Investigating the preparedness of the accountancy curricula for the 4th industrial revolution

E Landsberg

 orcid.org 0000-0003-1443-7572

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Supervisor: Dr JJ Swart

Co-supervisor: Dr L van den Berg

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Student number: 10545786

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ABSTRACT

Title: Investigating the preparedness of the accountancy curricula for the 4th industrial Revolution

Keywords: accountancy curricula, 4th Industrial Revolution, decision-making skills, relational skills, digital skills, expectation gap

To date, limited research has been conducted on the ability of the Accountancy curricula to prepare students for the Fourth Industrial Revolution (4IR). The business environment is changing rapidly and educational institutions are not keeping up with the fast workforce skills changes. The primary objective of the study is to investigate if the current Accountancy curricula provide graduates with essential skills needed to be successful in the 4IR. One of the secondary objectives of this study was a theoretical objective to conduct a comprehensive literature review on the skills needed by accountancy graduates. Another empirical objective was to compare the proposed competency framework with the current competency framework to identify newly added skills. In addition, the proposed competency framework was used as theoretical framework to identify additional skills within peer-reviewed documents in the Accountancy curriculum. The third empirical objective evaluates the current Accountancy curricula of South African universities to determine if it addresses graduate skills needed for the 4IR by using the enhanced competency framework.

Educational institutions have to adapt their Accountancy curricula to prepare students with skills for the changing technological environment. The purpose of the Accountancy curriculum aims to bridge the expectations of the labour market and the competencies of graduates to ensure employability. The South African Institute of Chartered Accountants (SAICA) is responsible for a framework with guidelines about curricula content for accountancy students. Accountants complete a prescribed curriculum at universities to prepare them for the labour market. Graduates need technical as well as pervasive and digital skills for the 4IR. SAICA proposed an updated competency framework to align competencies as a result of 4IR, digital disruption and stakeholder pressure.

A comparison was performed which identified new skills included in the proposed competency framework. A systematic literature review (SLR) using document analysis was conducted and peer-reviewed articles were selected for the qualitative document

analysis. In addition, a document analysis on the top five South African universities' Chartered Accountant module documents related to specific skills to be developed, was performed. The dissertation was delineated specifically to the proposed competency framework (2025CF) acumens of business, decision-making, relational and digital as the major categories of inquiry. A limitation in using the publicly available yearbooks of the different universities pertained to the level of detail regarding module outcomes, which was often condensed. However, a comprehensive evaluation of the various top universities in South Africa's curricula was performed according to the enhanced 2025CF skills.

The finding of the study provide insight into the proposed competency framework, with additional skills identified from literature, which could be included to enhance the 2025CF. Likewise, the universities need to adapt the Accountancy module outcomes to include additional skills to prepare students for the 4IR. The inclusion of the additional skills identified in the SLR, to the 2025CF, as well as the adaptation of the module outcome documents to include skills from the adjusted 2025CF, contribute towards the identification and development of competencies that accountancy students have to acquire to be successful in the 4IR.

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LIST OF ABBREVIATIONS, SYMBOLS AND ACRONYMS

2019CF	:	Current competency framework
2025CF	:	Proposed competency framework
4IR	:	Fourth Industrial Revolution
CA(SA)	:	Chartered Accountant (South Africa)
CCM	:	Constant comparative method
CF	:	Competency framework
CPA	:	Chartered Professional Accountant
CV	:	Curriculum vitae
ESG	:	Environmental Social Governance
HR	:	Human resources
ICAEW	:	The Institute of Chartered Accountants in England and Wales
IAESB	:	International Accounting Education Standards Board
IFAC	:	International Federation of Accountants
IFRS	:	International Financial Reporting Standards
IR	:	Industrial Revolution
IT	:	Information Technology
IoT	:	Internet of Things
SAICA	:	South African Institute of Chartered Accountants
SLR	:	Systematic literature review
THEWUR	:	Times Higher Education World University Rankings
TVET	:	Technical and Vocational Education and Training
WEF	:	World Economic Forum
κ	:	Cohen’s Kappa

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REMARKS TO THE READER

The reader of the dissertation needs to consider the following:

References in the dissertation are based on the **NWU Harvard referencing style** as per the 2020 reference guide prescribed by the North-West University.

CHAPTER 1: INTRODUCTION, PROBLEM STATEMENT AND OBJECTIVE OF THE STUDY

1.1 INTRODUCTION

The study addresses the influence of the Fourth Industrial Revolution (4IR) commonly known as 4IR on accountancy graduates' skills needed for the future workforce. The current skills required were compared to what the professional bodies require and what the universities include in their curricula. The industrial revolutions (IRs) changed the way the world operates and caused changes in the skills demanded (Al-Htaybat *et al.*, 2018:334). In this regard, different skills will be required for current graduates, being the future accountant, to remain successful and to sustain the profession. The educational and professional bodies involved in the accountancy profession established new skills and competencies according to the 4IR changes for prospective employees to perform their responsibilities better in the future (Ding *et al.*, 2018:2). The current accountant's practices may have to change to keep up with the current and future business demands. Li and Zheng (2018:815) explain that the 4IR requires future accountants to acquire skills such as professional, management, computer and analytical capabilities. Gray (2016) summarised the top ten skills needed for the 4IR based on the Future of Jobs Report of the World Economic Forum (WEF) as:

- Complex problem-solving
- Critical thinking
- Creativity
- People management
- Coordinating with others
- Emotional intelligence
- Judgement and decision-making
- Service orientation
- Negotiation
- Cognitive flexibility

Additional specific skills required for the 4IR include problem-solving, financial literacy, digital literacy, teamwork, marketing and presentation skills (Rodny-Gumede, 2019:1).

Educational institutions should adapt their curricula to prepare students with skills for the changing technological environment (Ding *et al.*, 2018:17). The accountant's occupation is changing and educational institutions must equip the student for his profession. The South African Institute of Chartered Accountants (SAICA) is responsible to prescribe a framework for universities in South Africa (assisted by academics and employer representatives) with guidelines about curricula content for accountancy students (Strauss-Keevy, 2012:21). The guidelines are known as the SAICA competency framework detailed guidance for the academic programme (SAICA, 2019b:6). Accredited universities' Accountancy curricula must comply with the framework. In order to illustrate the development and challenges of the different IRs the understanding from the First to the 4IR and its impact on the accountancy profession and skills are explained. It is important to analyse the first three IRs and their contributions to the 4IR. The following is a seminal discussion on the First to Third IR and how it relates to the 4IR and accountancy.

Selamat *et al.* (2017:8) from the University of Tecknologi Malaysia illustrates that the First IR started in the 18th century. The era was known for changing the manufacturing of products by replacing hand tools with power-driven tools. This was due to the discovery of waterpower and the steam engine powered by coal. The Second IR began from 1870 to around 1914. In this era, electricity was used as an energy source for production. Mass production and rapid industrialisation were implemented in this era and were known as the technological revolution. The Third IR was known as the digital era (Schwab, 2016:7). This era started around 1969 and was characterised by the advancement of the internet, electronics and advanced automation. Recording of accounting transactions was done manually until the Third IR when accountants started using computers to record transactions. Agrawal *et al.* (2017:3) and McKnight (2015:2) conclude that the availability of huge amounts of data challenged the accountancy profession in the 4IR. Figure 1.1 represents the historical development from the First to the Fourth Industrial Revolution as discussed in the previous paragraph.

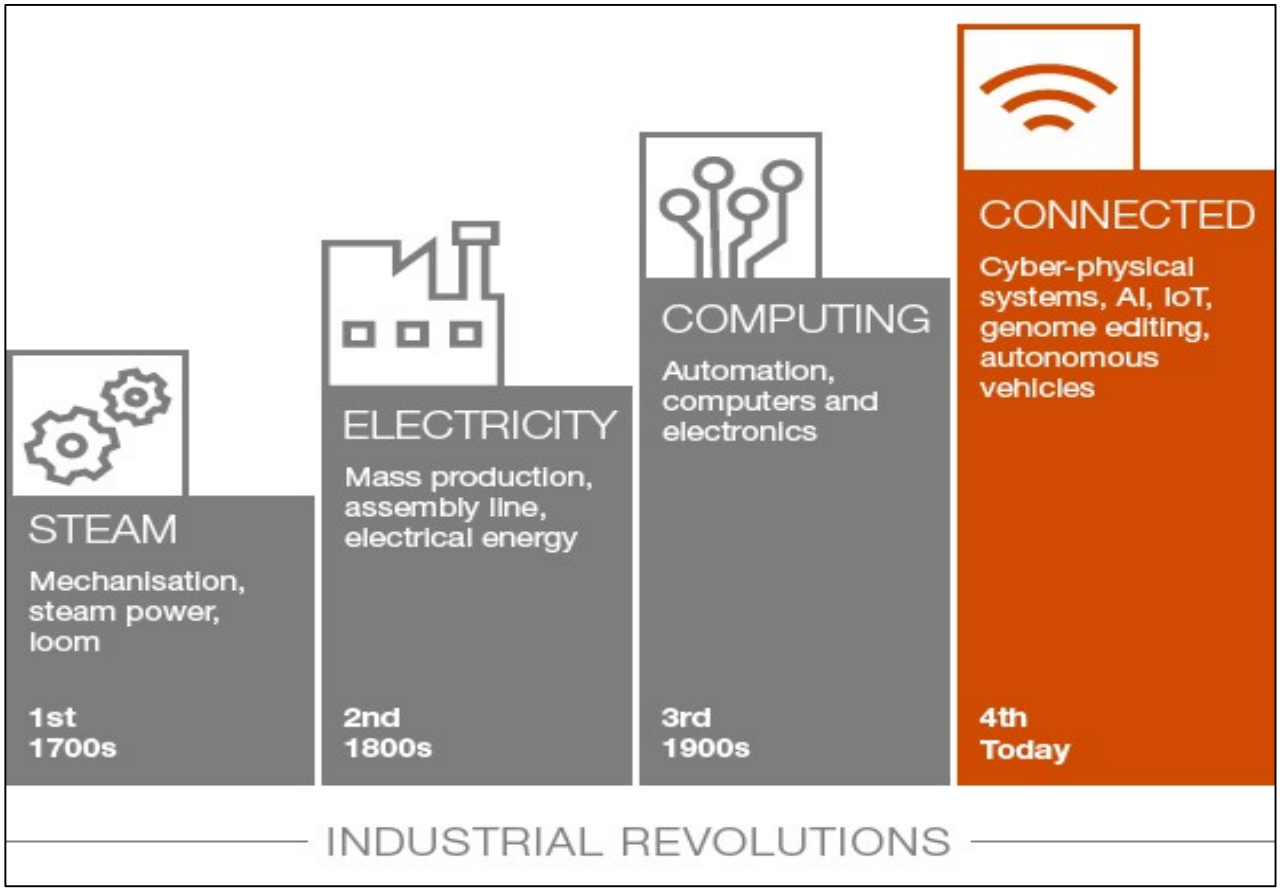

Figure 1.1: Historical view of Industrial Revolutions

Source: PWC (2019)

Figure 1.1 illustrates the development and continuation of the various IRs. From the First to the Second IR mechanisation in the steam era to the utilisation of electrical power in the electricity era are illustrated. The growth between the Second to the Third IR is exponentially due to the movement from electric power to computerisation, which is progressively in line with the developments of the first two eras. It can also be concluded that the 4IR is a continuation and major expansion of the Third IR. The major developments during the different IRs support the significant improvement of required skills. Likewise, the skills needed to align with the 4IR demands need to be determined and incorporated into training.

Banker *et al*. (2002:1) posit that the use of technology is evolving, and Mohamed and Lashine (2003:3) support this opinion, where changes in technology have led to a vivid transformation in the business environment. All the changes in technology and the

business environment have influenced the world of accountancy (Taipaleenmäki & Ikäheimo, 2013:322). Examples of the current technological developments influencing the accountancy profession in the 4IR include:

- Artificial Intelligence
- Big data and analytics
- Blockchain ─ The potential ledger of the future.

The world of business is rapidly moving into the 4IR (Wilson *et al*., 2017:3). This is the era of artificial intelligence, cloud computing, blockchain technologies and information and data management, which result in changes in business processes as well as accountancy. Brynjolfsson *et al.* (2018:34) further argue that due to major changes in production and data management, educational content as provided before the 4IR will not be to the benefit of business anymore. The way the current accounting and data management are dealt with will change due to 4IR. Agrawal *et al.* (2017:7) emphasise that the range of workers' skills will change from being forecast related to judgement related. The conclusion is that the rapid skills change due to the 4IR could be implemented in university curricula so that the workforce and academics are up to date.

A study done in the Third Federal Reserve District in the USA illustrates that bookkeeping, accounting and auditing clerks have a 97% probability of being affected by automation (Ding *et al.,* 2018:17). The study examined the types of occupations most likely affected by artificial intelligence. Ding *et al.* (2018:7) further posit that business and educational institutions need to consider the changes necessary to the curricula to provide prospective employees in the accountancy field to be equipped for the technological changes. Owing to this, accountants' tasks are likely to be affected by artificial intelligence, therefore, it is important to investigate the status quo of the Accountancy curriculum. McKnight (2015:8) recently performed research and revealed that in New Zealand and Australia there were no standalone courses on big data or business analytics as part of the undergraduate Accounting programme. In October 2020, the only 4IR Accounting course at accredited South African universities was identified at the University of Johannesburg to be presented from 2021 (Business Day, 2020).

Al-Htaybat *et al.* (2018:352) explain that accountants complete a prescribed curriculum at universities and other training institutions to prepare them for the labour market, however, with only a few universities with aspects such as big data in the curriculum, it seems as if graduates are not fully prepared. The International Federation of Accountants (IFAC, 2019) is the global organisation setting standards for the accountancy profession, regulating countries' curricula and professional practice prescriptions. Table 1.1 is an example of global professional bodies affiliated to IFAC.

Table 1.1: Members of the International Federation of Accountants (IFAC)

Member	Country
The Institute of Chartered Accountants in England and Wales (ICAEW)	Regulating statutory board in the United Kingdom
Chartered Professional Accountant Canada (CPA)	Canada
SAICA	South Africa

Source: IFAC (2019)

Mohamed and Lashine (2003:8) explain that the slow changes in the Accountancy curriculum that do not keep up with the rapid changes in the business environment creates an expectation gap. Stumke (2014:98) argues that the expectation gap exists between employers and university curriculum in terms of information technology related skills. Tribus (1999:2) concludes that students need to learn theory and should also be taught how to apply their skills. Al-Htaybat *et al.* (2018:21) support this and further argue that teaching and learning accountancy at universities should have the main purpose of empowering students to be ready for the labour market.

SAICA publish their guidelines for educational institutions to adhere to, in the form of the competency framework (CF) on a regular basis. SAICA is the professional body responsible for education and training quality in South Africa for accountants. Professional competencies consisting of knowledge, skills and attributes are identified in the SAICA CF. In order to remain relevant, SAICA launched a project called CA2025 (Chartered Accountants Worldwide, 2016:4), whereby a new CF was created to align competencies due to the changing and technologically advanced business environment, global influences such as the 4IR, digital disruption and augmented stakeholder pressures (SAICA, 2020:9). The implementation date of the new CF is uncertain and not

publicly available. However, in reaction to 4IR changes in the business environment and skills needed by accountancy graduates, the University of Johannesburg will be implementing a 4IR Accounting course from 2021 (Business Day, 2020).

Table 1.2 summarises the CF skills as obtained from websites of IFAC, SAICA and CPA professional bodies. The information is not similar in classification and synonyms were used to prepare this table. The requirements and guidelines from the professional bodies listed are generic and not specific enough to assist the educational institutions and educators to narrow the existing gap. CA2025 indicates that universities need to reflect 4IR business to expedite the current gap between education and business requirements for future accountants (CAW, 2016:6). In addition to technical skills needed for the 4IR, both pervasive and digital skills are required. Chapter 2 includes a discussion on the skills needed.

Table 1.2 concludes that SAICA and CPA are aligned to IFAC according to the CF, which also includes digital skills required. Accredited universities in South Africa have to develop their curricula to include all the competencies as per the CF of SAICA (as stipulated by IFAC). The modules specific for Chartered Accountancy students at universities need to be evaluated to determine if it correlates with the SAICA CF. Chapter 4 contains the results of these evaluations of module outcome documents of the universities for the inclusion of the required competencies.

Table 1.2: Summary of skills mentioned in documents

Required competency or similar competency	IFAC	SAICA	CPA
Communicating effectively	√	√	√
Personal organisation and teamwork	√	√	√
Decision-making	√	√	√
Meeting customer needs and professionalism	√	√	√
Digital skills	√	√	√
Business acumen	√	√	√
Professional and ethical behaviour	√	√	√
Teamwork and leadership	√	√	√
Technical competencies: • Financial reporting • Strategy and governance • Management accounting • Audit and assurance • Finance • Taxation	√	√	√

Source: IFAC (2019), CPA (2019) and SAICA (2019b)

Key √ competency included in professional body CF.

1.2 PROBLEM STATEMENT

The preliminary literature review with regard to the investigation into the preparedness of the Accountancy curricula identified a few gaps. In this regard, limited research has been performed in South Africa on the topic of the Accountancy curricula's preparedness for the 4IR. The business environment is rapidly changing while the Accounting curricula are too slow to keep up. Literature on specific and detailed guidance on how to develop the Accounting curricula for the 4IR is lacking. Literature indicates that the Accounting curricula are not currently up to pace to deliver 4IR ready students for the labour market and guidance and development is required to achieve the goal. Limited research was conducted on the preparedness of the accountancy students, which can be illustrated in a systematic literature search performed from 2015.

The gaps in literature and a synopsis of the background were used to set the problem statement of this research study. The gap in literature indicates limited research on the content on Accounting curricula to prepare future employees for the 4IR demands and

that business is changing rapidly and educational institutions are not keeping up with the fast changes (Mohamed & Lashine, 2003:8).

Due to the fact that bookkeeping, accounting, and auditing clerks have a 97% possibility to be affected by the 4IR, all future accountancy employees should be prepared by acquiring technical, the latest technological and other pervasive skills during their studies (Ding *et al.,* 2018:17).

The research question is: To what extent does the Accountancy curricula prepare students for the 4IR?

The study contributes to the body of knowledge needed to address this problem and the following objectives were set to be achieved.

1.3 OBJECTIVE OF THE STUDY

1.3.1 PRIMARY OBJECTIVE

The primary objective of this study is to investigate if the current Accountancy curricula provide graduates with essential skills needed to be successful in the 4IR.

1.3.2 SECONDARY OBJECTIVE

In order to achieve the primary objective, the following theoretical and empirical objectives were formulated for the study:

1.3.2.1 Theoretical objectives:

- Conduct a comprehensive literature review on the skills needed by accountancy graduates in the 4IR (Chapter 2).
- Follow a methodology that is appropriate for the comparison between current and proposed CFs (Chapter 3).

1.3.2.2 Empirical objectives:

In order to evaluate if the current Accountancy curricula of South African universities provide graduates with skills needed for the 4IR the following objectives were formulated:

- Compare the newly proposed CF (2025CF) and the current CF (2019CF) with each other (Phase I Chapter 4).

- Identify skills needed in the Accountancy curricula by using the 2025CF as a theoretical framework to identify additional skills within peer-reviewed documents to enhance the 2025CF (Phase II Chapter 4).

- Evaluate the current Accountancy curricula of South African universities to determine if it addresses graduate skills needed for the 4IR by using the enhanced 2025CF as theoretical framework (Phase III Chapter 4).

The last two mentioned objectives were addressed by performing a systematic literature review (SLR) using 2025CF as a theoretical framework (method explained in Chapter 3 and findings in Chapter 4).

1.4 RESEARCH DESIGN AND METHODOLOGY

This study was performed from the functionalist quadrant of the four paradigms for the analysis of social theory (Burrel & Morgan, 1979:22). This paradigm assumes societies have a concrete existence and follow a specific order that provides explanatory knowledge (Burrel & Morgan, 1979:26). The functionalist quadrant aims to provide rational explanations of identified problems (Burrel & Morgan, 1979:26). In this regard, the 2025CF was used as a theoretical framework to objectively assess and explain a particular phenomenon of university Accountancy curricula module documents to prepare graduates for 4IR.

1.4.1 QUALITATIVE RESEARCH

The study consisted of a SLR using document analysis and comparison for the empirical portion of the study. A qualitative content analysis was performed on peer-reviewed articles from expert authors and evidence-based research to integrate different theoretical stances of a phenomenon and purposively evaluate complex and integrative literature (Combs & Onwuegbuzie, 2010:2; Merriam, 2009:140). A SLR ensures a level of rigour in reviewing research evidence in selecting the peer-reviewed articles for the qualitative analysis (Merriam, 2009:154). Identified keywords were searched in accredited journals.

Manual searches were also conducted and the detailed process is described in Chapter 3. A SLR should be repeatable, include a document trail of the selection process and record the exclusion and inclusion criteria of documents (Cronin *et al.,* 2008:38; Kitchenham, 2004:16).

The SLR identified gaps within Accountancy curricula research as well as specific additional skills within literature that may not be portrayed within the 2025CF. The SAICA 2025CF provided the basis for the universities' curricula in guiding the knowledge, skills and attributes that have been developed by Chartered Accountancy students (SAICA, 2019a:6). In this regard, a document analysis on the top five SA universities' Chartered Accountant module documents related to specific skills to be developed, was performed.

1.4.2 POPULATION

The target population consists of the universities of the world. The Times Higher Education World University Rankings (THEWUR, 2019b) ranks the top 1 396 universities in the world, which is independently audited by PWC. The analysis is based on the bibliometric data supplied by the Elsevier database (THEWUR, 2019a). The "performance indicators that are used to rank the universities are grouped into five factors namely: teaching (the learning environment), research (volume, income, and reputation), citations (research influence), international outlook (staff, students and research) and industry income (knowledge transfer)" (THEWUR, 2019a). Table 1.3 ranked the South African universities based on analysis performed by THEWUR (2019b). The names of the universities are omitted to ensure anonymity.

1.4.3 SAMPLE SIZE

The sample size was based on the top five South African universities, which were found to be sufficient in prior research conducted by Manzoor *et al.* (2015:377). The top five South African universities are ranked from 136 to 600 (THEWUR, 2019b). The Chartered Accountancy degree presented at the accredited SA universities includes the following modules: Financial Accounting, Management Accounting, Microeconomics, Macroeconomics, Mathematics, Information Systems, Statistics, Financial Management, Information Technology, Auditing or Corporate Governance, Taxation, Business Law,

And Company Law. The five universities collectively had a total of 123 modules within the various Chartered Accountancy degrees.

Table 1.3 was prepared from the ranking published by THEWUR (2019) and the South African universities are listed below based on the analysis. Universities' names are omitted and only referred to as a university number to maintain anonymity.

Table 1.3: South African universities included in Times Higher Education World University Rankings for 2020

Institution	World ranking
1	136
2	194
3	251–300
4	401–500
5	501–600
6	601–800
7	601–800
8	601–800
9	801–1000
10	1001+

Source: THEWUR (2019b)

The top SA universities are presented in Table 1.3 as per THEWUR (2019b). The Chartered Accountancy degree is presented at the top SA universities as indicated above. The top ten SA universities fall within the top 1000 global universities out of 1396. The prescribed modules that form part of the Chartered Accountancy degree are freely available as official documents on the universities' website and were used in the qualitative document analysis (De Vos *et al.,* 2011:379).

1.4.4 RESEARCH METHOD

In order to evaluate the Accountancy curricula, the following quantitative method was followed:

A comparison was performed between the newly proposed CF (2025CF) and the 2019CF (Phase I). The overarching themes of the 2025CF consist of i) professional values and attitudes, ii) enabling competencies (defined as acumens) and iii) technical competencies in the value creation process (SAICA, 2019:3). The focus of the dissertation was delineated to the 2025CF acumens consisting of business-, decision-making-, relational- and digital acumen as the major categories. In addition, a SLR with a document analysis on peer-reviewed documents was performed, using the 2025CF as a theoretical framework (Phase II). A review protocol was developed whereby a list of keywords were identified and entered into a variety of suitable search engines (Jesson *et al.*, 2011:3). The criteria stipulate that full text and peer-reviewed articles in accredited journals, published from 2015 on accountancy skills and 4IR skills for accountancy students, were included. Additional identified skills within peer-reviewed documents added as inductive codes to the 2025CF, created an adapted theoretical CF. The document analysis performed on the university module documents, according to the adapted 2025CF theoretical framework, evaluated if the current Accountancy curricula of the top five SA universities included the graduate skills needed for the 4IR (Phase III).

1.4.5 QUALITATIVE CONTENT ANALYSIS

The foundation of qualitative analysis is the constant comparative method (CCM) (Boeije, 2002:391), whereby the simultaneous comparison and contrasting of data and information creates codes, categories, and themes (Tesch 1990 as cited in Boeije, 2002:392). The CCM qualitative analysis on selected documents was performed with ATLAS.ti™ 8, a computer-assisted qualitative software system for the creation of codes and categories. The coding procedure is discussed in Section 1.4.5.1 below.

1.4.5.1 Coding procedure

The content analysis commenced with a deductive code identification derived from the SAICA 2025CF. Coding data are seen as “the formal representation of analytical thinking” (Marshall & Rossman, 2016:222). Inductive coding was also performed through the identification of meaning units that could not be grouped under the deductively created codes. In this manner, codes created were compared to each other and conceptualised the subject of enquiry (Boeije, 2002:395). Each code was evaluated according to the

relatedness of skills needed by accountancy students for the workplace changes occurring due to the 4IR. The selection process for the SLR is fully explained in Chapter 3 (Methodology).

1.5 ETHICAL CONSIDERATIONS

The research study adhered to the ethical standards set out by the North-West University Research Ethics Committee. The application was submitted to the Faculty Ethics Committee and ethics clearance was issued (Ethics number NWU-00783-20-A4). The information used in this study is publicly available on the various universities' websites. The information was anonymously disclosed in aggregate to keep the university identities confidential.

1.6 OVERVIEW OF THE STUDY

This study comprises of the following chapters:

Chapter 1 Introduction and background to the study

Chapter 1 incorporates the introduction and background of the research as well as the problem statement, the research objectives and methodology.

Chapter 2 Literature review

A comprehensive literature review is performed in Chapter 2 based on the influence of the 4IR on the skills needed by graduates, current and proposed CFs and university curricula module outcomes.

Chapter 3 Research design and methodology

In Chapter 3 the SLR process and qualitative document analysis process are discussed.

Chapter 4 Results and findings

Chapter 4 provides the findings of the SLR and document analysis to address the theoretical and empirical objectives, divided into three phases.

Chapter 5 Conclusions and recommendations:

An overview of the whole research study is discussed in Chapter 5, where the conclusions are formulated for the study. Suggestions and recommendations are made according to the findings of the qualitative document analysis. This chapter concludes the findings and proposes future research possibilities.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

Chapter 1 identified gaps in the literature due to limited research being done on the Accountancy curricula and the 4IR. Because of the rapid changes in business due to 4IR, the Accountancy curricula necessitate to be updated and adapted. The current literature is discussed by investigating the guidelines from SAICA as to the content of the curricula. The dissertation focused on the updated CF enabling competencies that should be part of the Accountancy curricula to deal with 4IR. The enabling competencies have the following categories:

- Business acumen
- Decision-making acumen
- Relational acumen
- Digital acumen

The acumens include skills knowledge and attributes that focus on the technological and pervasive skills to enable the Accountancy curricula for the 4IR to be relevant. Universities need to prepare the students to complete their qualifications and be ready for employment (Altrawneh, 2016:62). The curricula changes when the skills required by employers change (Coyne *et al.,* 2016:161). Accountants complete a prescribed curricula at universities to equip them with skills and knowledge and attributes preparing them for the labour market (Al-Htaybat *et al.,* 2018:334). However, for the students to be prepared for the labour market the curricula must reflect the current market needs. As the essential qualities of work require a different acumen so should the skill change (Tan & Laswad, 2018:406). The changes brought into the working environment due to the 4IR and automation make pervasive skills even more important (Reddrop & Mapunda, 2019:85).

Educators and employers do not always agree on the skills accountancy students ought to be prepared for (Tan & Laswad, 2018:406). Academics responsible for teaching and learning of Chartered Accountancy students acknowledge that the effect of technology cannot be disregarded on the content of the curricula (Al-Htaybat *et al.,* 2018:346; Giles,

2019:29). Technological changes and improvements lead to changes in accounting practice and accounting education (Al-Htaybat *et al.,* 2018:347). Students must be prepared for jobs in the information age and not anymore for jobs that were initially created during the industrial age (Xu *et al.,* 2018:91). Entry-level accountants will be expected to analyse data versus the previous generation of entry-level accountants that sorted and process data, necessitating a change in the curricula to fulfil the present 4IR requirements (Giles, 2019:29).

The initial expectation was that the 4IR skills would primarily deal with information technology such as blockchain, artificial intelligence and big data. During the literature search stage and primary research, the expectation was dispelled as various competencies and skills appear to be relevant. This expectation compared to reality will be discussed further in Chapters 2 and 4. Digital acumen related to information technology is discussed in Section 2.8.4.

Chapter 4 includes a SLR on accountancy skills and the 4IR. The curricula need to be developed to prepare the labour market for the 4IR (Al-Htaybat *et al.,* 2018:334). The basis of the search for the literature review included articles recently published on the Accountancy curricula, accountancy skills, and the 4IR. The literature review with regard to the preparedness of the Accountancy curricula for the 4IR investigated all relevant recent studies relating to accountancy skills and the 4IR. The current debate is whether the accountancy practice and education will be influenced by technological changes and improvements (Al-Htaybat *et al.,* 2018:347). Although studies do exist on employer and educator requirements for the curricula limited studies exist on the 4IR requirements for the Accountancy curricula.

Several current literature studies reflected a gap between the skills graduates possess and the skills employers require (Altrawneh, 2016:63; Chartered Accountants Worldwide, 2016:14; Coady *et al.,* 2018:99; Jackling & De Lange, 2009:379; Trpeska & Lazarevska, 2018:60). The gap between employers' requirements and educators' perceptions is known as the "expectation gap" and the gap between competencies employers believe graduates possess and the actual competencies graduates demonstrate is known as the "performance gap" (Trpeska & Lazarevska, 2018:60). Plant *et al.* (2019:44) suggest that

educators must be better equipped to facilitate to bridge the gap between students and employers. The curricula should be developed to fill the gap between the needs of the labour market and the competencies of the graduates (Al-Htaybat *et al.,* 2018:334). The analysis of the curricula are discussed in the following paragraph.

2.2 THE GUIDELINE FOR THE ACCOUNTANCY CURRICULA

Education programme plays a vital part in the transfer of competencies to students (Strauss-Keevy, 2012:219). The curricula could be updated with the changing skills required by labour market because, the curricula ultimately impacts employability (Joseph *et al.,* 2015:94). In order for the curricula to be prepared for 4IR, educators should develop the Accountancy curricula in collaboration with practitioners and professional bodies to identify pervasive skills, teamwork, communication, adaptability, critical thinking and self-management skills needed (Plant *et al.,* 2019:45). The curricula need to prepare accountancy graduates for the 4IR because currently graduates perform diverse roles in employment and scorekeeping is only a small part (Wells, 2018:47).

The International Accounting Education Standards Board (IAESB, 2019) publishes guidelines that SAICA uses to compile their CF for South Africa. Students follow the Accountancy curriculum at universities, which is based on the guidelines from the professional bodies (SAICA, 2019c:1). The proposed SAICA CF is in line with the skills listed by Plant *et al.* (2019:45) as discussed above. The CF contains the competencies and skills that beginner Chartered Accountants need (SAICA, 2019a:1). Chartered Accountants need to be educated at accredited universities following a Chartered Accountant programme (Barac & du Plessis, 2014:61). The SAICA is a professional body and is an education and training quality assurer accrediting certain academic programmes to provide education to professional accountants in the Chartered Accountancy field (SAICA, 2019c:1). SAICA is an accredited member of IFAC since 1977. SAICA prescribes a CF that includes the knowledge, skills and attributes that a chartered accountant (CA(SA)) should demonstrate (SAICA, 2019a:6). The current CF is discussed in the following paragraph.

2.3 CURRENT COMPETENCY FRAMEWORK (2019CF)

The current CF is effective since January 2019 (SAICA, 2019b:1). The dissertation refers to the current CF as the 2019CF. The themes of the 2019CF include i) pervasive qualities and skills, ii) strategy risk management and governance, iii) accounting and external reporting, iv) auditing and assurance, v) financial management, vi) management decision-making and control and vii) taxation. The discussion of the 2019CF is a historical background for the purpose of comparing the proposed CF with the 2019CF in Chapter 4.

The CF is a basis for accredited universities to develop their teaching and learning, knowledge skills and attributes to accountancy graduates (Strauss-Keevy, 2012:10). SAICA has developed the CF to "define the capabilities of an entry-level Chartered Accountant" (SAICA, 2019a:1). The CF is a collection of knowledge skills and attributes that a graduate need to possess to become a CA(SA) (SAICA, 2019b:12). The importance of being proficient in pervasive qualities and skills is the focus of the CF and is in line with the requirements of the developing and changing business environment (Barac & du Plessis, 2014:53).

The emphasis of the dissertation is on the 4IR skills in the Accountancy curricula. Due to the 2019CF limited reference to 4IR skills the pervasive qualities and skills of the CF are analysed. Figure 2.1 presents the 2019CF from SAICA. The CF is divided into specific competencies I to VII. As illustrated by Figure 2.1 the pervasive qualities and skills of competency I are functioning in all the other specific competencies (SAICA, 2019b:33). Graduates need to master all seven competencies (SAICA, 2019b:30). The CF is a desegregated document incorporating information technology in each group's specific competency I to VII (SAICA, 2019b:22).

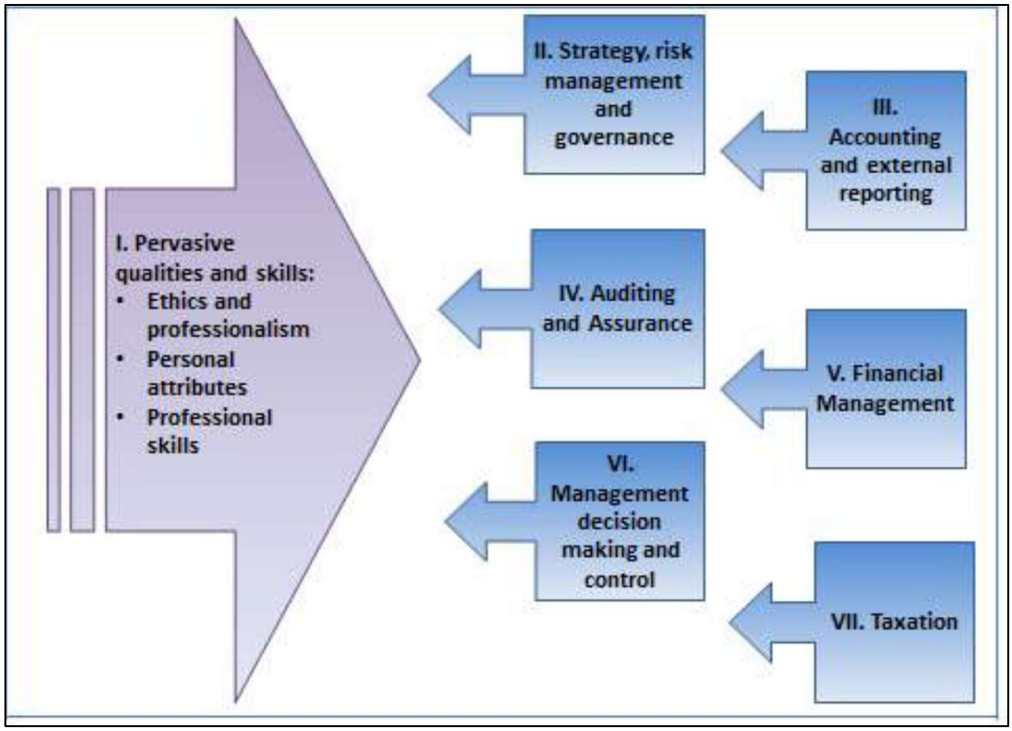

Figure 2.1: The current competency framework 2019CF

Source: SAICA (2019b:12)

Figure 2.1 is included in the 2019CF and illustrates the relationship between pervasive qualities and skills and the other specific competencies. Pervasive qualities and skills included in the CF could be part of the Accountancy curricula. There is a call for universities to adapt education content to develop students' pervasive skills for the 4IR (Teng *et al.,* 2019:600). The next paragraph discusses the literature on pervasive qualities and skills.

2.4 2019CF: PERVASIVE QUALITIES AND SKILLS

Pervasive qualities and skills are defined by SAICA (2019b:30) as qualities and skills employers expect from graduates to become a professional accountant. The following skills are part of pervasive skills: communication, interpersonal and problem-solving (Reynecke, 2016:12). Ethical behaviour and professionalism, personal attitudes and professional skills are included in the 2019CF as pervasive qualities and skills (SAICA, 2019b:12). Section 2.4.1 discusses ethical behaviour and professionalism.

2.4.1 2019CF PERVASIVE QUALITIES AND SKILLS: ETHICAL BEHAVIOUR AND PROFESSIONALISM

Ethical behaviour and professionalism are important for retaining clients' confidence and operating with “integrity, objectivity and independently” (SAICA, 2019b:30). “Integrity means acting ethically and honestly and address issues regarding stewardship” (SAICA, 2019b:34). SAICA (2019b:35) requires that graduates to be able to utilise suitable inhouse or external sources to solve ethical predicaments. The following paragraph explains the literature view on the skills included by SAICA as part of ethical behaviour and professionalism.

Table 2.1 illustrate the list of ethical behaviour and skills. Ethical reasoning is a much-needed skill in business and need to be part of the curricula (Abayadeera & Watty, 2016:15). Protecting the public interest is about acting with compliance and cognisant to standards of the profession and using the standards to secure the public interest (SAICA, 2019b:35). The public interest could be defined in accountancy as ringfencing individuals and organisations serving the profession to protect the economic interest of related parties. Dellaportas and Davenport (2008:1093) explain that the provision of relevant trustworthy economic data needs to be part of the curricula of accountancy students. Dellaportas and Davenport (2008:1096) further argue that a definition of public interest should be formulated for members of the profession to adhere to.

Table 2.1 illustrate the ethical behaviour and professional skills prescribed as competencies in the 2019CF that need to be included and taught in the Accountancy curricula (SAICA, 2019b:34). The ethical behaviour and professionalism skills included in the pervasive qualities and skills are discussed in Section 2.4.1. The next paragraph discusses the personal attributes category of pervasive qualities and skills.

