Babeș Bolyai University

Faculty of Economics and Business Administration

Doctoral School of Economics and Business Administration

DOCTORAL THESIS SUMMARY

INCREMENTAL REDESIGN OF THE ACCOUNTING LANDSCAPE IN THE MIDST OF INDUSTRY 4.0

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Contents

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THESIS INTRODUCTION

The economic stage is undergoing an extensive transformation, prompting a rearrangement of the engaged stakeholders. The advent of new technologies is pressuring worldwide organisations to become "digital" (Moll & Yigitbasioglu, 2019; Tiron-Tudor *et al.*, 2021). On the global arena, the accounting profession also assumes its responsibilities in the face of this tremendous shift and mandates a redesign triggered by Digital Technologies (DT) emerging throughout the industry (Vărzaru, 2022).

In response to the above challenges, the accounting profession is experiencing a complete makeover from manual bookkeeping to digitally complex processes attributable to new technologies such as *Artificial Intelligence* (AI), *Big Data & Data Analytics* (BDA), *Robotic Process Automation* (RPA), *Blockchain*, *Cloud Computing* (CC) (Onwughai, 2022). The traditional accountant as a concept (Li & Zheng, 2018; Bakulina *et al.*, 2020; O`Shea *et al.*, 2022), becomes obsolete, while the accountant profile is being revolutionized through technological advancements. The impending arrival of the "digital" in the industry (Moll & Yigitbasioglu, 2019) indicates that accountants could assume tasks closer to the company's decision-making core, and thus they are faced with a window of opportunity to proactively participate in the upbringing of the accounting profile and of the profession itself. As such, it is known that the accountant profile has expanded (Jeffrey, 2018; Deloitte, 2022; ACCA, 2022), consequently, there is a compelling need to keep improving the digital skills (Zhang et al., 2020; Kokina et al., 2021). In anticipation of a heightened technological trend toward smart technology, it becomes essential to properly position the Professional Accountant (PA) in the grand scheme of evolution.

Within this framework, the study aims to complete the studies of accounting transformation by delivering an up-to-date synthetisation of the studies in the field, focusing on the impact that the Fourth Industrial Revolution has on the profession. Moreover, the study dives into statistical analyses that tackle topics of resistance to technology and enabling factors, as well as the impact of an enhanced accountant profile on the landscape of graduate recruitment.

In the third chapter the landscape of graduate recruitment is placed under the spotlight, as changes in employability requirements imminently affect graduates of accounting studies (Sehgal & Nasim, 2018). Current and future employees are subjected to a continuous calibration of skills based on market needs. "Work ready" employees are required to transition from Higher Education Institutions directly into a digitalized workforce (Sehgal & Nasim, 2018). These requirements pose challenges, and the competences of graduates are expected to cover a wide range of traditional, as well as digital skills. The topic of skill gap gained focus within the market, as both the academia and current accounting students must enhance the skills relevant within the reality of the Fourth Industrial Revolution. In this sense, the third chapter aims to freeze-frame the most updated and relevant skill set that the accounting labour market requires. Secondly, it will challenge the differences between the market requirements and the perceptual assessment of accounting students regarding the pre-defined skill set.

The originality of the chapter lies in its effort to understand and validate accounting students` perception on different skill groups, valid in the context of the Fourth Industrial Revolution. The analysed skill set is exhaustive, containing elements of traditional-technical skills and enabling skills, but at the same time the analysis focuses on understanding and comparing the digital skills imposed by the digital transformation of companies namely the cyber, digital and technological skill set. The research seeks to emphasize the growing relevance of new skills in the era of digital transformation, and to expand the extant literature with an up-to-date, accurate and robust skill gap exploration in the context of Industry 4.0.

Ultimately, the current research explores the accounting profession and its evolution in the midst of digital transformation and the emergence of Industry 4.0. The thesis structure is as follows: the analysis starts with an examination of the extant literature devoted to new technology in accounting, as well as an examination of specific behaviour, challenges, and ramifications throughout the industry. Subsequently, a deepened examination of the current market, the research flows into an inquiry amongst current practitioners regarding technology perception, alongside specific inhibitors, and impact factors. Understanding the landscape of accounting workforce points towards another important aspect of todays` accounting workplace reality, that of the enlarging gap between market requirements and the under-preparedness of graduates transitioning

into the workplaces. The paper aims to cover this gap though an in-depth comparison of market needs against graduate`s capabilities, thus enabling a full coverage of the impact of Industry 4.0 amongst all layers of accounting workforce.

1. A STATUS QUO ON THE LITERATURE OF DISRUPTIVE TECHNOLOGIES IN ACCOUNTING – DEEP DIVE INTO DISRUPTIVE TECHNOLOGIES AND ASSOCIATED INTEREST AREAS

In the first chapter the thesis attempts to draw a robust and holistic image of the status quo of digital transformation in accounting through an in-depth analysis of the literature in the field. Through the means of a *Structured Literature Review* (SLR) the analysis takes various granularity levels and performs a comparative analysis of the topics and technologies extracted within the analysis process. As such, the analysis will first delimitate the major technologies that are impacting the profession, and then it will draw the lines around the major discussion topics surrounding each individual technology. In this manner the digital transformation of accounting can be dissected into areas of interest, pain points and main contributors.

CROSS ANALYSIS BETWEEN TECHNOLOGIES AND TOPICS

The first part of the chapter segregates the scope articles into two clusters, one being technology while the second refers to the topic of interest found in the literature analysis. The final step brings together and cross examines these two pillars on which the accounting current literature is built upon (***Table 1***). In this sense it can be observed that technologies such as AI and BDA present stronger correlations against topics such as advantages and disadvantages or implementation challenges, while the digital transformation which englobes several technologies is more frequent in topics of skill set and role of accountants. In general technologies bundled and studied as a group are present in all areas of interest challenging the discovery of implementation effects, and also of advantages and disadvantages, nonetheless seen from a global perspective, not specifically targeting one technology.

Technologies/Topics	Skill set & Curricula	Role of accountants	Advantages and Disadvantages	Implementation challenges & effects	TOTAL by topic
Digital transformation	9	7	4	3	23

Cloud	1	0	1	1	3
RPA	2	1	2	3	8
AI	1	5	8	2	16
Big Data & Data Analytics	3	2	1	4	10
Blockchain	0	0	2	3	5
Other techn. (e.g., mobile devices, Excel, SAP)	0	0	1	1	2
TOTAL by technology	16	15	19	17	67

**one or several technologies/topics discussed in one paper*

Table 1: Cross analysis between technologies and topics

The chapter provides an important contribution in the field of accounting in two regards. Firstly, the study brings to light the most widespread technologies with the capacity to disrupt the current order of things, thus classifying and structuring a basis for further analysis and research, as well as basis for organisations and accountants to improve their knowledge and aid decision making. Secondly, it enables a deeper understanding of the dynamics of technology assimilation and how it translates in the accounting reality. As such, the analysis provides a knowledge base containing struggles and benefits in implementing different technologies, implementation challenges and effects, role of accountants as well as the impact that resonates upon skill set and curricula.

