and AI. Additionally, Interviewee Nine (I9), also a Gen Z, discusses general technology such as software packages but then includes specific audit software from Thompson Reuters, Advanced Flow, and AI. The consensus is technology or technological tools of some form or another are essential for accountants to perform their tasks effectively, even though accountants of different generations define technology and technology products differently.

Quantitative data from the survey confirms the findings in Theme 1. Assuming that increased technology usage is motivated by efficiency returns, the survey indicates strong

technology usage at the subject firm, with 82% of respondents indicating they use computer-assisted audit tools, 64% indicating they use cloud computing, and 50% indicating they use artificial intelligence. Krieger et al. (2021) connect these findings to the literature review by noting audit software automates accounting tasks, thereby increasing efficiencies. Al-Htaybat et al. (2018) opine cloud-based applications provide accounting services at increased speed and efficiency by being remote.

Theme 2: An Accounting Firm's Leadership's Support of Technology is Essential to the Effective use of Technology at Accounting Firms.

Throughout the interviews, there was a consistent theme that without management's support, technology would not be effectively used at a firm. Per I4, "So, I think, the first thing we had to do was embrace people that were willing to try new technology. We didn't shun them. We didn't make it feel like they were wasting money." I4 went on to discuss how leadership cannot be afraid of technology and, moreover, must be proactive for technology to be successful. Interviewee Five (I5) contributed that leaders must be champions of continual change, and I6 added the action that most contributes to successful technology at an accounting firm is visionary leadership.

As stated by I4, a key component of leadership supporting technology is the embracement of spending to acquire, train, and upkeep technology. I4 quantified the magnitude of this spending by stating the average accounting firm spends 6% of annual net fees on technology but that AFX spends closer to 10%. Interviewee One (I1) confirmed the magnitude of AFX's spending on technology when I1 shared it was their second-largest operating expense.

Findings in the survey, both qualitative and quantitative, support the validity of Theme Two. In the open-ended question, Survey Respondent Four (S4) stated that one of the measures a firm should take to address technology is "Develop cost-benefit analysis for the use of software, training, and assess security." Quantitatively, the surveys showed the largest influence of a firm using technology was management, with 86% of respondents selecting this option.

Theme 3: In-house Training and Having Internal IT Staff is a Key Component of the Effective Use of Technology by an Accounting Firm

Multiple methods of training were identified in the interviews. As discussed by several interviewees, training includes training IT staff, software vendors, managers, and training

programs, such as AFX University, and a two-week onboarding training program. Throughout the interviews, it became apparent the most impactful measure enabling accounting firms to use technology effectively is to have in-house training and a dedicated internal IT team. As noted by I4, “I think we have a lot of opportunity to put a lot more effort into how we go about systematically training in technology.” I4 went on to explain they used to have an internal IT team five years ago, but they switched to an external provider, which has not been working. As a result, they are now rebuilding their internal team and bringing it back in-house. This need for an internal team was echoed in comments from I7, who stated one contributor to technology success at an accounting firm is “having internal people who look at different software” to gauge if it is the most effective option for the firm’s specific needs.

Data from survey respondents support Theme 3. As noted by Survey Respondent 19 (S19), the key measure to address the impacts of technology on the accounting profession is “required training on technology.” The survey results support the assumption that the firm’s in-house training leads to efficient use of technology and report an overwhelming 86% response that technology training is indeed being done by the subject firm. Interestingly, 59% of these respondents were not satisfied with the quality of training they received and indicated the subject accounting firm needs better trainers.

Theme 4: Distinct Generations of Accountants Perceive Technology Skills Differently, and Accountants of Distinct Generations Perceive and Support Technology Skills Differently

One interesting and surprising finding from the interviews was how accountants of distinct generations perceive and support technology skills differently. While most interviewees reported technology was essential to effective job performance, the type of technology used and the support for this technology differed across generational lines. As discussed above under Theme 1, older generations (Gen X and some Millennials) define technology as more general in scope, while younger generations (some Millennials and Gen Z) define it more specifically. The importance of this distinction is that as the age of an interviewee increased, their support for newer, more specific technologies decreased. This decrease came across in the interviews as a deterrent to the successful use of technology. The primary reason for this was a reluctance by older interviewees to learn more specific and newer technologies. As noted by Interviewee Three (I3):

We're not going to choose an inefficient way, even though there's maybe some old-timers. That is how they started in accounting. They're pushing us to learn and be able to keep up to date with what the clients prefer and what's most efficient for both of our uses of time. (I3)

This reluctance frustrates younger accountants and complicates management's support for technology. At AFX, most management is from the older generations. Per I4, the one Gen X in the interview pool:

I remember a time when I was the only partner at AFX who had an iPhone. Everyone else was using the old Blackberries, and they thought I was nuts because I jumped to this thing called an iPhone. I remember our IT support group sending an email out to the firm stating that if anyone got an iPhone, they wouldn't help troubleshoot it (I4).