Table 2.1: Pervasive qualities and skills: Ethical behaviour and professionalism (IA) 2019CF

IA Ethical behaviour and professionalism	
Number	**Pervasive qualities and skills**
IA-1	Uses an ethical reasoning process
IA-2	Protects the public interest
IA-3	Acts competently with honesty and integrity
IA-4	Performs work competently and with due care
IA-5	Maintains objectivity and independence
IA-6	Avoids conflict of interest
IA-7	Protects the confidentiality of information
IA-8	Maintains and enhances the profession's reputation
IA-9	Adheres to laws, professional standards and policies and the rules of professional conduct when exercising professional judgement

Source: SAICA (2019b:34)

2.4.2 2019CF PERVASIVE QUALITIES AND SKILLS: PERSONAL ATTRIBUTES

Included in the 2019CF personal attributes are defined as qualities concerning the graduates' behaviour (SAICA, 2019b:38). The following paragraph explains the literature view on personal attributes and Table 2.2 lists the skills included as personal attributes by SAICA as part of pervasive qualities and skills.

The self-manages competency was identified as one of the top five skills to form part of the Accountancy curricula (Abayadeera & Watty, 2016:16). The self-manages competency includes doing their work as and when expected by others and self-correcting as required, which is an essential skill for the Accountancy curricula (SAICA, 2019b:38). This will ensure that the student, which is also a prospective employee, is an asset for the future. Responsible leadership skills should show courage and distinguish between an incorrect and appropriate manner (SAICA, 2019b:39). Moore (2018:91) highlights that leadership skills are developed through critical thinking and decision-

making being added to the curricula. Both critical thinking and decision-making is a skill needed for the 4IR. Accountancy graduates are required to manage transformation while adding value through increased effectiveness (SAICA, 2019b:39). Interpersonal interactions are one of the top required skills for graduates as concluded in the study by Komarev and Preobragenskaya, (2018:31). In a study performed by Douglas and Gammie (2019:316) the aptitude for self-learning was rated the most advanced skill that a prospective professional should possess.

Self-learning will ensure the desired level of competency (SAICA, 2019b:39). Supporting co-members of the team also known as teamwork skills is an important part of the curricula (Paguio & Jackling, 2016:362). SAICA (2019b:41) stipulates that graduates should be able to manage deadlines. While Howcroft (2017:473) however indicates that educators were more optimistic about graduates' time management skills than was experienced by employers. The new entrants to the job market do therefore not possess time management skills. The skill should as a result be developed during a student's academic career. Another skill included as part of the personal attribute in the Accountancy curricula is the requirement by employers that graduates should be good corporate citizens to deal openly and transparently with stakeholders (SAICA, 2019b:41). SAICA defines good corporate citizens as a fitting mindset, dealing with integrity, including the right attitude, taking sustainability into account, cognisant of the environment and social issues, connecting transparently while exercising all-inclusive decision-making. Chapter 4 of the study follows up on the inclusion of these characteristics in the 2025CF. Table 2.2 details the personal attributes included in the 2019CF.

Table 2.2 sets out the pervasive qualities and skills personal attributes category that should be included in the Accountancy curricula. The personal attributes included in the pervasive qualities and skills were discussed in Section 2.4.2. SAICA and researchers above agree with the type of skills required and these skills should be implemented and more attention be paid to develop those skills in their academic career. The inclusion of these skills in the curricula is discussed further in Chapter 4. The next paragraph discusses professional skills included in the 2019CF.

Table 2.2: Pervasive qualities and skills: Personal attributes (IB) 2019CF

IB – Personal Attributes	
IB-1	Self-manages
IB-2	Demonstrates responsible leadership
IB-3	Maintains and demonstrates competence and recognises limits
IB-4	Strives to add value in an innovative manner
IB-5	Manages change
IB-6	Treats others in a professional manner
IB-7	Is a lifelong learner
IB-8	Plans and effectively manages teams and projects
IB-9	Works effectively as a team member
IB-10	Manages time effectively
IB-11	Demonstrates good corporate citizenship attributes

Source: SAICA (2019b:38)

2.4.3 2019CF PERVASIVE QUALITIES AND SKILLS: PROFESSIONAL SKILLS

Table 2.3 identifies all the skills that should be included in the Accountancy curricula as part of professional skills. The next three paragraphs are a discussion from literature on the skills.

Securing and substantiating information to get an appreciation of the entity is part of the SAICA CF and is a skill needed by accountancy graduates because employers value a developed research skill in graduates (Altrawneh, 2016:60; SAICA, 2019b:43). Several studies performed among employers and academics found that critical thinking is vital to make sensible assumptions (Parvaiz *et al.,* 2017b:147; Plant *et al.,* 2019:44; SAICA, 2019b:46; Warwick & Howard, 2015:5). Graduates should be able to decide which problems can be solved and which problems to manage (SAICA, 2019b:46). Students should develop abstract problem-solving skills during their accountancy education to be

prepared for the 4IR (Al-Htaybat *et al.,* 2018:353). Chapter 4 elaborates on the inclusion of critical thinking and problem-solving skills, in the module documents.

The Accountancy curricula for the 4IR should include decisions-making skills (Ballou *et al.,* 2018:14). Graduates need skills to evaluate options and give advice on the best use of available resources (Al-Htaybat *et al.,* 2018:347; SAICA, 2019b:47). Included in the 2019CF SAICA (2019b:42) is verbal and written communication as well as the presentation of information. Oussii and Klibi (2017:215) introduced the listen effectively skill as the most requested skill by employers. Parry and Jackling (2015:530) demonstrate the concern by employers that they may employ graduates without the required listening skills. The 2019CF does not give any reference to the listen effectively skill. In Chapter 4 the study discusses whether listening skills are included in the curriculum of universities. Listening skills are important as accounting graduates interact with the public and have a lot of human interfaces.

The 2019CF SAICA (2019b:48) includes professional judgement skills as part of decision-making, in the Accountancy curricula. Gray (2016) confirmed that judgement and decision-making are skills graduates required for the 4IR. According to the CF, the Accountancy curricula should include managing and supervising skills (Viviers *et al.*, 2016:369). Smith *et al.* (2018:540) propose that management skills are more important for graduates than technical accounting knowledge. However, Howieson *et al.* (2014:272) illustrated that there were different views by employers and academics on the skills that should be taught at university. Practitioners with limited resources for training prefer a graduate with technical knowledge while most employers prefer work-ready employees that possess both technical knowledge and pervasive skills (Howieson *et al.,* 2014:272). The study by Howieson *et al.* (2014:272) confirms the importance of pervasive skills to be included in the CF.

SAICA (2019b:49) classifies that understanding the information technology (IT) environment and software tools including spreadsheets and accounting packages is a skill graduates need to master in the 2019CF as part of pervasive skills. In a survey conducted of 197 accounting practitioners, data analytics and a working knowledge of Excel were rated important for beginner accountancy personnel (Lee *et al.,* 2018:45).

Data analytics, as well as critical thinking, can be developed in accountancy students with the use of case studies using Excel functionalities (Ramachandran *et al.*, 2016:162). The 2019CF does not include any reference to blockchain, artificial intelligence and big data. The inclusion of these 4IR elements in the 2025CF is discussed from Section 2.8.4.1 to Section 2.8.4.6 and analysed in Chapter 4.

Trpeska and Lazarevska (2018:64) argue that graduates need more knowledge of tax and business, therefore, justifying the tax skill inclusion in the 2019CF and in the Accountancy curricula (SAICA, 2019b:49). The assessment of the economic impact of local influences and global influences on the business entity is a skill accountancy graduates require (SAICA, 2019b:50; Moore, 2018:88). The inclusion of the relevant topics is addressed in Chapter 4. The personal attributes category of pervasive qualities and skills are detailed in Table 2.3.

Table 2.3: Pervasive qualities and skills: Professional Skills (IC) 2019CF

IC- Professional Skills	
IC-1	Obtains information
IC-2	Examines and interprets information and ideas critically (critical thinking)
IC-3	Solves problems and makes decisions
IC-4	Communicates effectively and efficiently
IC-5	Manages and supervises
IC-6	Understands and uses appropriate IT systems and tools
IC-7	Considers and applies legal concepts
IC-8	Understands how the national and international environment impacts a CA's role

Source: SAICA (2019b:42)

The pervasive qualities and skills professional skills category in Table 2.3, details the skills to be included in the Accountancy curricula. The pervasive qualities and skills (2019CF) as Competency I and illustrated in Tables 2.1 and 2.2 and 2.3, should be part

of the academic programmes (SAICA, 2019b:23). SAICA has made no provision for the listening skill as part of the CF. In Chapter 4 (Phase I) a comparison is made between the 2025CF and the 2019CF. The comparison identified new skills in the 2025CF to prepare the accountancy students' curricula for the 4IR. The next section comprises a short review of the specific competencies required in the Accountancy curricula as part of the 2019CF.

2.5 2019CF: SPECIFIC COMPETENCIES

The Accountancy curricula consist of pervasive qualities and skills (Figure 2.1), which are fully integrated with specific competencies (SAICA, 2019b:12). The university needs to include teaching competencies in strategy, risk management, and governance to enable knowledge and understanding with the accountancy students (SAICA, 2019b:58). Accountancy students have to obtain skills and abilities in recording transactions and calculating the performance in order to create reports (SAICA, 2019b:74). The accounting and external reporting competencies should include capturing, recognition, valuation and presenting financial and non-financial data as part of the Accountancy curricula (SAICA, 2019b:31).

The curricula must teach auditing and assurance skills to students enabling them to conduct assurance services and statutory and regulatory audits, being complacent (SAICA, 2019b:31). The curricula need to include financial management related skills including treasury and the valuation of an entity as prescribed by the 2019CF (SAICA, 2019b:31). The university should include teaching management accounting, and management decision-making and planning and control in the curricula (SAICA, 2019b:131). As part of the 2019CF, the curricula should include teaching tax-related skills and competencies for various tax types and entities (SAICA, 2019b:152).

As described above, the Accountancy curricula need to follow the guideline of the 2019CF by including pervasive qualities and skills fully integrated with specific competencies. The analysis of module outcome documents of different universities was used to compare requirements to actual curricula in Chapter 4. The next section discusses the proposed CF.

2.6 PROPOSED COMPETENCY FRAMEWORK (2025CF)

SAICA launched the project CA2025 to look at the future of the chartered accountant profession (Coetzee *et al.,* 2020:13). As part of the project CA2025, an updated CF was released in November 2018 for comment. The implementation date of the new CF is uncertain and not publicly available. For purposes of differentiating between the 2019CF and proposed CF the proposed CF will be renamed 2025CF for dissertation purposes. The 2025CF includes specific competencies that entry-level accountants should attain and, in this regard, SAICA expects academic programme providers to offer a curricula to equip students with the necessary competencies (SAICA, 2019b:28). This method agrees with Lawson *et al.'s* (2014:300) framework that focuses on prescribing competencies to master and does not prescribe academic subjects. Figure 2.2 illustrates the elements of the proposed CF.

As illustrated in Figure 2.2 the professional competencies work together to create value through accountable leaders. The 2025CF consists of overarching themes of i) professional values and attitudes, ii) enabling competencies and iii) technical competencies in the value creation process. (SAICA, 2019a:4). For SLR purposes the elements are used as the overarching themes (Chapter 3). The dissertation is delineated on the enabling competencies inclusion in the Accountancy curricula to prepare the students for the 4IR. A comparison is performed in Chapter 4 between the competencies of the 2025CF and the competencies in the 2019CF in order to identify new skills added to the 2025CF.

	Icon	Elements of the professional competencies
Responsible leaders creating value in using financial and non-financial information to fulfil their social mandate		1. Professional values and attitudes
		2. Enabling competencies (defined as acumens)
		3. Technical competencies in the value creation process

Figure 2.2: Components of the 2025CF

Source: SAICA (2019a:3)

The 2025CF divides the enabling competencies into four major acumens (categories) namely business, decision-making, relational and digital (SAICA, 2019a:3). Acumen is defined by the Oxford Dictionary as the "ability to make good judgement and quick decisions, typically in a particular domain" (Oxford, 2020). Business acumen consists of the following elements: business internal environment, business external environment and innovation and creativity (SAICA, 2019a:5). Decision-making acumen consists of analytical/critical thinking, problem-solving, judgement and decision-making and professional scepticism elements (SAICA, 2019a:5). The relational acumen has the following elements: communication skills, leadership skills, people skills, relationship-building skills, teamwork, self-management, managing others and emotional intelligence (SAICA, 2019a:6). The digital acumen consists of the following elements: data analytics, big data, cognitive and non-cognitive systems, new developments and protocols, distributed processing and cybersecurity and user competencies (SAICA, 2019a:6).

In Chapter 4 a comparison is performed between the 2025CF and the 2019CF. The elements and dimensions (skills) of the enabling acumens of the 2025CF are included as deductive codes in the SLR performed in Chapter 4. Chapter 3 includes a discussion of the methodology followed to determine the codes and preparation of the codebook. Tables 2.4 to 2.6 is a discussion of the enabling acumen's elements and dimensions of the 2025CF to prepare the Accountancy curricula for the 4IR.

Sections 2.7 and 2.8 and 2.9 discuss the 2025CF elements of the professional competencies as illustrated in Figure 2.2. Professional values and attitudes are briefly discussed in Section 2.7.

2.7 2025CF: PROFESSIONAL VALUES AND ATTITUDES

As illustrated in Figure 2.2 the professional values and attitudes are the first element of the 2025CF to prepare the Accountancy curricula for the 4IR. The foundation of the CF is "being responsible leaders creating value in the using financial and non-financial information to fulfil their social mandate" (SAICA, 2019a:4). Members have a responsibility to mitigate and clarify their actions to be accountable (Bovens, 2007:3). The Accountancy curricula should teach the students how to achieve professional competence by embracing professional values and supporting competencies and technical competencies while demonstrating professional values and attitudes (SAICA, 2019a:11).

Included in professional values and attitudes as per Figure 2.2 is continuous education, which is an essential part of accountancy students' competency to be prepared for the 4IR (Rufino *et al.,* 2017:127). The 2025CF identifies self-development as well as adaptability and agility as the most important parts of lifelong learning (SAICA, 2019a:4). Webb and Chaffer (2016:362) identified lifelong learning as not sufficiently implemented. Trpeska and Lazarevska (2018:58) proposed that the new work environment necessitates accountancy graduates to be adaptable, therefore, the skill needs to be part of the Accountancy curricula for the 4IR.

Social citizen is part of professional values and attitudes as per Figure 2.2 and defined as “includes making decisions that serve the social mandate in the personal, business and professional spheres” (SAICA, 2019a:1). Ethical values and attitudes consist of personal, business and professional ethics (SAICA, 2019a:4). Firescu *et al.* (2017:208) classified the up keeping of ethics by professional accountants as one of the pillars of professional competence to be part of the Accountancy curricula. Although employers regard ethics as one of the top five important skills for graduates the study finds that ethics is not considered important by educators in the curricula (Abayadeera & Watty, 2016:14).

The focus of the dissertation is on the enabling competencies. The 2025CF divides the enabling competencies into acumens of business, decision-making, relational and digital (SAICA, 2019a:3). The literature on the acumens is discussed in Section 2.8.

2.8 2025CF: ENABLING COMPETENCIES

2.8.1 2025CF: BUSINESS ACUMEN

The first part of enabling competencies to be part of the Accountancy curricula is the business acumen as illustrated in Table 2.4. The business acumen is included in the 2025CF. The business acumen is divided into the business internal environment, the business external environment and the innovation and creativity elements. The inclusion of the acumen as part of the curricula is analysed in Chapter 4.

2.8.1.1 Business internal environment

Table 2.4 illustrates that the business acumen consists of the following three elements such as business internal environment and the business external environment, and innovation and creativity. The business internal environment element consists out of the following dimensions, role of business in society, different types of entities and the role they play in society, internal functions of an entity, concept of stewardship, defining business success (value creation; profit motive vs sustainable businesses) and business models. Ballou *et al.’s* (2018:16) study performed on employers and faculty, supports SAICA's inclusion of the role of business in society dimension. Graduates should develop the skill to understand business holistically as part of the Accountancy curricula.

Table 2.4: 2025CF Enabling competencies business acumen

Acumens		**Elements**		**Dimensions**
Z	Business acumen	Z1	Business internal environment	• Role of business in society. • Different types of entities and the role they play in society. • Internal functions of an entity. • Concept of stewardship • Defining business success (value creation; profit motive vs sustainable businesses) • Business models
		Z2	Business external environment	• Global and other external influences (including sustainable development goals) • Tax policy
		Z3	Innovation and creativity	• Initiative • Innovation • Continuous improvement • Entrepreneurship

Source: SAICA (2019a:5)

Sections 2.8.1.1 to 2.8.1.3 is a discussion from the literature on the business acumen.

Kavanagh and Drennan (2008:294) identified business awareness and holistic business knowledge as important skills required by employers that ought to be part of the Accountancy curricula. Trpeska and Lazarevska (2018:64) assert that employers perceive graduates' competencies on knowledge of business law and the business environment, business strategies and management, as well as taxation as not sufficiently developed. Based on the literature above, the conclusion is that although studies are done the curricula are not updated by educators to include the required skills. In this regard curricula are a culmination of the professional bodies' required competencies and need to be reviewed and changed regularly. In Chapter 4 the study further elaborate on whether the current curricula include outcomes that reflects the development of skills as identified in the 2025CF and the articles within the SLR.

Knowledge about the role of business in society and the different types of entities and the role they play in society, as per Table 2.4 are competencies accountancy graduates should have (SAICA, 2019a:5). Coyne *et al.* (2016:162) endorsed the skill as part of the curricula due to accountants with expert business knowledge and information technology (IT) skills being considered a great asset to any business. The concept of stewardship is defined as acting responsibly with accountable resources while also influencing the success and profitability of a business (SAICA, 2019b:34). Stewardship could also be the reason for the double-entry system that originated due to a moral obligation where balancing every item of value that merchants or bankers took in, with what was returned (Casey & Vigna, 2018).

Accountancy graduates need to understand the internal functions of an entity and business models (SAICA, 2019a:5). Tan and Laswad (2018:420) remark that accountant's day-to-day activities have changed from doing "number crunching" to being a business partner and need to learn the skills to be a business partner as part of the Accountancy curricula.

2.8.1.2 Business external environment

SAICA (2019a:5) illustrates in Table 2.4 that graduates are required to be cognisant of the global external environment. Kavanagh and Drennan (2008:294) suggest ongoing learning for graduates to keep abreast of global business. SAICA (2019a:5) regards the tax policy as an important skill for graduates. Trpeska and Lazarevska (2018:64) concluded that the graduates' knowledge of taxation needs more development supporting the inclusion of the tax policy competency in the 2025CF and as part of the Accountancy curricula.

2.8.1.3 Innovation and creativity

Coady *et al.* (2018:110) support SAICA that initiative is a skill that calls for more emphasis on education. Curricula must focus on innovation and entrepreneurship education, where students are taught as part of the Accountancy curricula, how to analyse situations and be able to act on opportunities (Dong, 2019:31).

Ballou *et al.* (2018:15) are of the opinion that although technical accounting knowledge is important for employers; beginner accountants also require business knowledge. In Chapter 4 the inclusion of the dimensions (skills) from the business acumen as part of the module outcome of universities are analysed. The next acumen to be discussed as part of the enabling competencies for inclusion in the Accountancy curricula is the decision-making acumen.

2.8.2 2025CF: DECISION-MAKING ACUMEN

The decision-making acumen consists of the analytical/critical thinking-, the problem-solving-, the judgement and decision-making- and the professional scepticism elements. Sections 2.8.2.1 to 2.8.2.4 comprises a literature review on the decision-making elements and dimensions.

2.8.2.1 Analytical and critical thinking

Included in the analytical/critical thinking element (Table 2.5) is challenge assumptions- and perform critical analysis dimension that need to be part of the Accountancy curricula (SAICA, 2019a:5). The demand for critical thinking and analysis is increasing, therefore, the skill should be taught as part of the Accountancy curricula (Rodny-Gumede, 2019:1; WEF, 2018:11). Accountancy educators want to be recognised as promotors of critical thinking and not just providing technical knowledge to students (Howcroft, 2017:477). WEF (2018:29) defines critical thinking as identifying the strength and weaknesses of other options or decisions or methods using sensible judgement. The WEF conducted a Global Competitiveness report in 2019 and South Africa ranked 95 out of 141 countries in assessing critical thinking in teaching skills (WEF, 2019:536). This indicates that our curricula are required to evolve to accommodate critical thinking.

Table 2.5: 2025CF Enabling competencies decision-making acumen

Acumens		**Elements**		**Dimensions**
Y	Decision-making acumen	Y1	Analytical/critical thinking	• Challenge assumptions • Critical analysis
		Y2	Problem-solving	• Mindful reasoning • Impact of issues • Implications of actions • Knowing when to seek expert assistance
		Y3	Judgement & decision-making	• Issue identification • Integrated nature of quantitative and qualitative metrics (financial and non-financial information) • Analysis • Recommendations • Implementation
		Y4	Professional scepticism	• Independent and questioning mindset

Source: SAICA (2019a:5)

2.8.2.2 Problem-solving

The problem-solving element includes the following dimensions: mindful reasoning, impact of issues, implications of actions and knowing when to seek expert assistance. Mindful reasoning skills as per Table 2.5 are as important in the curricula as teaching technical skills (Douglas & Gammie, 2019:320; Machera & Machera, 2017:377). The most important data analytical skill is to ensure students acquire the skill to ask appropriate questions that can be answered by using data, which results in critical thinking and problem-solving (Dzuranin *et al.,* 2018:33). Problem-solving skills are one of the most important skills required by employers, and educators should include the skill as part of the curricula (Parvaiz *et al.,* 2017b:147; Tan & Laswad, 2018:416; Warwick & Howard, 2015:5). Gray (2016) identified complex problem-solving skills as one of the top ten skills required for 2020. Tan and Laswad (2018:402) also add paying attention to detail skills

need to be included in the curricula. The WEF (2016:21) agrees in the Future of Jobs Report to this statement, that complex problem-solving skills will be used in more than one-third of all jobs. The inclusion of problem-solving skills as part of module outcome documents is analysed in Chapter 4.

2.8.2.3 Judgement and decision-making

The judgement and decision-making element of the decision-making acumen (Table 2.5) consists of dimensions such as issues identification, integrated nature of quantitative and qualitative metrics (financial and non-financial information), analysis, recommendations and implementation. SAICA (2019a:5) includes the skill to identify issues dimension as part of the judgement and decision-making element (2025CF). Joseph *et al. (*2015:96) illustrate that educators rated the identification of issues skill of less importance compared to alumni and employers. In Chapter 4, the study discusses further whether the issues identification dimension is part of the current curricula. The inclusion of skills to quantify and qualify financial and non-financial information is essential for this dynamic technological world (Al-Htaybat *et al.,* 2018:336). Students need skills to make a recommendation as included in the decision-making acumen in the Accountancy curricula (Thatong, 2016:70).

2.8.2.4 Professional scepticism

The professional scepticism element includes the dimension of independent and questioning mindset. Accountancy graduates must be able to sceptically review big data (Al-Htaybat *et al.,* 2018:348). The skill needs to be developed in the Accountancy curricula (Tan & Laswad, 2018:421).

Decision-making skills are important both for employers and educators and should be part of the CF to be included in the curricula (Kavanagh & Drennan, 2008:296). Chapter 4 further elaborates on the inclusion of the decision-making skills as part of the module outcome documents. The next acumen to be discussed as part of the enabling competencies for inclusion in the Accountancy curricula is the relational acumen.

2.8.3 2025CF: RELATIONAL ACUMEN

The relational acumen consists of elements like communication skills, leadership skills, people skills, relationship-building skills, teamwork, self-management, managing others, and emotional intelligence. The elements and dimensions are listed in Table 2.6 and discussed from Section 2.8.3.1 to 2.8.3.7.

Table 2.6: 2025CF Enabling competencies relational acumen communication

Acumens		**Elements**		**Dimensions**
X	Relational acumen	X1	Communication skills	• Listening, interviewing and discussion • Communication media • Audience and effectiveness
		X2	Leadership skills	• Sustainability and long-term thinking • Servant leadership • Influence and consensus building • Moral and ethical decision-making
		X3	People skills	• Influence and negotiation • Conflict resolution • Consultation
		X4	Relationship-building skills	• Strategic professional relationships • Network building
		X5	Teamwork	• Knowledge sharing • Cooperation and collaboration
		X6	Self-management	• Work independently • Adapt to management styles • Organisation culture advocacy
		X7	Managing others	• Manage teams/projects • Talent management (developing others)
		X8	Emotional intelligence	• Handle relationships empathetically and judiciously

Source: SAICA (2019a:5-6)

2.8.3.1 Communication skills

Table 2.6 details the communication skills element that consists of listening, interviewing and discussion, communication media and audience and effectiveness dimensions. Students need to learn and exercise communication skills as proposed by professional bodies (Coetzee *et al.,* 2020:88). Students perceive their communication skills as not sufficiently developed leading to difficulty in finding employment (Oussii & Klibi, 2017:220; Riley & Simons, 2016:252). Kavanagh and Drennan (2008:296) conclude that although accountancy students and employers require verbal communication skills, accountancy educators focus on the development of written communication skills. Interestingly, the study conducted by Komarev and Preobragenskaya (2018:54) concluded that written and verbal communication skills are more important to employers than technical skills. Students rated their listening skills as more important than what they perceived was developed (Kavanagh & Drennan, 2008:289). Presentation skills as part of the presentation media dimension should be taught by universities throughout the Accountancy curricula (Crawford *et al.,* 2011:126). Accountancy students could miss out on career growth when they lack communication skills because employers do not want to be represented poorly (Camacho, 2015:319). Chapter 4 further discusses the inclusion of communication skills in the curricula.

2.8.3.2 Leadership skills

As illustrated in Table 2.6 the leadership skills element consists of dimensions such as sustainability and long-term thinking, servant leadership, influence and consensus building and moral and ethical decision-making. Kavanagh and Drennan (2008:288) nominated leadership skills as one of the top three skills essential for a rewarding career. To influence others is a skill accountancy graduates must be competent in (Rufino *et al.,* 2017:120). In addition, employers require graduates' ethical awareness for decision-making (Webb & Chaffer, 2016:362). The development of leadership skills as part of the 2025CF as per Table 2.6 is justified due to practitioners requiring graduates with leadership and social skills (Moore, 2018:88).

2.8.3.3 People skills

The people skills element (Table 2.6) consists of dimensions such as influence and negotiation, conflict resolution and consultation. Thatong (2016:67) rate negotiation skills as an important skill while Chaplin (2017:67) contradicts this statement in deeming negotiation as one of the least important skills required. However, the WEF identified negotiation skills as one of the top skills required for the 4IR (Gray:2016). The conclusion drawn from the literature above posit negotiation skill as needed for the Accountancy curricula. Mohamed and Lashine (2003:10) further assert that conflict resolution needs to be part of the Accountancy courses to teach students people skills. The consultation skill is another people skill necessary for the Accountancy curricula for the 4IR to ensure that man and machine understand each other (Giles, 2019:29). People skills such as these skills mentioned above need to be developed through the Accountancy curricula for the 4IR because, graduates will have to address management with the results of the data analysed (Giles, 2019:29). Chapter 4 commences on the inclusion of negotiation skills as part of the Accountancy curricula.

2.8.3.4 Relationship-building skills

The relationship-building skills element consist of the strategic professional relationships dimension and network building dimension. Parry and Jackling (2015:526) prose that collaboration through strategic relationships with co-workers and clients is necessary for employability and the skill should be developed in graduates. Accounting education needs to combine the right technical skills, with agility and the competency of network building through social skills (Al-Htaybat *et al.,* 2018:352). Komarev and Preobragenskaya (2018:54) argue that relationship skills is an important skill that employers require from graduates to be employable. The skill needs to be included in the 2025CF to be part of the Accountancy curricula (SAICA, 2019a:6).

2.8.3.5 Teamwork

The teamwork element, as illustrated in Table 2.6, consists of the knowledge sharing dimension and cooperation and collaboration dimension. Jackling and De Lange (2009:371) found that graduates do not have teamwork skills. Graduates need

teamworking skills as working in teams improves collaboration skills in students (Stone, 2019:40; Trpeska & Lazarevska, 2018:58). Students need to learn and develop pervasive skills like communication and teamwork as required by professional bodies (Coetzee *et al.,* 2020:88). Keneley and Jackling (2011:614) posit that students' teamwork skills are not sufficiently developed during their studies and the skill must be included in the Accountancy curricula.

2.8.3.6 Self-management skills

Work independently-, adaptive management styles- and organisation culture advocacy dimensions are included in the self-management element (Table 2.6). Employers need graduates with the skill to work independently and to be adaptable in work situations (Komarev & Preobragenskaya, 2018:29; Plant *et al.,* 2019:44; Tan & Laswad, 2018:416). Adaptable accountancy graduates endorse the culture of the entity as new employees (Olvera *et al.,* 2015:32). Self-management is one of the most important pervasive skills for accountancy graduates (Abayadeera & Watty, 2016:4).

2.8.3.7 Managing others skills

As in Table 2.6, the managing others element consist of manage teams/projects dimension and talent management (developing others) dimension. Tan and Laswad (2018:416) propose that the skill to manage others and meeting deadlines is a preferred skill by employers and needs to be part of the Accountancy curricula. The talent management skill is a necessary skill and must be developed through the Accountancy curricula (Olvera *et al.,* 2015:31). The Accountancy curricula should include the skill to manage others as guided by the 2025CF.

2.8.3.8 Emotional intelligence

Coady *et al.* (2018:114) argue that emotional intelligence skills could be of less importance to study with the reason that the skills can be satisfactorily mature in the workplace and is therefore not expected to be included as part of the curricula. SAICA (2019a:6), however, includes in Table 2.6, that accountancy students need emotional intelligence to handle relationships empathetically and that the emotional intelligence

element must be part of the Accountancy curricula. The inclusion of the elements and dimensions of the relational acumen is important in the Accountancy curricula. In Chapter 4, the study proceeds on the inclusion of the elements and dimensions as part of the module document of the universities. The next Section 2.8.4 explains the inclusion of the digital acumen in the 2025CF.

2.8.4 2025CF: DIGITAL ACUMEN

The digital acumen in the 2025CF consist of the following elements: data analytics, big data, cognitive and non-cognitive systems, new developments and protocols, distributed processing and cyber security and user competencies element. Table 2.7 outlines the digital acumen elements and dimensions (2025CF) to be included in the Accountancy curricula to prepare the accountancy graduates for the 4IR. As discussed in Section 2.4.3 the implementation of the 2025CF will better position the accountant to deal with recent technological advancements like blockchain, artificial intelligence and big data. In Chapter 4 a comparison is made between the 2025CF skills and the 2019CF skills to identify the additional digital skills that need to be included in the Accountancy curricula. Likewise, the module outcome documents of the selected universities are analysed for inclusion of the skills as per the digital acumen.

Table 2.7 sets out the digital acumen elements and dimensions (2025CF). The literature on the elements and dimensions is discussed in Sections 2.8.4.1 to 2.8.4.6. The skills included in the digital acumen of the 2025CF will enhance the technological abilities of the CA(SA).

2.8.4.1 Data analytics

As presented in Table 2.7 the data analytics element from the digital acumen consists of the nature of data (e.g. underlying characteristics and storage) dimension and performs data analysis dimension. Access to data and the ability to store and analyse data have grown exponentially (Shah *et al.,* 2012). Technology has a major impact on data storage and data retrieval leading to changes in the way accountancy employees operate and the skills required for the 4IR (Wells, 2018:42).

Table 2.7: 2025CF Enabling competencies digital acumen

Acumens		**Elements**		**Dimensions**
W	Digital acumen	W1	Data analytics	• The nature of data (e.g. underlying characteristics and storage) • Perform data analysis
		W2	Big data	• Impact on business models
		W3	Cognitive & non-cognitive systems	• Including but not limited to machine learning, robotic process automation and artificial intelligence
		W4	New developments & protocols	• Including but not limited to cloud computing, blockchain and mobile apps
		W5	Distributed processing and cybersecurity	• Distributed processing internet of things (IoT) • Risks and attacks • Mitigating steps
		W6	User competencies	• User tools (word processing, presentation software, spreadsheet software) • Basic coding • Securing and safeguarding

Source: SAICA (2019a:5)

The Accountancy curricula must include skills to analyse big data (Table 2.7) to enable auditors to advise on management decisions (Sledgianowski *et al.,* 2017:84). Innovation in data usage and analysis provide business with an edge leading to changes in the way work is performed (Ballou *et al.,* 2018:15). Graduates should be skilled to be competent in ensuring the integrity of data analysed (Zhang *et al.,* 2015:472). The Accountancy curricula must reflect the business demand for data analysis skills (Ballou *et al.,* 2018:15). Accountancy students ought to be equipped with the skill of asking effective questions when analysing data (McKinney Jr *et al.,* 2017:78). Shah *et al.* (2012:5) refer to the asking of good questions as the “Big Judgement”. The data or facts stay the same, but the interpretation of data can diverge between analysts (McKinney Jr *et al.,* 2017:71). The skill to communicate the data analytic process and the results are the second most

important data analytic skill for students to be included in the Accountancy curricula for the 4IR (Dzuranin *et al.,* 2018:33; Giles, 2019:29).

2.8.4.2 Big data

The big data element from the digital acumen (Table 2.7) needs to be part of the Accountancy curricula. The reduction of storage cost and the development of analysing and understanding data created the term big data (McKinney Jr *et al.,* 2017:63). Big data is seen as a mechanism for businesses to expose trends and relationships (Alles, 2015:440). McKinney Jr *et al.* (2017:65) claim to be the first to request that big data should be part of the Accountancy curricula. Big data fundamentally changes how data are understood. Alles (2015:442) explains that big data is instrumental in the analysis of data other than financial data. McKinney Jr *et al.* (2017:65) explain that historically the repetitive tasks were performed by entry-level personnel for example ticking and verifying while the senior personnel performed judgemental tasks like reviewing and reporting. Accountancy education in the 4IR needs to prepare students to successfully utilise big data because employers expect the skill from the students they hire (McKinney Jr *et al.,* 2017:63). A possibility exists that auditors will support the business by utilising big data techniques for auditing purposes (Alles, 2015:441). Griffin and Wright (2015:379) posit that the Accountancy curricula must be updated and maintained to include big data skills.

The increased importance of big data influencing the way data is collected and documented will have a substantial effect on accountancy and the Accountancy curricula should reflect the changes (Warren Jr *et al.,* 2015:397).

2.8.4.3 Cognitive and non-cognitive systems: Including but not limited to machine learning, robotic process automation and artificial intelligence

The cognitive and non-cognitive systems element from the digital acumen (Table 2.7) comprise the dimension including but not limited to machine learning robotic process automation and artificial intelligence. Graduates should develop skills from the Accountancy curricula to understand cognitive systems and non-cognitive systems. Graduates need to know cognitive systems are created based on the human brain that learns from experience and apply knowledge to new situations (Noor, 2014:76).

Graduates should develop skills from the Accountancy curricula to understand non-cognitive systems requiring human instructions or programming to perform actions (Noor, 2014:75).

Issa *et al.* (2016:3) define artificial intelligence as new technologies enhancing and changing audits. Artificial intelligence is a practical application that allows computers to pursue, acquire, consider and perceive human intelligence (Hong & Seo, 2018:46). Traditionally audits were backward-looking due to the availability of data (Issa *et al.,* 2016:5). The application of artificial intelligence to big data is expected to make the audit profession more dynamic and change the auditor function (Giles, 2019:30; Issa *et al.,* 2016:9). The Accountancy curricula must prepare the students for changes in the way work is done. Rather than manually testing a sample, auditors can test the complete population with artificial intelligence (Peterson, 2016). Artificial intelligence leads to increased instances of fraud detection or fraud prevention (Pincus *et al.,* 2017:6). The Accountancy curricula should prepare the accountancy graduates to be employed as auditors, to spend time on the interpretation of the results produced by artificial intelligence instead of spending time on manual labour. With the implementation of artificial intelligence, the companies will be able to run analytical models on an ongoing basis. The ongoing basis will increase external auditors' involvement in the system that may negatively impact the independence of auditors (Issa *et al.,* 2016:10).

2.8.4.4 New developments and protocols: including but not limited to cloud computing, blockchain, and mobile apps

The new developments and protocols element from the digital acumen as in Table 2.7, consist of the dimensions including but not limited to cloud computing, blockchain and mobile apps. Graduates need skills for new digital developments and protocols including cloud computing, blockchain and mobile applications (SAICA, 2019a:6). Blockchain increases auditability and trust of ledgers (Fanning & Centers, 2016:56). Any updates or changes to data on a blockchain are verifiable and unchangeable (Iansiti & Lakhani, 2017:4). Therefore, blockchain mitigates the limits of a double-entry bookkeeping system for external assurance of financial statements and potential for fraud argues (Schmitz &

Leoni, 2019:333). Graduates need skills to understand the distributed ledger or blockchain as part of the Accountancy curricula for the 4IR (Vaidyanathan, 2017:8).

The blockchain is a ledger duplicated in multiple look-alike or matching databases with a triple entry system that displays the same data on all the databases' (Vaidyanathan, 2017:11). Blockchain is a special ledger because the technology is based on trust (Casey & Vigna, 2018). Ultimately accountants have work because neither party trusts the other party's record (Casey and Vigna, 2018). When a blockchain transaction is captured and validated in one copy all the other copies are updated at the same time (Iansiti & Lakhani, 2017:5). Each blockchain user has a 30 plus character alphanumeric address to identify himself (Iansiti & Lakhani, 2017:9). When one of the blockchain databases is erased, the other databases will update themselves and undo the deletion (Rechtman, 2017:16). The Accountancy curriculum should include blockchain technology to skill the auditor in mitigating the authorisation risk (Coyne & McMickle, 2017:107). The Accountancy curricula need to include that although each block of transactions is added at the end of the chain, it is cryptographically linked to the prior block (Coyne & McMickle, 2017:102).

However, the recording of a blockchain transaction still does not prove that the transaction physically did take place (Schmitz & Leoni, 2019:335). The Accountancy curricula must include skills to identify the risks that are largely due to the possible difference between the asset transfer and the asset recorded in the blockchain (Coyne & McMickle, 2017:109). Rechtman (2017:15) argues that although the blockchain system carries some risk the built-in audit trail, as discussed above, will mitigate this risk. Data security and integrity are improved through blockchain and need to be taught in the Accountancy curricula for the 4IR (Hong & Seo, 2018:50).