DISCUSSIONS

The literature acknowledges that the skill gap accountants face in the light of digitalisation, is multifaceted and spreads across all areas of the industry, placing the topic under the spotlight in the reference literature (Österreich & Teuteberg, 2019; Pilipczuk, 2020; Kokina *et al.*, 2021). The growing discrepancy between the curricula and the workplace expectancy has been identified since the 1980s (Aldredge *et al.*, 2020), nonetheless with the expansion of technologies this is becoming more and more obvious. The research on the role of accountants in organisations has its foundational cornerstone set in the development of the skill gap in the current marketplace. The changing roles that accountants face trigger a remodelling of their role within organisations, opening the path towards big opportunities (Kokina *et al.*, 2021), through means of technological and regulation changes (Melnyk *et al.*, 2020), as well as expanded research opportunities (Bhimani, 2020).

2. DETERMINANTS OF TECHNOLOGY PERCEPTION IN THE ACCOUNTING PROFESSION – COMPARATIVE ANALYSIS BASED ON DIGITAL TECHNOLOGIES IMPLEMENTATION

In the second chapter the study continues to investigate how technology is affecting the accounting industry, and it addresses the broadest layer within the accounting landscape, namely it examines the accounting professionals working in various organisations within the industry. The study analyses PAs perception on technology use, while striving to scale its level of adoption and apprehension amongst employees. The analysis dives into excerpting the current level of technological use, validating behaviours and inhibitors of technology use, as well as identifying factors that impact technology use in accounting. In this sense, a questionnaire was disseminated amongst accounting practitioners, based on an adapted TAM technology to assess how PAs position themselves against new technology.

Originality of the chapter strives from extending a complex analysis model on the perception of technology inhibitors in a period of transition and organisational development, while attempting to identify the root causes and impact factors involved in perceptual assessment of new technologies. Moreover, the paper stands out through performing a comparative analysis, separating two groups of employees, thus comparing between practitioners using and not using new technologies, which is a gap observed in the current literature.

THEORETICAL FRAMEWORK - THE NEED OF AN ADAPTED TECHNOLOGY ACCEPTANCE MODEL THEORY

The Technology Acceptance Model (TAM), a modification of TRA, has developed from this line of social psychology research as a potent and economical way to depict the causes of technology adoption (Cokins *et al*., 2020). TAM is primarily determined by two factors (Davis, 1989):

- (1) *Perceived Utility (PU)*, which refers to how much a person thinks using a certain system would help him perform better; respectively,
- (2) *Perceived Ease of Use (PEU)*, which refers to how much a person thinks using an information system will be effortless.

The current study includes additional factors in the construction of the two main dimensions of the TAM methodology, namely Perceived Ease of Use and Perceived Utility, as seen in ***Figure 1***. Usefulness is being derived from the benefits perceived related to daily use of technology, the

stress involved in performing repeated work in such an environment and the general trust in the knowledge possessed over a certain technology. The personal ease of approaching a certain technology - i.e., Perceived Ease of Use was split into three components, namely "Perceived Ease of Understanding" (PEUN), "Perceived Ease of Learning" (PEL) and "Perceived Ease of Keeping Pace" (PEKP). Additionally, Perceived Usefulness (PU) is extended to incorporate three additional angles: Perceived Benefits (PB), Perceived Stress (PS) and Perceived Knowledge Trust (PKT). Having the knowledge required to use technology has been previously studied (Fauzi *et al.*, 2021), with directions already set on the easiness to become skilful for example (Napitupulu, 2017) but the current model offers a higher granularity in the study over easiness of use.

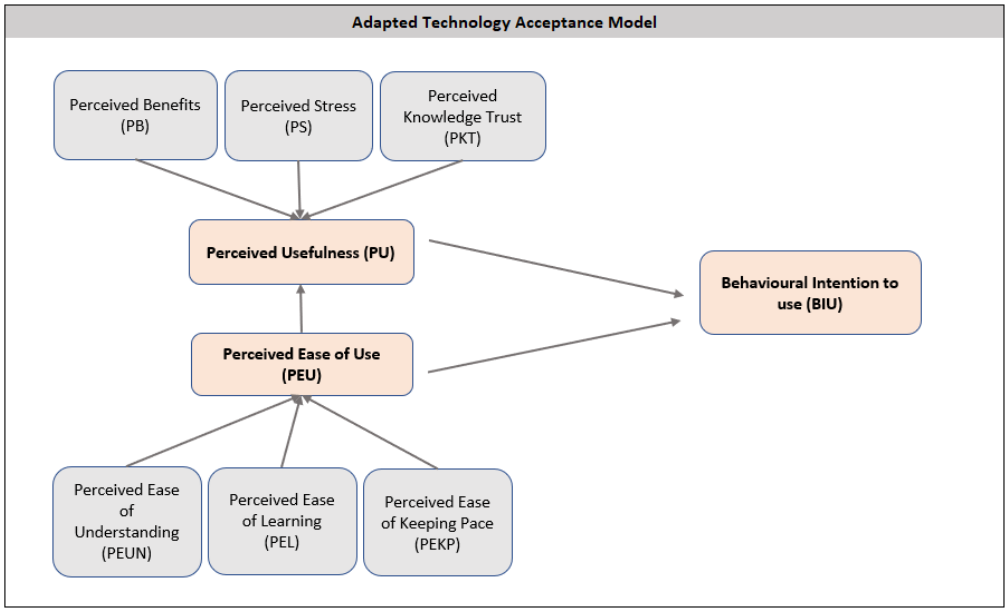

Figure 1: Author's Adapted Technology Acceptance Model Theory

RESULTS

FACTORIAL CORRELATION ANALYSIS

Significant positive relationships have been found between Perceived Utility and Perceived Benefits in both sets of data (.676/.601), as seen in ***Table 2.*** This demonstrates that if people are feeling the usefulness of technology as an enabler in their daily work, for example if it allows them to finish work in time, or provide assistance with repetitive, unenjoyable tasks, they are likely to feel joy and in turn to feel technology is beneficial to them.