As described by I4, decision power had to be transitioned to the younger generations, who were more willing to accept modern technology. I4 mentioned this transition occurred 16 years ago when I4 joined the firm. However, as these newer managers I4 referenced have aged, unless they have kept up with technology, it is extremely hard to do because -technology changes so fast; these managers are now the proverbial "Blackberry users" in the eyes of the younger accountants. This sentiment is shown in comments from I8, a Millennial, and I6, a Gen Z. Per I8 concurred tech is changing so fast, the firm is concerned it is not keeping up, and "we don't know what we don't know." I6 added the culture at AFX is encumbered with a desire not to grow or change too fast to avoid putting "people off in the firm that, uh, like the culture as it is."

The fact that one Baby Boomer (the oldest generation in the survey) respondent reports only using cloud computing and general audit tools provides quantitative results triangulating findings in Theme 4. Comparatively, the nine respondents from the youngest generation, Gen Z, report using five technologies responsible for the following percentage of total usage across the firm: audit tools (39%), data analytics (27%), cloud computing (21%), artificial intelligence (18%), and robotic process automation (17%). Adding another layer from the survey, Millennials accounted for 47% of the total survey group but were responsible for the bulk of all technology use across the firm, with overall usage by them as follows: cognitive assistance technology (83%), robotic process automation (67%), artificial intelligence (55%), data analytics (53%), blockchain (50%), cloud computing (50%) and audit tools (39%). It is obvious the bulk of the technology knowledge and usage is found in the Millennial generation, while Gen Z is still catching up to speed. The survey results also show the older generations appear less interested in learning newer technology.

Theme 5: Clients are a Major Driver in what Types of Technology and the Scope of Technology Products an Accounting Firm Offers

Clients not only drive technology updates in accounting firms, but they also provoke and benefit from accounting firms' investment in technology. As noted by I7, AFX often uses software that might be cost-prohibitive for a single client so that they can share the software with their clients for a small fee. I9 also adds their experience with technology comes from sourcing bookkeeping software for their clients I5 adds, "Everyone's system is a little bit different, and our expertise is, if you will, how do we adopt, tweak, or adapt a program to work with a client system."

Triangulating the survey results, the quantitative data supports the hypothesis that clients influence technology's effective use. As reported in the survey, 77% of respondents said that clients influence a firm's use of technology. Further, 82% of respondents answered that a client's use of technology impacts technology's usefulness in accounting and auditing.

Theme 6: The Auditing Profession is Changing Dramatically and will be Vastly Different Before the Next Decade is Over Because of Technology

One overarching and powerful theme common among most interviewees is because of technology, the auditing profession has dramatically changed, is drastically changing, and will be vastly different over the next decade. Technologies such as cloud computing and auditing software have revolutionized the auditing industry from what it was years ago, and newer technologies, such as robotic process automation and especially AI, will revolutionize the industry even faster over the next decade. As noted by I4, audits were completed with paper when I4 joined the profession, and now they are in the cloud. I8 adds the CPA exams will allow a specialized endorsement to a CPA license for technology skills starting January 2024. Interviewee I10 (I10) contributes, "Technology may eventually change to the point where the customer no longer wants the auditor at all, and they just trust the system to spit out the information how they want it presented." Meanwhile, I9 offered that tech tools are going to take huge steps to advance auditing, as evidenced by the following quote: "The newest version of Excel has some new functions and has some AI type integration that helps you with maybe analytics and stuff like that, and I think it is just going to further marry audit and tech together." Finally, I7 contributes, "And also AI, at this point, hasn't taken over auditing, but a lot of people say there could be a day where we're doing very little manual, it's just a lot of AI and non-

manual.” Accordingly, the overarching finding in the interviews is that the auditing profession has changed and is changing amazingly fast because of technology.

Supporting the findings in the interviews and the literature, using the hypothesis that a need for tech skills correlates with a changing accounting profession, the survey indicates 82% of respondents answered they need analytics skills to be competent at their jobs, 73% said they need cyber skills, and 59% indicate they need statistical skills. Also included on the list of needed technology were data analysis skills (32%), enterprise resource skills (27%), and programming skills (27%).

CONCLUSION

The purpose of this study was to explore the body of knowledge concerning the efficient use of technology at accounting firms. To accomplish this purpose, the study started with a literature review and then progressed to interviews and surveys. The aspiration was to gain an understanding of how accountants and auditors are using technology. The objective of this aspiration was to explore current training practices and other influences that could lead to the ineffective use of technology by an accounting firm.

During the study, six themes emerged: technology is essential for accountants to effectively perform their jobs, support from the leadership of accounting firms is essential for successful technology use, in-house and internal IT staff are critical for successful technology use, different generations of accountants perceive and use technology differently, clients are a major driver of an accounting firm’s technology, and the audit profession has and is changing dramatically due to technology. The themes were common amongst the literature, interview participants, and survey respondents. This congruency among the literature, participants, and respondents provided data saturation and allowed the researchers to draft their conclusions.

In conclusion, the findings from the study confirm the existence of problems identified in this study and provide information to the current body of knowledge concerning the ineffective use of technology at an accounting firm due to a difference between traditional accounting skills and technology skills. Future research can add to the body of knowledge by expanding the interview and survey participants to different-sized accounting firms, changing the situs of the study, and expanding the scope of the stakeholders included in the research.

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