Kokina *et al.* (2017:97) propose that academics must keep an eye on what the blockchain effect will be on accountants' future job profiles. Academics should prepare future accountants to take advantage of the possibilities evolving from the blockchain (Rechtman, 2017:17). The audit function could change due to the volume of data available, changes in sample size, unchangeable data and timing of audit (Vaidyanathan, 2017:25). One of the advantages of blockchain in the accountancy industry is the all-time availability of information resulting in increased efficiency of auditing, but the concern is

that blockchain could also be a complication to the profession (Schmitz & Leoni, 2019:331). Auditors could utilise more automation, analytics and machine learning algorithms on a near real-time basis (Bible *et al.,* 2017:11). Blockchain will reduce several of the manual data extraction and audit preparation activities and the Accountancy curricula need to reflect the changes.

The auditor must be competent in extracting data from the blockchain (Bible *et al.,* 2017:10). The auditors must broaden their skillset and knowledge as blockchain will have a substantial impact on the way auditors carry out their audit commitments (Bible *et al.,* 2017:2). Vaidyanathan (2017:32) proposes that the auditor may no longer need to understand sampling techniques and question individual transactions, but more emphasis will be on the origin of the data and the use of data. Although Vaidyanathan (2017:24) argues that the job of the accountant will not be directly influenced by blockchain the Accountancy curricula need to prepare the students for the 4IR and how to deal with blockchain.

2.8.4.5 Distributed processing and cybersecurity

As illustrated in Table 2.7 the distributed processing and cybersecurity element from the digital acumen consists of dimensions such as distributed processing (IoT), risks and attacks and mitigating steps that should be part of the Accountancy curricula. The initial development of the internet was for use by academics and martial purposes (Al-Htaybat *et al.,* 2018:340). Schwab (2016:22) describes the IoT as a connection between people and objects by joining various platforms with technology. The Accountancy curricula must include skills to master the connection between people and things and utilising the IoT. In the next two decades, the use of the IoT combined with big data analytics, the use of cloud computing and blockchain will result in less labour being required for accountancy related work. The cumulation of a digital practice will impact the skills needed and the Accountancy curricula need to prepare the students (Al-Htaybat *et al.,* 2018:352). Robots and machines will take over parts of the accountancy graduates' work (Al-Htaybat *et al.,* 2018:347). The Accountancy curricula should prepare the graduates to understand distributed processing and how to address related risks (Coyne *et al.,* 2016:166). Giles

(2019:9) proposes that graduates need to receive the necessary skills to deal with the new technology and to be able to detect probable data risks and problems.

2.8.4.6 User competencies

The user competencies element is part of the digital acumen and includes user tools-(word processing, presentation software, spreadsheet software), basic coding and securing and safeguarding dimensions. Students need the skills to enable them to choose the most appropriate software and user tools (Lee *et al.,* 2018:59; SAICA, 2019a:6). Employers perceived graduates' MS Excel software knowledge and skills as higher than tertiary educators do (Ramachandran Rackliffe & Ragland, 2016:160). This could be the result of students gaining knowledge on their own as part of continuous improvement (Ramachandran Rackliffe & Ragland, 2016:160). Because future employers will expect graduates with demonstrated knowledge of algorithms as well as with technical accountancy knowledge, the Accounting curricula should teach students the required skills to be employable in the 4IR (Slyozko & Zahorodnya, 2016:6). Graduates require skills from the Accountancy curricula to be competent to secure and safeguard assets (Rasid *et al.,* 2019:188)

The Accountancy curricula need to include the elements and dimensions (Table 2.7) of the digital acumen. Chapter 4 continues on the elements and dimensions of the digital acumen included in the module outcome documents of the selected universities. The next paragraph will define the technical competencies of the 2025CF.

2.9 2025CF: TECHNICAL COMPETENCIES

At the core of the CF as per Figure 2.2 is the technical competencies. Technical competencies are defined as the skill to apply technical knowledge to perform a role at a required standard. (SAICA, 2019a:7). Ballou *et al.* (2018:16) define technical accounting as "Knowledge of standards and processes needed to perform tasks and make judgements within specific accounting domains e.g. financial, managerial, auditing, tax, systems."

Section 2.10 reviews literature on the Chartered Accountancy curricula.

2.10 CHARTERED ACCOUNTANCY CURRICULA

Universities' curriculum must comply with SAICA's guidelines to retain accreditation. Professional bodies need to ensure that the curricula are aligned with current practice (Moore, 2018:2). Studying and obtaining a Chartered Accountancy degree is subject to time limitations forcing universities to choose which skills and technical knowledge to teach students (Douglas & Gammie, 2019:320). Lubbe (2017:69) suggests that the expansion in the intricacy of the world of economics and legislation and governance has led to additional competencies required of accountancy students that ultimately result in curriculum overload. The requirements of professional bodies may result in exclusions in curricula development, therefore, employers and alumni students need to be part of curricula development (Howard & Warwick, 2016:58). The academic programme should follow the prescribed SAICA guidelines and include teaching abilities and skills based on the academic institution's judgement (SAICA, 2019b:33). The Accountancy curricula's aim should be to equip and accustom students for management and not to teach them to be bookkeepers only (Thatong, 2016:70). The content of the curricula is important as well as the process of mastering knowledge and skills (Thatong, 2016:68).

The curricula are a cohesive fusion of expected knowledge skills and attributes to be attained by students based on perceptions of accounting academics, employers and professional bodies (Bunea, 2017:444). Information literacy ought to be part of various modules of the curricula to ensure knowledge and the application thereof stays dynamic (Joseph *et al.,* 2015:91). Coady *et al.* (2018:114) contradict by indicating that the following knowledge and skills could be of less importance to study: management accounting, IT, emotional intelligence skill of optimism, self-confidence, inspiration and emotional self-awareness. They reason that the skills can be satisfactorily mature in the workplace and therefore not expected to be included as part of the curricula.

Curricula education has evolved to teaching and learning as students should not only gain knowledge but also be able to apply what was learnt (Al-Htaybat *et al.,* 2018:350). Dzuranin *et al.* (2018:38) posit that data analytics could be taught as a hands-on project as well as through case studies. A variety of other teaching methods besides case studies are available to learn data analytics and big data, for example, online resources, blogs

and audio or video files (Mesa, 2019:1; Sledgianowski *et al.,* 2017:87). Teaching methodologies have a resistance to change due to the generation gap between students being young and educators being older (Parvaiz *et al.,* 2017a:97). In order to prevent the generation gap, educators need to keep up to date with what is going on in research and teaching (Pincus *et al.,* 2017:13).

The Accountancy curricula must include both technical skills and pervasive skills (Abayadeera & Watty, 2016:14). Perseverance, social skills and curiosity are important character skills (Economist, 2016). Ballou *et al.* (2018:20) propose that different skills knowledge and attributes should be incorporated as part of technical accounting knowledge teaching. In the study performed by Ballou *et al.* (2018:23) interviewing accounting professionals in 2018, the conclusion was that technical accounting topics are overemphasised in the curricula relative to other knowledge, skills and abilities. The curricula need to be more than just technical accounting (Bunea, 2017:445; Jackling & De Lange, 2009:377; Livingstone & Lubbe, 2017:138; Warwick & Howard, 2015:1). Rebele and Pierre (2019:73) in contrast argue that the learning objectives of Accountancy education programmes should reduce the relative importance of pervasive skills. In Chapter 4 the inclusion of technical knowledge and pervasive skills in the Accountancy curricula are reviewed. In Section 2.11 the literature on the Accountancy curricula and the 4IR is elaborated on.

2.11 ACCOUNTANCY CURRICULA AND THE FOURTH INDUSTRIAL REVOLUTION

Skills required by employers changed from the first IR and the steam engine to the invention of electricity. Due to the operational changes workers were concerned about their future job opportunities. Economist (2014) explains that despite the fear of workers losing their jobs, extensive job creation occurred. Now with the age of artificial intelligence workers are once again concerned about job losses reports (Economist, 2016). The accountancy profession already started to change and again employees have an increasing uneasiness about automation (Issa *et al.,* 2016:14). Xu *et al.* (2018:90) explain that the changes in automation will bring about changes in authority, expertise and fortune due to the rise of the productivity synergy effect. Industrialisation changed both the

required education as well as the format of teaching (Economist, 2016; Xu *et al.,* 2018:90).

Digital accountancy is the result of accountancy staff being replaced by a variety of algorithms leading to lower employment of traditional accountancy employees (Slyozko & Zahorodnya, 2016:5). In order to fast-track our economy, the workforce requires new skills and capabilities and the higher education system has a big role to play in assisting with the change (Rodny-Gumede, 2019:2-3). Benchmarking international degrees and growth in overseas institutions to meet the demands for 4IR in the dynamic world of work can be used to develop the higher education system. Peterson (2016) concludes that universities are currently upgrading the curricula to prepare students for data analytics and manipulation of big data with the sole purpose to accommodate the future auditor. The application of big data and data analytics will lead to technology-based auditing.

Disruptive innovations redefine conventional teaching leading to changes in the curricula and the method of providing education (Xu *et al.,* 2018:93). The universities could also enhance their curriculum offering with online education (Economist, 2014). Currently, due to the COVID-19 outbreak worldwide, students had to adapt to using new technologies (Sokhulu, 2020:3). Universities had to divert to online offerings. The accountancy curricula need to include technology subjects that will help to understand the connection between accountancy and technology (Al-Htaybat *et al.,* 2018:354). Coyne *et al.* (2016:167) posit that the curricula should be redirected towards the information life cycle away from the business cycles. This is mainly due to employers progressively recruiting new IT skills in system design and data analytics. Both analytical skills and database skills need to be added to the curricula (McKinney Jr *et al.,* 2017:64). Shah *et al.* (2012:3) argue that employers will hire analysts with good coaching skills to transfer knowledge and skills rather than an analyst with only good quantitative skills. Alumni and recent graduates must be upskilled and reskilled to retain their employability (Pedron, 2018:23)

We are living in a world driven by information (Komarev & Preobragenskaya, 2018:14). Over and above technology subjects, pervasive skills will be of higher importance due to changes brought into the world of work owing to 4IR and automation (Reddrop & Mapunda, 2019:85). Rodny-Gumede (2019:1) proposes specific skills that are essential

for the 4IR based on the “four C’s: critical thinking, collaboration, communication, and creativity”. This will also include “problem-solving, financial literacy, digital literacy, and teamwork, marketing, and presentation skills”. Rufino *et al.* (2017:127) regard technical knowledge as the basis of accounting education with complimenting pervasive skills. Parry and Jackling (2015:533) added that employers favour employing students with both technical knowledge and pervasive skills. Pervasive skills especially listening skills have been included in courses because it increases collaboration, trust, and productivity to the benefit of employers (Reddrop & Mapunda, 2019:85). The new accountant requires technical knowledge and the human touch (Al-Htaybat *et al.,* 2018:347).

2.12 CONCLUSION

The Accountancy curricula are prepared from the guidelines of professional bodies. The guidelines are included in the CF. SAICA as a member of IFAC follows the IAESB guidelines. The CF is a collection of knowledge skills and attributes that a graduate need. The importance of being proficient in pervasive qualities and skills is the focus of the 2019CF. The 2019CF includes pervasive qualities and skills and specific competencies. The 2019CF does not include listening skills as a required skill to be developed as part of the Accountancy curricula. There is a demand for universities to adapt education to develop students’ pervasive skills for the 4IR (Teng *et al.,* 2019:600).

The CA2025 project proposed a new direction for the chartered Accountancy profession (Coetzee *et al.,* 2020:13). A new proposed CF was developed by SAICA with the following elements: professional values and attitudes, enabling competencies and technical competencies. The prescribed competencies must be included in the Accountancy curricula to prepare the students with skills for the 4IR. Chapter 4 makes a comparison between the 2025CF and the 2019CF to identify new skills to be part of the Accountancy curricula. Students should develop themselves through lifelong learning to master skills that employers demand (Manyika *et el.*, 2017:127). Fast-track technological innovations like the internet change the availability of information resulting in changes in the requirements of current accountancy practitioners, which ultimately influence the Accountancy curricula (Stone, 2019:98).

Accountancy graduates should be prepared by the Accountancy curricula to fulfil the requirements of the dynamic developments in the business environment (Barac & du Plessis, 2014:74). Accounting graduates are required to be competent in being a business partner instead of performing only number crunching. The Accountancy curricula should prepare the students for innovation and entrepreneurship. Problem-solving skills are required in the Accountancy curricula for the 4IR. The Global Competitiveness report conducted in 2019, ranked South Africa 95th out of 141 countries in assessing critical thinking skills. In order to address the deficiency, the Accountancy curricula need to teach the students critical thinking skills as well as judgement and decision-making skills.

Some employers deemed written and oral communication more important than technical skills and the Accountancy curricula should include the skills since graduates lack career growth without the necessary communication skills. Leadership skills ought to be part of the Accountancy curricula as it is considered one of the top three essential skills. Likewise, people skills are required as graduates will have to address and communicate with management the results of the data analysed. Relationship-building is an important skill that graduates need for 4IR. Accounting education should combine the right technical skills with agility and network building skills and social skills. Studies indicate that accountancy students' teamwork skills are insufficient developed, therefore, teamwork skills must be included in the 2025CF and the Accountancy curricula. Graduates need to be able to work independently and be adaptable as well as being emotionally intelligent.

Pervasive skills will even be more important due to the changes brought by 4IR and automation. Disruptive innovations redefine skills employees need; therefore, the Accountancy curricula should change to prepare the students for the 4IR. The Accountancy curricula must include skills for data analysis and big data. Students need to understand cognitive and non-cognitive systems like machine learning and artificial intelligence to be prepared for the 4IR. The Accountancy curricula need skills in new developments like cloud computing, blockchain and mobile applications as well as the IoT and cybersecurity. Students ought to be competent in accountancy software and other office programs and require skills in coding. Skills in demand changed from the first IR through to the 4IR due to changes in the economy, therefore accountancy graduates

require new skills and capabilities. Specific skills essential for the 4IR include critical thinking collaboration communication and creativity. The accountant of tomorrow needs technical knowledge and the human touch.

CHAPTER 3: METHODOLOGY OF STUDY

3.1 QUALITATIVE RESEARCH DESIGN

This study was performed from the functionalist quadrant of the four paradigms for the analysis of social theory (Burrel & Morgan, 1979:22). This paradigm assumes societies have a concrete existence and follow a specific order that result to explanatory knowledge (Burrel & Morgan, 1979:26). The scientist assesses the society or object of inquiry objectively to provide a rational explanation of social occurrences and often use mechanical analogies to model an understanding for a particular phenomenon (Burrel & Morgan, 1979:26). The functionalist quadrant aims to provide rational explanations of identified problems (Burrel & Morgan, 1979:26). In this regard, the 2025CF was used as a theoretical framework to objectively assess and explain a particular phenomenon of university Accountancy curricula module documents, which should prepare graduates for 4IR. The flexible nature of qualitative research, which ensures an in-depth inquiry into a phenomenon, was used as a research method to provide a rational explanation to the Accountancy module documents outcomes preparing accountancy graduates.(Chesebro & Borisoff, 2007:10; Liamputtong, 2007:36; McMillan & Schumacher, 2014:5).

3.2 RESEARCH METHOD

The qualitative research method is a meticulous subjective evaluation performing explanatory fieldwork, intending to uncover explanations to a phenomenon or identify trends (Chesebro & Borisoff, 2007:8; Kothari, 2004:5; McMillan & Schumacher, 2014:20; Welman *et al.,* 2005:188). The qualitative research methodology was conducted to answer the question regarding the preparedness of the Accountancy curricula for the 4IR. In this regard, this study was performed to answer the research question and investigate new or different ways of understanding the Accountancy curricula phenomenon (Jackson *et al.,* 2007:21).

Figure 3.1 presents a schematic flow diagram of the study's research phases, activities, and sequences by describing the qualitative research process followed.

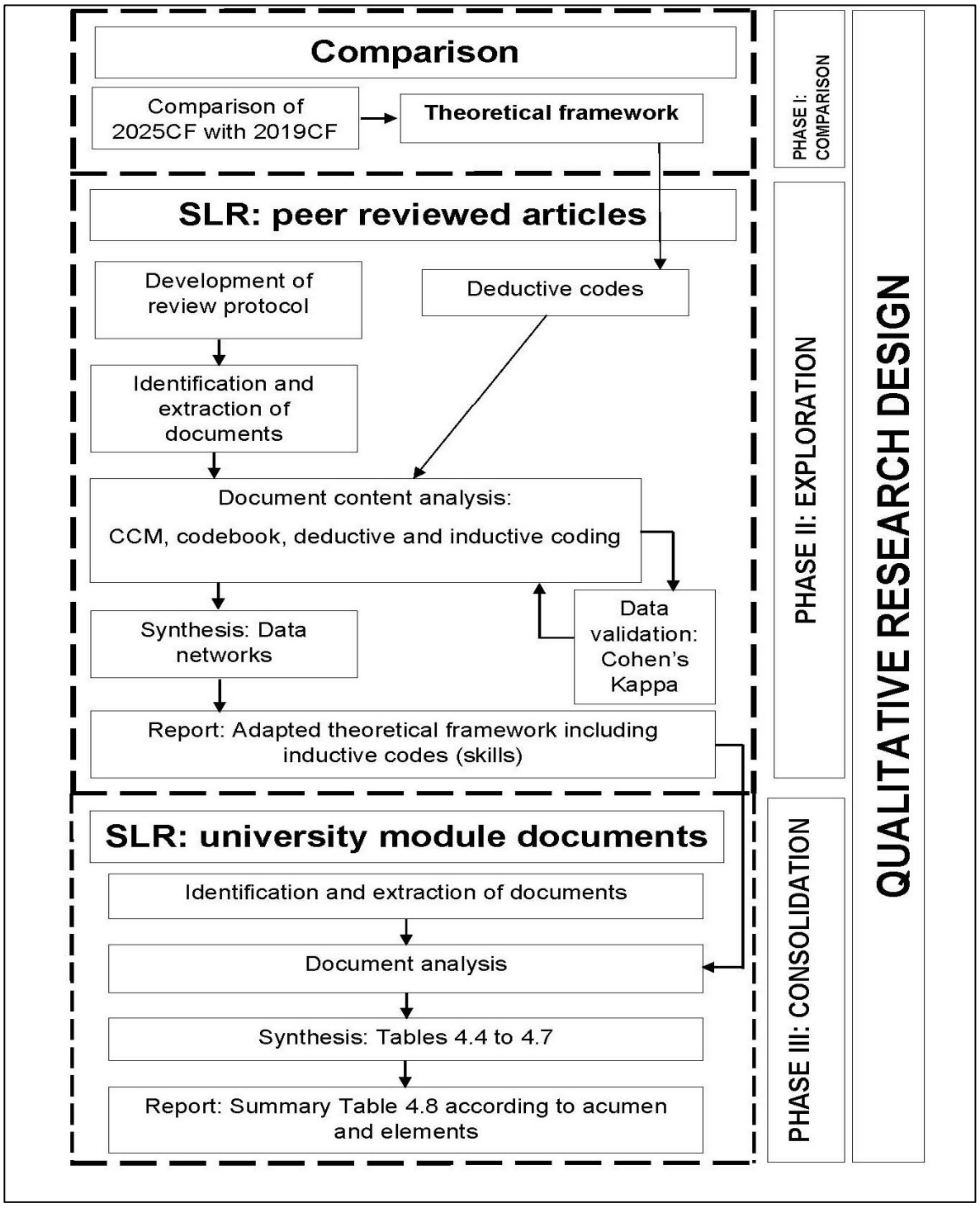

Figure 3.1: Schematic flow diagram of the qualitative research process followed in the study

Source: Own compilation

Qualitative research methods inter alia include interviews, observations and document analysis (Merriam, 2009:139). The selection of documents from expert authors and the analysis of specifically identified documents for inclusion in a SLR, serves multiple purposes. In this regard, a SLR integrates different theoretical ideas of a phenomenon, analyse and synthesise data for purposeful writing and provide rational explanations to a specific occurrence (Combs & Onwuegbuzie, 2010:2; Merriam, 2009:140). The qualitative study emphasise a sense of understanding while engaging purposeful samples of documents for a specific enquiry (Merriam & Tisdell, 2015:42). The SLR also provides insight about a phenomenon, since the evidence is often robust and transferrable (Kitchenham, 2004:4).

In order to evaluate if current university Accountancy curricula, outlined as prescribed competencies by SAICA, prepare graduates for the disruption of 4IR, the following qualitative analysis process was followed:

- Phase I: A comparison was performed between the newly proposed CF (2025CF) and the current CF (2019CF). The overarching themes of the 2025CF consist of i) professional values and attitudes, ii) enabling competencies (defined as acumens) and iii) technical competencies in the value creation process (SAICA, 2019a:3). The focus of the dissertation was delineated specifically to the 2025CF acumens of business, decision-making, relational and digital acumen as the major categories. Comparatively the 2019CF competencies indicated seven themes, opposed to the 2025CF's three overarching themes. The themes of the 2019CF include i) pervasive qualities and skills, ii) strategy risk management and governance, iii) accounting and external reporting, iv) auditing and assurance, v) financial management, vi) management decision-making and control and vii) taxation. The first theme of the 2019CF pervasive qualities and skills is the focus of this study in accordance with the enabling competencies of 2025CF and include ethical behaviour and professionalism, personal attributes and professional skills. The 2025CF four enabling competencies, consisting of the four acumens were compared to the 2019CF pervasive qualities and skills, consisting of ethical behaviour and professionalism, personal attributes and professional skills. The

elements and dimensions of the proposed 2025CF were used as a theoretical framework for analysis for Phase II.

- Phase II: A SLR was performed on peer-reviewed documents, using the 2025CF as a theoretical framework. Additional identified skills within peer-reviewed documents were added to the 2025CF through inductive coding. The inductive codes were categorised within the 2025CF and adapted the skills theoretical framework used for the analysis in Phase III.

- Phase III: The addition of skills identified in peer-reviewed articles, adapted the 2025CF theoretical framework, which was used to evaluate the university module outcome documents in Phase III. The adapted 2025CF provided the foundation for the document analysis on the module outcomes of the selected universities.

The three phases linked to the three empirical objectives of the study are discussed hereafter.

3.3 PHASE I: COMPETENCY FRAMEWORK COMPARISON

Universities use the SAICA CF as a guideline to develop the competencies to be included in the module outcome documents within the curricula for accountancy students (SAICA, 2019b:14). The 2019CF, in conjunction with the detailed guidance for the academic programme 2019, SAICA (2019b:12) focused on pervasive qualities and skills, strategy risk management and governance, accounting and external reporting, auditing and assurance, financial management, management decision-making, and control and taxation. The SAICA CF is reviewed and updated regularly to align with the current business environment. Due to global influences, complicated business environments, digital disruption and augmented stakeholder pressures, the 2025CF was developed to restore society's trust in CA(SA) through a clearer alignment of competencies (SAICA, 2020:9). The enabling competencies of the 2025CF consist of business, decision-making, relational and digital acumen. In order to ascertain the similarities and differences between the two CF's, a comparison between the 2025CF acumens and the 2019CF pervasive qualities and skills was made. The breadth of the 2019CF skills and 2025CF acumens, necessitated a delineation for the focus of investigation and in this regard, the

dissertation evaluated the preparedness of the Accountancy curricula for the 4IR and focused on 2025CF enabling competencies. The pervasive qualities and skills of the 2019CF consist of ethical behaviour and professionalism, personal attributes and professional skills (SAICA, 2019b:32). The Merriam-Webster dictionary defines acumen as “keenness and depth of perception, discernment, or discrimination especially in the practical matter” (Merriam-Webster, 2020).

Elements of the 2025CF consist of professional values and attitudes, enabling competencies defined as acumens and technical competencies in the value creation process. The skills comparison linked the acumen elements and dimensions of the 2025CF to the pervasive qualities and skills from the 2019CF. The purposeful comparison identified new and additional skills or dimensions included in the 2025CF to adapt the curricula for the 4IR changes. The comparison identified new acumens added to the 2025CF. The purpose of performing the comparison was to identify a theoretical framework to be used as a basis for the document analysis of the peer-reviewed articles during the SLR in Phase II.

3.4 PHASE II EXPLORATION: SYSTEMATIC LITERATURE REVIEW

Observations, interviews and document analysis are methods often used to collect data during qualitative research (McMillan & Schumacher, 2014:369). In order to investigate the Accountancy curricula’s inclusion of skills to prepare graduates for the 4IR, a SLR was performed. The SLR aimed to outline the application of elements from 2025CF with previously conducted research since 2015 (Kitchenham, 2004:3). The selection of documents from a variety of expert authors on the Accountancy curricula and skills development research purposed to synthesise data for purposive writing and to substantiate the 2025CF as the theoretical framework for this study. (Cronin *et al.,* 2008:38; Hemingway & Brereton, 2009:5). Additionally, the SLR was performed to add to the 2025CF from existing evidence of accountancy students’ skills development research aimed at the changes envisioned for the 4IR workforce. Therefore, the SLR aimed to identify gaps within the Accountancy curricula research as well as specific additional elements within literature that may not be portrayed within the 2025CF. The identified gaps expanded on the 2025CF as a theoretical framework for the analysis of the top five South African universities’ Accountancy curriculum module documents used in Phase III.

The SLR ensures a level of rigour to review the 2025CF and its elements, while research evidence enhanced the 2025CF as a theoretical framework. A SLR provided a perspective on research and is a crucial step in a research enquiry (Kitchenham & Charters, 2007:3).

The selection of documents for the qualitative analysis should follow the same precision as the selection of suitable participants for research interviews (Merriam, 2009:154). The fundamental principles of a SLR are based on the following: i) the ability of the process to be repeated at any time, ii) a clear document trail of standardised selection process and methods and iii) an assessment record of the documented inclusion and exclusion criteria according to a hierarchy of decisions (Cronin *et al.,* 2008:39; Kitchenham, 2004:9). A SLR should adhere to criteria of validity, reliability and trustworthiness with little researcher bias (Kitchenham & Charters, 2007:14). The documentation process and adherence to specific criteria aim to assume quality assessment of primary documents (Kitchenham, 2004:18). A SLR must follow a predefined search strategy to assess the completeness of the search, which requires considerably more effort than performing a traditional literature review (Kitchenham & Charters, 2007:4). A predefined search strategy was outlined for this study as part of a precise methodology (Kitchenham & Charters, 2007:4). In order to ensure a rigorous method and the repeatability of this study, the researcher followed six steps to complete the SLR. In addition, well-defined annexures were prepared to provide further detail of the SLR process followed (Kitchenham, 2004:9; Mays & Pope, 1995:109). The six steps followed are summarised in Table 3.1, where after each step is described (Kitchenham, 2004:25).

3.4.1 DEVELOPMENT OF A REVIEW PROTOCOL

The development of a review protocol was performed as part of Step 1. As Kitchenham and Charters (2007:3) proposed, the researcher compiled a review protocol at the start of the process. This protocol ensured precision and objectivity in the review process (Ghanbari, 2017:44). The co-supervisor oversaw the development of a review protocol (and the SLR process as a whole). The protocol purposed to increase the trustworthiness and reliability of results, as well as to prevent researcher bias (Kitchenham, 2004:7). The review protocol controlled the process and steps followed in performing the SLR (Mays & Pope, 1995:110).

Table 3.1: Six key steps performed to conduct the SLR

Key steps		Activities performed
1	Development of a review protocol	• Identified a list of keywords (Hsieh & Shannon, 2005:1286). • Detailed method to perform SLR described (Kitchenham, 2004:9).
2	Identification and extraction of research	• Electronic databases were accessed and searched by using keywords (Kitchenham, 2004:4). • Documents identified were filtered by applying inclusion and exclusion criteria.
3	Quality assessment	• Document quality was evaluated by using hierarchy of evidence (Kitchenham & Charters, 2007:21).
4	Qualitative content analysis	• Document analysis according to 2025CF theoretical framework. • Deductive and inductive coding process applied using ATLAS.ti™ 8. • CCM was conducted (Boeije, 2002:406). The inter- and intra-rater agreement was calculated through Cohen's Kappa (McHugh, 2012:277). • Development of codebook (Saldaña, 2013:25).
5	Synthesis	• Concatenation of individual and combined data codes, categories and themes into networks (Kitchenham & Charters, 2007:34). • Diagrams of network relationships prepared (Saldaña, 2013:36).
6	Report	• Codes, elements, and dimensions reported as data networks in Chapter 4 (Cronin *et al.,* 2008:42).

Source: (Kitchenham, 2004:25)

The development of a review protocol process commenced through the identification of a list of keywords (Jesson *et al.,* 2011:108). The keywords were discussed with the promotors. The keywords identified included Accountancy curricula, accountancy skills, Fourth Industrial Revolution accountancy and Fourth Industrial Revolution skills. Booleans and truncation were used to maximise the searches within the databases (California State University Northridge Oviatt Library, 2009). The keywords adjusted for Booleans and truncation included: "account* AND curricu*", "skills AND account*", "account* AND skills" "accounting AND curriculum", "accountant skills AND account*", "4th

industrial revolution AND account*", ""4th industrial revolution" AND skills"", ""4IR" AND skills". In order to ensure validity, the searches were performed with the help of the Manager Information Services in the Faculty of Economic and Management Sciences on the Vanderbijlpark Campus of the North-West University. Suitable databases for the different accountancy and educational domains were identified with the help of the information specialist (Kitchenham, 2004:18). The criteria used for the selection process included publication date, language, journals, authors and research design. Research articles published since 2015 were included in the literature searches, since the research topic aims to discover changes due to influences from 4IR, which had recently started (Pedron, 2018:21). In this regard, the titles of full text, scholarly and peer-reviewed articles in accredited journals and conference proceedings were accessed. Only articles available for download were selected and books and SLR's were excluded from the document searches, since according to the hierarchy of evidence are deemed as secondary sources (Kitchenham, 2004:1).

3.4.2 IDENTIFICATION AND EXTRACTION OF RESEARCH

The SLR process had to remain transparent and replicable and was therefore documented for readers to assess the thoroughness of the searches, identification and extraction performed (Kitchenham, 2004:16). The searches and application of inclusion and exclusion criteria are documented in Annexure 1, which indicates the detail concerning the SLR document search and identification process followed. Each search was numbered and dated and the database accessed was listed with the keywords searched. The number of hits per search, the selected articles, as well as the inclusion and exclusion criteria applied were clearly stated (Annexure 1). A total of 29 searches were conducted independently.

The listed keywords using Booleans and truncation (California State University Northridge Oviatt Library, 2009) were used to conduct searches on the following databases: Scopus®, Google Scholar, Ideas RePEc, Taylor & Francis Online™, Science Direct, Mendeley, and Emerald Insight™. During the first round of searches, articles with one or more of the keywords in the title were included for further scrutiny. The search delivered a total of 444 hits for the identified keywords within the various databases (Annexure 1). Manual searches for specific journal publications were also included to ensure

completeness of documents extracted (Cronin *et al.,* 2008:40; Kitchenham & Charters, 2007:15). The Journal of Accounting Education was searched manually, since relevant research on Accountancy curricula skills development was identified within the initial searches. The manual search resulted in a total of 104 hits for the identified keyword. From the additional journal hits, a total of 100 documents were excluded since the documents were not relevant to the study or were already selected. In addition, leading authors in the field of accountancy were identified for manual searches. Two leading authors were searched on the Emerald Insight™ and Scopus® databases. During the first round of author searches, 29 additional hits were included for further scrutiny (Annexure 1). From the additional hits, a total of 28 documents were excluded since it included books, articles on continuous professional development, migration or referred to skills deficiencies of international graduates. In this regard, a number of new hits were already included during previous searches. After the inclusion and exclusion criteria were applied, only one document was included. Only English articles published from 2015 in peer-reviewed journals, available to the researcher with at least one of the keywords in the title was included for further scrutiny. Documents were also scrutinised to ensure no duplications were included (Kitchenham & Charters, 2007:33). From a total of 577 hits, 55 articles were included, which adhered to the inclusion and exclusion criteria.

3.4.3 QUALITY ASSESSMENT

In addition to the application of the inclusion and exclusion criteria during the search process, the quality of the literature selected needs to be assessed (Cronin *et al.,* 2008:39). The assessment of quality documents was performed over and above the inclusion and exclusion criteria applied (Kitchenham, 2004:10). As part of the review, the quality of the selected documents was evaluated based on the hierarchy of evidence checklist (Kitchenham & Charters, 2004:21). The literature searches excluded SLRs and books since it is deemed as secondary sources. Only documents from primary research were selected for inclusion in the SLR. The application of the inclusion and exclusion criteria together with the hierarchy of evidence as quality assessment, rendered 55 articles in total (Annexure 2).

3.4.4 QUALITATIVE DOCUMENT CONTENT ANALYSIS

The CCM is a fundamental part of the qualitative content analysis (Boeije, 2002:406). The CCM use comparison as the primary intellectual tool where the simultaneous comparing and contrasting of information establish codes, categories and themes (Tesch 1990 as cited in Boeije, 2002:392). Through comparison, the researcher created inductive codes and applied deductive codes according to 2025CF used as theoretical framework. Deductive codes are previously defined codes or identified from theoretical frameworks while inductive codes are rational understanding that emerge from working with the data (Forman & Damschroder, 2007:48). The comparison process involves an analysis that considers new data in light of previous data (Boeije, 2002:393). The CCM qualitative analysis created codes and categories using ATLAS.ti™ 8. The accountancy skills (described as elements and dimensions) within the 2025CF were used as a theoretical framework to create deductive codes during the content analysis. In addition, inductive codes were created during the coding procedure.

3.4.4.1 Coding procedure

The 2025CF elements and dimension (related to skills) were used as a theoretical framework to perform the document analysis as part of the SLR. The content analysis was performed on the 55 included documents, where each passage was studied to determine the meaning thereof. Passages were labelled according to an adequate code through applying deductive and inductive coding. Coding is seen as a formal application of analytical thinking whereby meaning is assigned to specific passages (Marshall & Rossman, 1999:155). The 2025CF provided a sound theoretical framework for analysis and allowed for the identification of deductive pieces of information, specific to the research question (De Vos *et al.,* 2005:47). The application of 2025CF as deductive codes was substantiated, since the elements and dimensions of 2025CF are related to skills that are developed through the Accountancy curricula and portrayed in published research. The deductive reasoning allows for the identification of broad patterns, which are theoretically expected to be evident within the selected articles.

In addition to deductive code creation based on 2025CF elements and dimensions (skills), inductive coding was also applied. Inductive code creation implies the discovery of

specific pieces of information as meaning units, which cannot be explained within the deductive reasoning scope (DeCuir-Gunby *et al.,* 2011:137). Meaning units or inductive codes are seen as labels of meaning to describe the information during the document analysis (DeCuir-Gunby *et al.,* 2011:137). Codes have their own meaning and are able to stand on their own (Côté *et al.,* 1993:131). In this regard, Saldaña (2013:4) emphasises that coding is not an act of precision, but fundamentally interpretation. Coding is defragging and dividing text from disguise (St. Pierre & Jackson, 2014:716). Words or a short-expression with a similar meaning were consistently grouped under a code (Saldaña, 2013:3; Weber, 1990:12). In this manner, inductive codes were created and compared to find new information with the aim to conceptualise new elements and dimensions (skills) not within 2025CF, but portrayed within existing literature.

The variety of deductive and inductive created codes substantiated the 2025CF skills within current literature, as well as provided insight into additional skills identified by literature and not within 2025CF. The created codes were documented in a codebook (Saldaña, 2013:25). The codebook aimed to order and organise the qualitative analysis and consisted of the deductive codes that were identified as elements and dimensions (skills) from 2025CF as well as the inductive codes identified during the document analysis. With the creation of deductive and inductive codes, attention was given to provide precise code names, adequately define each code and to add an example from literature within the codebook (DeCuir-Gunby *et al.,* 2011:147) (Annexure 5). The codes, definitions and examples were discussed and evaluated with the accounting expert and promotor. During the document analysis using the CCM and codebook creation process, application consistency needs to be assessed (DeCuir-Gunby *et al.,* 2011:147). In this regard, intra- and inter-rater reliability or verification of the code application process was achieved through the calculation of Cohen's Kappa coefficient (Cohen, 1960 as cited in DeCuir-Gunby *et al.,* 2011:149).

3.4.4.2 Cohen's Kappa calculation

Reliability and validity are important for researchers when judging the quality of qualitative research (Seale, 1999:472). The establishment of inter- and intra-rater reliability is necessary to determine the code application consistency by the researcher and multiple raters (DeCuir-Gunby *et al.,* 2011:149). Inter-rater reliability is established when multiple

people interpret data similarly (McHugh, 2012:276). The agreement between raters is defined as inter-rater reliability and can be portrayed through a Cohen's Kappa calculation (Anderson *et al.,* 2001:12). During the process of establishing inter-rater reliability, the primary researcher coded two documents and created a codebook, complete with codes, definitions and examples. The second rater who in this case was the co-promotor, scrutinised the codebook and revised the created codes within the context of the data and through a discussion with the researcher, understood the codes to be applied. After the inspection of codes, definitions and examples in the codebook, the co-promotor coded the two documents, which was also coded by the primary researcher. The Cohen's Kappa inter-rater reliability value was calculated at κ = 0.83 for inter-rater reliability (Annexure 3). The rating indicated that the inter-rater agreement was almost perfect with consistent codes allocation (Table 3.2) (McHugh, 2012:277; Viera & Garrett, 2005:362). The following formula in Figure 3.2 was used to calculate Cohen's Kappa:

KAPPA CALCULATION

$$\kappa = \frac{Pr(a) - Pr(e)}{1 - Pr(e)}$$

Figure 3.2: Kappa calculation

Source: (McHugh, 2012:280)

Where Pr(a) represents the actual observed agreement, and Pr(e) represents change agreement. The sample size consists of the number of observations made across which raters compared and Kappa is based on the chi-square table and Pr(e) obtained with the following formula: Pr(e) Calculation

$$\text{Expected Agreement} = \frac{\left(\frac{cm^1 \times rm^1}{n}\right) + \left(\frac{cm^2 \times rm^2}{n}\right)}{n}$$

$$\text{Expected Agreement} = \frac{\left(\frac{157 \times 150}{222}\right) + \left(\frac{65 \times 72}{222}\right)}{222}$$

$$\text{Expected Agreement} = \frac{108.08 + 21.08}{222} = .57$$

Figure 3.3: Kappa calculation Pr(e)

Source: (McHugh, 2012:280)

Where: cm1 represents column 1 marginal,

cm2 represents column 2 marginal,

rm1 represents row 1 marginal,

rm2 represents row 2 marginal and

n represents the number of observations.