	PKT	**PS**	**PB**	**PU**	**PEUN**	**PEL**	**PEU**	**PEKP**

PKT	1	-.217**	.428**	.289**	-.260**	-.261**	-.257**	-.332**
PS	-.097	1	-.095	-.172*	.218**	.239**	.280**	.219**
PB	.520**	.016	1	**.601****	-.019	.07	-.045	-.232**
PU	.398**	-.144*	**.676****	1	-.102	-.033	-.119	-.282
PEUN	-.146*	.377**	-.131*	-.288**	1	**.718****	**.623****	.391**
PEL	-.098	.427**	-.131	-.228**	**.896****	1	**.682****	.347**
PEU	-.099	.443**	-.106	-.293**	**.878****	**.872****	1	.422**
PEKP	-.057	.422**	-.086	-.266**	**.840****	**.835****	**.872****	1

Table 2: Factorial correlation for respondents using DT and not using DT, authors' calculation with IBM SPSS Statistics 20

*** Correlation is significant at the .01 level (2-tailed).*

Legend:	
	Respondents using DT
	Respondents not using DT

Another strong correlation that results in both data sets indicates that Perceived Ease of Understanding connects with Perceived Ease of Learning (.896/.718) and Perceived Ease of Use (.878/.623) sharing a similar logic, that if technology is appears to be easily understandable, PA`s feel confident in learning and further on in using it. These results address the topic of learning facilitation, as by enabling easy access towards understanding and grasping the edges of new technology, the easiest it will become to learn and use innovative technologies. Moreover, Perceived Ease of Use and Perceived Ease of Learning prove strong correlation both for respondents using and not using Digital Technologies (.872/.682) which indicates that users feel that a generalised ease of approaching Digital Technologies can be related to users perceived ability to learn it.

In general, users tend to focus their attention on the two main variables that form the topic of technology related knowledge perception and gathering. The strongest relationships surround the understanding (PEUN) and learning (PEL) factors which appear as a trigger point for further usage. This implies that PA`s have a good understanding of the implications that the new technology requires, and their focus is properly set on the knowledge gathering aspect. Possibly the correlations can be seen as a commitment to learning and addressing these topics in the near future.

HYPOTHESIS TESTING - SPEARMAN RANK CORRELATION

Validation measurements have been conducted using statistical program IBM SPSS Statistics 20. Given that IBM SPSS Statistics 20 is an instrument made up of 10 response scales, the correlation coefficient determined by the non-parametric Spearman rank correlation test.

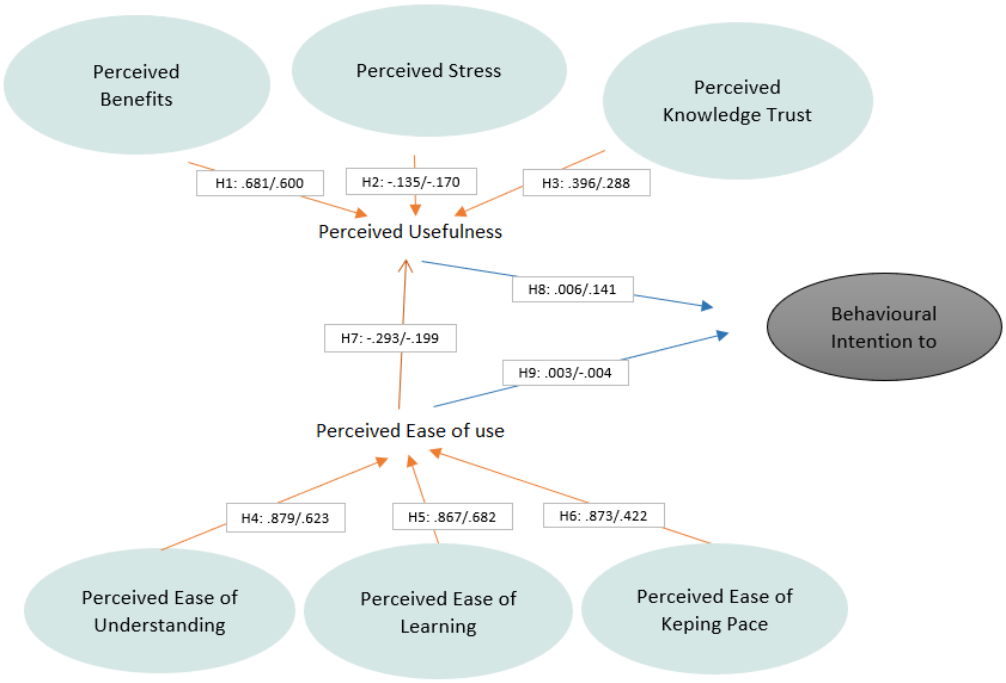

Figure 2: Construct testing for using/not using DT

The main takeaways construct an image around the current challenges laid ahead by the digitalisation of the accounting fields. ***Figure 2*** shows that PA`s tend to correlate Perceived Benefits with Perceived Utility (.681/.600), meaning that the perception of personal gain has strong roots in assessing the utility of new technology, overshadowing factors as Perceived Stress or Perceived Knowledge Trust. Stress and confidence over new implementations appear to be overcome by a strong perception of personal benefits. On the other hand, Perceived Ease of Use displays strong connection to Perceived Ease of Learning (.879/.623) and Perceived Ease of Keeping Pace (.873/.422) touching on the main topic of learning, continuous learning and sustainable development of skills. Usage of new technology can be made easy by providing the correct learning environment and learning tools. In general, the industry should focus on enabling and simplifying the tools for knowledge gathering, and for presenting a more structured approach towards learning.

REGRESSION ANALYSIS

Two separate determinations were conducted, using the two data sets available, however for the purpose of summarisation, ***Table 3*** presents regression equations available in the cluster of respondents using Digital Technologies. The R2 variable shows significant influence in hypothesis

1, 3, 6 and 7. Perceived Utility is determined by Perceived Benefits in proportion of 58.2% and by Perceived Knowledge Trust in proportion of 26%.

Hypothesis Using DT	R^2	Regression equation
H1: PB significantly influence PU	.582	PU= 3.539+.630*PB + Ɛ
H3: PKT significantly influence PU	.26	PU= 5.492+.428* PKT + Ɛ
H6: PEKP significantly influence PEU	.769	PEU=.640+ .926* PEKP+ Ɛ
H7: PEU significantly influence PU	.049	PU= 9.400-.107*PEU+ Ɛ

Table 3: Regression analysis - cluster using DT

Regression analysis generally emphasises the most influential factors in drawing the layout of technology perception. Hypothesis with high impactfulness developed mainly in the cluster of respondents using Digital Technologies. The highest factorial influence is seen in addressing the Perceived Ease of Use from a Perceived Ease of Keeping Pace perspective, with a percentage of 76.9%. This means that in the future, the probability is that an increase in Perceived Ease of Keeping Pace will highly influence the Perceived Ease of Use, paving the road for research in the field of learning to address the topic of simplifying learning of new technologies and thus removing the fear associated with ongoing developments. At the same time, an increase in Perceived Benefits will highly contribute to a sense of usefulness of using innovative technology, overshadowing all other factors.

DISCUSSIONS

The chapter examines the current applicability of the TAM theory in a comparative approach of the technology perception in the accounting profession. The distinction between two clusters of respondents is represented by the user`s statement over having/not having implemented new technologies within the past 5 years.