Table 3.2: Data for Kappa calculation example

DATA IN TABLE FORMAT

		Rater 1		Row Marginals	
		normal	abnormal		
Rater 2	normal	147	3	150	rm^1
	abnormal	10	62	72	rm^2
Column Marginals		157	65	222	n
		cm^1	cm^2		

Raw % Agreement

$$\frac{147+62}{222} = .94$$

Source: (McHugh, 2012:280)

Intra-rater reliability was calculated using the same formula and rendered a κ = 0.805 value, where the researcher coded the same initial two documents seven days apart (Annexure 4). Viera and Garett (2005:362) rate the Kappa value of 0.805 as substantial agreement. The consistent manner in which codes were created and applied, validated the qualitative content analysis method performed and therefore the researcher continued with the coding process since the inter- and intra-rater reliability was acceptable. The analyses on the remaining documents were completed using a similar method of deductive and inductive coding application, while applying the CCM and developing a codebook.

3.4.5 SYNTHESIS

The SLR provided an analysis of the most recent research papers using the 2025CF skills as a theoretical framework (Jesson & Lacey, 2006:144). The analysis of documents substantiated the inclusion of specific skills (elements and dimensions) within the 2025CF and in addition identified skills within empirical studies not included in the 2025CF. The identification of the 2025CF skills within the most recent research publications as well as

the additional skills within literature are presented in data networks (Figure 4.1 to Figure 4.4). According to St Pierre and Jackson (2014:717), data networks establish a graphical explanation of the analysis process through the coded data. Individual data network maps for each 2025CF acumen were established and graphically displayed and are discussed in detail in Chapter 4.

3.4.6 REPORT

The report is the culmination of the SLR as it progressed through the development of a review protocol, identification and extraction of documents, quality assessment, qualitative content analysis and synthesised data (Kitchenham, 2004:25). Findings of a SLR can be presented in various ways with the structure of the report that plays a vital role to understand and interpret the analysis (Cronin *et al.,* 2008:42). The findings of the SLR on 2025CF skills within research papers as well as additional skills within literature not included in 2025CF, are presented in a data network format and discussed further in Chapter 4.

The findings from the SLR rendered an adapted 2025CF with additional skills identified within literature, which was added to the 2025CF theoretical framework. The adapted 2025CF framework was used to analyse the Accountancy curricula module outcome documents of the top five universities in South Africa. This was performed as part of Phase III.

3.5 PHASE III CONSOLIDATION: UNIVERSITIES MODULE DOCUMENTS ANALYSIS

The document analysis performed on the selected articles in Phase II provided a comprehensive overview of the skills needed in the Accountancy curricula needed by graduates entering the 4IR workforce. The adapted 2025CF is presented in Chapter 4 as numerous data networks to indicate the variety of skills grouped under the categories and themes of dimensions and acumens of the 2025CF. The skills (elements and dimensions within the four major acumens (categories)) from the 2025CF, together with the newly identified and added skills from the SLR in Phase II, was used to analyse the Accountancy curriculum module documents of the top five universities in South Africa. In this regard,

the module document analysis was performed using the adapted 2025CF as theoretical framework. Document analysis, as part of qualitative research, is defined as a methodical practice of studying and assessing documents (Bowen, 2009:27). The strengths of the document analysis included the public availability of the module documents as part of the different universities' Accountancy curricula. Likewise, the document analyses posed limited cost implications (Bowen, 2009:31). The module documents were analysed by using the adapted 2025CF (and the codebook) as a theoretical framework to evaluate the skills included within Accountancy curricula as needed for the 4IR. Phase III was completed using the four steps depicted in Table 3.3.

Table 3.3: Key steps performed to conduct the university module document SLR

Key steps		**Activities performed**
1	Identification and extraction of research	• Keywords were identified. • Searches performed on search engines using keywords (Kitchenham, 2004:4). • Documents identified for inclusion were filtered by applying inclusion and exclusion criteria.
2	Qualitative content analysis	• Document analysis according to adapted 2025CF theoretical framework. • Deductive coding process applied using ATLAS.ti™ 8.
3	Synthesis	• Tables prepared for analysis according to adapted 2025CF theoretical framework.
4	Report	• The report was compiled (Chapter 4) with codes, elements, and dimension tables (Cronin *et al.,* 2008:42).

Source: Kitchenham (2004:25)

3.5.1 IDENTIFICATION AND EXTRACTION OF DOCUMENTS

The identification of documents to be included has to be done in an unbiased way to ensure thoroughness and consistency of analysis (Kitchenham, 2004:7). In order to achieve transparency and unbiased analysis, the THEWUR (2019b) were used to select the top five universities in South Africa. THEWUR performs annual rankings of the top universities based on five areas of "teaching, research, citations, international outlook and industry income" (THEWUR, 2019a). The ranking is conducted annually on more or less

1397 institutions worldwide (THEWUR, 2019b). Ten of South Africa's tertiary educational institutions were included in the rankings for 2020 (THEWUR, 2019b). The top five universities in South Africa were selected to mitigate the risk of bias inclusion. The universities are not disclosed to adhere to ethical guidelines and the results are presented anonymously in Table 3.4.

Table 3.4: Top five South African universities included in Times Higher Education World University Rankings of 2020

Institution	World ranking
1	136
2	194
3	251–300
4	401–500
5	501–600

Source: THEWUR (2019b)

The top five South African universities' websites were accessed and searched. The searches were conducted via the internet using the Mozilla Firefox search engine. The keywords searched were universities in South Africa, Accountancy degree, Accounting degree, Chartered Accountant programme, Commerce degree, Bachelor of Commerce degree, curriculum outcome, module outcome, yearbooks and syllabus. The module outcome documents were filtered by applying the inclusion and exclusion criteria (Kitchenham, 2004:2). The universities' yearbooks, syllabuses or calendars detailing the module outcomes were publicly available on the universities' websites and the module documents of the Chartered Accountancy degrees or programmes accessed. The Chartered Accountancy degrees' module documents were included, and non-Chartered Accountancy degree module documents were excluded. The university module outcomes are official documents and available for external communication (McMillan & Schumacher, 2014:387). The module documents contain specific information on degree or programme module outcomes, which should be aligned with SAICA prescriptions as stipulated within 2025CF.

3.5.2 QUALITATIVE CONTENT ANALYSIS

The module documents were analysed and decoded. The decoding was performed to bring forth meaning and appreciation in developing empirical knowledge (Bowen, 2009:32). Decoding is a process of making sense through interpretation. The detailed module outcome documents were coded using the codes (skills) as per the adapted 2025CF theoretical framework. The qualitative analysis classified codes (dimensions) into categories (elements) identifying patterns and connections to themes (acumens) using ATLAS.ti™ 8 (McMillan & Schumacher, 2014:395).

3.5.3 SYNTHESIS

The findings of the document analysis as part of the university module document SLR in Phase III of the top five SA universities are presented in table format (Table 4.4 to Table 4.7 in Chapter 4). In this regard the adapted 2025CF theoretical framework indicating the skills (elements, dimensions and acumens) needed by the 4IR accountancy graduates' workforce were reported on. The tables that represent the synthesis of the document analysis, follows the structure of the adapted 2025CF as developed during Phase II.

3.5.4 REPORT

The analysis of the elements and dimensions (codes) within the four acumens of the 2025CF, purposes to identify compliance by the top five SA university Accountancy curricula to the SAICA CF guidelines and is presented in Table 4.8 in Chapter 4. The summary table follows a similar structure to the adapted 2025CF.

3.6 LIMITATIONS

A limitation in using the publicly available yearbook of the different universities may result in the limited level of detail regarding module documents. In few instances information in module documents made it difficult to evaluate the curriculum. The possibility exist that the curriculum is not totally reflected within the module outcome documents, however, universities have to develop their documents to adhere to the SAICA prescriptions, and therefore the module documents are a true reflection of the current curricula outcomes.

3.7 ETHICAL CONSIDERATIONS

In order to comply with the North-West University Research Ethics Committee guidelines, the universities selected for the module outcome document analysis were not disclosed and the results are presented anonymously. The results of the three phases of the qualitative research as outlined in Figure 3.1 are discussed in Chapter 4.

CHAPTER 4: RESULTS AND DISCUSSION

4.1 INTRODUCTION

This chapter reports on and interprets the findings of this study based on the empirical objectives as formulated under Section 1.3.2.2 in Chapter 1. This chapter provides the results in three sections, as outlined by the three phases of the flow diagram (Figure 3.1) in Chapter 3. The first findings section reports on the comparison between the SAICA 2025CF and 2019CF and highlights general and specific similarities as well as clear differences with new additions to the 2025CF. The comparison of the newly proposed 2025CF to the 2019CF specifically aimed to identify additional competencies (skills) included in the 2025CF, previously not addressed within the 2019CF. Likewise, the 2025CF skills, as portrayed by dimensions, categorised into elements and grouped into acumens, served as the theoretical framework of enquiry for the study. The theoretical framework with its specified structure was used during the deductive analysis performed in Phase II on the peer-reviewed documents regarding accountancy skills needed, as well as during Phase III where the different universities' module outcome documents were analysed. During Phase II, the 2025CF skills, used as deductive codes as well as newly inductive codes created from peer-reviewed documents, substantiated and enhanced the conceptual framework of the study.

The adapted 2025CF, according to additional skills identified during the article document analysis, served as an enhanced theoretical framework for analysis on the skills identified within module outcomes from the top five universities in South Africa during Phase III. Findings for Phase I are portrayed within Table 4.1 according to the structure of 2025CF acumens, elements and dimensions, which signify the skills that universities have to include in their Accountancy module outcomes (SAICA, 2019a:1). The CF purposes to define the capabilities of an entry-level CA(SA) (SAICA, 2019a:1). The capabilities are known as the competencies and consist of knowledge, skills and attributes (SAICA, 2019b:6). The document analysis findings of Phase II are portrayed within data networks to indicate similarities, differences and new findings according to deductive and inductive codes that were created during the analysis. The findings of Phase III are presented in table format to represent the findings regarding university module outcomes.

4.2 SAICA COMPETENCY FRAMEWORK COMPARISON

SAICA launched the CA2025 project with the intent to stay relevant and to restore trust in the profession in providing knowledge, skills and professional values needed for the 4IR (CAW, 2016:4). The 2025CF consists of overarching themes of i) professional values and attitudes, ii) enabling competencies and iii) technical competencies in the value creation process. Enabling competencies are divided into four major acumens (categories) namely business, decision-making, relational and digital acumen (SAICA, 2019a:3). The CF contains detail of proven knowledge, skills and attributes for an entry-level CA(SA) to the workforce (SAICA, 2019b:6). Contrary to the 2025CF, the themes of the 2019CF include i) pervasive qualities and skills, ii) strategy risk management and governance, iii) accounting and external reporting, iv) auditing and assurance, v) financial management, vi) management decision-making and control, and vii) taxation. The first theme of the 2019CF's pervasive qualities and skills include ethical behaviour and professionalism, personal attributes and professional skills. For the purpose of this study, the focus was directed at the analysis of enabling competencies since the dissertation was delineated specifically to the 2025CF acumens of business, decision-making, relational and digital acumens as the major categories.

Ethical behaviour and professionalism competencies that were evident in the 2019CF pervasive qualities and skills theme are included in the 2025CF professional values and attitudes overarching theme. Personal attributes and professional skills competencies from 2019CF pervasive qualities and skills theme are evident in 2025CF enabling competencies (acumens) overarching theme. The specific competencies from the themes (2019CF) such as strategy risk management and governance, accounting and external reporting, auditing and assurance, financial management, management decision-making and control and taxation are included in the 2025CF overarching theme of technical competencies in the value creation process. As the dissertation was delineated to the enabling competencies with the four acumens, the professional values and attitudes and technical competencies as part of the 2025CF, was not included in the analysis.

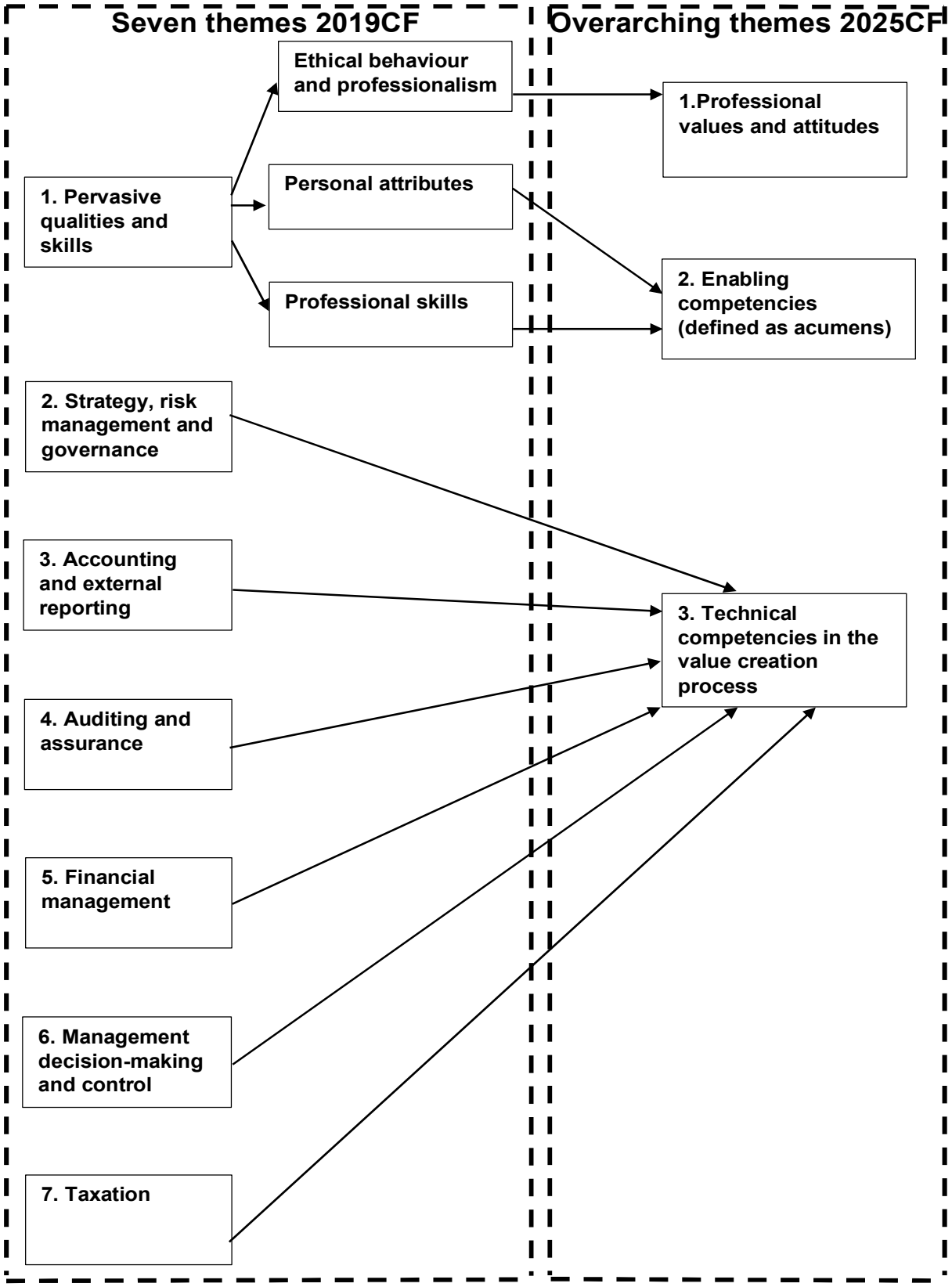

Figure 4.1: Seven themes of the 2019CF matched to elements of the 2025CF

Source: SAICA 2025CF SAICA (2019a:1-11) and own compilation

For the purpose of this study, the skills related to ethics and ethical behaviour were not included in the analysis.

For comparative purposes, the similarities and differences between the 2025CF and 2019CF skills were listed (Table 4.1). These skills as per CF are used by universities to develop their Accountancy module outcomes. In Table 4.1, the enabling competencies of the 2025CF with its four acumens, 20 elements and 55 dimensions were used as foundation to compare and highlight the changes made from the 2019CF. The current 2019CF, which has a different structure of skills categories and themes, were scrutinised to ascertain the occurrence of skills within the proposed 2025CF.

Table 4.1: Comparison between the proposed 2025CF and current 2019CF

Proposed 2025CF			**Current 2019CF theme**	**New skill within 2025CF**
Acumen	**Element**	**Dimension**		
Business acumen	Business internal environment	Role of business in society	Specific competency: Strategy, risk management and governance	**No**
		Different types of entities and the role they play in society		
		Internal functions of an entity		
		Concept of stewardship		
		Defining business success (value creation; profit motive vs sustainable businesses)		
		Business models		
	Business external environment	Global and other external influences (including sustainable development goals)	Pervasive qualities and skills - Professional skills: Understands how the national and international environment impacts a CA's role	**No**
		Tax policy	Specific competencies of taxation	**No**
	Innovation and creativity	Initiative	Pervasive qualities and skills – Personal attributes: Strive to add value in an innovative manner	**No**
		Innovation		**No**

Proposed 2025CF			**Current 2019CF theme**	**New skill within 2025CF**
Acumen	**Element**	**Dimension**		
		Continuous improvement	Specific competency: Strategy, risk management and governance	**No**
		Entrepreneurship	Pervasive qualities and skills	**No**
Decision-making acumen	Analytical/critical thinking	Challenge assumptions	Pervasive qualities and skills – Personal attributes: Demonstrate responsible leadership	**No**
		Critical analysis	Pervasive qualities and skills – Professional skills: Examines and interprets information and ideas critically (critical thinking)	**No**
	Problem-solving	Mindful reasoning	Pervasive qualities and skills – Professional skills: Examines and interprets information and ideas critically (critical thinking)	**No**
		Impact of issues	Pervasive qualities and skills – Professional skills: Solves problems and makes decisions	**No**
		Implications of actions		**No**
		Knowing when to seek expert assistance	Pervasive qualities and skills – Professional skills: Manages and supervises	**No**
	Judgement & decision-making	Issue identification	Pervasive qualities and skills – Professional skills: Solves problems and makes decisions	**No**
		Integrated nature of quantitative and qualitative metrics (financial and non-financial information)	Pervasive qualities and skills – Professional skills: Examines and interprets information and ideas critically (critical thinking) Included in the specific competency: Financial management	**No**
		Analysis	Pervasive qualities and skills – Professional skills: Examines and interprets information and ideas critically (critical thinking)	**No**
		Recommendations	Pervasive qualities and skills – Professional skills: Solves problems and makes decisions	**No**
		Implementation		**No**
	Professional scepticism	Independent and questioning mindset	Pervasive qualities and skills – Ethical behaviour and professionalism: Maintains objectivity and independence	**No**

Proposed 2025CF			**Current 2019CF theme**	**New skill within 2025CF**
Acumen	**Element**	**Dimension**		
Relational acumen	Communication skills	Listening, interviewing and discussion	Pervasive qualities and skills ─ Professional skills: Communicates effectively and efficiently	**Listening Yes No**
		Communication media	Pervasive qualities and skills ─ Professional skills: Communicates effectively and efficiently	**No**
		Audience and effectiveness		
	Leadership skills	Sustainability and long-term thinking	Pervasive qualities and skills ─ Personal attributes: Demonstrate responsible leadership	**No**
		Servant leadership		
		Influence and consensus building		**Yes**
		Moral and ethical decision-making	Pervasive qualities and skills ─ Ethical behaviour and professionalism: Uses an ethical reasoning process	**No**
	People skills	Influence and negotiation	Pervasive qualities and skills ─ Personal attributes: Manage and supervises	**No**
		Conflict resolution	Pervasive qualities and skills ─ Personal attributes: Treat others in a professional manner Works effectively as a team member	**No**
		Consultation	Pervasive qualities and skills ─ Personal attributes Maintain and demonstrates competence and recognises limits	**No**
	Relationship-building skills	Strategic professional relationships	Pervasive qualities and skills ─ Personal attributes: Demonstrate responsible leadership	**No**
		Network building		**Yes**
	Teamwork	Knowledge sharing		**Yes**
		Cooperation and collaboration	Pervasive qualities and skills ─ Personal attributes: Works effectively as a team member	**No**
	Self-management	Work independently	Pervasive qualities and skills ─ Personal attributes: Self-management	**No**
		Adapt to management styles		

Proposed 2025CF			**Current 2019CF theme**	**New skill within 2025CF**
Acumen	**Element**	**Dimension**		
		Organisation culture advocacy	Specific competency: Strategy, risk management and governance	**No**
	Managing others	Manage teams/projects	Pervasive qualities and skills ─ Personal attributes: Plans and effectively manages teams and projects, manages time effectively. Professional skills: Manages and supervises	**No**
		Talent management (developing others)	Pervasive qualities and skills ─ Personal attributes: Manage and supervises	**No**
	Emotional intelligence	Handle relationships empathetically and judiciously	Pervasive qualities and skills ─ Personal attributes: Demonstrate responsible leadership	**No**
Digital acumen	Data analytics	The nature of data (e.g. underlying characteristics and storage)		**Yes**
		Perform data analysis		**Yes**
	Big data	Impact on business models		**Yes**
	Cognitive & non-cognitive systems	Including but not limited to machine learning, robotic process automation and artificial intelligence		**Yes**
	New developments & protocols	Including but not limited to cloud computing, blockchain, and mobile apps		**Yes**
	Distributed processing and cyber security	Distributed processing (IoT)		**Yes**
		Risks and attacks		**Yes**
		Mitigating steps		**Yes**
	User competencies	User tools (Word processing, presentation software, spreadsheet software)	Pervasive qualities and skills ─ Professional skills: Understands and uses appropriate IT systems and tools	**No**
		Basic coding		**Yes**
		Securing and safeguarding		**Yes**

Source: Elements and dimensions identified in the 2025CF SAICA (2019a:1-11), and skills identified in the SAICA 2019CF (SAICA, 2019b:33-50)

Key: No – skill similar to 2019CF
Yes – New skill added to 2025CF

The comparison between 2025CF and 2019CF highlighted specific similarities and clear differences according to the 2025CF acumen structure. The findings are presented per acumen and are divided into the business, decision-making, relational and digital acumen.

4.2.1 Business acumen

The 2025CF business acumen contains three elements of business internal and external environment elements, as well as innovation and creativity. The business internal environment element consists of the following dimensions: role of business in society, different types of entities and the role they play in society, internal functions of an entity, concept of stewardship, defining business success (value creation: profit motive vs sustainable businesses) as well as business models. As shown in Table 4.1 all the dimensions from the business internal environment in the 2025CF were previously included in 2019CF within the strategy, risk management and governance specific competency theme.

The second business acumen element on business external environment consists of two dimensions namely global and other external influences (including sustainable development goals) and tax policy. The global and other external influences (including sustainable development goals) dimension was represented in the 2019CF pervasive qualities and skills theme, professional skills which referred to how the national and international environment impacts a CA(SA) role. The 2025CF tax policy dimension was included in the 2019CF specific competencies theme on taxation. The third business acumen dimension element of innovation and creativity consists of initiative, innovation, continuous improvement and entrepreneurship dimensions. The initiative and the innovation dimensions from the 2025CF were both evident in the 2019CF under pervasive qualities and skills theme, personal attributes, strive to add value in an innovative manner. The 2025CF continuous improvement dimension was comparable to the specific competency theme of strategy risk management and governance within the 2019CF. Similarly, the 2025CF entrepreneurship dimension was integrated within the 2019CF pervasive qualities and skills theme.

The business acumen in the 2025CF consisting of business internal and external environment, as well as innovation and creativity elements, which can be seen as skills, were evident within the 2019CF (Table 4.1). In this regard, 2019CF and 2025CF skills for curricula development purposes are similar when categorised under the 2025CF business acumen. The comparison between the two CFs was extended to the further acumens of which the decision-making acumen is one.

4.2.2 Decision-making acumen

The 2025CF decision-making acumen consists of analytical/critical thinking, problem-solving, judgement and decision-making, as well as the professional scepticism elements. The analytical/critical thinking element consists of two dimensions: challenge assumptions and critical analysis. The challenge assumptions dimension in the 2025CF was apparent in the 2019CF within the pervasive qualities and skills theme, personal attributes by demonstrating responsible leadership. The critical analysis dimension was evident within the 2019CF pervasive qualities and skills theme, professional skills examining and interpreting information and ideas critically (critical thinking). The problem-solving element includes dimensions of mindful reasoning, impact of issues, implications of actions and knowing when to seek expert assistance dimensions. The mindful reasoning dimension in 2025CF was comparable to the 2019CF pervasive qualities and skills theme, professional skills examining and interpreting information and ideas critically (critical thinking). The impacts of issues as well as the implications of actions dimensions in the 2025CF were both identifiable in the 2019CF under pervasive qualities and skills theme, professional skills of solving problems and making decisions. The dimension of knowing when to seek expert assistance in 2025CF linked to the 2019CF pervasive qualities and skills theme, professional skills of managing and supervising.

The judgement and decision-making element of the decision-making acumen consists of issues identification, integrated nature of quantitative and qualitative metrics (financial and non-financial information), analysis, recommendations and implementation dimensions. The 2025CF issues identification dimension is comparable to the 2019CF pervasive qualities and skills theme, professional skills in solving problems and making decisions. The integrated nature of quantitative and qualitative metrics (financial and non-financial information) dimension is linked to the 2019CF pervasive qualities and skills

theme, professional skills of examining and interpreting information and ideas critically (critical thinking) as well as the specific competency financial management theme. The analysis dimension in the 2025CF compares to the pervasive qualities and skills theme professional skills of examining and interpreting information and ideas critically (critical thinking). Likewise, the recommendations dimension of the 2025CF is evident within the 2019CF of pervasive qualities and skills theme professional skills in solving problems and making decisions. The implementation dimension in the 2025CF is linked to the 2019CF pervasive qualities and skills theme of professional skills solving problems and making decisions. The 2025CF professional scepticism element, with the independent and questioning mindset dimension, is compared to the 2019CF pervasive qualities and skills theme, ethical behaviour and professionalism skills of maintaining objectivity and independence.

The comparison of the 2025CF with the 2019CF specific to the decision-making acumen concludes that the decision-making acumen that refers to analytical/critical thinking problem-solving, judgement and decision-making and the professional scepticism elements were evident in the 2019CF and no new skills were added in this acumen for the 2025CF. The next acumen for comparison is the relational acumen.

4.2.3 Relational acumen

The relational acumen consists of eight elements which include: communication, leadership, people, relationship-building skills, teamwork, self-management, managing others and emotional intelligence. The communication skills element consists of three dimensions of listening interviewing and discussion, communication media and audience and effectiveness. As seen in Table 4.1 under the communication skills element, all three dimensions of the 2025CF, except for listening skills, are comparable to the 2019CF pervasive qualities and skills theme, professional skills of communicating effectively and efficiently. Listening skills are not identified in the 2019CF and indicate a new skill added to the new framework. The 2025CF leadership skills element is divided into sustainability and long-term thinking-, servant leadership-, influence and consensus building- and moral and ethical decision-making dimensions. The sustainability and long-term thinking dimension as well as the servant leadership dimension from 2025CF are linked to the 2019CF pervasive qualities and skills theme, personal attributes on demonstrating

responsible leadership. The influence and consensus building dimension in the 2025CF could not be identified in the 2019CF, which also identifies a new skill within the 2025CF. The moral and ethical decision-making dimension (2025CF) is linked to the pervasive qualities and skills theme, ethical behaviour and professionalism skills of using an ethical reasoning process in the 2019CF.

The relational acumen people skills element consists of influence and negotiation, conflict resolution and consultation dimensions. The influence and negotiation dimension in the 2025CF is linkable to pervasive qualities and skills theme, personal attributes of managing and supervising skills in the 2019CF. The conflict resolution dimension (2025CF) is identifiable under the 2019CF pervasive qualities and skills theme, personal attributes of treating others in a professional manner as well as working effectively as a team member. The consultation dimension (2025CF) is evident in the 2019CF pervasive qualities and skills theme, personal attributes maintaining and demonstrating competence and recognising limits. Furthermore, the 2025CF relational acumen element of the relationship-building skills consist of the strategic professional relationships and network building dimensions. The strategic professional relationships dimension is comparable to the pervasive qualities and skills theme, personal attributes of demonstrating responsible leadership in the 2019CF. The network building dimension (2025CF) could not be linked to any skills within the 2019CF and indicates a new skill added to the 2025CF to address changes in the accountancy profession graduate's skills need.

The relational acumen element of teamwork is divided into knowledge sharing and cooperation and collaboration dimensions. The knowledge sharing dimension in the 2025CF is not evident of the 2019CF pervasive qualities and skills theme, which highlights the addition of another new skill for future graduates. The cooperation and collaboration dimension (2025CF) links well to the pervasive qualities and skills theme, personal attributes of working effectively as a team member (2019CF). The relational acumen element of self-management is divided into the dimensions of work independently, adapt to management styles and organisation culture advocacy. The work independently as well as to adapt to management styles dimensions of the 2025CF is represented in the 2019CF under pervasive qualities and skills theme, personal attributes

of self-management. The organisation culture advocacy dimension (2025CF) refers to specific competencies theme on strategy risk management and governance (2019CF).

The relational acumen element of managing others is divided into two dimensions of manage teams/projects and talent management (developing others). The manage team/projects dimension (2025CF) is linked to pervasive qualities and skills theme, personal attributes of planning and effectively managing teams and projects, as well as managing time effectively and professional skills of managing and supervising (2019CF). The emotional intelligence element as described by the handle relationships empathetically and judiciously dimension (2025CF) was linked to personal attributes demonstrating responsible leadership (2019CF).

Concluding the comparison regarding the relational acumen (2025CF), consisting of elements such as communication, leadership, people, relationship-building, teamwork, self-management, managing others and emotional intelligence skills, compared to the 2019CF, identified four new skills. The new 2025CF relational acumen skills included listening skills, influence and consensus building, network building and knowledge sharing. The 2025CF expanded its inclusion of the four skills within the relational acumen, indicate the necessity of accountancy graduates to develop specific relational skills. Likewise, due to the changing workforce, graduates not only need enhanced relational skills, but also improved digital skills. In this regard, the digital acumen is discussed next.

4.2.4 Digital acumen

The comparison identified the addition of the digital acumen to the 2025CF as an enabling competency. The additional digital skills or dimensions included in the 2025CF, indicate the adaptation needed to the curricula for the changes due to 4IR. In this regard, it is clear that the 2025CF was developed to embrace the digital disruption brought on by the 4IR by including a number of digital competencies (SAICA, 2020:9). SAICA therefore, aims to address the 4IR technological advancements within the 2025CF. The prescription of SAICA's 2025CF regarding digital acumen to the university Accountancy curriculum aims to prepare graduates for the digital disruption (CAW, 2016:6). The digital acumen added to the required competencies of CA(SA) and is justified since the business environment increasingly relies on technologies to perform specific accounting tasks (Trpeska,

2018:58). The Accountancy curricula should therefore include technology subjects that will enhance the connection between accountancy and technology use (Al-Htaybat *et al.,* 2018:354). The inclusion of the digital acumen is a necessity for the 4IR skills needed by graduates and discussed in detail hereafter.

The digital acumen consists of the following elements: data analytics, big data, cognitive and non-cognitive systems, new developments and protocols, distributed processing and cyber security and user competencies. The data analytics element refers to understanding the nature of data (e.g. underlying characteristics and storage) dimension as well as performing data analysis dimension. Both these dimensions (2025CF) were not addressed in previous SAICA frameworks (2019CF). Likewise, the proposed big data element with the impact on business models dimension (2025CF) was not evident in the 2019CF. The element of cognitive and non-cognitive systems (2025CF) as described by the dimension of including, but not limited to machine learning, robotic process automation and artificial intelligence, is also a new element and dimension that were not included in the 2019CF. The element of new developments and protocols, which refers to the dimension of including, but not limited to cloud computing, blockchain and mobile apps (2025CF), is another new addition to the 2025CF and not identifiable in the 2019CF. The distributed processing and cyber security element, which consist of distributed processing (IoT), risks and attacks and mitigating steps dimensions, have been added to the 2025CF since it is not described in the 2019CF. The 2025CF user competencies element refers to user tools (including word processing, presentation software, spreadsheet software) dimension was linked to the 2019CF pervasive qualities and skills theme, professional skills of understanding and using appropriate IT systems and tools. The basic coding dimension and the securing and safeguarding dimension in the 2025CF were not within the 2019CF. The comparison indicated an array of digital skills added to the 2025CF needed by accountancy graduates. The inclusion of the digital acumen warrants a closer investigation.

Giles (2019:29) posits that due to the increased reliance of businesses on technology, accountancy graduates need digital skills to be successful as accountants. The 2025CF digital acumen introduced new elements to address the skills required by businesses namely data analytics, handling big data, cognitive and non-cognitive systems, new

developments and protocols, distributed processing, cyber security and user competencies. These elements are linked to dimensions (skills) such as the nature of data (e.g. underlying characteristics and storage), data analysis, impact on business models, including but not limited to machine learning, robotic process automation and artificial intelligence. These dimensions also include cloud computing, blockchain and mobile apps (including but not limited to), distributed processing (IoT), risks and attacks, mitigating steps, basic coding and securing and safeguarding.

In summary, the four acumens were introduced to prepare accountancy graduates to operate as competent professional accountants in the digitised world of business (SAICA, 2020:10). The comparison between the 2025CF and 2019CF identified similarities in the business, decision-making, relational and digital acumens (categories), which indicates that SAICA finds these skills inclusion satisfactory. On the contrary, to prepare the accountancy students for the 4IR, SAICA added new skills to the 2025CF that were previously not included in the 2019CF. In this regard, the communication, leadership, relationship-building and teamwork skills were expanded in the 2025CF relational acumen category. New dimensions (skills) in this acumen included listening (part of listening, interviewing and discussion), influence and consensus building, network building and knowledge sharing. The inclusion of listening skills is substantiated since listening skills are one of the most demanded skills by employers (Oussii & Klibi, 2017:215). The new skill of influence and consensus building was not deemed as a high priority (Coady *et al*., 2018:104), however on the contrary, Rufino *et al.* (2017:120) posit the need for influence and consensus building skills for professional accountants. This finding warrants the inclusion in the 2025CF. The addition of network building as a skill in the 2025CF is agreed upon for inclusion in the Accountancy curriculum (Al-Htaybat *et al.,* 2018:352). SAICA's inclusion of knowledge sharing skills as a competency of graduates is a reflection of the importance of the skills of new appointments. Graduates need to be prepared and have skills to transfer personal knowledge to the rest of the organisation in order to develop the organisation (Salleh, 2010:396). A possible gap in literature exists and knowledge sharing skills development could be included in future research of the Accountancy curricula.

The added digital acumen (2025CF), which included the following elements of data analytics: big data, cognitive and non-cognitive systems, new developments and protocols, distributed processing and cyber security and user competencies, is a necessity in the 4IR. The dimensions added to the digital acumen include the nature of data (e.g. underlying characteristics and storage), perform data analysis, impact on business models, including but not limited to machine learning robotic process automation and artificial intelligence, including but not limited to cloud computing, blockchain and mobile apps, distributed processing (IoT), risks and attacks, mitigating steps, basic coding and securing and safeguarding. Tschakert *et al.* (2017:11) agree that data storage is an important skill needed to be developed. The business demand data analysis skills and the Accountancy curricula should reflect the demand (Ballou *et al.,* 2018:15). Due to changes in the way business operates, skills relating to machine learning, robotic process automation and artificial intelligence will need to be part of education (Brynjolfsson *et al.,* 2018:34). The inherent qualities of blockchain aim to mitigate audit risks like validation and authorisation, which necessitates the accountancy operational part of blockchain to be included in the curricula (Iansiti & Lakhani, 2017:5; Coyne & McMickle, 2017:107). The Accountancy curriculum aims to prepare the graduates to understand IoT and how to address related risks (Coyne *et al.,* 2016:166). Dong (2019:32) agrees that risk assessment abilities should be a core competency of the accountancy graduate. According to Slyozko and Zahorodnya (2016:6), the 4IR requires accountancy employees to demonstrate coding skills, therefore the graduates should be equipped with coding skills. The identified skills, as portrayed in the elements, dimensions and acumens of the 2025CF, is the foundation for the analysis in Phase II, which refers to the document analysis of peer-reviewed, published articles since 2015 on Accountancy curricula and the 4IR.

4.3 DOCUMENT ANALYSIS

The comparison of the 2025CF elements and dimensions within the four acumens, with the pervasive qualities and skills theme of the 2019CF, identified new skills to the 2025CF aimed to guide universities to develop modules to equip students and graduates for the 4IR. The 2025CF was used as theoretical framework to analyse peer-reviewed research completed in the past five years to evaluate skills empirically identified by scholars as

published in scientific journals. The acumens, elements and dimensions that refer to skills within the 2025CF were used as deductive codes during the document analysis, using ATLAS.ti™ 8 software. During the document analysis of the included papers, inductive coding was also performed, where new meaning units were identified and coded. The inductive codes represented skills that could not be categorised within the 2025CF theoretical framework. The dimensions within 2025CF relate to the detailed skills as stipulated by SAICA as necessary future skills for graduates. In this regard, for the researcher to use the 2025CF as theoretical framework, each dimension was scrutinised and the researcher developed a definition for each of the skills (dimensions). The dimensions (skills) and the definitions created were used to develop a codebook (Annexure 5). The process of creating a codebook was explained in detail in Chapter 3, where the codebook provides an extended understanding and foundation of the theoretical framework based on the 2025CF. The created codebook was used to perform the deductive document analysis of this study. During the document analysis, the codebook was amended through the inclusion of a definition and examples from articles. The researcher requested definitions from SAICA related to the elements and dimensions, however, since it is deemed a working document and circulated for comment, the professional body has not yet finalised all detail pertaining to the 2025CF. In this manner, the document analysis expanded the understanding of the 2025CF and provided deeper meaning to different skills (DeCuir-Gunby *et al.,* 2011:147).

The 55 peer-reviewed articles were deductively and inductively coded to identify meaning units. The codes created in ATLAS.ti™ 8 were used to develop data networks that indicate the categorisation of skills according to the 2025CF. The data networks included additional codes identified through inductive coding, meaning that new skills emerged from peer-reviewed journal articles, not included within the 2025CF.

Through the process of deductive and inductive coding, 111 codes were identified within the articles relevant to accountancy skills and the 4IR. A total of 54 inductive codes relevant to the study, but not reflected in the 2025CF acumens, were also identified (Annexure 5). The additional inductive codes identified during the document analysis included meaning units referring to aspects such as curriculum, intellectual and personal qualities, teaching methods, education, employability, technology, various skills and

business awareness. Therefore, not all inductive codes could be grouped under a specific element or acumen, however, were included in the codebook. During the document analysis, articles often referred in general to the element as stipulated in 2025CF and not only referred to a specific dimension. In this regard, a new inductive code (skill), similar to the element within a specific acumen, was created and grouped accordingly as a dimension (skill).

4.3.1 PEER-REVIEWED JOURNAL ARTICLES DOCUMENT ANALYSIS

The document content analysis of the 55 articles using the 2025CF as theoretical framework is presented as data networks (Figures 4.2 to 4.6). The data networks were created according to the four acumens of the 2025CF enabling competencies namely business, decision-making, relational and digital acumen. Deductive codes from the 2025CF are displayed in green and codes stated in the 2025CF but not identified in the 55 articles were indicated in orange. Codes that were additionally identified as inductive codes within the articles, but not within 2025CF are displayed in a white block.

4.3.1.1 Business acumen

The enabling competencies in the 2025CF consist of four acumens, of which business acumen is the first to be discussed. As illustrated in Figure 4.2, the business acumen is divided into three elements and each subdivided into dimensions (skills). The three elements refer to the business internal environment, business external environment and innovation and creativity. The business internal environment consists of eight dimensions (2025CF) of which the following three were coded in the articles: role of business in society, internal functions of an entity and defining business success (Al-Htaybat *et al.,* 2018:351; Coyne *et al.,* 2016:162; Rasid *et al.,* 2019:188) (Z1 green codes). The inductive codes (Z1 white) of organisational and business management skills were added since, Douglas and Gammie (2019:316) found organisational and business management skills important, whereas Trpeska and Lazarevska (2018:58) found broader business knowledge as important skills for accountancy students. While the white codes did not form part of the 2025CF, both were added as inductive codes (Z1 white codes). The yellow codes that referred to different types of entities and the role they play in society, the concepts of stewardship and business models, are dimensions from the 2025CF, yet

were not identified within the articles. The inclusion of the yellow codes is, however, justified as SAICA developed the proposed CF "through three phases of research: focus group discussions, surveying SAICA members and face-to-face interviews" (SAICA, 2020:10). SAICA obtained feedback during research conducted from various role-players including academics, professional bodies, executive management, industry leaders and assurance providers. Due to the extensive research performed by SAICA, they are informed as to skills required by the industry and employers that would clarify the identification and inclusion of skills by SAICA while those skills were not yet researched.

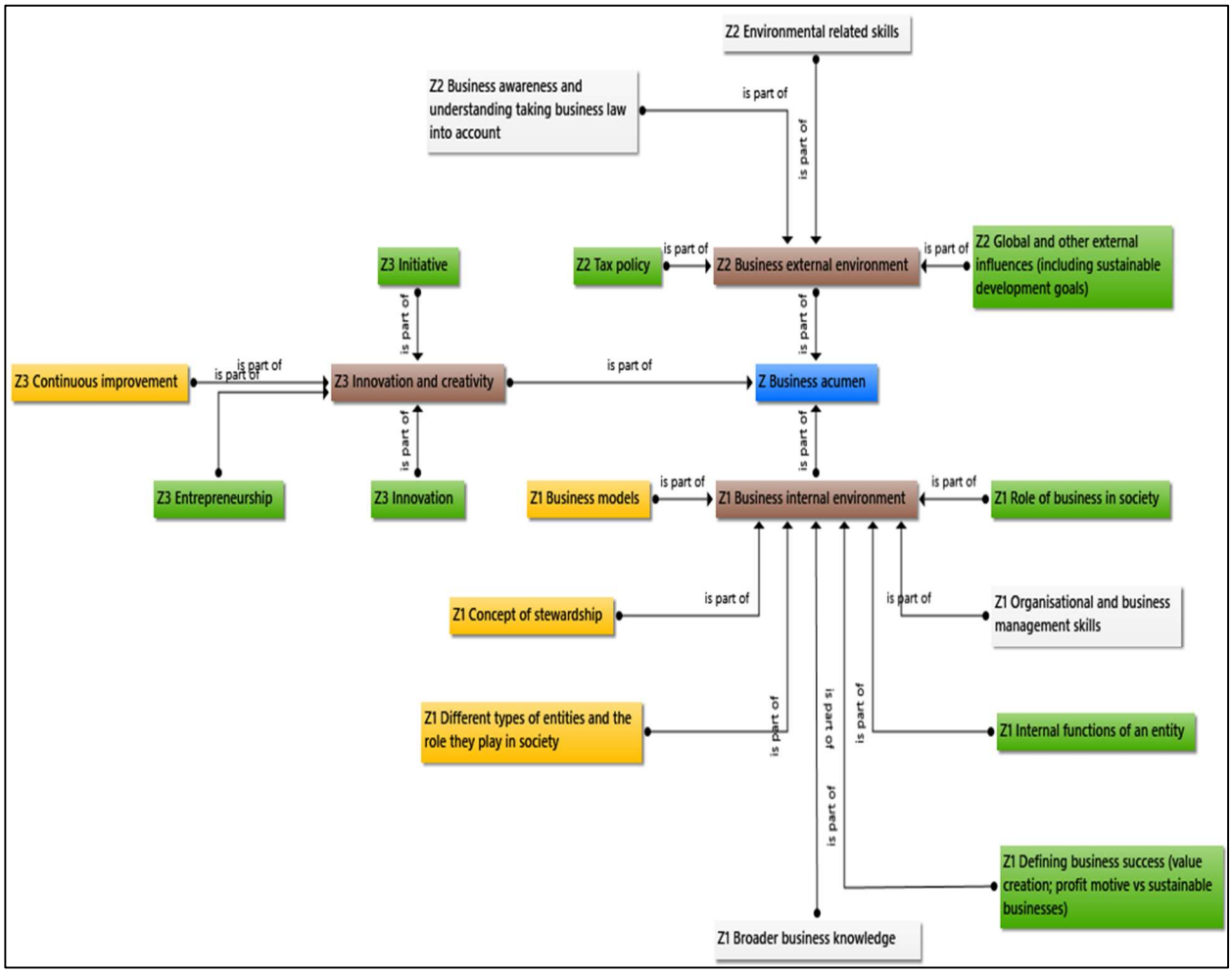

Figure 4.2: Business acumen codes as per peer-reviewed articles

Source: SAICA 2025CF adjusted SAICA (2019a:1-11) and codebook Annexure 5

Key: 2025CF skills as deductive codes in green; inductive codes (skills not within 2025CF) in white and codes marked in orange are within the 2025CF, but not identified in articles. Elements marked in brown and acumen marked in blue.

The business external environment as the second business acumen element consists of two dimensions (2025CF). Both dimensions of global and other external influences (including sustainable development goals) and tax policy were also supported in the articles (Bunea, 2017:444; Komarev & Preobragenskaya, 2018:27) (Z2 green codes). Two additional inductive codes (Z2 white codes) were identified in the articles and created within this element, namely business awareness and understanding taking business law into account and environmental related skills (Z2 white codes). In this regard, Webb and Chaffer (2016:351) support business awareness and understanding taking business law into account. Olvera *et al.* (2015:29) agree that environmental related skills should be part of the Accountancy curricula. Environmental related skills are important for accountancy graduates due to increasing environmental responsibilities evident in the corporate world. In this regard, accountants need skills to perform environmental accounting (Saito, 2016:25). SAICA could therefore consider the inclusion of this skill in the 2025CF.

The third element of innovation and creativity as part of the business acumen consists of four dimensions namely initiative, innovation, continuous improvement and entrepreneurship. In this regard, all three dimensions were identified within the articles (Altrawneh, 2016:56; Dong, 2019:33; Teng *et al.,* 2019:592) (Z3 green codes). The continuous improvement dimension (Z3 orange code) as part of the 2025CF was not identified in the articles, even though it was evident in both the 2025CF and 2019CF. Accountancy graduates should be able to manage change as products, services and practices are constantly improving (Campbell, 2020).

Accountancy graduates are expected to be skilled with business acumen skills in order to contribute to organisations as graduates. The comparison between the 2025CF and 2019CF (Phase I) identified no new business skills added to the new CF, however, the SLR indicates that the following skills could be included within the business acumen as identified by deductive codes (Z green codes): role of business in society, internal functions of an entity, defining business success (value creation: profit motive vs sustainable businesses), global and other external influences (including sustainable development goals), tax policy, initiative, innovation and entrepreneurship. The SLR articles analysis identified additional skills included as inductive codes (Z white codes) namely organisational and business management skills, broader business knowledge,

business awareness and understanding taking business law into account and environmental related skills. Rufino *et al*.'s (2017:119) survey on organisational and business management skills indicated this as important competencies often needed within business. The IAESB prescribe competencies such as organisational and business management skills for accountants, (cited by Smith *et al.,* 2018:538). Accountants need to have knowledge of the broader business to take advantage of developments in technology (Trpeska & Lazarevska, 2018:58). Business awareness and understanding and taking business law into account are added as new skills because employers rate the skill important due to accountancy employees' proposals potential impact on business (Trpeska & Lazarevska, 2018:60). Environmental related skills were added as an inductive code since recent developments in the Environmental Social Governance (ESG) investments and the increase in employment opportunities in the environmental sector necessitates it (Eco Canada, 2020).

Four skills from the 2025CF that were not identified in the articles analysed (Z orange codes) include different types of entities and the role they play in society, concept of stewardship, business models and continuous improvement. These skills may not have been researched within the Accounting curricula and therefore warrants possibilities for future research.

4.3.1.2 Decision-making acumen

The decision-making acumen as part of the 2025CF enabling competencies is divided into four elements namely analytical/critical thinking, problem-solving, judgement and decision-making and professional scepticism. Figure 4.3 presents the decision-making acumen data network with deductive and inductive codes identified during the document analysis.

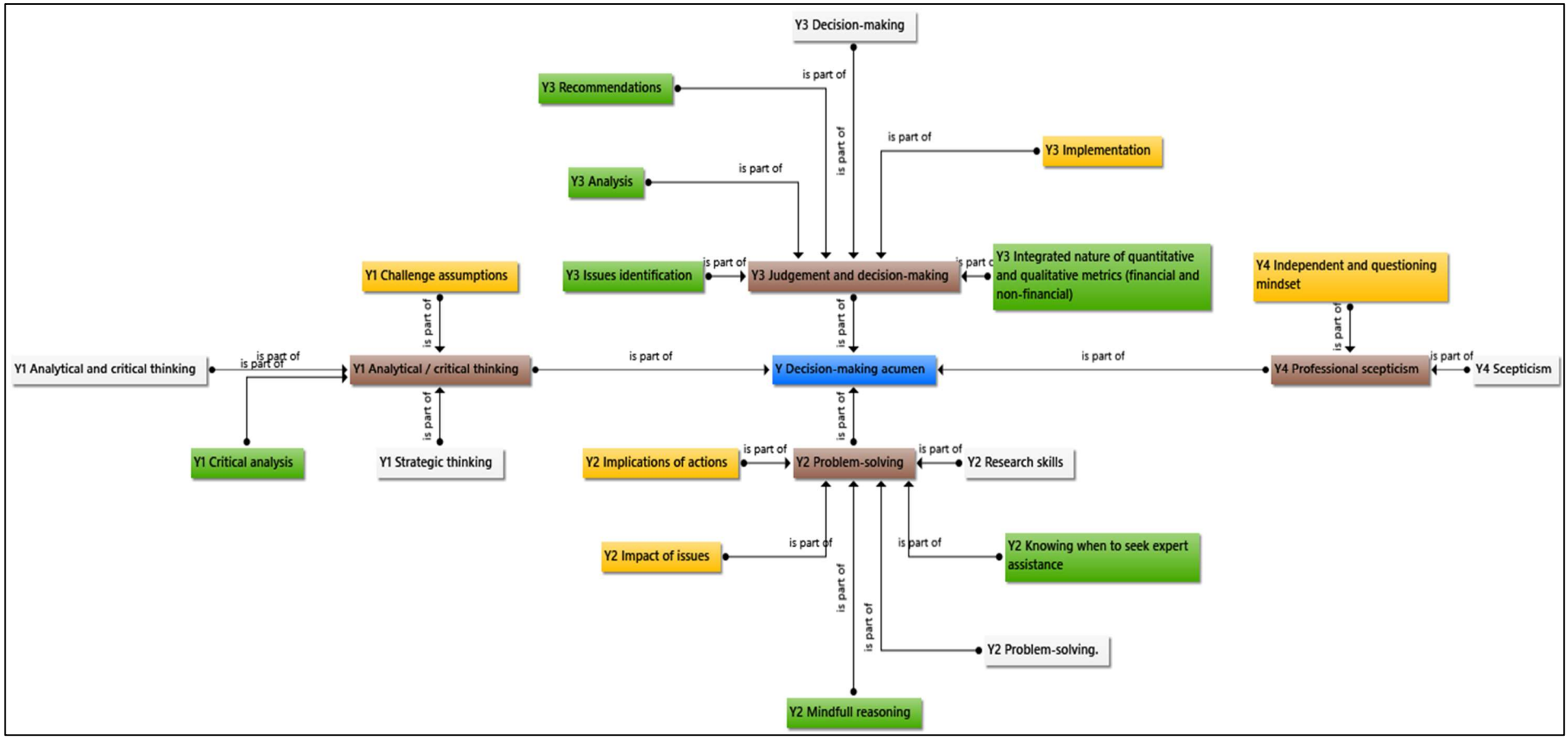

Figure 4.3: Decision-making acumen codes as per peer-reviewed articles

Source: SAICA 2025CF adjusted SAICA (2019a:1-11) and codebook Annexure 5

Key: 2025CF skills as deductive codes in green; inductive codes (skills not within 2025CF) in white and codes marked in orange are within the 2025CF, but not identified in articles. Elements marked in brown and acumen marked in blue.

The decision-making acumen (Figure 4.3) consist of four elements with dimensions and skills that should be part of the Accountancy curriculum to prepare the students for the 4IR. Analytical/critical thinking is the first element, with dimensions of challenging assumptions and critical analysis. The critical analysis dimension (Y1 green code) is a skill needed in the 21st century, which aims to prepare students for the future of accountancy (Thatong, 2016:64). The challenge assumption dimension (2025CF) was not identified within the articles (Y1 orange code) however, accountancy graduates need to evaluate knowledge through the ongoing challenge of assumptions (CGMA, 2018). Within the articles, analytical/critical thinking was generally referred to as a skill and therefore even though at element level in 2025CF, it was added at skill level (Y1 white code). The critical thinking skill was identified by the WEF as one of the top ten skills needed for the 4IR (Gray, 2016) and likewise, Howcroft (2017:477) posits that employers require educators to develop critical thinking skills. Strategic thinking (Y1 white code) was additionally identified from the articles, yet not within the 2025CF. The addition of this skill is owed to the American Institute of Certified Public Accountants including the strategic thinking skill as a required competency (Stone, 2019:31).

The problem-solving element is divided into the dimensions of mindful reasoning, impact of issues, implications of actions and knowing when to seek expert assistance. Problem-solving was added as an inductive code because numerous articles included the expression “problem-solving” as a skill without explaining the detail of the expression (Douglas & Gammie, 2019:309; Parvaiz *et al.,* 2017b:140) (Y2 white code). Mindful reasoning (Y2 green code) was identified as one of the top 13 skills advertised by employers required for accountancy graduates (Tan & Laswad, 2018:416). Part of the problem-solving element, new appointees need to exhibit the knowing when to seek expert assistance skills (Y2 green codes) (Camacho, 2015:321). Although the impact of issues and the implications of actions are dimensions in the 2025CF, the selected articles did not include any research on these aspects (Y2 orange codes). An inductive code of research skills (Y2 white code) was identified and categorised under the problem-solving element as students should be able to research alternative answers to solve a problem (Ballou *et al.,* 2018:23).

The third element within the decision-making acumen of judgement and decision-making has five dimensions (2025CF) of issues identification, integrated nature of quantitative and qualitative metrics (financial and non-financial information), analysis, recommendations, and implementation. The document analysis indicated that articles refer to decision-making skills and therefore it was coded and categorised as a white code under the judgement and decision-making element (Abayadeera & Watty, 2016:12). The dimensions of issue identification, integrated nature of quantitative and qualitative metrics (financial and non-financial information), analysis and recommendations are dimensions within the 2025CF and evidence found in the articles analysed as a needed skill (Altrawneh, 2016:55; Ballou *et al.,* 2018:15; Bunea 2017:444; Joseph *et al.,* 2015:97) (Y3 green codes). The orange marked code of implementation is a dimension included in the 2025CF as well as in the 2019CF, but was not identified in the articles analysed. Accountants could play a major role in decision-making by supplying business with the needed information to make informed decisions. The implementation skills are justified in the 2025CF as the accountant needs specific skills to execute the plan.

The last decision-making acumen element of professional scepticism has one dimension of independent and questioning mindset. The dimension from the 2025CF was not identified within the articles (Y4 orange code) as articles generally referred to scepticism skills and not to the detailed dimension of independent and questioning mindset. Tan and Laswad (2018:421) referred to the importance of scepticism skills for employers and thus the inductive code was added (Y4 white code). In this regard, scepticism is a needed skill to perform big data analysis (McKinney Jr *et al.,* 2017:63).

The SLR indicated that SAICA's inclusion of the following skills within the decision-making acumen (Y green codes) are needed: critical analysis, mindful reasoning, knowing when to seek expert assistance, issues identification, integrated nature of quantitative and qualitative metrics (financial and non-financial information), analysis and recommendations. In addition, new skills were identified from the literature and added as inductive codes (Y white codes) such as analytical/critical thinking, strategic thinking, problem-solving, research skills, decision-making and scepticism skills. However, although no new codes were added to the 2025CF from the 2019CF, five codes were included in the 2025CF that were not identified in the articles analysed (Y orange codes),

which refer to challenging assumptions, impact of issues, implications of actions, implementation and independent and questioning mindset.

4.3.1.3 Relational acumen

The relational acumen as part of the 2025CF enabling competencies has eight elements of communication namely leadership, people, relation-building skills, teamwork, self-management, managing others and emotional intelligence. The comparison between the 2025CF and 2019CF conducted in Phase I identified newly added listening skills, influence and consensus building, network building and knowledge sharing. Figures 4.4 and 4.5 presents the relational acumen data network with deductive and inductive codes identified during the document analysis.

The relational acumen as illustrated in Figures 4.4 and 4.5 have eight elements that should be included in the curriculum to prepare students for the 4IR. Various studies confirm the importance of communication skills for accountancy students (Jackling & De Lange, 2009:378; Van Romburgh & Van der Merwe, 2015:146). Communication skills as an element is divided into listening, interviewing and discussion, communication media and audience and effectiveness dimensions. Listening skills were newly added by SAICA to the 2025CF. Christensen and Rees (2002:67) include effective listening skills as essential for accountancy personnel as newly appointed personnel do not always listen to the whole conversation resulting in time wasted or misunderstandings. Listening, interviewing and discussion, as well as audience and effectiveness dimensions were previously researched and identified as important graduate needed skills (Altrawneh, 2016:55; Oussii & Klibi, 2017:217) (X1 green codes). Communication skills were added at skill level as an inductive code since articles referred to this dimension in this regard (X1 white code). The document analysis identified three additional inductive codes related to communication skills needed for the 4IR workforce which include: Curriculum vitae (CV) writing, interview and job search, reading skills and written communication skills (X1 white codes). CV writing, interview and job search skills were inductively added due to employers recognising students' inability to perform during interviews or present themselves (Camacho, 2015:327).

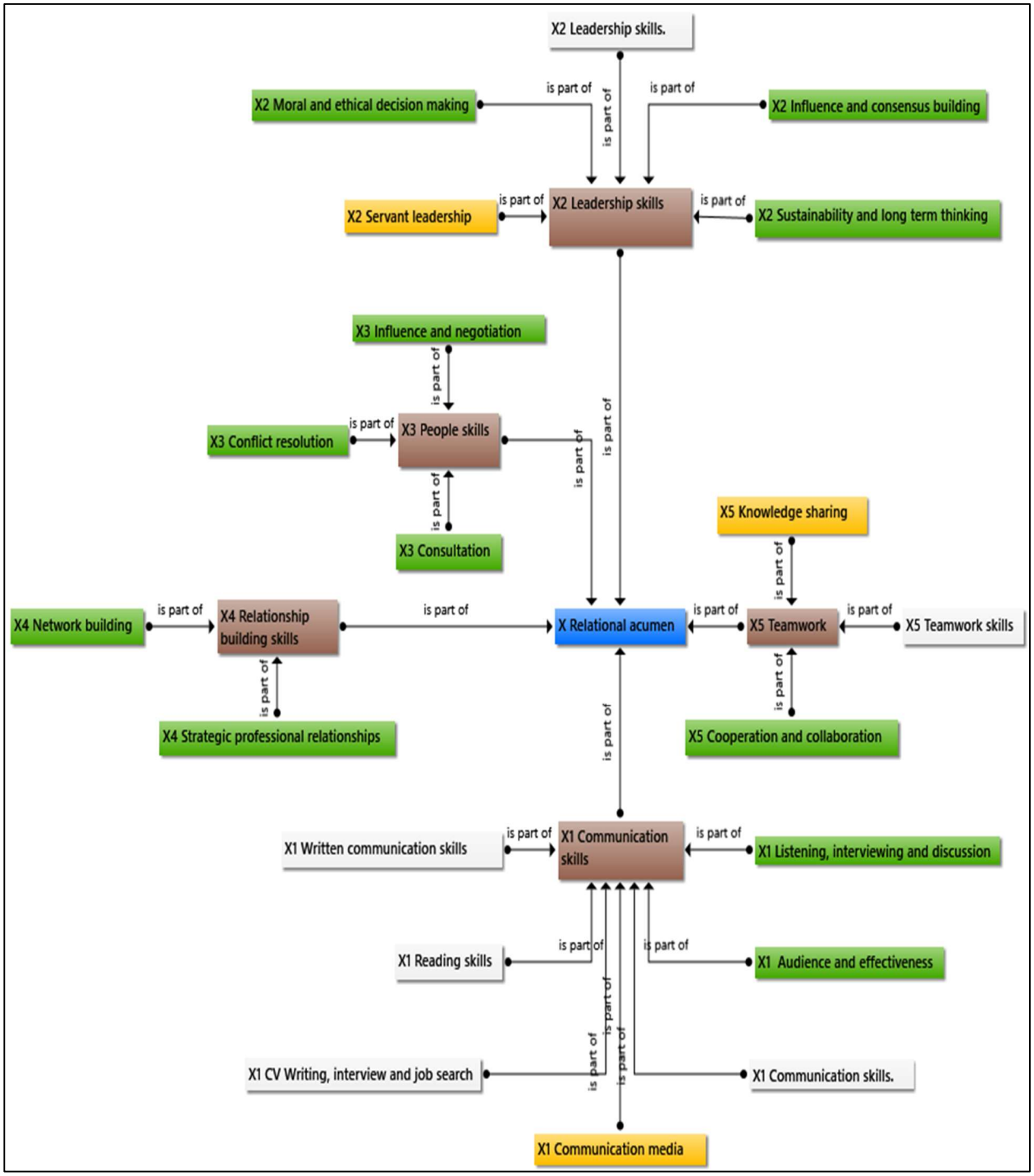

Figure 4.4: Relational acumen codes as per peer-reviewed articles Part 1

Source: SAICA 2025CF adjusted SAICA (2019a:1-11) and codebook Annexure 5

Key: 2025CF skills as deductive codes in green; inductive codes (skills not within 2025CF) in white and codes marked in orange are within the 2025CF, but not identified in articles. Elements marked in brown and acumen marked in blue.

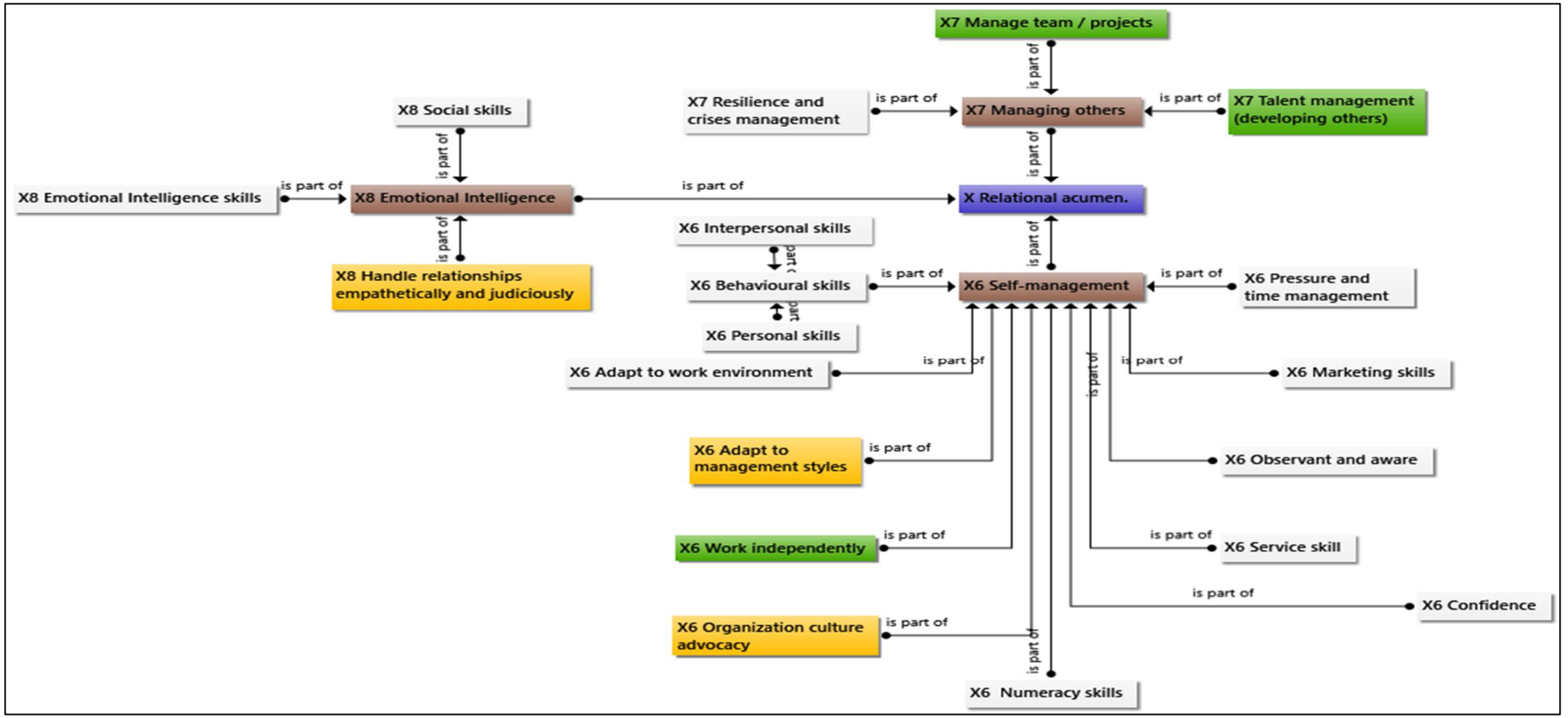

Figure 4.5: Relational acumen codes as per peer-reviewed articles Part II

Source: SAICA 2025CF adjusted SAICA (2019a:1-11) and codebook Annexure 5

Key: 2025CF skills as deductive codes in green; inductive codes (skills not within 2025CF) in white and codes marked in orange are within the 2025CF, but not identified in articles. Elements marked in brown and acumen marked in blue.

Employers and educators agree that critical reading skills are needed by accountancy graduates (Howcroft, 2017:472) and likewise the importance of written communication skills for accountancy students has been accounted for in previous research (Webb & Chaffer, 2016:360; Smith *et al.,* 2018:551). Camacho (2015:320) explains that accountancy personnel spend on average between 20 and 30% of their time writing and therefore good written communication skills are essential. SAICA could consider the inclusion of CV writing, interview, job search, reading and written communication skills in the 2025CF.

The leadership skills element is divided into four dimensions of sustainability and long-term thinking, servant leadership, influence and consensus building as well as moral and ethical decision-making. During the analysis of the articles performed in ATLAS.ti™ 8 sustainability and long-term thinking, influence and consensus building as well as moral and ethical decision-making, were identified (Abayadeera & Watty, 2016:14; Coady *et al.,* 2018:104; Slomski *et al.,* 2016:918) (X2 green codes). Several articles refer to leadership skills without describing the detail of the leadership skill (Moore, 2018:93; Olvera *et al.,* 2015:30) (X2 white code). Therefore, the inductive code of leadership skill was added to the theoretical framework at dimension level. A specific reference to servant leadership as a dimension was not identified within the articles selected (X2 orange code). Servant leadership skills are needed to manage a firm while taking care of employees, customers and the close community (Kass & Friedman, 2007). Influence and consensus building were identified as a new skill in Phase I of the comparison between 2025CF and 2019CF. Influencing skills are rated important by both employers and students (Coady *et al.,* 2018:104) since accountancy graduates need to lead by influencing others towards a common goal. Accountancy graduates in employment need to act in the best interest of both investors and creditors, and therefore, moral and ethical decision-making is an essential skill for accountants in business (Abayadeera & Watty, 2016:15).

The three dimensions of the people skills element (2025CF) were previously researched and identified in the articles part of the SLR Phase II. This refers to influence and negotiation skills, conflict resolution and consultation dimensions. A professional competency such as conflict management (X3 green codes) is a necessity for accountancy graduates to manage people effectively (Slomski *et al.,* 2016:914). Influence

and negotiation skills (X3 green codes) are applied regularly by accountants to convince co-workers and clients (Rufino *et al.,* 2017:120). Accountancy graduates need consultancy skills (X3 green codes) to be able to enter into discussions and sessions where they provide advice to clients, since technology changed the current job profiles (Al-Htaybat *et al.,* 2018:347). The relationship-building skills element consists of two dimensions, which were both identified within the articles. Parry and Jackling (2015:526) support strategic professional relationship skills in the curricula, because accountancy graduates need to interact with clients regularly and build relationships. Network building skills (X4 green codes), were newly added to the 2025CF as identified in Phase I, since students desire to develop networking skills to enhance career development (Douglas & Gammie, 2019:318).

The fifth relational acumen of teamwork is divided into dimensions of knowledge sharing and cooperation as well as collaboration. Numerous articles refer to teamwork broadly without going into detail and thus teamwork skills were added as an inductive code on the dimension level to the theoretical framework (Kavanagh & Drennan, 2008:288; Trpeska & Lazarevska 2018:59) (X5 white code). The cooperation and collaboration skills (2025CF) of students need to be developed by universities to ensure accountancy graduates can work together with other parties (Coady *et al.,* 2018:104) (X5 green code). The knowledge sharing dimension (X5 orange code) is a new skill added to the 2025CF (Phase I) and was not evident within the SLR articles analysed. SAICA has identified the importance of knowledge sharing skills for accountancy graduates after conducting extensive research (SAICA, 2020:10). The self-management element only identified the work independently skill within the articles (Stone, 2019:35) (X6 green code). The other two dimensions, adapt to management styles and organisation culture advocacy, was not evident in the SLR article analysis (X6 orange codes). Within the self-management element, the researcher created numerous inductive codes (X6 white codes), which do not form part of the 2025CF. The inductive code of adapt to work environment was added due to changes in the way business operates, which requires accountancy graduates to be flexible and adaptable to the work environment (Trpeska & Lazarevska, 2018:58). Behavioural skills consisting of interpersonal- and personal skills were added as inductive codes as employers consider interpersonal skills as important as technical knowledge (Howcroft, 2017:469).

Confidence was added as an inductive code as it is an attribute that needs to be developed by accountants. Accountants need to act with confidence while employers need confidence that accountants will act to their advantage (Thatong, 2016:69). Confidence was rated as one of the three most important skills as perceived by students (Smith *et al.,* 2018:540). Trpeska and Lazarevska (2018:57) consider marketing skills (X6 white codes) a required skill for accountancy graduates, but deemed least developed through the curricula and therefore, the skill was added as an inductive code, since accounting firms need to market their services to increase the client base and generate revenue. Another inductive code was numeracy skills and students' perception were that numeracy skills were more important than teamwork (Smith *et al.,* 2018:551). Being observant and aware (X6 white codes) are highly preferred skills by employees as accountants need to focus on detail and work accurately (Tan & Laswad, 2018:417). Accountants need to prioritise assignments at work to meet cut-off dates and therefore the curricula could include skills to handle pressure and manage time effectively (Howcroft, 2017:473; Parry & Jackling, 2015:518) (X6 white codes). Employees providing good services assist in expanding the business client basis, while the retention of existing clients are also very important and therefore the service skill was added as inductive code. Coady *et al.* (2018:105) observed that the service skill was ranked highest by graduates and employers and requires inclusion in the Accountancy curricula. SAICA could consider adding the aforementioned inductive skills to the 2025CF as indicated by previous literature.

The managing others element (2025CF) consists of manage teams/projects and talent management (developing others) dimensions and were identified in articles as a needed skill (Oktalina & Simanungkalit, 2016:101; Plant *et al.,* 2019:43) (X7 green codes). According to Webb and Chaffer (2016:362), the development of resilience and crises management skills (X7 white code) is currently underdeveloped in the Accountancy curricula. Resilience and crises management skills are needed to cope and thrive in the changing 4IR world, necessitating the inclusion of an inductive code (Webb & Chaffer, 2016:362). Emotional intelligence as the last element of relational acumen refers to the dimension to handle relationships empathically and judiciously. However, this skill was not identified within the articles (X8 orange code). Emotional intelligence skills was identified by multiple articles as a skill needed for accountancy students and was

therefore added at dimension level (Coady *et al.,* 2018:94; Komarev & Preobragenskaya, 2018:4) (X8 white code). Higher levels of emotional intelligence can improve collaboration between co-workers and interaction with clients (Reddrop & Mapunda, 2019:79). Likewise, social skills were identified from the articles as a skill that needed to be included in the curricula (Rufino *et al.,* 2017:125) (X8 white code). Due to the WEF's (2018:10) assessment that the demand for social skills will increase from 5% in 2018 to 15% around 2030, SAICA could consider the inclusion of this skill in the 2025CF.

Relational skills are important in the Accountancy curricula for the 4IR. Rufino *et al.* (2017:127) regard technical knowledge as the basis of accounting education with complimenting pervasive skills. Dimensions included in the relational acumen (2025CF) as deductive codes (X green codes) and identified in the articles include: listening, interviewing and discussion, audience and effectiveness, sustainability and long-term thinking, influence and consensus building, moral and ethical decision-making, influence and negotiation, conflict resolution, consultation, strategic professional relationships, network building, cooperation and collaboration, work independently, manage teams/projects and talent management (developing others). The following additional skills were identified in the articles and included in the theoretical framework under relational acumen inductive codes (X white codes): communication skills, CV writing, interview and job search, reading skills, written communication skills, leadership skills, teamwork skills, adapt to work environment, behavioural skills, interpersonal skills, personal skills, confidence, marketing skills, numeracy skills, observant and aware, pressure and time management, service skills, resilience and crises management, emotional intelligence skills and social skills. The 2025CF included six dimensions that were not identified in the articles (X orange codes): communication media, servant leadership, knowledge sharing, adapt to management styles, organisation culture advocacy and handle relationships empathically and judiciously.

4.3.1.4 Digital acumen

The 2025CF digital acumen consists of six elements. The 2025CF was developed by SAICA for among other things to prepare accountancy graduates with competencies for the digital disruption (SAICA, 2020:9). The comparison as performed in Phase I identified ten new digital acumen skills added to the 2025CF (Table 4.1). Nine codes were

deductively generated using the 2025CF as theoretical framework, meaning they were evident in the 2025CF and articles (W green codes) and two codes appeared in the 2025CF, but were not identified in the articles analysed (W orange codes). Four codes were inductively created from the articles analysed, which means that the skills appeared in the literature but not within the 2025CF (W white codes).

The 2025CF digital acumen consists of six elements, which include data analytics, big data, cognitive and non-cognitive systems, new developments and protocols, distributed processing and cyber processing, as well as user competencies. The data analytics element has two dimensions referring to the nature of data and data analysis, which were both identified within the articles (Dzuranin *et al.,* 2018:24; Rasid *et al.,* 2019:187) (W1 green codes). Several articles refer to big data skills needed for the Accountancy curricula, resulting in the inclusion at dimension level (W2 white code) (Hong & Seo, 2018:46; Sledgianowski *et al.,* 2017:82). In this regard, data analytics including big data skills will increase in significance due to the business model becoming increasingly digital (Al-Htaybat *et al.,* 2018:337) (W2 green code). The cognitive and non-cognitive systems element refer to the dimension of machine learning, robotic process automation and artificial intelligence and was identified within the articles (Webber-Youngman, 2017:iv; Wells, 2018:45) (W3 green code). New technologies and reliance on IT technologies skills were additionally identified during the document analysis as important skills for the 4IR and added as inductive codes (W3 white codes). Articles referred to new technologies and reliance on IT technologies, without description, therefore the inductive codes were added at skill level. According to Hong and Seo (2018:50), accountants need to rely on IT technologies in order to automate processes and utilise resources better. New technologies enable accountants to take advantage of faster and more accurate analysis and therefore it is important for accountancy graduates to poses this skill (Rasid *et al.,* 2019:187).