The results indicate that the model is valid for determining the factors that influence Perceived Utility and Perceived Ease of Use, nonetheless the two do not contribute to BIU. The research then emerges into a regression analysis to reveal factors that can predict future influences over Perceived Utility and Perceived Ease of Use. This analysis discloses those factors that have the ability to predict future behaviour and the conclusions show that Perceived Utility is greatly influenced by Perceived Benefits and Perceived Knowledge Trust in both data sets, while Perceived Ease of Use is again strongly influenced by Perceived Ease of Keeping Pace. The

aforementioned relationships transcend both clusters of respondents, revealing that an assessment of utility stands on two pillars of personal gain and trust over using a technology. It seems that respondents need to be more confident in using technology in their daily tasks and the benefits gained need to be obvious and easily identifiable. In terms of Perceived Ease of Use, the main predictor is Perceived Ease of Keeping Pace, which indicates that most probably users feel currently confident in using Digital Technologies, but future developments still govern their confidence in personal abilities.

A correlation analysis reveals that users tend to focus their attention on knowledge perception and gathering. Strong relationships surround Perceived Ease of Understanding and Perceived Ease of Learning, implying that PA`s have a good understanding of the implications that the new technology requires, and their focus is properly set on the knowledge gathering aspect. Similarly, factors like Support and Skill appear in the literature as highly influencing BIU (Pouratashi & Rezvanfar, 2010). At the same time, it is seen that a high interest is shown amongst PA`s already using Digital Technologies for Perceived Ease of Keeping Pace in correlation with Perceived Ease of Learning and Perceived Ease of Use, implying that professionals using Digital Technologies, who have experienced to some level the implications of new technology in their daily work, do tend to worry about their ability to keep up with the ongoing changes that appear. Similar variables, such as Perception of External Control, are found relevant in the literature when assessing Perceived Ease of Use (Bröhl *et al*., 2016). This indicates that awareness exists that technology is not yet in a stable or final setup, and it is continuously evolving, generating a level of anxiety over this rapid dynamic.

3. FUTURE-PROOFING ACCOUNTING WORKFORCE IN MIDST OF INDUSTRY 4.0 - SKILL POSSESSION AND EXPECTATION GAP

In the third chapter the landscape of graduate recruitment is placed under the spotlight, as changes in employability requirements imminently affect graduates of accounting studies (Sehgal & Nasim, 2018). Current and future employees are subjected to a continuous calibration of skills based on market needs. “Work ready” employees are required to transition from Higher Education Institutions (HEIs) directly into a digitalized workforce (Sehgal & Nasim, 2018). These requirements pose challenges, and the competences of graduates are expected to cover a wide

range of traditional, as well as digital skills. The topic of skill gap gained focus within the market, as both the academia and current accounting students must enhance the skills relevant within the reality of the Fourth Industrial Revolution. In this sense, the third chapter aims to freeze-frame the most updated and relevant skill set that the accounting labour market requires. Secondly, it will challenge the differences between the market requirements and the perceptual assessment of accounting students regarding the pre-defined skill set.

The originality of the chapter lies in its effort to understand and validate accounting students` perception on different skill groups, valid in the context of the Fourth Industrial Revolution. The analysed skill set is exhaustive, containing elements of traditional-technical skills and enabling skills, but at the same time the analysis focuses on understanding and comparing the digital skills imposed by the digital transformation of companies namely the cyber, digital and technological skill set. The research seeks to emphasize the growing relevance of new skills in the era of digital transformation, and to expand the extant literature with an up-to-date, accurate and robust skill gap exploration in the context of Industry 4.0.

DEBATING THE SKILLS USED WITHIN THE BORDERS OF THE ACCOUNTING LITERATURE

To be employed in the job market, graduates of accounting programs must possess **technical skills** or a basic knowledge of accounting, including management accounting (Aryanti & Adhariani, 2020; Burriel et al., 2023), and financial accounting (Osmani et al., 2020; Ayranti & Adharaini, 2020; Leitner-Hanetseder et al., 2021; Bunea & Guinea, 2023; Burriel et al., 2023). With accounting having a constantly evolving role, possessing an overall knowledge throughout the industry is a must, although universities are expected to place a significant emphasis on subject-specific skills. The attention that the articles attribute to the technical skill set, confirming the applicability of basic skill while also highlighting industry expertise, process enhancement, and organizational governance—all of which point to the profession's progress – are presented in ***Table 4***.

		Aryanti & Adhariani, 2020	Aldamen et al., 2021	Al-Hattami, 2021	Arquero et al., 2022	Burriel et al., 2023	Bunea & Guinea, 2023	Cernuşca, 2020	Dow et al., 2021	Daff, 2021	Douglas & Gammie, 2019	Elo et al., 2023	Hayes et al., 2018	Kwarteng & Mensah, 2022	Karcioglu & Binici, 2023	Leitner-Hanetseder et al., 2021	Osmani et al., 2020	Sarapaivanich et al., 2019	Salam & Hasan, 2020	Roy, 2022	Tan & Fawzi, 2017	Tsiane & Motebang, 2023	Yigitbasioglu et al., 2023	Yudin et al., 2021
Technical skills	Financial Accounting	x		x		x	x					x		x		x	x	x			x	x		
	Management Accounting	x				x												x						
	Auditing					x										x	x	x						
	Taxation	x																x						
	Corporate Governance, Risk Assessment, and Internal Control	x				x											x	x						
	Industry knowledge																x	x		x				
	Process improvement & Performance management		x														x							
Cyber, digital and technology skills	Advanced IT skills and programming			x					x							x	x						x	x
	Basic digital skills	x		x	x			x	x			x			x	x	x	x		x			x	x
	Analytical skills / Data enquiries	x	x				x	x	x			x			x		x			x			x	x
	Advanced data analysis and mathematical skills	x											x				x							x
	General computer skills (Word, Excel, Windows, Internet)			x	x	x	x	x		x				x	x		x						x	x
	AIS	x				x	x	x		x					x		x						x	x
	New technology skills (AI, RPA, Cloud, Blockchain, etc.)											x			x	x							x	
	Knowledge of database software				x									x										
	Technology design and programming							x				x			x								x	
Enabling skills	Complex information processing and interpretation	x	x		x		x	x	x		x	x				x	x				x	x		x
	Decision making and problem solving	x		x			x	x				x				x	x		x					x
	Communication skills	x					x										x		x	x				x
	Leadership skills		x				x	x									x		x	x				
	Initiative, innovation and change mindset	x						x				x								x				
	Ethics and public interest	x		x	x		x											x	x	x				

Table 4: Skills within the scope articles.

The subject of **skill sets related to Industry 4.0**, which range from new technology skills like Cloud, RPA, AI (Leitner-Hanetseder et al., 2021; Yigitbasioglu et al., 2023; Karcioglu & Binici, 2023; Elo et al., 2023) to basic computer skills (Hayes et al., 2018; Cernuşca, 2020; Arquero et al., 2022; Bunea & Guinea, 2023) is addressed in the accounting literature. This is noticeable in ***Table 4***.