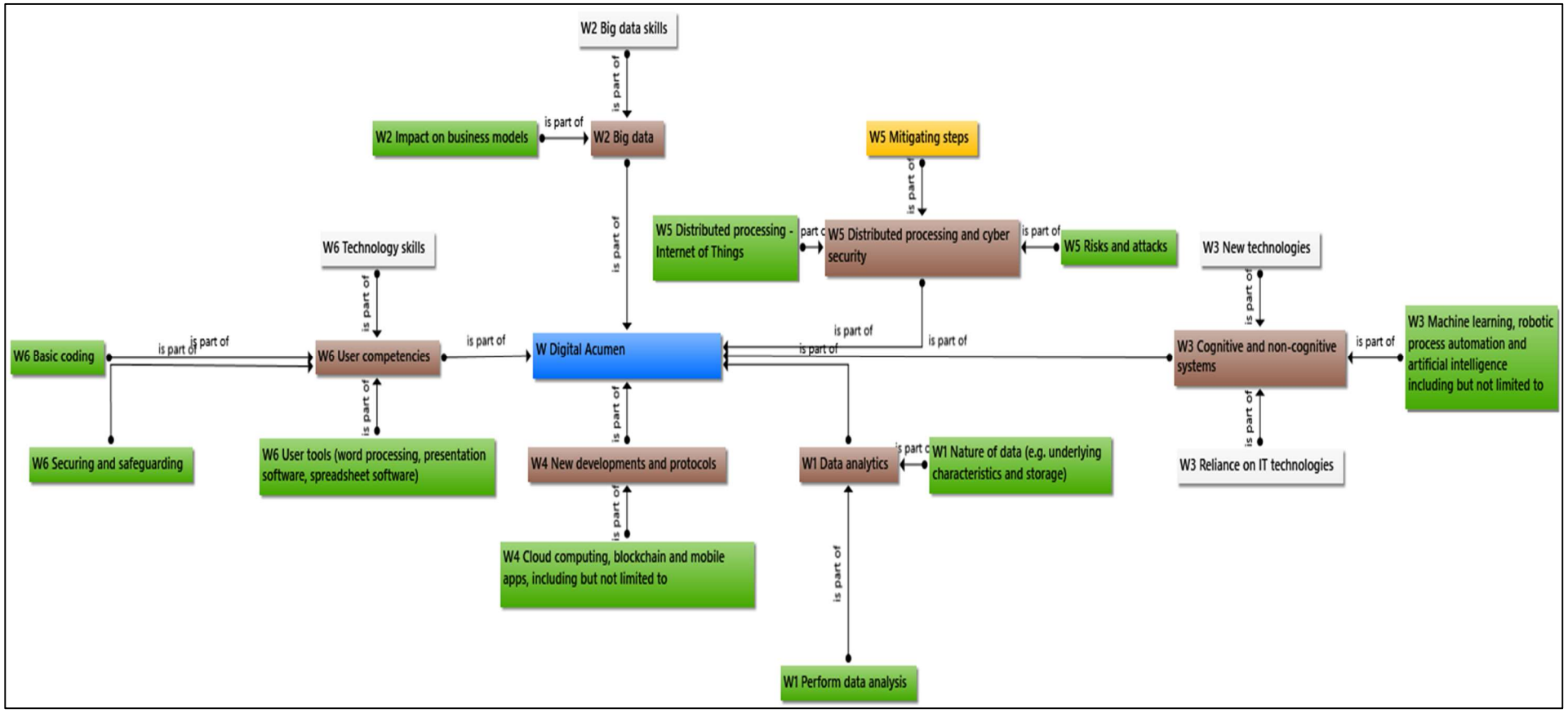

Figure 4.6: Digital acumen codes as per peer-reviewed articles

Source: SAICA 2025CF adjusted SAICA (2019a:1-11) and codebook Annexure 5

Key: 2025CF skills as deductive codes in green; inductive codes (skills not within 2025CF) in white and codes marked in orange are within the 2025CF, but not identified in articles. Elements marked in brown and acumen marked in blue.

The Accountancy curricula for the 4IR need to include skills regarding new developments and protocols (element of digital acumen), which refers to the dimension of cloud computing, blockchain and mobile apps (W4 green code). The skills required from accountancy graduates will change due to blockchain technologies that have emerged during 4IR (Bible *et al.,* 2017:2). The distributed processing and cyber security element have three dimensions such as distributed processing (IoT), risks and attacks and mitigating steps. Distributed processing (IoT) (W5 green code) needs to be included in the curricula for accountancy education to stay relevant (Al-Htaybat *et al.,* 2018:335). Accountancy graduates need the competency to protect data from risks and attacks (W5 green codes) (Rasid *et al.,* 2019:188). Although the mitigating steps dimension was not identified in the articles (W5 orange code), the skill is acknowledged to be included in the 2025CF as SAICA has done extensive research on required skills. The sixth element of the digital acumen refers to user competencies and include user tools- (word processing, presentation software, spreadsheet software), basic coding-, securing and safeguarding dimensions, which were each identified within the articles (Giles, 2019:8; Moll & Yigitbasioglu, 2019:13; Tan & Laswad, 2018:406) (W6 green codes). The SLR articles refer to technology skills without including detail, therefore, the inductive code of technology skills was additionally created and was categorised under the user competency dimension. This skill is deemed as an additional identified skill needed within the Accountancy curricula (Chaplin, 2017:67) (W6 white code) indicating to SAICA a possible skill inclusion candidate to the 2025CF.

The newly added digital acumen with six elements reflects the progression of the business world to the digital environment with vague distinctions between physical and digital worlds (Schwab, 2016:22). The intertwined physical and digital worlds are a result of the IoT, which has built a bridge connecting people and things (Schwab, 2016:22). Higher education institutions must ensure that graduates are prepared to merge the digital and physical worlds (Schwab, 2016:43). The breakout of COVID-19 pandemic accelerated the use of 4IR technologies in business and especially accounting (Mhlanga & Moloi, 2020:2). The acceleration of the digital economy is increasing the gap in accountancy professional skills between mastered and needed skills. Skills included in the digital acumen aim to enable CA(SA)’s to be successful professionals within the 4IR environment.

The following dimensions from the digital acumen (2025CF), except for mitigating steps (W5 orange code), were identified in the articles (W green codes) as deductive codes: nature of data, perform data analysis, impact on business models, machine learning, robotic process automation and artificial intelligence, cloud computing, blockchain and mobile apps, distributed processing (IoT), risks and attacks, user tools, basic coding and securing and safeguarding. The deductive codes were included in several articles as essential skills for the 4IR as rated by employers, academics and students. However, the articles did not always indicate the current skill level of the students obtained through the curricula, which could indicate a gap in literature. Additional skills were added from articles analysed as inductive codes (W white codes): big data, new technologies, reliance on IT technologies and technology skills. Accountancy graduates need specific digital skills due to the increased reliance of business on technology and the changes brought about by the 4IR (Giles, 2019:29).

The document analysis on the peer-reviewed articles rendered numerous similarities in dimensions as deductive codes stated in the 2025CF. Additional codes not within the SAICA 2025CF were identified as inductive codes. Each dimension or code was categorised under the different elements within the four major acumens. However, the document analysis indicated that a variety of new codes were created that were not part of the 2025CF. The newly inductively developed codes were grouped into one of the existing elements. These codes were included in the codebook with a definition and proper example provided. The additional inductive codes created from the analysis of the peer-reviewed articles, indicate that researchers and academics have identified supplementary skills that are present in the Accountancy curricula, yet not included within the SAICA 2025CF. The document analysis, therefore, implies additional skills that could be included in the 2025CF. The added inductively created codes to the 2025CF, purposed to enhance the theoretical framework and was used as the foundation for the analysis of the top five university's Accounting module outcomes documents as discussed in the next section.

4.3.2 UNIVERSITIES' MODULE OUTCOMES DOCUMENT ANALYSIS

The application of the deductive and inductive coding process in Phase II, provided the additional skills that were added to the 2025CF within the different elements and

acumens. The dimensions of the adapted 2025CF were used as theoretical framework to assess if these skills were evident within the top five South African university module documents. The university module documents that were accessed from publicly available websites were analysed regarding the outcomes stated by using the adapted 2025CF as theoretical framework. Chapter 3 Section 3.5.1 describes the process followed to identify the top five universities in South Africa. The five universities are presented numerically in Table 4.2 according to The World University Rankings (THEWUR, 2019b) accessed during October 2019. In order to comply with ethical guidelines, the universities are not disclosed and results are presented anonymously.

Table 4.2: South African universities included in Times Higher Education World University Rankings of 2020

South African Institutions	World Ranking
1	136
2	194
3	251–300
4	401–500
5	501–600
6	601–800
7	601–800
8	601–800
9	801–1000
10	1001+

Source: THEWUR (2019b)

The rankings for the top five universities in SA varied from 136–600. The top five universities were included in the analysis of the module outcome document analysis process. The rankings are based on the overall ranking of the university and were not discipline specific. The Chartered Accountancy degree presented at the top five SA universities, consists of modules such as financial accounting, management accounting, microeconomics, macroeconomics, mathematics, information systems, statistics, financial management, IT, auditing or corporate governance, taxation, business law and company law. The module outcomes were captured from the curriculum or yearbook that

is publicly available on the various universities' websites. The module outcome documents included in the curriculum or yearbooks were analysed in ATLAS.ti™ 8. The module outcomes were coded using the adapted 2025CF and developed codebook as foundation for the coding process (Annexure 5).

Table 4.3: Chartered Accountancy degrees number of modules per university

University #	Degree name	Number of modules
1	Bachelor of Commerce Chartered Accountancy	22
2	Bachelor of Commerce Degree in Accounting	28
3	B Accounting	19
4	Bachelor of Accounting Science (BAccSci)	28
5	Bachelor of Commerce specialising in Financial Accounting	26
	Total	**123**

Source: Own compilation

Table 4.3 was prepared from the selected universities' syllabuses or yearbooks with detail of the modules included for the specific degree. The five selected universities collectively had a total of 123 modules within the various Chartered Accountancy degrees. A limitation in using the publicly available yearbook of the different universities may result in the limited level of detail regarding module documents. In few instances, information on module documents made it difficult to evaluate the curriculum. The possibility exists that the curriculum is not totally reflected within the module outcome documents, however, universities have to develop their documents to adhere to the SAICA prescriptions and therefore have to portray the current curriculum outcomes within the yearbook or module documents. The module outcomes were linked directly or indirectly to the skills (element or dimension in 2025CF as created in codebook) by way of implication of the module outcome description. Direct coding refers to instances where the skills/dimensions are clearly identifiable within the module outcome. Following is an example of a direct coding of the module outcomes: "Research findings will then be applied to a case scenario and presented in the form of a written report". In this example, the following codes were allocated to the module outcome: research skills (indirect code as code not in 2025CF),

written communication skills (indirect code as code not in 2025CF), communication skills (indirect code as code not in 2025CF), audience and effectiveness (direct code as code in 2025CF). Indirect coding refers to instances where the skills/dimensions are linked to the code by way of implication. The following is an example of an indirect coding: “Teaching logic thinking skills which enables students to use and apply the principles learnt on different software packages.” In this example, the following codes were allocated to the module outcome: analytical and critical thinking (indirect code), user tools (direct code as code in 2025CF).

The module outcome documents analysis purposed to identify the elements and dimensions (codes/skills) within the four acumens of the 2025CF (including additional skills from the articles). The analysis aimed to identify specific skills development currently included in the top five universities' Accountancy module outcomes documents. The results of the module outcome document analysis are depicted in Tables 4.4 to 4.7. The tables represent a detailed analysis of the dimensions and additional codes identified in the articles and included in the modules. Skills (dimensions) from 2025CF that were identified within the article document analysis (Phase II) were marked in green. Skills within 2025CF but not identified in the 55 articles were marked in orange. Skills additionally identified as new codes within the articles yet not part of 2025CF is represented in white. Table 4.4 represents a detailed analysis of the dimensions and additional codes of the business acumen. The elements, dimensions and codes are from the codebook as per Annexure 5 was used. Column numbers 1 to number 5 represent the top five SA universities. The percentage calculated in the last column portrays a figure regarding the number of universities that included the code/skills in their module outcome document(s).

4.3.2.1.1 Business acumen business internal environment

Table 4.4 illustrates the detailed analysis of the business acumen dimensions and elements as per the 2025CF for the top five SA universities’ module outcome documents. In this regard, only 40% of selected universities’ Chartered Accountancy curriculum

4.3.2.2 Business acumen

Table 4.4: Detail analysis of business acumen codes within module outcome documents of universities

Business acumen: element, dimension and codes	Included in module outcome documents for universities #					%
	1	2	3	4	5	
Z1 Business internal environment						
Role of business in society	✔	x	x	x	✔	40%
Different types of entities and the role they play in society	✔	✔	✔	✔	✔	100%
Internal functions of an entity	✔	✔	✔	✔	✔	100%
Concept of stewardship	✔	✔	✔	✔	✔	100%
Defining business success (value creation; profit motive vs sustainable businesses)	✔	✔	✔	✔	✔	100%
Business models	✔	✔	✔	✔	✔	100%
Organisational and business management skills	✔	✔	✔	✔	✔	100%
Broader business knowledge	✔	✔	✔	✔	✔	100%
Z2 Business external environment						
Global and other external influences (including sustainable development goals)	✔	✔	✔	✔	✔	100%
Tax policy	✔	✔	✔	✔	✔	100%
Business awareness and understanding taking business law into account	✔	✔	✔	✔	✔	100%
Environmental related skills	✔	x	✔	x	x	40%
Z3 Innovation and creativity						
Initiative	x	x	x	x	x	0%
Innovation	✔	x	✔	x	x	40%
Continuous improvement	x	x	x	x	x	0%
Entrepreneurship	✔	✔	✔	x	x	60%

Source: SAICA 2025CF adjusted SAICA (2019a:1-11) and codebook Annexure 5 and own compilation

Key: ✔ The curriculum includes reference to the code/skill.
X The curriculum does not include or reference specific code/skill.
% Percentage universities that included codes in curriculum.
Orange codes only in 2025CF and not identified in articles; green codes in 2025CF and articles; white codes identified in articles but not 2025CF.

specifically referred to the role of business in society. The finding agrees with Tan and Laswad (2018:420) that employers need graduates to be knowledgeable in the role of business in society. The 2025CF included different types of entities and the role they play

in society as knowledge needed in the Accountancy curricula. This essential knowledge was mentioned in every university module outcome (100%). Likewise, the internal functions of an entity dimension were also included in all the universities' module outcomes (100%). The inclusion of these aspects within university module outcomes is supported by Coyne *et al.* (2016:162), who suggested that accountants who understand the internal work of an organisation is a worthy associate in business. The concept of the stewardship dimension as per the 2025CF, although not identified in articles, was evident in the five university module outcome documents (100%). The Accountancy curricula need to include stewardship skills such as handling resources with integrity (SAICA, 2019b:34). Defining business success (value creation; profit motive vs sustainable businesses) (2025CF), was identified in articles and included in all the university modules (100%). Howard and Warwick (2016:53) agree that graduates should have skills to define profitability as a measurement and use of available resources to generate excess income over expenses. The business models' dimension from the SAICA 2025CF, although not identified in the articles, was evident in all the universities' module outcome documents (100%). Organisational and business management skills (2025CF) is identified in the articles as a needed skill and was part of each of the universities' curriculums (100%). Tschakert *et al.* (2017:10) confirm that employing accountancy students with organisational and business management skills adds value to the business. Broader business awareness is a skill identified in the articles and included in all the universities' module outcomes (100%) supporting Trpeska and Lazarevska (2018:58) that broader business knowledge is required to understand the effects of technology.

4.3.2.2.1 Business external environment

Global and other external influences (including sustainable development goals) and tax policy skills (2025CF) were identified in the articles as well as in all the university module outcome documents (100%). Accountancy students are expected to be skilled to manage global influences for the benefit of the business (Rasid *et al.,* 2019:188). Tax skills enhance accountancy students' employability as explained by Livingstone and Lubbe (2017:138) and is therefore a necessity for universities to include in their modules. Business awareness and understanding of how to consider business law is a skill identified within the articles as a much-needed accountancy graduate attribute. This skill

was included in the module outcome documents of all the selected universities (100%). Kavanagh and Drennan (2008:295) agree that business awareness knowledge support employees to make decisions cognisant of the effect on business. Environmental related skills, although not clearly defined, have been identified by the articles as an additional skill and are included in the module outcome by only 40% of the universities. In this regard, Stone (2019:42) confirms that employers need graduates with environmental related skills to negate business risks, especially where new developments take place.

4.3.2.2.2 Innovation and creativity

The initiative dimension (2025CF) as identified in the articles as a needed skill, was not evident in any of the universities' module outcomes (0%). Altrawneh (2016:56) confirms that the graduate of the future should show initiative in the work environment and it is alarming that none of the top five universities included this type of skill development within the current modules. Graduates with initiative prove that they can work on their own and think independently and universities need to develop this skill. While Dong (2019:31) supports the need to include innovation skills in Accountancy courses, only 40% of universities included this skill in the module outcome documents. None of the universities (0%) made any reference to the continuous improvement dimension included in the 2025CF. The 4IR is transforming the accounting profession therefore graduates should be prepared to continually change (Al-Htaybat *et al.,* 2018:333). Although the entrepreneurship dimension is included in the 2025CF and was identified in the articles as a skill accountancy graduates need for the 4IR, the skill is included in the module outcome documents of 60% of the universities. Al-Htaybat *et al.* (2018:347) suggest entrepreneurship is a skill new graduates need to be able to offer a wider service to clients and accountants need to be equipped with a broader skillset to include entrepreneurial and service type skills. Accountants with entrepreneurial skills will be able to innovate new business processes and services (Teng *et al.,* 2019:593).

The 2025CF necessitate universities to expand the current module outcomes to include the role of business in society, initiative, innovation, continuous improvement and entrepreneurship skills. Environmental related skills as identified in the articles and not currently in the 2025CF, could be included in the module outcomes to increase the employability of accountancy students.

4.3.2.3 Decision-making acumen

The detailed analysis of the dimensions and additional codes of the decision-making acumen, inclusion in module outcome documents is shown in Table 4.5. The elements and dimensions and codes were included in the codebook as per Annexure 5.

4.3.2.3.1 Analytical/critical thinking

Gray (2016) identifies critical thinking skills as one of the top ten skills needed for the 4IR. The dimension of challenging assumptions (2025CF), which is an integral part of critical thinking was not identified in the articles and was not evident in the module outcome documents of any university (0%). In this regard, assumptions in organisations create risk and therefore, accountancy graduates need to be skilled to challenge assumptions to mitigate the risk of incorrect results or decisions taken (Chartered Accountants Ireland, 2020). Analytical/critical thinking (2025CF) identified in articles was included in the module outcome documents of all the universities' curricula (100%). The inclusion could indicate that universities attempt to develop this skill with their accountancy students. In mastering the skills, graduates may impact the South African ranking of critical thinking in teaching skills made by the WEF as referred to in Chapter 2 (WEF, 2019:536). Critical analysis within 2025CF and identified in the articles, were included in the universities' curricula outcome documents (100%). Reviewing, understanding and assessing financial data is part of engaging critical analysis in the workplace by accountancy graduates and need to be addressed during classes or assignments (Rufino *et al.,* 2017:126). Strategic thinking is identified in the articles as a skill accountancy graduates need and is part of the module outcome documents of 80% of the universities. In this regard, Stone (2019:80) identified strategic thinking as one of the top subjects for the curricula, accounting the views of accountancy students, employers and academics who agreed on the importance of strategic thinking skills development in the Accountancy curricula. Accountants need to be able to see the bigger picture and be focused on the long-term business, before developing and implementing new ideas (Tan & Laswad, 2018:417). By exercising strategic thinking, the accountant will be able to translate management decisions into financial benefits for the business (CIMA, 2017). The strategic thinking skill is not only developed by the academic institution, but throughout employment (SAICA, 2020:5).

Table 4.5: Detail analysis of decision-making codes within module outcome documents of universities

Decision-making acumen: element, dimension and codes	Included in module outcome documents for universities #					%
	1	2	3	4	5	
Y1 Analytical/critical thinking						
Challenge assumptions	x	x	x	x	x	0%
Critical analysis	✔	✔	✔	✔	✔	100%
Analytical/critical thinking	✔	✔	✔	✔	✔	100%
Strategic thinking	✔	x	✔	✔	✔	80%
Y2 Problem-solving						
Problem-solving	✔	✔	✔	x	✔	80%
Mindful reasoning	✔	✔	x	x	x	40%
Impact of issues	x	x	x	x	x	0%
Implications of actions	x	x	x	x	x	0%
Knowing when to seek expert assistance	x	x	x	x	x	0%
Research skills	✔	x	✔	✔	x	60%
Y3 Judgement & decision-making						
Decision-making	✔	✔	✔	✔	✔	100%
Issues identification	✔	x	x	x	✔	40%
Integrated nature of quantitative and qualitative metrics (financial and non-financial information)	✔	✔	✔	✔	✔	100%
Analysis	✔	✔	✔	✔	✔	100%
Recommendations	✔	✔	✔	x	✔	80%
Implementation	x	x	x	x	x	0%
Y4 Professional scepticism						
Scepticism	x	x	x	x	x	0%
Independent and questioning mindset	x	x	x	x	x	0%

Source: SAICA 2025CF adjusted SAICA (2019a:1-11) and codebook Annexure 5 and own work

Key: ✔ The curriculum includes reference to the code/skill.
X The curriculum does not include or reference specific code/skill.
% Percentage universities that included codes in curriculum.
Orange codes only in 2025CF and not identified in articles; green codes in 2025CF and articles; white codes identified in articles but not 2025CF.

4.3.2.3.2 Problem-solving

The problem-solving dimension identified in the articles is included in the module outcome of 80% of universities. Business depends on accountancy graduates to analyse business problems and to have the skills to apply problem-solving methods to a wide variety of business problems (Mohamed & Lashine, 2003:6). Mindful reasoning (2025CF) as identified in articles as a needed skill was evident in 40% of universities' module documents. Douglas and Gammie (2019:320) posit that although mindful reasoning skills are needed by accountancy graduates, this topic has been neglected in the curricula in favour of technical skills development. The impact of issues and implications of actions dimensions (2025CF) were not identified in the articles and not found within the universities' module outcomes (0%). The accountancy profession could be employed as strategic management and therefore have to develop the skills to analyse and explain the impact of business and financial issues (ACCA, 2018). In order to comply with ethics, accountancy graduates need to be cognisant of the implications of their actions (Barac & du Plessis, 2014:65). The skill of knowing when to seek expert assistance from the 2025CF was identified in the articles as a skill to be included in the curricula, yet was not part of any university module outcome documents (0%). Camacho (2015:320) revealed that various sources of expert assistance exist, which accountancy graduates should be able to utilise. Research skills were identified within the articles as an important skill and 60% of the universities included the skill in the module outcome documents. This finding is in line with Abayadeera and Watty's (2016:16) who posit that research skills are important and that employers are satisfied with the level of research capability of graduates.

4.3.2.3.3 Judgement and decision-making

Gray's (2016) analysis found that judgement and decision-making is one of the top ten needed skills for 2020. Decision-making as a skill was inductively added to the theoretical framework and identified in articles as a needed skill for accountancy students. As such, this skill was evident within all the selected universities' module outcome documents (100%). Kavanagh and Drennan (2008:288) support decision-making as one of the top needed skills since the availability of information in the 4IR influences the way accountants make decisions. Although the skill of identifying issues, were included in the

2025CF and identified in articles, only 40% of universities included the skill in the module outcome documents. Joseph *et al.* (2015:98) agree that issues identification is a skill needed for starting graduates' employment journey and, therefore, needs to be included in the curricula. Integrated nature of quantitative and qualitative metrics (financial and non-financial information) as per the 2025CF and identified in articles are included in all top five universities module outcomes (100%). The skill is a necessary skill to be included in the curricula since statistical methods and analyses is an essential skill for 4IR (Giles, 2019:9). Analysis skills from the 2025CF were identified in articles and the curriculum of all the universities (100%). Accountancy graduates without the needed analytical skills, result in additional costs to employers for extra time and money to train graduates (Machera & Maschera, 2017:377). The recommendations dimension (2025CF) was identified in the articles and included in 80% of the universities' curriculum. Ballou *et al.* (2018:15) identified the need by employers and academics to have recommendation skills as part of knowledge, skills and attributes as well as technical knowledge. The implementation dimension included in the 2025CF as a needed skill was not identified in articles. The implementation dimension is not part of any of the universities' curriculum (0%). Accountancy graduates need to learn how to implement a chosen strategy and to take action to achieve the successful implementation to increase the business position (Speculand, 2014:29).

4.3.2.3.4 Professional scepticism

Scepticism was identified in the articles as a needed skill for accountancy graduates, however, it was not included in the module outcome documents of any of the universities (0%). Professional scepticism within the 2025CF was also identified in articles as a needed skill for future graduates, yet none of the university module documents included the skill in the current curriculum (0%). CASA's need scepticism skills when analysing big data critically and throughout the audit process to ensure validity (McKinney Jr *et al.,* 2017:63). The universities have to investigate on how to include professional scepticism in the module outcomes (Tan & Laswad, 2018:421).

Accountancy graduates need skills for the 4IR that will be difficult to automate. Skills needing a human mind such as analysing, decision-making and reasoning should be highly developed through the Accountancy curricula to ensure the employability of

graduates. The curriculum presented at the universities could be expanded to include more decision-making acumen skills such as challenging assumptions, strategic thinking, problem-solving, mindful reasoning, impact of issues, implications of actions, knowing when to seek expert assistance, research skills, issues identification, recommendations, implementation, scepticism and independent and questioning mindset.

4.3.2.4 Relational acumen

Table 4.6 presents the analysis of elements and dimensions from 2025CF, with additional codes (skills) identified in articles, as well as the inclusion of skills module outcome documents.

Table 4.6: Detail analysis of relational acumen codes within module outcome documents of universities

Relational acumen: element and dimensions and codes	Included in module outcome documents for universities #					%
	1	2	3	4	5	
X1 Communication skills						
Communication skills	✔	✔	✔	✔	✔	100%
Listening, interviewing and discussion	✔	x	x	✔	✔	60%
Communication media	x	x	x	x	x	0%
Audience and effectiveness	✔	x	x	✔	✔	60%
CV writing, interview and job search	x	x	x	x	x	0%
Reading skills	x	✔	✔	✔	✔	80%
Written communication skills	✔	✔	✔	✔	✔	100%
X2 Leadership skills						
Leadership skills	x	✔	x	x	x	20%
Sustainability and long-term thinking	x	x	x	x	x	0
Servant leadership	x	x	x	x	x	0
Influence and consensus building	x	x	x	x	✔	20%
Moral and ethical decision-making	✔	✔	✔	✔	✔	100%
X3 People skills						
Influence and negotiation	x	x	x	x	x	0%
Conflict resolution	✔	x	x	x	x	20%
Consultation	✔	x	x	x	x	20%
X4 Relationship-building skills						
Strategic professional relationships	x	x	x	x	x	0%
Network building	x	x	x	x	x	0%
X5 Teamwork						
Teamwork skills	✔	x	x	x	✔	40%
Knowledge sharing	x	x	x	x	x	0%
Cooperation and collaboration	✔	x	x	x	✔	40%

Relational acumen: **element and dimensions and codes**	**Included in module outcome documents for universities #**					**%**
	1	**2**	**3**	**4**	**5**	
X6 Self-management						
Work independently	✔	x	x	x	x	20%
Adapt to management styles	x	x	x	x	x	0%
Organisation culture advocacy	x	x	x	x	x	0%
Adapt to work environment	x	x	x	x	x	0%
Behavioural skills	x	x	x	x	x	0%
Interpersonal skills	x	x	x	x	x	0%
Personal skills	x	x	x	x	x	0%
Confidence	x	x	x	x	x	0%
Marketing skills	x	x	x	x	x	0%
Numeracy skills	x	x	x	x	x	0%
Observant and aware	✔	✔	x	✔	✔	80%
Pressure and time management	✔	x	x	x	✔	40%
Service skills	x	x	x	x	x	0%
X7 Managing others						
Manage teams/projects	✔	✔	✔	x	x	60%
Talent management (developing others)	x	x	x	x	x	0%
Resilience and crisis management	x	x	x	x	x	0%
X8 Emotional intelligence						
Emotional intelligence skills	x	✔	x	x	x	20%
Handle relationships empathetically and judiciously	x	x	x	x	x	0%
Social skills	x	x	x	x	x	0%

Source: SAICA 2025CF adjusted SAICA (2019a:1-11) and codebook Annexure 5 and own work

Key: ✔ The curriculum includes reference to the code/skill.
X The curriculum does not include or reference specific code/skill.
% Percentage universities that included codes in curriculum.
Orange codes only in 2025CF and not identified in articles; green codes in 2025CF and articles; white codes identified in articles but not 2025CF.

4.3.2.4.1 Communication skills

It is essential to develop different dimensions of communication through the curricula since students perceived their communication skills in need of development (Oussii & Klibi, 2017:220). Communication skills, as an inductively added code, were included in 100% of the universities' module outcome documents. Listening skills were newly added to the 2025CF (Phase I), which was not previously evident within the 2019CF. Christensen and Rees' (2002:67) include the effective listening skill as very important for accountancy personnel as research found that newly appointed personnel do not always

listen to the whole conversation resulting in time wasted or misunderstandings. Listening, interviewing and discussion (2025CF) were identified in articles as skills needed for the 4IR, and in this regard, 60% of the universities' curriculum, included outcomes to develop this aspect. Jackling and De Lange (2009:377) confirm that verbal communication is in demand by employers. Besides accountants using communication skills to clearly convey the results of work performed, they also need good communication skills when representing the company in dealing with external clients (Trpeska & Lazarevska 2018:58). Communication media included as a dimension in the 2025CF, had no reference in the articles and were not evident within any of the universities' module outcomes (0%). Accountants need skills to communicate via different ways of media like face-to-face media, video conference, telephonically and electronic media. Especially within the 4IR, this is a much-needed skill and universities have to incorporate it into the curricula within the near future.

Accountancy employees are considered part of management and as such must interact and communicate with a variety of audiences continually (Douglas & Gammie, 2019:318). The audience and effectiveness dimension (2025CF) identified in articles as a skill needed for accountancy graduates, is part of the module outcome of 60% of the universities. Although CV writing, interview and job search are not in the 2025CF, the skill was identified through the document analysis as a skill accountancy graduates need (Camacho, 2015:322). None of the universities included CV writing, interview skills and job search in the module outcome documents (0%). The possibility exists that these skills are developed by a university career centre as a centralised function and not formally as part of the module outcome. Warwick and Howard (2015:6) suggest that job search, interview and CV writing skills have to be developed within the curricula to ensure students are competent in the art of finding work. The inductive code of reading skills is included in 80% of the module outcomes, where reading skills are considered of equal importance as problem-solving skills (Howcroft, 2017:475). Although written communication skills are not in the 2025CF, the skill was identified in the articles since writing is a substantial part of accountants' daily activities and all the universities included the skill in the module outcome documents (100%). In this regard, Crawford *et al.* (2011:126) supported the need for accountancy graduates to be able to write proper reports and need to communicate in writing with clients. Howcroft (2017:469) posits that

accountants should be able to communicate with colleagues and clients and not only have technical and business knowledge.

4.3.2.4.2 Leadership skills

Managers within organisations are more leaders than managers (Slomski *et al.,* 2016:918). The inductive code of leadership skills was mentioned in the curriculum of 20% of the universities, which is alarming since it is deemed an important skill. Sustainability and long-term thinking (2025CF) as identified in articles as needed skills were not included in any of the universities' module outcomes (0%) and once again, the findings portray a gap within universities' current module outcomes to address SAICA's prescriptions for accountancy graduates. Al-Htaybat *et al.'s* (2018:352) study confirms that sustainability and long-term thinking skills are needed to accomplish business goals. Servant leadership included in the 2025CF was not identified in the articles as a needed skill, nor were it included in the universities' module outcomes (0%). SAICA's current focus, as part of servant leadership, is to deliver in the service demand of customers (SAICA, 2021). The influence and consensus building dimension, as newly added to the 2025CF (Phase I), and identified in articles as a needed skill, were included within 20% of the universities' module outcomes. The finding agrees with Bunea's (2017:447) research conducted on final year accountancy students, indicating that students need to develop personal skills such as influencing others. The universities will have to expand the curricula to include influence and consensus skills for development. Moral and ethical decision-making dimensions within the 2025CF and identified in the articles were evident within all five SA universities' module outcomes (100%). Slomski *et al.* (2016:918) agree that moral and ethical decision-making should be taught as part of the curricula to ensure graduates are competent when applying ethics in the profession. Leaders are responsible to follow the code of ethics of the company and ensure that decision-making is done in an ethical manner.

4.3.2.4.3 People skills

The importance of people skills in the curricula cannot be emphasised enough (Plant *et al.,* 2019:44). One of the major employers of technological employees advertise "Bring people skills. Learn tech skills" (Apple, 2020). The influence and negotiation dimension

from the 2025CF were included in the articles as skills needed by accountancy students, however, were not visible within any of the universities' module outcome documents (0%). Trpeska and Lazarevska (2018:58) argue that due to growing dependence on technology, accountancy professionals will be required to deal more effectively with co-workers and clients through negotiation skills. Negotiation skills contribute to business success and in this regard, Gray (2016) argues that although negotiation skills are one of the top ten needed skills, the importance will decrease in the 4IR due to the analytics of big data taking over decision-making. Conflict resolution and consultation dimension from the 2025CF were identified in the articles as skills needed, however, only 20% of the universities included the skill in their curriculum. Mohamed and Lashine (2003:10) proposed that Accountancy courses should include conflict management and therefore it is alarming that only one (20%) of the universities have since adapted the curriculum to include developing this skill. The consultation dimension included in both the 2025CF and articles as skills needed by accountancy students were included by one university (20%) in the module outcome document. In the new era of 4IR, consultation is much-needed to bridge the gap between machines and people (Rasid *et al.*, 2019:188). Although the 2025CF and articles on accountancy skills consider people skills to be part of the Accountancy curricula, the practice is that all three of the dimensions of people skills are not well-defined within module outcome documents and therefore seems not to be a focus for development.

4.3.2.4.4 Relationship-building skills

Research by Coady *et al.* (2018:110) revealed that employers and graduates consider their strategic professional relationships to be well-developed at university. However, the strategic professional relationships and network building skills (newly included in the 2025CF) were identified in articles but not within university module outcome documents (0%). Network building was also identified as a skill that needed to be developed by accountancy education (Al-Htaybat *et al.,* 2018:352). Network building skills together with communication helps accountants to thrive in the dynamic business world (Tschakert *et al.*, 2017:12), but the non-inclusion of relationship-building skills in the curricula may have a negative impact on the student's ability to build work relationships with colleagues and clients.

4.3.2.4.5 Teamwork

Howcroft (2017:475) indicated that educators ranked teamwork as a skill that students perform well, while employers in contrast rank teamwork as the fifth-best skill mastered by students. In this regard, teamwork as a skill could be assigned a higher priority and included in the module outcomes to a greater extent. The teamwork dimension (2025CF) and identified in articles as a skill needed for accountancy graduates, was evident within 40% of the universities' module outcomes. The knowledge sharing dimension is newly included in the 2025CF, but could not be identified in articles and was not clearly identifiable in any of the selected universities' module outcome documents (0%). Knowledge sharing improves communication in business and is seen as a method to distribute a scarce skill through the organisation (Postolache, 2017). The cooperation and collaboration dimension (2025CF) identified in articles, was evident within 40% of the universities' module outcomes. The research conducted by Chaplin (2017:67) may explain the absence of the development of this skill since it was ranked as least important by employers. Chaplin (2017:67) justifies this finding since most employers rated this skill as unimportant outsourced accounting services. Accountancy graduates need to develop cooperation and collaboration skills because they work in teams and need to interact with clients regularly. This skill has to be part of the 2025CF and module outcomes.

4.3.2.4.6 Self-management

Accountancy graduates will have to be adaptable, innovative, teamworkers who takes initiative and have accomplished self-management (Altrawneh, 2016:56). The ability to work independently as a 2025CF dimension was identified in articles and included by only 20% of the universities in the module outcomes. Komarev and Preobragenskaya (2018:29) support that the development of working independent skills will enable career growth. Rufino *et al.* (2017:121) agree that working independently shows self-discipline and needs to be developed in the curricula. The skills to adapt to management styles as well as organisation culture advocacy as 2025CF dimensions were not identified in articles as a skill needed and none of the universities included the development of the skills in the curriculum (0%). The adaptation to the work environment was identified within articles as a needed skill but is not part of the module outcome of any of the universities (0%). Dong (2019:32) confirmed that adaptability should be part of accountancy

graduates' skills since business constantly change due to 4IR. The behavioural skills were identified by articles as needed but did not form part of the module outcome documents of any of the universities (0%). Behavioural skills consist of personal skills and interpersonal skills and in this regard, Stone (2019:43) suggests that the curricula need to expand to include behavioural skills to facilitate communication, teamwork and self-management. Confidence as a skill was identified by articles as very important but was not evident within the module outcome documents of any of the universities (0%). Jackling and De Lange (2009:376) assessed confidence as a skill of limited importance admitting that confidence will result in improved negotiation skills and teamwork. Marketing skills was identified within articles as needed, but was not included in any module outcomes of any of the universities (0%). Trpeska and Lazarevska (2018:67) found that students rated their marketing skills as insufficiently developed through the Accountancy programme, which could assign as not being part of the Marketing Accountancy curricula. Numeracy skills and service skills were identified within the articles as needed for accountancy students, but none of the universities (0%) included the skill in the module outcome. Coady *et al.* (2018:95) support the service skill to be part of the curricula of accountancy students.

4.3.2.4.7 Managing others

The management of teams/projects and time management are considered by students as important skills (Trpeska & Lazarevska, 2018:68). Three of the selected universities (60%) included the management of teams/projects from the 2025CF as well as from literature, in the module outcome. Talent management (developing others) is part of the 2025CF and identified in articles as a needed skill but was not included in the module documents of any university (0%). Olvera *et al.* (2015:31) suggest talent management is a specific competency needed to track skills development. Emotional intelligence and how to handle relationships emphatically and judiciously (2025CF) were identified in articles and included at one university (20%) as part of the module outcomes. Coady *et al.* (2018:114) posit that emotional intelligence, optimism and self-awareness could be of less importance to develop at university and maybe developed at the accountancy workplace. This could indicate why emotional intelligence is not part of the curricula. In contrast to this finding Gray (2016) identified emotional intelligence as one of the top ten

skills needed for the 4IR, suggesting that emotional intelligence should be included in the curricula. Social skills identified in the articles are not included in the module outcome document of any university (0%). Professional relationships are built through social skills, therefore employers require graduates to be socially skilled (Moore, 2018:88).

The relational acumen analysed in Table 4.6 showed the inclusion of the skills from the 2025CF and additional skills from the articles included in the module outcome documents. The analysis of the relational acumen found that the module outcomes need to expand to include more relational skills. Three of the dimensions of the relational acumen were included in the module outcome of all the universities: communication skills, written communication skills and moral and ethical decision-making. Although the following dimensions are included in the module outcomes of some of the universities, the dimension has to be expanded and included in all the module outcome documents to prevent an expectation gap: listening interviewing and discussion, audience and effectiveness, reading skills, leadership skills, influence, and consensus building, conflict resolution, consultation, teamwork skills, cooperation and collaboration, work independently, observant and aware, pressure and time management, manage teams/projects and emotional intelligence skills. The following skills were not included in the module outcome documents at any of the universities: communication media, CV writing, interview and job search, sustainability and long-term thinking, servant leadership, influence and negotiation, strategic professional relationships, network building, knowledge sharing, adapt to management styles, organisation culture advocacy, adapt to work environment, behavioural skills, interpersonal skills, personal skills, confidence, marketing skills, numeracy skills, service skills, talent management (developing others), resilience and crises management, handle relationship empathetically and judiciously as well as social skills. The universities will have to adapt the module outcome documents to include the skill shortages as detailed above. Besides technology subjects, pervasive skills will be even more important in the curricula, due to 4IR and automation (Reddrop & Mapunda, 2019:85). The digital acumen was analysed in the same manner. Table 4.7 represents a detailed analysis of the dimensions and additional codes of the digital acumen included in the module outcome documents of universities. The elements and dimensions and codes are from the codebook as per

Annexure 5. The percentage is a calculated figure of the number of universities that included the code in their module outcome.