Lastly, one of the most represented skills set within accounting literature are the **soft skills**. According to research, hiring managers in the accounting field have shown a desire to work with professionals who have a variety of experiences, provided that they have strong cognitive abilities and inherent talents (Douglas & Gammie, 2019). The literature discusses the value of acquiring soft skills such as emotional intelligence and how to integrate these into the accounting curriculum (Carvalho & Almeida, 2022). It also discusses whether or not these skills should be taught in university programs. While smaller businesses typically place a higher value on technical skills and interpersonal competencies than on analytical and communication abilities, it is anticipated

that accounting graduates with a background in digital skills will have a greater chance of landing a job at one of the Big Four companies (Aryanti & Adhariani, 2020).

THE OPINION OF PROFESSIONAL BODIES ON ACCOUNTING SKILLS

To ensure the accuracy of the skills retrieved and the categories identified, the study compares the acquired skills to a chosen report from an accounting organization. In order to conclude with an extensive and consistent set of abilities, a standardized format has to be included. The goal is to obtain an overall picture of the skills derived from the literature study. The GAA Competency Framework's design was thought to be the most suitable for this purpose. ***Figure 3*** displays a graphic representation of the GAA Competence Framework, which offers a solid foundation that facilitates the division of competencies.

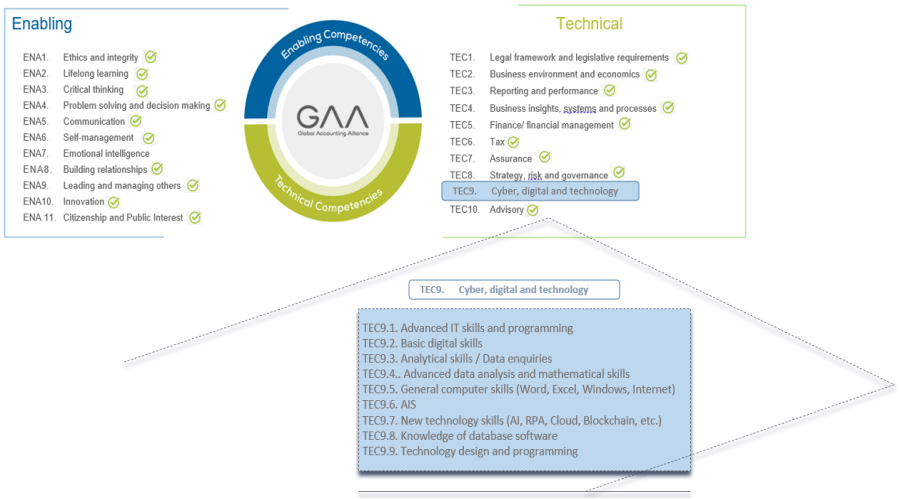

Figure 31: The GAA Competency Framework as modified by the author

The research focuses on the skills needed for accounting when faced with the complexities of the Industrial Revolution. As a result, the research methodology has expanded the GAA framework's predetermined format by emphasizing those skills connected to technology, digital, and cyberspace. The detailed presentation of those skills has led to the formation of a new skill category that reflects the evolving demands placed on accountants in the digital age. We include a range of skills from basic digital skills to expert IT and programming inside the newly formed category of skills called digital skills.

Subsequently, the study attempts to corroborate the emergence of a novel set of competencies (digital skills) across the accounting businesses' reports included in the article. The eight reports

from professional organizations are compared to the accounting skills in the skill set analysis of accounting bodies' reports. ***Table 5*** displays how the skill set selection is validated across accounting professional organizations. All the skills that were initially selected were discovered within the content of the reports that were evaluated.

		ACCA, 2020	ACCA, 2022	CPA, 2022	GAA, 2020	ISCA, 2022	IFAC, 2020	WEF, 2018	WEF, 2020
Technical skills	Financial Accounting	x	x	x	x	x			
	Management Accounting		x	x	x	x			
	Auditing		x		x	x			
	Taxation		x	x	x	x			
	Corporate Governance, Risk Assessment, and Internal Control		x		x	x			
	Industry knowledge		x		x	x			
	Process improvement & Performance management		x		x	x	x		
Digital skills	Advanced IT skills and programming	x	x	x	x				
	Basic digital skills	x		x	x				
	Analytical skills / Data enquiries	x	x		x	x		x	
	Advanced data analysis and mathematical skills	x		x	x			x	
	General computer skills (Word, Excel, Windows, Internet)	x			x				
	AIS	x			x	x			
	New technology skills (AI, RPA, Cloud, Blockchain, etc.)	x		x	x			x	x
	Knowledge of database software			x					
	Technology design and programming			x	x			x	
Soft skills	Complex information processing and interpretation		x		x	x	x		
	Decision making and problem solving		x		x	x			
	Communication skills		x		x	x	x		
	Leadership skills		x	x	x	x			
	Initiative, innovation and change mindset	x	x	x	x	x			
	Ethics and public interest		x	x	x	x			

Table 51: Skills listed by accounting professional bodies.

An additional framework that structures accounting skills is compared to the skills selected in the analysis. As a result, the skill set taken from professional body literature has been compared against two respected professional bodies: the IES Accounting Standard (CA, 2014) and the GAA Competency Framework (GAA, 2020). With the exception of the fact that the group of digital skills has been expanded from IES2_8 in the IES standard and from TEC9 in the case of the GAA Framework, ***Table 6*** displays the results in accordance with the earlier findings. The double analysis is performed against two of the current frameworks in order to verify and optimize the accounting profile with respect to skills classification.

Technical skills	GAA skill correspondence	IES2 skill correspondence
Financial Accounting	TEC5. Finance/ financial management	IES2_1 Financial accounting and reporting IES2_3 Finance and financial management IES2_10 Economics
Management Accounting	TEC10. Advisory	IES2_2 Management accounting
Auditing	TEC7. Assurance	IES2_5 Audit and assurance
Taxation	TEC6. Tax TEC1. Legal framework and legislative requirements	IES2_4 Taxation
Corporate Governance, Risk Assessment, and Internal Control	TEC8. Strategy, risk and governance	IES2_6 Governance, risk management and internal control
Industry knowledge	TEC2. Business environment and economics	IES2_7 Business laws and regulations IES2_9 Business and organisational environment
Process improvement & Performance management	TEC4. Business insights, systems and processes TEC3. Reporting and performance	IES2_11 Business strategy and management
Digital skills	**GAA skill correspondence**	**IES2 skill correspondence**
Advanced IT skills and programming	TEC9. Cyber, digital and technology	IES2_8 Information technology
Basic digital skills	TEC9. Cyber, digital and technology	IES2_8 Information technology
Analytical skills / Data enquiries	TEC9. Cyber, digital and technology	IES2_8 Information technology
Advanced data analysis and mathematical skills	TEC9. Cyber, digital and technology	IES2_8 Information technology
General computer skills (Word, Excel, Windows, Internet)	TEC9. Cyber, digital and technology	IES2_8 Information technology
AIS	TEC9. Cyber, digital and technology	IES2_8 Information technology
New technology skills (AI, RPA, Cloud, Blockchain, etc.)	TEC9. Cyber, digital and technology	IES2_8 Information technology
Knowledge of database software	TEC9. Cyber, digital and technology	IES2_8 Information technology
Technology design and programming	TEC9. Cyber, digital and technology	IES2_8 Information technology
Soft skills	**GAA skill correspondence**	**IES2 skill correspondence**
Complex information processing and interpretation	ENA3. Critical thinking ENA7. Emotional intelligence	IES3_1 Intellectual competence
Decision making and problem solving	ENA4. Problem solving and decision making ENA6.Self-management	IES3_3 Personal competence IES3_4 Organisational competence
Communication skills	ENA5. Communication	IES3_2 Interpersonal and communication competence
Leadership skills	ENA8. Building relationships ENA9. Leading and managing others	IES3_3 Personal competence
Initiative, innovation and change mindset	ENA2. Lifelong learning ENA10.Innovation	IES3_4 Organisational competence
Ethics and public interest	ENA1. Ethics and integrity ENA11. Citizenship and Public Interest	IES4_1 Professional scepticism and professional judgment IES4_2 Ethical principles IES4_3 Commitment to the public interest