4.3.2.5 Digital acumen

Table 4.7 presents the elements and dimensions from 2025CF, with additional codes from articles, for evaluation of inclusion in module outcome documents. The university module outcome documents were analysed using the adapted 2025CF. The dimensions of the adapted 2025CF were used as theoretical framework to assess if these skills were evident within the South African top five university module outcome documents.

The digital acumen (Table 4.7) element of data analytics with the dimension of the nature of data (e.g. underlying characteristics and storage) (2025CF), was identified in the articles, but were not part of any of the selected universities' curriculum (0%). The curricula have to include the skills due to the impact of technology on the storage and retrieval of data (Wells, 2018:42). Although Ballou *et al*. (2018:15) assessed that data analytics was already included in accounting education mainly due to improved awareness and communication, the data analysis skill, was evident in one of the selected universities (20%) module outcome documents. Al-Htaybat *et al.* (2018:336) confirm that for students to be employment ready they need skills in data analysis.

McKinney Jr *et al.* (2017:63) has proposed in 2017 that big data should be part of the curricula as employers' expectations changed in this regard, needing graduates to possess this skill. Big data and the analyses thereof require professional scepticism and critical thinking skills, and these skills are included competencies of the 2025CF. Big data as per the 2025CF is not included in the module outcomes of any of the selected universities (0%). The impact of business models skill (2025CF) was identified in the articles analysed and was not included in the module outcomes of universities (0%). In order to prepare and communicate integrated reporting, accountancy students have to understand the impact of big data on business models (Sledgianowski *et al.,* 2017:84).

Table 4.7: Detail analysis of digital acumen codes within module outcome documents of universities

Digital acumen: element and dimension and codes	Included in module outcome documents for universities #					%
	1	2	3	4	5	
W1 Data analytics						
The nature of data (e.g. underlying characteristics and storage)	x	x	x	x	x	0%
Perform data analysis	x	x	x	x	✔	20%
W2 Big data						
Big data	x	x	x	x	x	0%
Impact on business models	x	x	x	x	x	0%
W3 Cognitive & non-cognitive systems						
Including but not limited to: machine learning, robotic process automation and artificial intelligence	x	✔	x	x	x	20%
New technologies	x	x	✔	x	✔	40%
Reliance on IT Technologies	x	✔	✔	✔	x	60%
W4 New developments & protocols						
Including but not limited to: cloud computing, blockchain, and mobile apps	x	x	x	x	x	0%
W5 Distributed processing and cyber security						
Distributed processing (IoT)	✔	✔	✔	✔	✔	100%
Risks and attacks	x	x	x	x	x	0
Mitigating steps	x	x	x	✔	x	20%
W6 User competencies						
User tools (word processing, presentation software, spreadsheet software)	✔	✔	✔	✔	✔	100%
Basic coding	x	x	x	x	x	0%
Securing and safeguarding	x	✔	✔	x	✔	60%
Technology skills	✔	x	✔	✔	x	60%

Source: SAICA 2025CF adjusted SAICA (2019a:1-11) and codebook Annexure 5 and own work

Key: ✔ The curriculum includes reference to the code/skill.
X The curriculum does not include or reference specific code/skill.
% Percentage universities that included codes in curriculum.
Orange codes only in 2025CF and not identified in articles; green codes in 2025CF and articles; white codes identified in articles but not 2025CF.

The inclusion of cognitive and non-cognitive systems (2025CF) which include, but are not limited to, machine learning, robotic process automation and artificial intelligence, were identified in articles, however, was only part of the curriculum of one of the universities (20%). Schwab (2016:39) indicated that accountants' jobs may change in the future

emphasising the need to include the development of cognitive and non-cognitive systems in accountancy students' curriculum.

New technology skills were identified in the articles analysed with 40% of the universities including the skill in the module outcome documents. The current digital revolution requires new skills and in order to address new technology demands, the Accountancy curricula have to ensure graduates are ready for the workplace (Al-Htaybat *et al.,* 2018:333). Reliance on IT technologies is a skill identified in the articles and was included within 60% of the universities' module outcomes. Since business rely more on technology to perform a part of the accountants' daily tasks, the job profile of accountants changed (Giles, 2019:29). New developments and protocols including, but not limited to, cloud computing, blockchain and mobile apps were included in the 2025CF, however, the current module documents did not include any reference to new developments such as cloud computing and blockchain (0%). Academics have to include blockchain education in the curriculum within the near future (Rechtman, 2017:17; Giles, 2019:10). Blockchain changed the accessibility and updating of the accountancy ledger, resulting in changes in the way data is extracted for audit purposes (Hong & Seo, 2018:49). The Accountancy curricula have to adapt to reflect the changes. Cloud computing enables remote access to information and the curricula should include skills about cloud computing (Al-Htaybat *et al.,* 2018:337). The analysis of the digital acumen dimensions revealed that the only skills currently part of the curricula are focused on the internet related skills and user tools such as Excel and Pastel to students (100%).

The risks and attacks dimension in the 2025CF were not included in the module outcome documents of any university (0%). Identifying possible risks and problems are vital skills for accountancy graduates (Giles, 2019:9). Dong (2019:32) agrees that risk assessment ability is a core competency for accountancy graduates. Mitigating steps (2025CF) was evident with the module outcome document of one (20%) of the universities. Accountancy graduates need to be skilled in introducing mitigating steps to protect systems and data (Post, 2017). Basic coding is not taught by any university currently (0%). Giles (2019:8) highlighted the importance of understanding coding, for the inclusion of coding skills in the curricula. Securing and safeguarding is part of the module outcome of 60% of the selected universities. Students have to be able to perform risk assessments and

implement corrective steps to ensure the system is secure and safeguarded (Sledgianowski *et al.,* 2017:87).

The skills of the digital acumen that were included in only two module outcome documents refer to distributed processing (IoT) and user tools. Only a few of the universities currently include the following skills in the module outcome documents: perform data analysis, including, but not limited to, machine learning robotic process automation and artificial intelligence, new technologies, reliance on IT technologies, mitigating steps, securing and safeguarding and technology skills. The following skills were not included in any university module outcome documents and the absence of teaching the skill could result in the accountancy student to be unprepared for the 4IR: the nature of data (e.g. underlying characteristics and storage), big data, impact on business models, including but not limited to: cloud computing blockchain and mobile apps, risks and attacks basic coding. The universities have to investigate the possibility to adapt and extent their module content to include the skills as per the findings indicated.

The results of the module outcome document analysis are depicted in Tables 4.4 to 4.7. The module outcomes analysis purposed to identify the elements and dimensions (codes) within the four acumens of the 2025CF (and additional skills from the articles) compared to the module outcome documents of the top five universities. The tables represent a detailed analysis of the dimensions and additional codes identified in the articles and included in the modules.

Table 4.8 represents a summary of the elements and dimensions (codes) within the four acumens of the 2025CF. The analysis of the elements and dimensions purposes to identify compliance to the 2025CF.

Table 4.8: SAICA 2025CF acumen and element and dimension linked to module outcome documents

Acumen and 2025CF element		Included in module outcome documents for universities #					%
		1	2	3	4	5	
Business acumen							
Business internal environment	Z1	✔	✔	✔	✔	✔	100%
Business external environment	Z2	✔	✔	✔	✔	✔	100%
Innovation and creativity	Z3	✔	✔	✔	x	x	60%
Decision-making acumen							
Analytical/critical thinking	Y1	✔	✔	✔	✔	✔	100%
Problem-solving	Y2	✔	✔	x	x	x	40%
Judgement & decision-making	Y3	✔	✔	✔	✔	✔	100%
Professional scepticism	Y4	x	x	x	x	x	0
Relational acumen							
Communication skills	X1	✔	✔	✔	✔	✔	100%
Leadership skills	X2	✔	✔	✔	✔	✔	100%
People skills	X3	✔	x	x	x	x	20%
Relationship-building skills	X4	x	x	x	x	x	0
Teamwork	X5	✔	x	x	x	✔	40%
Self-management	X6	✔	x	x	x	x	20%
Managing others	X7	✔	✔	✔	x	x	60%
Emotional intelligence	X8	x	✔	x	x	x	20%
Digital acumen							
Data analytics	W1	x	x	x	x	✔	20%
Big data	W2	x	x	x	x	x	0
Cognitive & non-cognitive systems including machine learning, robotic process automation and artificial intelligence	W3	x	✔	x	x	x	20%
New developments & protocols including cloud computing, blockchain and mobile apps	W4	x	x	x	x	x	0
Distributed processing and cyber security	W5	✔	✔	✔	✔	✔	100%
User competencies	W6	✔	✔	✔	✔	✔	100%

Source: SAICA (2019a:5-6) and own work

Key: ✔ The curriculum includes reference to the code/ skill.
X The curriculum does not include or reference specific code/skill.
% Percentage universities that included codes in curriculum.
Green codes in 2025CF and articles.

The business acumen dimensions of business internal and external environment were included in all five universities' module outcome documents for 100% compliance on both dimensions. However, the dimensions of innovation and creativity were included in three

of the five (60%) university module outcomes. Since employers' value innovation and creativity, all universities must include innovation and creativity skills in the curricula (Altrawneh, 2016:63). The two universities will have to address this aspect within their CA(SA) degree to comply with the 2025CF.

The decision-making acumen element of analytical/critical thinking and judgement and decision-making were evident within all five universities' Chartered Accountancy curriculum (100%). On the contrary, only two of the universities included problem-solving (40%) and none of the universities (0%) referred to professional scepticism within the module outcomes. Komarev and Preobragenskaya (2018:29) agree that problem-solving is an important CA(SA) graduate skill for the 4IR. Problem-solving is one of the skills that cannot be captured by automation, as a result accountancy graduates must pursue a level of excellence in solving problems (Webber-Youngman, 2017:v). Accountancy academics must ensure students can solve problems by thinking critically. Professional scepticism needs to be included by all five universities within their curriculum since progress in the business environment needs the new skill of scepticism (Rufino *et al.,* 2017:121). Professional scepticism is integrated with skills such as critical thinking, data analyses, and problem-solving.

The relational acumens' element of communication was evident only in three of the five universities' module documents (60%). Even though all five universities included leadership skills in their module outcomes (100%), only one university included people skills (20%). The curricula have to include people skills since good people skills lead to better results in the work environment. None of the universities had relationship-building skills (0%), with only one university module outcome directed to develop teamwork (20%). Students need to develop the skills to be competent in building relationships with superiors, subordinates and with external parties (ACCA, 2010). Likewise, only one university purposed to develop self-management and emotional intelligence (20%). The WEF included emotional intelligence as one of the top ten skills needed in the 4IR, due to an expected increase in human skills demanded (Gray, 2016). Three universities included managing others' skills within module outcomes (60%). Although numerous articles were published since 2009 explaining that the Accountancy curricula should include more relational skills to fill the expectation gap, the current status still indicates a

shortage of relational skills in the curricula (Bunea, 2017:445; Chaplin, 2017:68; Jackling & De Lange, 2009:377; Livingstone & Lubbe, 2017:138; Warwick & Howard, 2015:1).

Data analytics, cognitive and non-cognitive systems including machine learning, robotic process automation and artificial intelligence elements, were part of the module outcome document of one (20%) of the universities. Peterson (2016) supports that universities have to upgrade their curriculum to include data analytics and manipulation of big data skills. Business use new technologies and accountancy students should be familiar with these technologies. Although WEF (2016:7) identified big data and cloud technology (new developments and protocols) as technological drivers of change, the inclusion of big data skills and new developments and protocols skills are not part of any (0%) universities' module outcome documents. Distributed processing and cyber security, as well as user competencies, were included by all the universities (100%) in the module outcome documents. The IoT as distributed processing will positively impact the audit process due to the availability of real-time data (Hong, 2018:49). In this regard, user competencies such as MS Word and Excel were one of the first technological skills included in the Accountancy curricula for students. These skills formed the foundation for digital skills for accountancy students.

The analysis of the elements and dimensions (codes) within the four acumens of the 2025CF purposes to identify the compliance to the 2025CF as presented in Table 4.8. The modules do include business internal and external environments (100%), as well as analytical/critical thinking (100%). Judgement and decision-making (100%) and leadership skills (100%) are presented in the module documents. From the digital acumen, distributed processing (100%) and user competencies (100%) are contained in the module outcome documents. Some of the elements in the 2025CF are not included in the module outcome documents of all the selected universities. The elements included in the module outcomes such as innovation and creativity (60%), problem-solving (40%), communication skills (60%), people skills (20%), teamwork (20%), self-management (20%), managing others (60%) and emotional intelligence (20%). From the digital acumen data analytics and cognitive and non-cognitive systems are included in the module outcome of only one university (20%). The universities could expand the module outcomes to include the elements in order to close the gap between business and

education. Two of the elements were both in the 2019CF and 2025CF and are currently not included in the module outcome documents: professional scepticism (0%) and relational-building skills (0%). There are new elements in the SAICA CF, which are not currently part of the module outcomes such as big data (0%) and new developments and protocols (0%). The universities need to expand the Accountancy curricula to include the absent elements in the module outcomes.

4.4 CONCLUSION

Phase I compared the 2025CF with the 2019CF and commented on specific and general similarities and differences between the two CFs. The comparison of the 2025CF with the 2019CF aimed to identify new skills required for an entry-level CA(SA) as proposed by SAICA. The skills within 2019CF, specifically within the pervasive qualities theme, were compared with the enabling competencies of the 2025CF. The current 2019CF, which has a different structure on skills categories and themes, was scrutinised to ascertain the occurrence of skills within the proposed 2025CF. The comparison between the 2025CF and 2019CF identified similarities in the business-, decision-making-, and relational acumens categories.

In preparing the accountancy students for the 4IR, SAICA added new skills to the 2025CF, which should be reflected in the curricula. The communication-, leadership-, relationship-building- and teamwork skill elements were expanded on the 2025CF relational acumen category. The new skills introduced within the framework were listening (part of listening, interviewing and discussion), influence and consensus building, network building and knowledge sharing. The added digital acumen (2025CF) included the following new skills: the nature of data (e.g. underlying characteristics and storage), perform data analysis, impact on business models, including but not limited to machine learning robotic process automation and artificial intelligence, including but not limited to cloud computing, blockchain and mobile apps, distributed processing (IoT), risks and attacks, mitigating steps, basic coding and securing and safeguarding. The comparison of the 2025CF elements and dimensions within the four acumens, with the pervasive qualities and skills theme of 2019CF, identified new skills to equip students for the 4IR.

The acumens, elements and dimensions which refer to skills within the 2025CF were used as deductive codes during the document analysis in Phase II. However, the document analysis indicated that a variety of new codes were created that were not part of the 2025CF. The newly inductive developed codes were grouped into one of the existing 2025CF elements. The additional inductive codes created from the analysis of the peer-reviewed articles, indicate that researchers and academics have identified supplementary skills that are present in the Accountancy curricula, yet not within the SAICA 2025CF. The document analysis, therefore, implies skills additions that could be made to the 2025CF. Through the process of deductive and inductive coding, 111 codes (Annexure 5) were identified within the articles relevant to accountancy skills and the 4IR. A total of 54 inductive codes relevant to the study and not reflected in the 2025CF acumens, were also identified.

SAICA could consider the inclusion of four inductive codes from the articles analysed as part of the business acumen in Table 4.4, such as organisational and business management skills, broader business knowledge, business awareness and understanding taking business law into account and environmental related skills. The dimensions of different types of entities and the role they play in society, concept of stewardship, business models and continuous improvement originated from the 2025CF yet were not identified in the article analyses, which could indicate a possible gap in research.

The decision-making acumen consists of four elements with dimensions and skills that have to be in the Accountancy curricula to prepare the students for the 4IR. Four inductive codes were identified (Table 4.5) that SAICA could include in the 2025CF decision-making acumen as dimensions: strategic thinking, analytical and critical thinking, problem-solving, research skills, decision-making and scepticism. The following codes included in the 2025CF were not identified in the articles analysed: challenge assumptions, impact of issues, implications of actions, implementation, and independent and questioning mindset.

Relational skills are increasingly important to prepare the accountancy student for the 4IR. Table 4.6 included 19 additional skills identified in the articles that did not appear in the 2025CF dimensions and SAICA could consider the inclusion of these skills as

dimensions. The inductive codes identified in the articles were communication skills, CV writing, interview and job search, reading skills, written communication skills, leadership skills, teamwork skills, adapt to work environment, behavioural skills, interpersonal skills, personal skills, confidence, marketing skills, numeracy skills, observant and aware, pressure and time management, service skills, resilience and crisis management, emotional intelligence skills and social skills. The relational acumen included six codes from the 2025CF that were not identified in the articles: communication media, servant leadership, knowledge sharing, adapt to management styles, organisation culture advocacy, and handle relationships empathetically and judiciously. The inclusion of the skills in the curricula could be subject to future research.

The digital acumen aims to prepare the accountancy student for the digital disruption. Additional identified dimensions in the articles were big data, new technologies, reliance on IT technologies and technology skills (Table 4.7). Although mitigating steps skills was in the 2025CF, the skill was not identified in the articles analysed, which could indicate a gap in current research.

The module outcomes analysis in Phase III purposed to identify the elements and dimensions (codes) within the four acumens of the 2025CF (and additional skills from the articles). The deductive codes from the 2025CF and the inductive codes identified through the document analysis combined in the codebook to form the theoretical framework used for analysis. Each module outcome was analysed using the codebook to evaluate the inclusion of skills development within the module. The module outcome documents did not include the 2025CF business acumen skills at some of the universities: role of business in society, environmental related skills, initiative, innovation and entrepreneurship skills. All the universities need to expand their module outcomes to include initiative and continuous improvement skills.

The module outcome documents for the decision-making acumen did not include skills about challenge assumptions, strategic thinking, problem-solving, mindful reasoning, impact of issues, implications of actions, knowing when to seek experts' assistance, research skills, issues identification, recommendations, implementation, scepticism and independent and questioning mindset. The aforementioned modules should be included

in the module outcome of all the universities to prepare the Accountancy curricula for the 4IR.

The analysis of the relational acumen found that the module outcomes need to expand to include more relational skills. Only two of the dimensions of relational acumen were included in the module outcome of all the universities: written communication skills and moral and ethical decision-making. Although the following dimensions from the 2025CF are included in the module outcomes of some of the universities, the dimension should be included in all the module outcomes to prevent an expectation gap: listening interviewing and discussion, communication media, audience and effectiveness, sustainability and long-term thinking, servant leadership, influence and consensus building, influence and negotiation, conflict resolution, consultation, strategic professional relationships, network building, knowledge sharing, cooperation and collaboration, work independently, adapt to management styles, organisation culture advocacy, manage teams/projects, talent management (developing others), and handle relationship empathetically and judiciously. The universities will have to change the module outcome documents to include skills to enhance the relational acumen in order to prepare the students for the 4IR.

The following relational acumen additional skills identified from the articles are not included in the module outcomes at some of the universities: CV writing, interview and job search, reading skills, leadership skills, teamwork skills, adapt to work environment, behavioural skills, interpersonal skills, personal skills, confidence, marketing skills, numeracy skills, observant and aware, pressure and time management, service skills, resilience and crises management, emotional intelligence skills and social skills. SAICA and the universities should consider the inclusion of the previous researched skills to enrich the curricula. Reddrop and Mapunda (2019:85) support that besides technology subjects, pervasive skills will be even more important in the curricula, due to the 4IR and automation.

Of all the skills in the digital acumen, only two are included in the module outcome documents: distributed processing (IoT) and user tools. The nature of data (e.g. underlying characteristics and storage), perform data analysis, big data and impact on business models are digital acumen skills included in the module outcome of some of the

universities and should be included at all the universities to prepare the accountancy student. Likewise, machine learning, robotic process automation and artificial intelligence, new technologies and reliance on IT technologies, should be included in the curricula of all the universities. In addition, cloud computing, blockchain and mobile apps, risks and attacks, mitigating steps, basic coding, securing and safeguarding and technology skills should be included at all the universities to prepare the accountancy student for the digital age.

4.5 LIMITATIONS OF THE STUDY

The modules of the Chartered Accountancy were coded in ATLAS.ti™ 8 from the curricula as available in the yearbooks and calendars from the selected universities. The possibility exists that the curriculum is not totally reflected within the module outcome documents, however, universities have to develop their documents to adhere to the SAICA prescriptions and therefore it portrays the current curricula outcomes. The module outcome was linked directly or indirectly to the skills (element or dimension in the 2025CF as created in the codebook) by way of implication of the module outcome description.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

The purpose of this chapter is to conclude previous chapters and assess whether the problem statement has been addressed. This chapter evaluates the achievement of the primary, theoretical and empirical objectives as set in Chapter 1. The limitations, contributions and recommendations based on Chapter 4 are also discussed in this chapter. This chapter concludes the findings and proposes future research possibilities.

5.2 CHAPTER 1

Chapter 1 presented the introduction to the problem statement and research question. The problem statement explained that the business environment has changed rapidly due to the 4IR, which necessitated different skill sets from graduates. Higher education institutions need to update the skills developed within the curricula, yet research suggested that the Accountancy curricula were slow to adapt to the 4IR workforce skills demand. Furthermore, specific guidance is lacking from professional bodies on how to develop the Accounting curricula aimed to address the skills needed by the 4IR workforce. The literature gap indicates that content on Accounting curricula aimed at developing specific graduate skills for the 4IR, is limited. Research further indicates that the business and workforce environment is rapidly changing, but that educational institutions are not keeping up with the fast changes. The research question proposes to answer the extent to which the current Accountancy curricula prepare students for the 4IR.

The primary and secondary research objectives including the empirical objectives were addressed through three phases of analysis and discussed in Chapter 4. The qualitative methodology followed is discussed in Chapter 3. The theoretical objective of the study was achieved in compiling a comprehensive literature study on the Accountancy curricula as discussed in Chapter 2.

5.3 CHAPTER 2

The objective of Chapter 2 addressed the theoretical objective of the study. In this regard, a comprehensive literature review on the accountancy skills needed by accountancy graduates for the 4IR was performed. Accountancy skills needed within the industry have changed from the first IR through to the 4IR due to technological and business environment developments. Changes in the business environment demand new skills from employees. Similarly, accountancy professionals and students require new skills and capabilities within the 4IR environment. The changes in employees' needed skills development have to be addressed in the Accountancy curricula of universities. In this regard, universities have to carefully compile the curriculum, aimed at developing the students' skills needed in the workforce. The purpose of skills development is to prepare students to be employable and refers to the "graduateness" of students. It is important that university curricula reflect the skills development needed within the current work market. The purpose of the Accountancy curricula are to bridge the expectations gap between the labour market and the competencies of graduates to ensure employability. The 4IR brought about major technological changes, which resulted in changes that need to be affected within the universities' Accountancy curricula.

Disruptive innovations redefine skills employees need and therefore the Accountancy curricula have to change to prepare the students for the 4IR. New technological developments like blockchain, artificial intelligence and big data are newly included elements and skills within the 2025CF. Pervasive skills will even be more important due to the changes brought by the 4IR and automation. The WEF expects an increase in human skills jobs like customer service, training and development, and sales and marketing (WEF, 2018:8). Self-management skills are needed as part of the Accountancy curricula. Both critical thinking and decision-making are needed skills for the 4IR. Likewise, interpersonal interactions are a top required skill for accountancy graduates. The aptitude for self-learning was rated as the most advanced skill that a prospective professional should possess. The new entrants to the job market should possess time management skills developed during a student's academic career. Students need to develop abstract problem-solving skills during their accountancy education to be prepared for the 4IR (Al-Htaybat *et al.,* 2018:353). Written and verbal communication

skills are more important to employers than technical skills (Komarev & Preobragenskaya, 2018:54). The 2019CF includes verbal and written communication skills and the listen skill is newly included in the 2025CF as a required competency. Leadership skills are one of the top three skills essential for a rewarding career (Kavanagh & Drennan, 2008:288). Employers prefer graduates that possess both technical knowledge and pervasive skills.

A comprehensive review of literature was performed on the preparedness of the Accountancy curricula to provide the students with skills needed for the 4IR and therefore meet the secondary theoretical objective set in Chapter 1. The competencies needed by accountancy graduates are included in the CF as discussed in Chapter 2.

5.4 CHAPTER 3

Chapter 3 describes the research methodology applied for this study. The qualitative research in the form of SLR was conducted in three phases to address the empirical objectives of the study. The methodology of the SLR provides a robust and rigorous process to ensure in-depth analysis of the phenomenon at hand. In this regard, Phase I of the study compared the 2025CF with the 2019CF. The comparison enabled the identification of a theoretical framework to be used as basis for the document analysis of the peer-reviewed articles during the SLR and Phase II. The comparison was presented within Chapter 4 (Phase I). The method followed for Phase II of the study were described in Chapter 3 and well-documented in Annexures 1 to 5. Phase II performed a SLR on the most recent research and used the 2025CF skills as a theoretical framework to analyse the included documents (Annexures 1 to 2). The analyses provided additional skills that were identified from literature that was not evident within the 2025CF. The results of Phase II were presented in data networks in Chapter 4. The major findings of the SLR Phase II, identified a shortage of skills within the 2025CF, which expanded the 2025CF theoretical framework for the analysis in Phase III. In the last phase of the SLR, the top five South African universities' Accountancy curriculum module outcome documents were analysed according to the expanded 2025CF. The document analysis according to the adapted 2025CF theoretical framework evaluated the extent to which the current Accountancy curricula of South African universities prepare graduates for the 4IR skills needed and the results of Phase III were presented in table format in Chapter 4.

5.5 CHAPTER 4

The chapter reports and interprets the empirical findings based on the following empirical objectives:

- Compare the newly proposed CF (2025CF) and the current CF (2019CF) with each other (Phase I).
- Identify skills needed in the Accountancy curricula by using the 2025CF as a theoretical framework to identify additional skills within peer-reviewed articles to enhance the 2025CF (Phase II).
- Evaluate the current Accountancy curricula of South African universities to determine if it addresses graduate skills needed for the 4IR by using the enhanced 2025CF (Phase III).

The phases and results are discussed in accordance to the phases.

5.5.1 PHASE I: COMPARISON OF COMPETENCY FRAMEWORKS

Table 4.1 (Chapter 4) listed similarities and differences between the 2025CF and 2019CF. The conclusion from the comparison (Phase I) of the 2025CF with the 2019CF indicated that new skills were added to the 2025CF. Specifically, the 2025CF included newly added relational and digital skills, which were not evident within 2019CF. The relational acumen of 2025CF added pervasive skills such as listening (part of listening, interviewing and discussion dimension), influence and consensus building, network building and knowledge sharing. SAICA included the skills that accountancy graduates need to develop to meet employer expectations. The digital acumen (2025CF) added the following skills: data analytics and the nature of data (e.g. underlying characteristics and storage), perform data analysis, big data impact on business models, cognitive and non-cognitive systems including but not limited to machine learning, robotic process automation and artificial intelligence, new developments and protocols including but not limited to cloud computing blockchain and mobile apps, distributed processing (IoT), risks and attacks, mitigating steps, basic coding and securing and safeguarding skills. SAICA added these new skills to the 2025CF to address the workforce changes for the 4IR and

likewise, universities will have to adapt their curricula to include the new 2025CF skills. The Future of Jobs Report includes that routine-based jobs are decreasing, while there is a growing demand for roles in emerging technologies like big data and artificial intelligence specialists (WEF, 2018:9).

5.5.2 PHASE II: SYSTEMATIC LITERATURE REVIEW ON PEER-REVIEWED DOCUMENTS

The objective of Phase II was to evaluate recent research regarding skills developed by students within the Accountancy curricula. The 2025CF was used as a theoretical framework for the analysis, and during Phase II, additional skills were identified from peer-reviewed documents that indicated a number of skills that were not included in the 2025CF. In this manner, the analysis of Phase II resulted in the skills added to the CF, which enhanced the 2025CF.

In Phase II the qualitative analysis therefore identified additional skills (coded during the document analysis) within recent literature on accountancy students' skill development, which were not within SAICA's 2025CF. In addition, the document analysis on the peer-reviewed articles rendered numerous similarities related to dimensions within the 2025CF, which substantiates the inclusion of those skills in the 2025CF. The newly identified additional skills were grouped into one of the existing elements of 2025CF. The new skills identified in the peer-reviewed articles, indicated that researchers and academics already identified supplementary skills that are needed and were addressed within the Accountancy curricula. However, these skills were not included within the SAICA 2025CF and the findings of Phase II therefore implies that additional skills could be added to the 2025CFas substantiated by literature. Since SAICA deems the 2025CF as a working document, the possibility exists that these identified skills could still be added to the new framework. The additional skills identified from the SLR Phase II, are presented below as per acumen.

5.5.2.1 Business acumen

The articles analysed during the SLR (Phase II) and presented in Figure 4.2 indicated that the following skills could be added to the 2025CF as part of the business acumen: organisational and business management skills, broader business knowledge, business

awareness and understanding taking business law into account and environmental related skills. The inclusion of the skills from articles could enhance the 2025CF and could be included by SAICA. The dimensions such as different types of entities and the role they play in society, concept of stewardship, business models and continuous improvement within the 2025CF, were not identified in the articles, which indicates a gap in literature and possibilities for future research to be conducted. The inclusion of the following skills in the 2025CF by SAICA is justifiable since recent literature agreed with the skills needed within the Accountancy curricula: role of business in society, internal functions of an entity, defining business success (value creation; profit motive vs sustainable businesses), global and other external influence (including sustainable development goals), tax policy, initiative, innovation, and entrepreneurship.

5.5.2.2 Decision-making acumen

The decision-making acumen identified strategic thinking and research skills additionally within peer-reviewed articles related to accountancy skills that need to be developed, which was, however, not included in the 2025CF (SLR (Phase II) as presented in Figure 4.3). SAICA needs to consider adding these skills to the required competencies of accountancy graduates to be prepared for the 4IR, since strategic thinking and research abilities are valuable in the ever-changing and volatile business environment (Trpeska & Lazarevska, 2018:57). However, SAICA included analytical/critical thinking, problem-solving skills, decision-making and scepticism as elements in 2025CF (and not as dimensions), while the articles identified the aforementioned as skills. The difference lies in the level of detail pertaining to the skill or element, and in this regard, research could be expanded to define the detailed skills components according to the detail of the 2025CF. This identifies a research gap for future possibilities of inquiry undertaken by accountancy researchers. Additionally, the following skills were included in the 2025CF but were not identified in the articles: challenging assumptions, impact of issues, implications of actions, implementation and independent and questioning mindset. Similarly, the shortcoming of these skills within recent research, portrays a literature gap worth exploring with future research on the development of these skills within Accounting curricula.

5.5.2.3 Relational acumen

The comparison of CFs in Phase I identified the following relational skills as newly added to the 2025CF: listening skills, influence and consensus building, network building, and knowledge sharing. Except for knowledge sharing, all the above-mentioned skills were supported by literature as a skill accountancy graduates need. While communication and teamwork skills, as well as emotional intelligence, were included by SAICA as elements and not as dimensions, the articles identified these as skills. The difference in level application indicates a gap in literature whereby research could be conducted in future for a detailed description of these skills components. The results of Phase II (Figures 4.4 and 4.5) identified the following additional relational acumen skills not included in the 2025CF: CV writing, interview, job search, reading, written communication, adapting to work environment, behavioural, interpersonal, personal, confidence, marketing, numeracy, observant and awareness, handling pressure, time management, service, resilience, crises management and social skills. SAICA could consider the inclusion of the above skills to be part of the CF as pervasive skills, which will be of great importance in the curricula for the 4IR (Reddrop & Mapunda, 2019:85). Pervasive skills are important as substantiated by the WEF, which project that the human communicating and interacting part of every job will decrease by only 8% in 2022 from 77% in 2018 to 69% (WEF, 2018:11). The following skills were included in the relational acumen in the 2025CF, however, none of these skills were identified in the articles during the SLR: communication media, servant leadership, knowledge sharing, adapt to management styles, organisation culture advocacy, and how to handle relationships empathetically and judiciously. This literature gap indicates possible future research opportunities.

5.5.2.4 Digital acumen

The comparison conducted between the 2025CF and the 2019CF from Phase I identified all the digital acumens skills as newly added excluding user tools skills. The inclusion of all the newly added digital skills (Figure 4.6) is supported by prior research, except for mitigating steps that were not identified in the SLR articles. The analysis of the peer-reviewed documents identified new technologies, reliance on IT technologies, and technology skills as additional skills that were not evident within the 2025CF. Employers highlighted the importance of the above-mentioned skills to be part of the curricula,

therefore SAICA has to consider adding the skills as required competencies of accountancy graduates. Although the 2025CF identified mitigating steps as needed skills for the 4IR, the skill was not identified in any of the articles. Therefore, future research could focus on evaluating the importance of mitigating skills for accountancy graduates in the 4IR. The research will focus on a South African context, since SAICA identified the skill as important and included in the 20215CF. Big data skills were included in the 2025CF as an element and not a dimension. However, the articles included big data skills as a needed skill for the 4IR and future research could focus on the detail of how big data skills are developed by universities for the 4IR workforce environment.

5.5.3 PHASE III: SYSTEMATIC LITERATURE REVIEW ON UNIVERSITY MODULE DOCUMENTS

The objective of the module outcome document evaluation was to determine the extent to which the current Accountancy curricula of South African universities address graduate skills needed for the 4IR. The enhanced 2025CF, adapted during Phase II, was used as theoretical framework for the analysis performed in Phase III.

The module documents were captured from the curriculum or yearbook that was publicly available on the top five universities' websites. Each of the module documents included in the curriculum or yearbooks and was analysed in ATLAS.ti™ 8 and summarised into tables (Tables 4.4 to 4.7). The university module documents were analysed using the adapted 2025CF (after Phase II), in order to identify skills addressed by the curricula as mentioned within the module outcomes. The module document analysis purposed to identify the elements and dimensions or skills within the four acumens of the 2025CF (including additional skills from the articles) within the university curricula. The university identities were concealed to adhere to ethical standards and results were presented anonymously. The number of universities that included the skills in their module documents was portrayed as a percentage regarding the inclusion of that particular skill. The summarised findings of the university module document analysis as presented in Tables 4.4 to 4.7 are discussed per acumen.

5.5.3.1 Business acumen

The module outcomes analysed identified skills in the adjusted 2025CF that were not in the module outcomes. The role of business in society skill is included in 40% of the module documents. Universities may have to include module outcomes, focusing on development of and students' skills regarding the role of business within society, so that graduates will be able to address this function within business. The environmental related skills were only presented by 40% of the universities' Accountancy curricula. Accountants should be able to calculate the impact of business activities on the environment (Olvera *et al.,* 2015:29), and therefore is a needed skill to be included within more university curricula. As part of the innovation and creativity element, the initiative skills and continuous improvement skills were not addressed at any of the universities (0%). This may lead to accountancy graduates entering the 4IR workforce, with little or no knowledge on continuous improvement, which may have negative consequences for individuals or the organisations, since skills on continuous improvement are needed due to ongoing improvements to products or processes (Campbell, 2020). The complexity of business requires accountancy graduates with initiative skills (Altrawneh, 2016:56). The innovation skills were included in 40% and entrepreneurship skills in 60% of the university's module documents. According to the low inclusion rate of these skills, universities will have to focus on the inclusion of more innovation and entrepreneurial skills development for graduates. This is substantiated in literature where students have to be able to perform practical accountancy, innovation and entrepreneurship and therefore need to be included in tertiary education (Dong, 2019:31). The inclusion of the aforementioned skills in the curricula will aid in preparing the accountancy students for the 4IR.

The module outcome documents included all the skills from the 2025CF except for those discussed above. The inclusion of these skills as part of the module outcomes indicated that the universities' curricula address these needed skills and will be able to adhere to the 2025CF.

5.5.3.2 Decision-making acumen

The module outcomes analysed identified skills in the adjusted 2025CF that were not in the module outcomes. The skills of challenging assumptions, impact of issues,

implications of actions and knowing when to seek expert assistance were not in the curriculum of any of the universities (0%). Strategic thinking and problem-solving were in the curriculum of 80% of the universities. Mindful reasoning skills were evident in 40% of the universities' Accountancy curriculum. According to Al-Htaybat *et al.* (2018:352), the new Accounting curricula should focus on providing accountants with mindful reasoning skills to evaluate and analyse internal and external data. Research skills are part of the Accountancy curriculum of 60% of the universities. Abayadeera and Watty (2016:16) posits that employers and students rate research skills as important for the curricula. The identification of issues skill was included in 40% and the recommendations skill was evident within 80% of the Accountancy curriculum of the universities. The scepticism skill, which is a prerequisite for career advancement according to Douglas and Gammie (2019:323), was not included in the Accountancy curriculum of any of the universities (0%). Implementation skills and independent and questioning mindset skills from the 2025CF were not included in the Accountancy curriculum of any of the selected universities (0%). The universities have to address this shortcoming of skills development and need to include the skills in their module outcome documents. The other dimensions from the adjusted theoretical framework not discussed above, were included in the module outcome documents.

5.5.3.3 Relational acumen

The analysis of the module outcomes identified skills in the adjusted 2025CF that were not in the module outcomes. Communication media skills, CV writing, interview and job search skills, sustainability and long-term thinking, and servant leadership were not included in the Accountancy curriculum of any of the universities (0%). Student development and support as well as career centre's assist students with the development of the CV writing, interview and job search skills and therefore may explain the exclusion from the Accountancy curricula (NWU, 2020). The sustainability and long-term thinking skill should be in the new Accountancy curricula to prepare students to think long-term while analysing reports and external big data (Al-Htaybat *et al.,* 2018:352). Influence and negotiation, and strategic professional relationship skills, are not part of the universities' module outcome documents (0%). Network building skills and knowledge sharing skills

were both newly added to the 2025CF and neither of the skills were included in the Accountancy curriculum of any university (0%).

None of the following self-management skills were included in the Accountancy curriculum of the universities (0%): adapt to management styles, organisation culture advocacy, adapt to work environment, behavioural, interpersonal, personal, confidence, marketing, numeracy and service. The researched articles indicated the importance of the above skills for accountancy graduates and SAICA needs to consider including these skills in the CF. Talent management (developing others), resilience and crisis management, handling relationships empathetically and judiciously and social skills and the development thereof were not included within any of the university's Accountancy curricula (0%). According to the WEF (2018:10), social skills demanded will increase from 5% in 2018 to 15% around 2030, and therefore accountancy students must be prepared while at university. The universities should include the skills from the module outcome gaps as part of the curricula to comply with the SAICA 2025CF and previously researched skills, needed for accountancy students.