Table 6: Comparing accounting skills across professional organizations.

MARKET REQUIREMENTS CONCERNING SKILLS IN THE ACCOUNTING PROFESSION

The accounting job market offers a variety of opportunities for accounting practitioners. In this sense the paper analyses a large number of job postings and compares the resulting competencies required on the market against the competencies extracted from the accounting literature. In this way, a homogeneity is ensured for cross analysis of the quantitative exercises within the current research.

The selected skill set was matched with the extracted data set found on the job market, resulting in the data displayed in ***Figure 4***. Consequently, there are three groups of skills based on the GAA Competency Framework (GAA, 2020), namely technical skills, cyber, digital and technology skills and thirdly, enabling skills. From a total of 85% of usable data, the technical competencies amount to 51% of total, cyber, digital and technology competencies form 23% of the total, while enabling skills generate 11% of the total skills extracted.

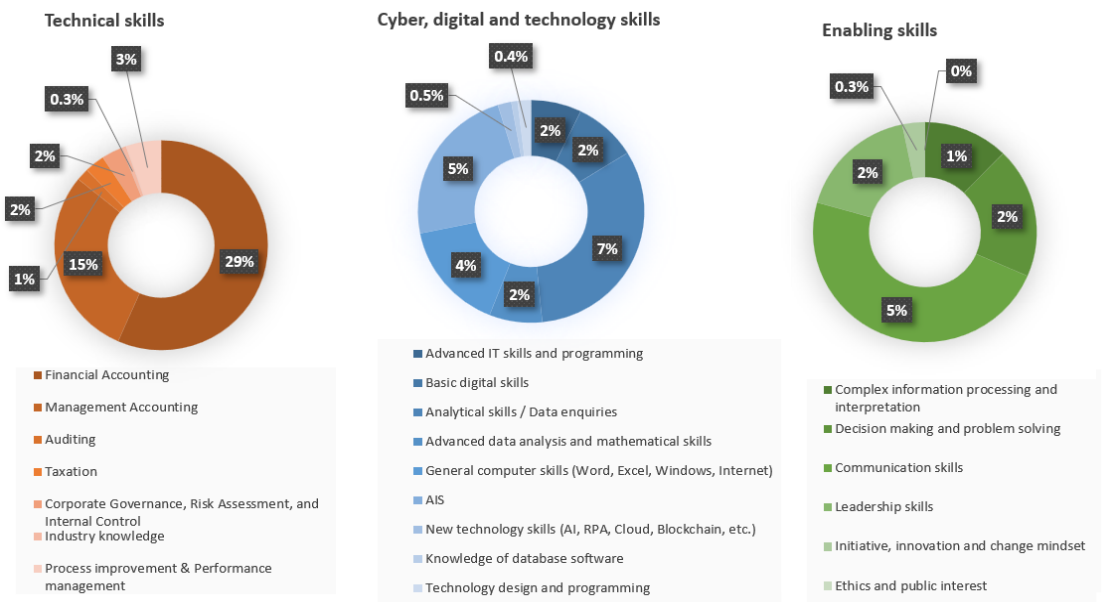

Figure 4: Job market skill demands - authors` creation

STUDENT`S VIEW CONCERNING SKILLS IN THE ACCOUNTING PROFESSION

Gap between students` perception of possession and importance

In order to determine the gap between students` perceived possession and importance of the relevant skills, the Independent T-test was used. The analysis reveals the presence of a statistically significant difference between the means of the perceived possession and importance of the various skills.

	Levene`s test for Equality of Variances			t-test for Equality of Means			
	Equal variances	F	Sig	t	df	p	Cohen`s d
Financial Accounting	**not assumed**	**7.172**	**0.008**	-10.692	496.705	0	0.95
Auditing	**not assumed**	**4.595**	**0.033**	-10.269	490.743	0	1.53
Taxation	assumed	0.23	0.632	-9.857	498	0	0.88
Industry knowledge	assumed	2.025	0.155	-6.456	494	0	0.58
Process improvement & Performance management	assumed	3.511	0.062	-8.008	0.062	0	0.71
Corporate Governance, Risk Assessment, and Internal Control	assumed	2.551	0.111	-11.098	496	0	0.99
Management Accounting	assumed	2.181	0.14	-9.129	496	0	0.81
Basic digital skills	assumed	3.697	0.055	-3.248	496	0.001	0.29
General computer skills (Word, Excel, Windows, Internet)	**not assumed**	**4.626**	**0.032**	-3.299	489.138	0.001	0.29
Analytical skills / Data enquiries	assumed	1.776	0.183	-5.913	494	0	0.53
Advanced data analysis and mathematical skills	assumed	1.761	0.185	-5.198	494	0	0.46
AIS	assumed	0.751	0.387	-8.589	496	0	0.76
New technology skills (AI, RPA, Cloud, Blockchain, etc.)	assumed	0.059	0.808	-4.705	496	0	0.42
Knowledge of database software	assumed	2.654	0.104	-7.502	496	0	0.67
Technology design and programming	assumed	2.832	0.093	-4.643	494	0	0.41
Advanced IT skills and programming	assumed	0.038	0.845	-6.045	496	0	0.54
Ethics	**not assumed**	**4.168**	**0.042**	-2.35	489.041	0.019	0.21
Leadership skills	assumed	0.094	0.76	-4.778	493.985	0	0.42
Communication skills	**not assumed**	**4.533**	**0.034**	-4.242	489.561	0	0.38
Decision making and problem solving	assumed	2.327	0.128	-5.285	490	0	0.47
Complex information processing and interpretation	assumed	0.21	0.647	-6.457	496	0	0.57
Initiative, innovation and change mindset	assumed	0.584	0.445	-4.328	495	0	0.38

Table 7: Independent T test and Cohen`s d for students` perceptive gap of possession and importance of skills

Independent t-test appreciates the significance of deltas between the two groups, without explaining the magnitude of differences (Cohen, 1992). In the attempt to cover that gap, Cohen's d measures the difference between the means of the two groups, as seen in ***Table 7***.

Levene's test represents an ANOVA on the absolute difference scores. At group level, out of the 22 skills analysed for the two datasets, only in the case of five skills there is a statistically significant difference ($p<0.05$) between the average scores obtained: financial accounting, ethics, auditing, competences basic computer operation (Office package, Windows, Internet, etc.) and communication skills. In the aforementioned 5 cases, the null hypothesis of equal population variances is being rejected, as they violate the homogeneity of variance required for an ANOVA test.

Analysis performed on the size of the effect advocates for a more scientific approach in comparison with significance tests, as the effect size is independent of sample size, as seen in ***Table 8***. In the current analysis, Cohen's value was maximum in the case of audit (1.53) and minimum in the case of ethics (0.21). Data interpretation states that Cohen`s d = 0.2 suggests a small effect size, 0.5 suggests a medium effect size, while 0.8 suggests a large effect size (Cohen, 1992). Reading the Cohen`s d tests it can be observed that similarities between the perceptive possession and importance of skills exist in relation to ethics, general computer skills and basic digital skills, while differences in perception exist when referring to auditing, corporate governance, risk assessment, and internal control and financial accounting.

Factors	Group	M	SD	SEM	t	DF	p	Cohan`s d
Technical skills	Possesion	3.7	1.39	0.08829	-11.056	497.8	0	0.98
	Importance	5.07	1.36	0.08654				
Cyber, digital and technology skills	Possesion	4.1	1.43	0.09096	-6.78	497.94	0	0.6
	Importance	4.97	1.42	0.08998				
Enabling skills	Possesion	4.5	1.45	0.09186	-5.345	497.35	0	0.47
	Importance	5.18	1.4	0.08861				

Table 8: Independent test for perceptive differences in students

In conclusion, there is a discrepancy of different intensity between the perception of students in relation to a self-assessed possession of skills and the perceived importance of technical skills. The obtained results show the existence of a statistically significant difference between the averages of the two groups of data, perceived possession of skills and perceived importance of skills, in all three categories: technical skills, cyber, digital and technology skills and enabling skills. The value of the Cohan's d coefficient reaches the maximum value in the case of technical skills and the

minimum value in the case of enabling skills. In other words, there are greater differences between the averages of the two groups (possession/importance) in the case of technical skills compared to the smaller difference between the averages of the two groups in the case of enabling skills.

Effect of line of study over perception skill importance

The accounting curricula offers a granularity in line with the job models existent on the marketplace. In this sense, a possible split, as seen also in the analysed dataset acknowledges groups of study as financial accounting, audit, marketing and informatics and economics. In this sense, the study investigates if there are differences based on the line of study for the three groups of skills, namely technical skills, cyber, digital, technological, and enabling skills.

	Pearson Chi-Square	df	p
Tehnical skills	**157.93**	**105**	**0.001**
Cyber, digital and technology skills	**350.165**	**138**	**0**
Enabling Skills	127.944	108	0.092

Table 9: Results of Chi-Square analysis of the effect of line of study over skill assessment

The Chi-Square analysis shown in ***Table 9***, also called a comparable nonparametric test, is used to test a hypothesis on the distribution of a categorical variable. The conclusion of the analysis shows that there are different perceptions of skills between different lines of study.

Hypothesis testing

The hypotheses within the current study aim to obtain those demographics factors that influence students` perception over various skills in accounting. As such, the study aims to demonstrate how groups of students differentiate and which are the common points regardless of external factors. In pursuit of employment, the students assess different levels of importance and possession to the skill set. In this sense, the following hypothesis have analysed what impacts their assessment and judgement over the pre-defined skill set. In obtaining such results, the study used IBM SPSS Statistics version 20, and analysed the data through means of MANOVA tests and Chi-Square test.

H1: Perceived expectancy of the importance of skill required for novice professionals is statistically affected by employment status/or current year.

Effect	Box`s test of equality		MANOVA test		
	Box`s M	Sig.	Pillai`s Trace	F statistics	Sig.
Tehnical skills	4.154	0.251	0.001	0.159	0.853
Cyber, digital and technology skills	7.112	0.071	0.006	0.702	0.497
Enabling skills	6.363	0.099	0.008	0.965	0.382

*p<0.05

Table 10: Hypothesis 1 testing using one-way MANOVA for employment status analysis

To determine the presence of a statistically significant difference between the two groups (student/job market) the MANOVA test was used, as seen in ***Table 10***. The data are not homogeneous as $p>0.05$ for all three categories of skills. Following the application of the one-way MANOVA test, the results do not indicate a difference in the perception of the importance of skills depending on the status of the labour market. This results in the rejection of Hypothesis 1.

A similar exercise has been carried out for all hypothesis developed for the analysis of students` perception.

Hypothesys description	Hypothesys status
H1: Perceived expectancy of the importance of skill required for novice professionals is statistically affected by employment status/or current year	Rejected
H2: Importance of skills desired by professionals differs based on the type of job (accounting, consulting, audit, etc.)	Accepted
H3: Perceived importance of skills does not vary statistically with gender amongst accounting students.	Accepted
H4: Perceived importance of skills differs with line of study among accounting students	Accepted

Table 11: Summary of hypothesis of student`s perception analysis

Table 11 shows a summarization of the proposed hypothesis. In this sense, using a one-way MANOVA test, it can be concluded that student`s perception of skill relevance is not directly affected by employment status, nonetheless it differs based on job type and line of study. The study also proves that gender has no impact in student`s assessment of skills. Moreover, the study used the Chi-Square test to confirm that for cyber, digital and technology skills, the line of study has great importance, thus implying that digitalisation is a trend that did not spread throughout all corners of the accounting profession but is heterogeneously approached also during academic formation.

UNDERSTANDING THE GAP BETWEEN STUDENTS` AND MARKETS` VIEWS

The hypotheses are directly correlated with the two groups of questions that have been addressed in the questionnaire disseminated amongst students. One group of questions refers to the assessed skill possession of students, while the second question refers to the importance they attribute to each skill, in the pursuit of employment. The job market analysis follows the same structure of skills, but it refers to only one pool of data, showing the importance that the employers give to certain skill sets. The hypotheses are statistically analysed using IBM SPSS Statistics version 20, and the analyses used T-independent and Cohen`s d test.

In conclusion, the summarisation of the hypothesis aimed at revealing the perceptual skill gap between students` views and the requirements of the job market, brings to light a validation of the

presumed behaviour. In this sese, using Independent T statistics and Cohen`s d test, it can be concluded that perceived possession of skills in accounting graduates differs significantly from the skills requested by the job market. Concomitantly, significant perceived expectancy gap exists between students and the job market regarding skill necessity in employment prospects. The results suggest misalignment of perception between students seeking to secure employment in accounting and the job market requirements and rigours.

DISCUSSIONS

The challenges faced by the parties involved in the accounting landscape are captured by the specialized literature through an ongoing attempt to decipher the optimal skill set that the labour market compels (Aldamen *et al*., 2021; Daff, 2021). The study focused on the correct delimitation of the skills that are relevant in the accounting professions, especially in the midst of the Fourth Industrial Revolution. The individual skills that encompass the category of cyber, digital and technology skills are simultaneously validated by the literature (Leitner-Hanetseder *et al*., 2021; Moore and Felo, 2022; Arquero *et al*., 2022; Kwarteng & Mensah, 2022). In regards to students` perception of the various skills set, agreement exists between possession and perceived importance of skills for many technologically related skills (basic digital skills, general computer skills, technology design and programming and new technology skills (AI, RPA, Cloud, Blockchain, etc.), revealing students` interest in the competences triggered by Industry 4.0. At the same time students tend to assess low possession in traditional technical skills (financial accounting, management accounting, taxation and audit) and rather high importance, in line with literature, where technical skills are seen as insufficiently acquired (Burriel *et al.,* 2023). When comparing between students' perceptions and the requirements of the job market, the results show that in the case of managerial accounting, no statistically significant difference exists between the average scores obtained. The results work in accordance with the literature, showing that knowledge of financial and managerial accounting remains key in obtaining employment, nonetheless raising questions on the difference in perception of ethics, which literature finds to be a fundamental competency in all functions performed by accounting practitioners (Burriel *et al.,* 2023). Other differences bring forth skills such as initiative, innovation and change mentality, together with general computer skills and basic digital competences where the difference in perception exists. The three skills are alluding to a change dynamic in terms of technological advancements, raising

an alarm signal over the transformation of the accounting profession in the digital era, and the gaps posed by these changes.

THESIS CONCLUSIONS

In a rapidly changing world of industries and businesses fuelled by IT enabling requirements, (Österreich & Teuteberg, 2019), research remains the foundation for confronting and comprehending change. Change has become a constant in today's workplace as technology advances toward smart automation and more interconnectedness. Similarly, the accounting marketplace has seen significant changes as a result of the introduction of new technology into the industry.

As such, the literature review lays out the knowledge foundation for the research and forms the pillar on which further analysis is carried out. Subsequently, the research takes an angled approach as it first analyses the impact and resistance towards new technology within the line of accounting practitioners, and then it completes the puzzle by assessing the students` opinion of new skills requires and maps them against the labour market demands.

The first chapter conducted a thorough examination of the existing accounting literature on emerging technologies and painted the picture of the most relevant technologies in accounting alongside key interest points that literature attributes to them. Subsequently, the study integrated the key issues depicted with the technology to which they allude to, emphasizing particularly specific places of confluence between the two parts. As a result, themes such as the changing role of accountant, the deepening of the skill gap, as well as advantages, disadvantages and implementations challenges have been discussed. The growing discrepancy between the taught skills and the labour market expectancy (Aldredge *et al.*, 2020), has been addressed with a summarisation of those skills found relevant by forward looking research in accounting. The under-preparedness of practitioners in the face of the changing role of accountant is being tackled within literature, nonetheless accountants are not expected to be replaced in the work field, nonetheless they are faced with a transformational process that could lead them into more value adding roles within organisations, should they tap on the opportunity that this change offers (Melnyk *et al.*, 2020; Andreassen, 2020; Bakulina *et al.*, 2020).

The second chapter proceeded to investigate technology resistance within accounting practitioners, alongside impact factors and contributors that moderate perception of utility and ease

of use. The analysis confirmed that technology is already well positioned within the mindset of accounting practitioners and validates a general behavioural intention to use technology amongst participants to the research. The chapter started by validating that accountants are enablers of technology expansion and then proceeded to identify those factors that influence perception rather than acceptance of technology. Originality of the research stands in separating two polls of participants, through their interaction with technology, thus revealing differences between PAs that have implemented and worked with emergent technologies and those that have not. Most noticeable deltas of technology perception are perceived ease of understanding, learning, keeping pace and usage. As such the study reveals that respondents not using technologies present a higher level of anxiety, thus showing that technology use can lower the perceived stress level, felt in anticipation of technology use. Similarly, the fear of keeping pace is diminished through practical experience. The overall construct distinguishes several factors influencing perceived usefulness, with emphasis on perceived benefits. A positive benefit-effect relationship could be the key to diminish technology resistance amongst practitioners. This finding is in line with other research that throughout the years, found very strong relationships between perceived benefits and technology use (Chwelos *et al.,* 2001; Musawa & Wahab, 2012; Gangwar & Date, 2015). In assessing the general easiness in using new technology, main contributors are high levels of understanding, learning, and feeling of keeping pace. Thus, through proper investments in knowledge transfer and formation, technology expansion can be enhanced. Another novelty is represented by a disconnection between perceived usefulness of technology and the PAs intention to use it. This finding is not in line with most literature findings (Gangwar & Date, 2015; Bröhl *et al*., 2016; Fauzi *et al*., 2021), nonetheless there is also research that confirm this disconnection and admits that technology has become widespread, indirectly correlatable with individuals` perception of it (Silaban & Siallagan, 2019).

The third chapter delved into analysing perceptual opinions and influencing factors of accounting graduates in preparation of employment pursuit, and thus completing the analysis on technology perception for all layers of the accounting industry, including current practitioners but also future employees, who are currently in the academic phase of their career. The chapter firstly validated the transformation of the accounting profile through the lens of Industry 4.0 and built an updated picture of the most required skills that the accounting industry currently proposes. The skill structure is initiated from the eyes of literature, refined through reports of accounting professional

bodies, and lastly, confirmed by the requirements of the job market. Secondly, the research analysed perceptual importance and possession of skills in accounting students, demonstrating high perceptual variations between assertion of possession and relevance, thus revealing a sense of under-preparedness of skills possessed by accounting graduates in pursuit of employment. Thirdly, the study corroborated the capabilities of accounting graduates against the requirements and the reality of the accounting job market and noticed an overconfidence in perceptive skill possession in comparison with the reality of the labour market. In terms of cyber, digital, and technological skills the study found high discrepancies between market reality and students' expectancy, thus indicating that graduates are not well aligned with the requirements of a digitalised workplace, which could in turn pose problems in obtaining employment post-graduation.

The current study responds to a call for further developing the existing base of quantitative and qualitative accounting research in the midst of an ever-growing market of emergent technologies. (Hasan, 2022). The study's goal is to gain a better understanding of new technologies and their applications in business and academia. With the advent of the information age, PAs must constantly adapt to new workplace conditions and expectations. In this sense the research took a layered approach and emerged into a deep investigation of the actors of the accounting industry and their perceptual positioning against the changes that the Fourth Industrial Revolution poses.

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