Listening, interviewing and discussion skills and audience and effectiveness skills were included in 60% of the selected universities' Accountancy curricula. Reading skills were included in 80% of the universities' module outcome documents. Although leadership skills are present in 20% of the universities' curriculum, there is an increasing realisation among academics and employers for the need to provide accountancy graduates with technical skills as well as leadership skills (Altrawneh, 2016:55). Influence and consensus building skills were newly added to the 2025CF and 20% of the universities' modules included the development of this skill. Skills such as conflict resolution and consultation (people skills) were part of 20% of universities' module outcomes. People skills are needed by accountancy graduates for addressing management with the results of data analysed (Giles, 2019:29). Cooperation and collaboration skills were included in 40% of the university module outcomes. According to Rodny-Gumede (2019:1), teamwork skills are specifically required for the 4IR and currently, teamwork skills are included in 40% universities' modules.

Abayadeera and Watty (2016:16) include self-management skills in the top five needed skills for accountancy graduates. The self-management element with skills such as work

independently included in 20%, being observant and aware included in 80% and handling pressure and time management skills included in 40% of the universities' Accountancy curriculum. Likewise, managing teams/projects skill was included in 60% of the universities' Accountancy curriculum. Emotional intelligence skills were included in 20% of the Accountancy curriculum of the universities. Employers value accountancy graduates with empathy, warmth and kindness in their interaction with clients (Reddrop & Mapunda, 2019:79).

The universities have to address this shortcoming of skills development and need to include the skills in their module outcome documents. The research found that only three skills from the adjusted 2025CF were within all of the universities' (100%) module outcome documents namely communication skills, written communication skills and moral and ethical decision-making.

5.5.3.4 Digital acumen

The module outcomes analysed identified skills in the adjusted 2025CF that were not in the module outcomes. The nature of data (e.g. underlying characteristics and storage), big data skills, as well as impact on business models, were not within the module outcome documents of the universities (0%). The new developments and protocols element, including but not limited to cloud computing, blockchain and mobile app, risks and attacks and basic coding skills were not included within any universities' module outcome documents (0%). The aforementioned skills needed for the 4IR need to be integrated into the Accountancy curricula.

Performing data analysis, cognitive and non-cognitive systems element, including but not limited to machine learning robotic process automation and artificial intelligence skills and mitigating steps, were included in 20% of the universities' module outcome documents. New technologies skills were included in 40% of the module outcomes. The following skills were included in the module outcome documents of 60% of the universities: reliance on IT technologies, securing and safeguarding as well as technology skills. The inclusion may be due to the increasing reliance of businesses on technology, graduates require digital skills (Giles, 2019:29). Therefore, the module outcome documents should be extended with the identified skill shortages.

From the adjusted theoretical framework, only two of the digital acumen skills were included in the universities' module documents (20%): distributed processing and cyber security element with distributed processing (IoT) and user tools (word processing presentation software spreadsheet software).

The empirical objectives as set out in Phase I, II, and III were achieved.

5.6 RECOMMENDATIONS

The following skills could be added to the 2025CF as part of the business acumen: organisational and business management skills, broader business knowledge, business awareness and understanding, taking business law into account and environmental related skills. The SLR (Phase II) identified strategic thinking and research skills additionally within peer-reviewed articles related to accountancy skills developed, yet not included in the 2025CF: SAICA should consider adding the skills to the required competencies of accountancy graduates to be prepared for the 4IR.

The article analysis identified the following additional relational acumen skills not included in the 2025CF: CV writing, interview and job search, reading, written communication, adapt to work environment, behavioural, interpersonal, personal, confidence, marketing, numeracy, observant and awareness, pressure and time management, service, resilience and crises management, and social skills. SAICA should consider the inclusion of the above skills to be part of the new CF. The analysis of the peer-reviewed documents identified previously researched skills such as new technologies, reliance on IT technologies and technology skills as additional skills that were not evident within the 2025CF. Employers highlight the importance of the above-mentioned skills to be part of the curricula, therefore SAICA should consider the inclusion of the skills as required competencies of accountancy graduates.

SAICA identified skills to be included in the 2025CF. A number of the skills in the CF were not identified in the document analysis. Different types of entities and the role they play in society, the concept of stewardship, business models and continuous improving from the business acumen, were not found within literature. From the decision-making acumen, skill such as challenging assumptions, impact of issues, implications of actions,

implementation, and independent and questioning mindset were not identified in the articles. Servant leadership, knowledge sharing, adapting to management styles, organisation culture advocacy, and handling relationships empathetically and judiciously were included in the 2025CF relational acumen, yet not in the articles. Mitigating skills from the 2025CF digital acumen were not identified in the articles. Future research could focus on evaluating the importance of the aforementioned skills for accountancy graduates.

SAICA included analytical/critical thinking, problem-solving, decision-making and scepticism from the decision-making acumen, and communication skills, leadership skills, teamwork and emotional intelligence from the relational acumen, and big data from the digital acumen as elements in the 2025CF and not as a dimension, while the articles identified the aforementioned as skills. The shortcoming indicates that research could expand to define the detailed components of the skills in order to be comparable to the 2025CF.

The evaluation of South African universities' module outcomes in Tables 4.4 to 4.8, identified gaps, where modules did not include all the skills to prepare the students for the 4IR. The curricula should be extended to include all the needed skills (Tables 5.1 to 5.4 module outcome gaps) per acumen. In this regard, within the business acumen, role of business in society, environment related skills, initiative, innovation, continuous improvement and entrepreneurship could be included in university module outcome documents. Within the decision-making acumen, challenge assumptions, strategic thinking, problem-solving, mindful reasoning, impact of issues, implications of actions, knowing when to seek expert assistance, research skills, issues identification, recommendations, implementation, scepticism and independent and questioning mindset, could be included in university module outcome document. Likewise, the relational acumen skills that should be addressed by universities include listening, interviewing and discussion, communication media, audience and effectiveness, CV writing, interview and job search, reading skills, leadership skills, sustainability and long-term thinking, servant leadership, influence and consensus building, influence and negotiation, conflict resolution, consultation, strategic professional relationships, network building, teamwork skills, knowledge sharing, cooperation and collaboration, work

independently, adapt to management styles, organisation culture advocacy, adapt to work environment, behavioural skills, interpersonal skills, personal skills, confidence, marketing skills, numeracy skills, observant and aware, pressure and time management, service skills, manage teams/projects, talent management (developing others), resilience and crisis management, emotional intelligence, handle relationships empathetically and judiciously and social skills. The digital acumen indicated the most skills that needed to be included in university module outcome documents. Skills such as the nature of data (e.g. underlying characteristics and storage), perform data analysis, big data, impact on business models, including but not limited to machine learning, robotic process automation and artificial intelligence need to be included in the module outcomes. Likewise, new technologies, reliance on IT technologies, including but not limited to cloud computing, blockchain, and mobile apps, risks and attacks, mitigating steps, basic coding, securing and safeguarding and technology skills are digital acumen skills that needed to be included in university module outcome documents.

In this regard, only one South African university to date has developed a new module called 4IR accounting, which will be introduced in 2021 (Business Day, 2020). This inclusion purposes to address the skills needed for the 4IR, which indicates the need for more module types with specific inclusion of identified 2025CF skills to be developed and incorporated to prepare students for the 4IR workforce.

5.7 LIMITATION OF THE STUDY

A limitation in using the publicly available yearbooks of the different universities was that the level of detail regarding module outcomes was very often condensed or lacking specific information to evaluate if the curriculum is set up according to the 2025CF skills. Each module document was analysed using the codebook to evaluate the inclusion of skills development within the module. The possibility exists that the curriculum is not totally reflected within the module outcome documents, however, universities have to develop their documents to adhere to the SAICA prescriptions and therefore it portrays the current curricula outcomes. The module outcome was linked directly or indirectly to the skills (element or dimension in the 2025CF as created in the codebook) by way of implication of the module outcome description as in Section 4.3.2.

5.8 CONTRIBUTION OF THE STUDY

The comparison between the 2019 and 2025CF indicated significant findings regarding digital and relational acumens that were included in SAICA's new prescription to university curricula. The identification of additional skills identified within recent literature substantiated SAICA's new skills included in the 2025CF, but recent literature also proposed further inclusion of additional skills to the 2025CF. The results of Phase II could be utilised by SAICA to review the completeness of skills included in the 2025CF, before the final document is released. The findings from Phase III indicate that the top five universities have to make considerable adjustments to their curricula (demonstrated within the module outcome documents) to address the changes prescribed by the 2025CF as well as recent literature. This study may be a guiding document to SAICA for evaluation of the inclusion of required competencies within the 2025CF as well as a measure as to the degree that universities are complying with the framework through the inclusion within the Accountancy curricula.

The findings are summarised per element of the 2025CF. Table 5.1 summarise the business acumen findings according to Phases II and III. Dimensions included in the SAICA 2025CF, but not identified in the articles analysed, indicate possible future research topics labelled as research gaps. Likewise, skills included within recent literature, but not in SAICA 2025CF, indicate that the 2025CF can still be enhanced (labelled as SAICA2025CF gaps). The module outcome gaps in Table 5.1 reflect the skills portrayed in the enhanced 2025CF, but not included in the module documents at the selected universities. The module outcome gaps indicate that universities need to consider adapting the current curriculum and module outcome documents in order to include the identified business acumen skills with the aim of developing these skills before students graduate.

Table 5.1: Summarised findings on the business acumen

Research gaps	SAICA2025CF gaps	Module outcome gaps
Z1 Business internal environment		
Different types of entities and the role they play in society. Concept of stewardship Business models	Organisational and business management skills Broader business knowledge	Role of business in society
Z2 Business external environment		
	Business awareness and understanding taking business law into account. Environmental related skills	Environmental related skills
Z3 Innovation and creativity		
Continuous improvement		Initiative Innovation Continuous improvement Entrepreneurship

Source: Students' own compilation of Phases II and III findings on the business acumen

The findings summarised for the business acumen in Table 5.1 indicate that certain research gaps exist, especially within the internal business environment. According the SAICA2025CF gaps column, there are four skills identified from literature that could be included in the new CF. Regarding the business acumen, universities will have to consider the inclusion of a number of skills with the focus of developing innovation and creativity in the business environment for accountancy students.

Table 5.2: Summarised findings on the decision-making acumen

Research gaps	SAICA2025CF gaps	Module outcome gaps
Y1 Analytical/critical thinking		
Challenge assumptions	Strategic thinking	Challenge assumptions Strategic thinking
Y2 Problem-solving		
Impact of issues Implications of actions	Research skills	Problem-solving Mindful reasoning Impact of issues Implications of actions Knowing when to seek expert assistance. Research skills
Y3 Judgement & decision-making		
Implementation		Issues identification Recommendations Implementation
Y4 Professional scepticism		
Independent and questioning mindset		Scepticism Independent and questioning mindset

Source: Students' own compilation of Phases II and III findings on the decision-making acumen

Table 5.2 summarises the decision-making acumen findings according to Phases II and III. A number of dimensions included in the SAICA 2025CF, but not evident within recent literature, indicate research gaps, which can be explored within accountancy students' curricula. A very limited number of skills were listed under SAICA2025CF gaps column, which SAICA may consider to include in the 2025CF. The module outcome gaps in Table 5.2 reflect a large number of skills portrayed in the enhanced 2025CF, but not evident within the module documents at the selected universities. In this regard, universities need to pay considerable attention to adapt the curriculum in order to address the much-needed decision-making acumen and skills.

Table 5.3: Summarised findings on the relational acumen

Research gaps	SAICA2025CF gaps	Module outcome gaps
X1 Communication skills		
Communication media	CV Writing, interview and job search Reading skills Written communication skills	Listening, interviewing and discussion Communication media Audience and effectiveness CV Writing, interview and job search Reading skills
X2 Leadership skills		
Servant leadership		Leadership skills Sustainability and long-term thinking Servant leadership Influence and consensus building
X3 People skills		
		Influence and negotiation Conflict resolution Consultation
X4 Relationship-building skills		
		Strategic professional relationships Network building
X5 Teamwork skills		
Knowledge sharing		Teamwork skills Knowledge sharing Cooperation and collaboration
X6 Self-management		
Adapt to management styles. Organisation culture advocacy	Adapt to work environment Behavioural skills Interpersonal skills Personal skills Confidence Marketing skills Numeracy skills	Work independently Adapt to management styles Organisation culture advocacy Adapt to work environment Behavioural skills

Research gaps	SAICA2025CF gaps	Module outcome gaps
	Observant and aware Pressure and time management Service skills	Interpersonal skills Personal skills Confidence Marketing skills Numeracy skills Observant and aware Pressure and time management Service skills
X7 Managing others		
	Resilience and crisis management	Manage teams/projects Talent management (developing others) Resilience and crisis management
X8 Emotional intelligence		
Handle relationships empathetically and judiciously	Social skills	Emotional intelligence Handle relationships empathetically and judiciously Social skills

Source: Students' own compilation of Phases II and III findings on the relational acumen

The relational acumen findings summarised in Table 5.3 included a limited number of skills within the Accountancy curricula that could be explored through future research. A moderate number of skills are included under SAICA2025CF gaps column, with the biggest gap within the self-management skills category. In this regard, SAICA could investigate the inclusion of the identified skills to be included in the 2025CF, since literature deems these skills important. The module outcome gaps included a large number of skills that are not currently included or evident within universities' module outcome documents. The Accountancy curricula need to be adapted to include the large number relational skills that needs to be developed. The different universities' curricula could enhance their preparedness to develop the relation acumen skills needed to be successful in the 4IR workforce.

Table 5.4: Summarised findings on the digital acumen

Research gaps	SAICA2025CF gaps	Module outcome gaps
W1 Data analytics		
		The nature of data (e.g. underlying characteristics and storage) Perform data analysis
W2 Big data		
		Big data Impact on business models
W3 Cognitive & non-cognitive systems		
	New technologies Reliance on IT Technologies	Including but not limited to: machine learning, robotic process automation and artificial intelligence New technologies Reliance on IT Technologies
W4 New developments & protocols		
		Including but not limited to: cloud computing, blockchain, and mobile apps
W5 Distributed processing and cyber security		
Mitigating steps		Risks and attacks Mitigating steps
W6 User competencies		
	Technology skills	Basic coding Securing and safeguarding Technology skills

Source: Students' own compilation of Phases II and III findings on the digital acumen

The digital acumen findings according to Phases II and III are summarised in Table 5.4. Very limited research gaps exist indicating that previous research conducted agree with SAICA on the important skills for the 2025CF. A limited number of skills were listed under SAICA2025CF gaps column for which SAICA should consider including the skills in the 2025CF. The module outcome gaps in Table 5.4, however, indicate that the current Accountancy curriculum of the top five universities are not prepared to develop the digital

skills students aimed at addressing the technological changes brought on by the 4IR. The universities need to adapt the curricula.

Further research is required to evaluate the preparedness of accountancy students for the 4IR in the South African and global context, since the workforce environment is globally encountering accelerated changes. The implementation of the recommendations purposes to expand the current curricula to include the development of needed skills for the 4IR.

5.9 CONCLUSION

The comparison of the 2025CF with the 2019CF identified new skills that were purposefully added by SAICA. The newly added skills to the 2025CF relational acumen included listening skills, influence and consensus building, network building, and knowledge sharing. The digital acumen of the 2025CF introduced new skills such as the nature of data (e.g. underlying characteristics and storage), perform data analysis, impact on business models, including but not limited to machine learning robotic process automation and artificial intelligence, including but not limited to cloud computing, blockchain and mobile apps, distributed processing (IoT), risks and attacks, mitigating steps, basic coding and securing and safeguarding.

The document analysis performed as part of the SLR identified new skills in the articles yet not included in the SAICA 2025CF. As part of business acumen organisational and business management skills, broader business knowledge, business awareness and understanding taking business law into account, and environmental related skills were added. Accountancy graduates need knowledge of the broader business to understand the effects of technology (Trpeska & Lazarevska, 2018:58). Additional skills identified in the document analysis of the decision-making acumen were: analytical/critical thinking, strategic thinking, problem-solving, research skills, decision-making and scepticism skills. Skills related to judgement and decision-making were identified by the WEF, as one of the top ten skills that needed to be developed (Gray, 2016). The following skills were identified in the articles as additional skills to be included in the relational acumen: communication, CV writing, interview and job search, reading skills, written communication skills, leadership skills, teamwork skills, adapt to work environment,

behavioural skills, interpersonal skills, personal skills, confidence, marketing skills, numeracy skills, observant and aware, pressure and time management, service skills, resilience and crises management, emotional intelligence skills and social skills. The document analysis added the following skills in the digital acumen: big data, new technologies, reliance on IT technologies, and technology skills. Ding *et al.* (2018:17) suggest accountancy students should prepare for the 4IR by acquiring technical, technological and pervasive skills. SAICA should review the possibility of including the skills as identified in articles in the CF.

The module outcome analysis identified the following elements from the 2025CF not included in the module outcomes at any university: professional scepticism (0%), relationship-building skills (0%), big data (0%), new developments and protocols including cloud computing, blockchain and mobile apps (0%). The following elements were included by some of the universities in their module outcomes: innovation and creativity (60%), problem-solving (40%), people skills (20%), teamwork (40%), self-management (20%), managing others (60%), emotional intelligence (20%), data analytics (20%), cognitive and non-cognitive systems including machine learning, robotic process automation and artificial intelligence (20%). Most of the shortages are elements of the relational and digital acumens. From the above, it is evident that universities will have to adapt their curricula to prepare for the 4IR.

Upon comparing the shortages in the module outcomes with the list of top ten skills from the WEF (Gray, 2016) the following elements appear both in the top ten skills list and in the module outcome shortages as discussed above: problem-solving, people skills, teamwork (coordinating with others), managing others (people management) and emotional intelligence. Five of the top ten skills (50%) identified by the WEF are not currently part of the universities' module outcome. SAICA should engage with universities to address the inclusion of the skills in the Accountancy curricula.

The research objectives were purposed to evaluate the ability of the Accountancy curricula in order to prepare graduates for the 4IR workforce changes. A comprehensive literature review was conducted to fulfil the theoretical objective in Chapter 2. In order to fulfil the empirical objectives, a comparison was performed between the proposed CF and the current CF. A SLR was performed on skills needed for the 4IR. The skills identified in

the SLR were used as theoretical framework to assess if these skills are evident in the South African top five university module outcome documents. The empirical results were presented in Chapter 4. Results from the literature review and the findings were concluded in Chapter 5.

The final evaluation of this study indicates that the primary and secondary objectives of investigating the preparedness of the current Accountancy curricula to provide graduates with essential skills needed to be successful in the 4IR were fulfilled.

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Annexure 1: Systematic literature review search databases

Annexure 1						
Systematic literature review: search databases						
Search process documentation						
No	**Date**	**Database**	**Key words**	**Hits**	**Selection**	**Exclusion**
1	20-Sep	Scopus	Account* AND curricu* In article titles Peer-reviewed Scholarly articles 2015-2019	12	5 Account* curricu* in title, applicable to study	Articles relating to a wider academic setting: Ethics, Financial literacy, Audit regulations, IFRS, SAP software, WBVO, Intercultural skills
2	23-Sep	Scopus	skills AND account* In article titles Peer-reviewed Scholarly articles 2015-2019	2	2 Skills AND account* in title, applicable to study	
3	24-Sep	Scopus	account* AND skills In article titles Peer-reviewed Scholarly articles 2015-2019	3	0	Accounting skills for lodging managers, Accounting skills in simulation software, Articles not available
4	30-Sep	Google Scholar	accounting AND curriculum In titles Peer-reviewed all hits 2015-2019	68	19 Accounting AND curriculum in title, applicable to study	Articles not available, already selected, not English, ethics and accounting, secondary school, TVET accounting, IFRS and accounting, sustainability, lecture competence, accounting theory, integrated learning
5	14-Oct	Ideas	accounting AND curriculum In titles Peer-reviewed Scholarly articles 2015-2019	16	2 Accounting AND curriculum in title, applicable to study	Already selected, articles not available, ethics

Annexure 1						
Systematic literature review: search databases						
Search process documentation						
No	**Date**	**Database**	**Key words**	**Hits**	**Selection**	**Exclusion**
6	14-Oct	Ideas	4th industrial revolution AND accounting In titles Scholarly articles	0	0	Already selected, articles not available, ethics
7	14-Oct	Ideas	accountant skills In titles Peer-reviewed Scholarly articles 2015-2019	30	16 accountant skills in title, applicable to study	Already selected, macroeconomics, other language, outsourcing and accounting, literature review, communication skills, framework-based accounting, management accounting
8	22-Oct	Science Direct	4th industrial revolution AND accounting In titles Research articles 2015-2019	0	0	
9	23-Oct	Mendeley	4th industrial revolution AND account* Research articles 2015-2019	5	1 4th industrial revolution AND account* in title, applicable to study	Not accounting or accounting relevant, not accessible
10	23-Oct	Taylor & Francis Online	Industrial revolution 2015-2019	66	0	Not published in accounting related journals
11	23-Oct	Taylor & Francis Online	Journal Accounting Education account* curricu* 2015-2019	128	0	No new articles
12	23-Oct	Taylor & Francis Online	Journal Accounting Education Industrial revolution 2015-2019	0	0	
13	24-Oct	EbscoHost	4th industrial revolution	4	0	Not relevant to accounting

Annexure 1						
Systematic literature review: search databases						
Search process documentation						
No	**Date**	**Database**	**Key words**	**Hits**	**Selection**	**Exclusion**
14	24-Oct	E Journals	4th industrial revolution accounting	2	0	Not relevant to accounting
15	24-Oct 13-Nov	EBSCO Discovery Service	4th industrial revolution In titles 2015-2019 Academic journals English language	28	3	Not relevant to accounting
16	24-Oct	Emerald Insight	4th industrial revolution In titles	2	0	Book, already selected
17	06-Jun	Google scholar	"4th industrial revolution" AND skills In article titles Peer-reviewed Scholarly articles 2015-2019	10	1 "4th industrial revolution" AND AND skills title, applicable to study	No access, e-Skills, preschool teachers' skills, industrial training, SMARTIES CSIR, sponsor paper, human resources skills
18	06-Jun	Google scholar	"4IR" AND skills In article titles Peer-reviewed Scholarly articles 2015-2019	6	1 "4IR" AND skills title, applicable to study	Engineering graduates, no access,
19	06-Jun	Google scholar	industrial revolution and skills In article titles Peer-reviewed Scholarly articles 2015-2019	19	0	WEF Future of Jobs Report on many industries and regions, Africa labour market, not accessible, journal comment, not applicable, digital citizen skills

Annexure 1						
Systematic literature review: search databases						
Search process documentation						
No	**Date**	**Database**	**Key words**	**Hits**	**Selection**	**Exclusion**
20	06-Jun	Scopus	"4th industrial revolution" AND skills In article titles Peer-reviewed Scholarly articles 2015-2019	19	0	Books, already selected, no access, TVET, SLR, maritime education, social responsibility, engineering, foreign affairs states, not accessible, entrepreneurship education
21	06-Jun	Scopus	"4IR" AND skills In article titles Peer-reviewed Scholarly articles 2015-2019	7	0	Human rights, engineering students, nursing, Entrepreneurs, SLR, ICT
22	06-Jun	Scopus	industrial revolution and skills In article titles Peer-reviewed Scholarly articles 2015-2019	8	0	High school, entrepreneurs, employees' well-being, cloud-based education, HR, origin of IR
23	06-Jun	Ideas	industrial revolution AND skills In titles Scholarly articles	0	0	
24	06-Jun	Ideas	4th industrial revolution AND skills In titles Scholarly articles	0	0	
25	06-Jun	EBSCO Discovery Service	4th industrial revolution AND skills In titles 2015-2019 Academic journals	9	0	Already selected, TVET, communication students, IoT, not English language
			Total	**444**	**50**	

Annexure 1						
Systematic literature review: search databases						
Search process documentation						
No	**Date**	**Database**	**Key words**	**Hits**	**Selection**	**Exclusion**
26	22-Oct	Journal of Accounting Education	Account* In titles Peer-reviewed Scholarly articles 2015-2019	104	4	Not relevant to study, already selected
			Total	**104**	**4**	

No	**Date**	**Database**	**Key words**	**Hits**	**Selection**	**Exclusion**
27	24-Oct	Emerald Insight	Author Search P de Lange	9	0	Not relevant to accounting
28	25-Oct	Scopus	Author Search B Jackling	7	0	Book, continuous professional development, migration, already selected
29	28-Oct	Scopus	Author Search B Jackling	13	1	Book, continuous professional development, migration, already selected, skills deficiencies in international accounting graduates
			Total	**29**	**1**	
			Total searches	**577**	**55**	

Annexure 2: List of articles included in literature review

Annexure 2				
List of articles included in systematic literature review				
No	**Title**	**Author**	**Year**	**Source**
1	A model to update accounting curricula for emerging technologies	Coyne, J.G., Coyne, E.M., Walker, K.B.	2016	*Journal of Emerging Technologies in Accounting*, 14(2):101-111
2	Educating digital natives for the future: accounting educators' evaluation of the accounting curriculum	Al-Htaybat, K., Von Alberti-Alhtaybat, L., Alhatabat, Z.	2018	*Accounting Education*, 27(4):333-357
3	Excel in the accounting curriculum: perceptions from accounting professors	Ramachandran Rackliffe, U., Ragland, L.	2016	*Accounting Education*, 25(2):139-166
4	Infusing data analytics into the accounting curriculum: a framework and insights from faculty	Dzuranin, A.C., Jones, J.R., Olvera, R.M.	2018	*Journal of Accounting Education*, 43:24-39
5	Toward integration of Big Data, technology and information systems competencies into the accounting curriculum	Sledgianowski, D., Gomaa, M., Tan, C.	2017	*Journal of Accounting Education* 38:81-93
6	Listening skills: accountancy educators in retreat?	Reddrop, A., Mapunda, G.	2019	*Australasian Accounting, Business and Finance Journal*, 13(1):76-89
7	The communication skills accounting firms desire in new hires.	Camacho, L.	2015	*Journal of Business & Finance Librarianship*, 20(4):318-329
8	Academic management actions facing reforms in curriculum and in competencies required to graduating from an accounting sciences course.	Slomski, V.G., Da Silva Souza, L.R., Pereira, A.C. & Da Silva, A.C.R.	2016	*Creative Education*, 7(07):910-921
9	Accounting graduate employers' expectations and the accounting curriculum.	Thatong, S.	2016	*Catalyst*, 13(1):64-73
10	Beyond Excel: software tools and the accounting curriculum	Lee, L., Kerler, W & Ivancevich, D	2018	*AIS Educator Journal*, 13(1):44-61
11	Competency requirements for professional accountants: basis for accounting curriculum Enhancement	Rufino, H., Payabyab, R.G. & Lim, G.T.	2017	*Review of Integrative Business and Economics Research*, 7(3):116-128
12	Computerised accounting software; a curriculum that enhances an accounting programme	Machera, R.P. & Machera, P.C.	2017	*Universal Journal of Educational Research*, 5(3):372-385
13	Creative thinking skills within accounting in college curriculum of Indonesia	Oktalina, G. & Simanungkalit, E.F.B.	2016	Paper delivered at the 2016 Global Conference on Business, Management and Entrepreneurship, Bandung

Annexure 2				
List of articles included in systematic literature review				
No	**Title**	**Author**	**Year**	**Source**
14	Data-driven decision-making and its impact on accounting undergraduate curriculum	Ballou, B., Heitger, D.L. & Stoel, D.	2018	*Journal of Accounting Education*, 44(2018):14-24
15	Designing a market-oriented accounting curriculum: a method and an application with GCC Data	Komarev, I. & Preobragenskaya, G.	2018	Designing a market-oriented accounting curriculum: a method and an application with GCC Data. *SSRN Electronic Journal*. http://dx.doi.org/10.2139/ssrn.3292924
16	Exploring the curriculum gap: an analysis of Management Accounting topics and skills	Howard, A. & Warwick, J.	2016	*MSOR Connections*, 13(2):51-60
17	How artificial intelligence and machine learning will change the future of financial auditing: an analysis of the university of Tennessee's accounting graduate curriculum	Giles, K.M.	2019	Knoxville: The University of Tennessee. (Thesis – Chancellor's Honours Programme)
18	How business schools can integrate data analytics into the accounting curriculum	Tschakert, N., Kokina, J., Kozlowski, S. & Vasarhelyi, M.	2017	*The CPA Journal,* 87:10-12
19	Including pervasive skills in an accounting curriculum at a rural South African university	Livingstone, M. & Lubbe, S.	2017	*Alternation Special Edition,* (20):128-147
20	*Perceptions of students, practitioners, and educators in graduate accounting curriculum: a qualitative study*	Stone, R.E.	2019	San Diego: Northcentral University. (Thesis – PhD)
21	Perspectives on information literacy in the accounting curriculum	Joseph, G., George, A. & Strickland, S.	2015	In: Rupert, T.J., eds. *Advances in accounting education: teaching* and *curriculum innovations.* Bingley: Emerald Group Publishing Ltd. pp. 89-111
22	Prescribing an accounting curriculum: shaping a new vision for accounting education	Crawford, D.	2015	*The CPA Journal.* 85(11):6-9
23	Reconstruction of accounting major curriculum based on CBE	Dong, M.	2019	International Conference on Education Innovation and Economic Management (ICEIEM 2019), Penang, Malaysia. pp. 31-34
24	*Technology applications: collaboration efforts to improve accounting curriculum*	Moore, S.A.	2018	Arizona: University of Phoenix. (Thesis – PhD)

Annexure 2				
List of articles included in systematic literature review				
No	**Title**	**Author**	**Year**	**Source**
25	The construction of" four horizontal lines and four vertical lines" curriculum systems in college accounting major	Ren, J., Yang, Y., Zhang, Y. & Wang, B.	2018	*The Construction of" Four Horizontal Lines and Four Vertical Lines" Curriculum Systems in College Accounting Major*. Paper delivered at the 4th International Conference on Social Science and Higher Education (ICSSHE 2018) Sanya:China.
26	What should we contribute to develop an effective accounting curriculum?	Saito, M.	2016	*International Review of Business,* (16):17-32
27	A note on structuring employability skills for accounting students	Warwick, J. & Howard, A.	2015	*International Journal of Academic Research in Business and Social Sciences*, 5(10):165-174
28	Accounting education and the prerequisite skills of accounting graduates: are accounting firms' moving the boundaries?	Chaplin, S.	2017	*Australian Accounting Review, 27(1):61-70*
29	Accounting students' and employers' perceptions on employability skills in the SEE Country	Trpeska, A.A.M. & Lazarevska, Z.B.	2018	*European Financial and Accounting Journal*, 13:55-72
30	Accounting students' perceptions of important business communication skills for career success: An exploratory study in the Tunisian context	Oussii, A.A. & Klibi, M.F.	2017	*Journal of Financial Reporting and Accounting*, 15(2):208-225
31	An empirical evaluation of accounting graduates' employability skills from Jordanian employers' perspective	Altrawneh, G.	2016	*International Business Research*, 9(1):55-65
32	An investigation into the development of non-technical skills by undergraduate accounting programmes	Douglas, S. & Gammie, E.	2019	*Accounting Education*, 28(3):304-332
33	Generic skills in accounting education in a developing country: exploratory evidence from Sri Lanka	N Abayadeera, N. & Watty, K.	2016	*Asian Review of Accounting*, 24(2):149-170
34	Generic skills in accounting: perspectives of Chinese postgraduate students	Smith, B., Maguire, W. & Han, H.H.	2018	*Accounting & Finance*, 58(2):535-559
35	Graduates' vocational skills for the management accountancy profession: exploring the accounting education expectation-performance gap	Howcroft, D.	2017	*Accounting Education*, 26(5-6):459-481

Annexure 2				
List of articles included in systematic literature review				
No	**Title**	**Author**	**Year**	**Source**
36	Integrated curriculum design revision-The case of the School of Accounting and Administrative Sciences of the UMSNH	Olvera, M.E.R., Reyes, N.L.G. & Ochoa, J.A.	2015	*Higher Education Studies*, 5(2):25-37
37	Positioning of emotional intelligence skills within the overall skillset of practice-based accountants: employer and graduate requirements	Coady, P., Byrne, S. & Casey, J.	2018	*Accounting Education*, 27(1):94-120
38	Problems and challenges in skills development: a perspective from professional accounting education	Parvaiz, G.S., Mufti, O. & Gul, S.	2017	*Business & Economic Review*, 9(4):83-110
39	Professional skills required of accountants: what do job advertisements tell us?	Tan, L.M. & Laswad, F.	2018	*Accounting Education*, 27(4):403-432
40	Skills acquisition shortfall: a study of professional accounting education	Parvaiz, G.S., Mufti, O. & Wahab, M.	2017	*Business & Economic Review*, 9(2):135-164.
41	The contribution of accounting disciplines to developing professional and personal skills	Bunea, S	2017	*SEA–Practical Application of Science*, V(15):443-450
42	The development of the profession of accounting, rules between ethics and practical skills	Firescu, V., Branza, D. & Popescu, B.M.	2017	*Scientific Bulletin-Economic Sciences*, 16(3):200-209
43	The expectation-performance gap in accounting education: a review of generic skills development in UK accounting degrees	Webb, J. & Chaffer, C.	2016	*Accounting Education*, 25(4):349-367
44	The written communication skills that matter most for accountants	Riley, T.J. & Simons, K.A.	2016	*Accounting Education*, 25(3):239-255
45	Accounting students' learning processes in analytics: a sensemaking perspective	Mesa, W.B.	2019	*Journal of Accounting Education*, 48:50-68
46	Forces for change in higher education and implications for the accounting academy	Pincus, K.V., Stout, D.E., Sorensen, J.E., Stocks, K.D. & Lawson, R.A.	2017	*Journal of Accounting Education*, 40:1-18
47	How well do our introductory accounting text books reflect current accounting practice?	Wells, P.K.	2018	*Journal of Accounting Education*, 42:40-48
48	Preparing work-ready graduates – skills development lessons learnt from internal audit practice	Plant, K., Barac, K. & Sarens, G.	2019	*Journal of Accounting Education*, 48:33-47

Annexure 2				
List of articles included in systematic literature review				
No	**Title**	**Author**	**Year**	**Source**
49	*The eminence of the 4th Industrial Revolution: how it transformed management accountants*	Rasid, S.Z.A., Saruchi, S.A. & Tamin, R.S.M.	2019	Paper delivered at the 16th International Symposium on Management (INSYMA 2019) Manado.
50	Developing a blockchain based accounting and tax information in the 4th Industrial Revolution	Hong, S. & Seo, C.-R.	2018	*Journal of the Korea Convergence Society*, 9(3):45-51
51	Graduate readiness for the employment market of the 4th Industrial Revolution: The development of soft employability skills	Teng, W., Ma, C., Pahlevansharif, S. & Turner, J.J.	2019	*Education + Training*, 61(5):590-604
52	The Fourth Industrial Revolution: the present and future of accounting and the accounting profession	Slyozko, T. & Zahorodnya, N.	2016	*Polgari Szemle.* https://polgariszemle.hu/aktualis-szam/136-nemzetkozi-kitekintes/868-the-fourth-industrial-revolution-the-present-and-future-of-accounting-and-the-accounting-profession Date of access: 7 Aug. 2019.
53	How do professional financial services firms understand their skill needs and organise their recruitment practices?	Parry, N. & Jackling, B.	2015	*Accounting Education*, 24(6):514-538
54	Life skills needed for the 4th Industrial Revolution	Webber-Youngman, R.C. W	2016	*Journal of the Southern African Institute of Mining and Metallurgy*, 117(4): iv-v
55	Developing 4IR engineering entrepreneurial skills in polytechnic students. A conceptual framework.	Abdullahi, I.M., bin Jabor, M.K. & Akor, T.S.	2020	*International Journal of Innovative Technology and Exploring Engineering*, 9(3):2636-2642

Annexure 3: Inter-rater reliability (Cohen's Kappa)

Data in table format

		Rater 1		Row	
		normal	abnormal	Marginals	
Rater 2	normal	390	5	395	rm^1
	abnormal	6	30	36	rm^2
Column Marginals		396	35	431	
		cm^1	cm^2		

$$Pr(a) = \frac{390 + 30}{431}$$

$$\frac{420}{431}$$

$$Pr(a) = \mathbf{0,9745}$$

$$Pr(e) = \frac{\left[\frac{396 \times 395}{431}\right] + \left[\frac{35 \times 36}{431}\right]}{431}$$

$$= \frac{\left[\frac{156420}{431}\right] + \left[\frac{1260}{431}\right]}{431}$$

$$= \frac{362,92 + 2,9234}{431}$$

$$= \frac{365,85}{431}$$

$$Pr(e) = \mathbf{0,8488}$$

$$\kappa = \frac{0,9745 - 0,8488}{1 - 0,8488}$$

$$= \frac{0,1256}{0,1512}$$

$$= \mathbf{0,8312}$$

Annexure 4: Intra-rater reliability (Cohen's Kappa)

Data in table format

		1st rate		Row	
		normal	abnormal	Marginals	
2nd rate	normal	390	5	395	rm^1
	abnormal	8	30	38	rm^2
Column Marginals		398	35	433	
		cm^1	cm^2		

$$Pr(a) = \frac{390 + 30}{433}$$

$$\frac{420}{433}$$

$$Pr(a) = \mathbf{0,97}$$

$$Pr(e) = \frac{\left[\frac{398 \times 395}{433}\right] + \left[\frac{35 \times 38}{433}\right]}{433}$$

$$= \frac{\left[\frac{157210}{433}\right] + \left[\frac{1330}{433}\right]}{433}$$

$$= \frac{363,07 + 3,0716}{433}$$

$$= \frac{366,14}{433}$$

$$Pr(e) = \mathbf{0,8456}$$

$$\kappa = \frac{0,97 - 0,8456}{1 - 0,8456}$$

$$= \frac{0,1244}{0,1544}$$

$$= \mathbf{0,8056}$$

Annexure 5: Codebook

Annexure 5				
Codebook				
No	Deductive/Inductive code	Definition	Example	Source
1	Adapt to management styles (D)	Accommodate the management style of the controlling officers	Not coded in any article	
2	Adapt to work environment (I)	Accommodate work conditions	"Needs graduates with flexible mindsets and transferable generic skills, capable of innovating and adapting to dynamic work environment"	Trpeska, A.A.M. & Lazarevska, Z.B. 2018. Accounting students' and employers' perceptions on employability skills in the SEE Country. *European Financial and Accounting Journal*, 13:55-72.
3	Adaptation and agility	Flexible mindset prepare to change views if presented with logic and facts	"Receive, evaluate and react to new ideas"	Parvaiz, G.S., Mufti, O. & Wahab, M. 2017b. Skills acquisition shortfall: a study of professional accounting education. *Business & Economic Review*, 9(2):135-164. https://doi.org/10.22547/BER/9.2.6
4	Analysis (D)	Any detail and a thorough examination to evaluate the data or information by breaking it into its more basic parts	"Accounting competencies include external reporting, planning, analysis and control, taxation, management information systems, assurance and internal control, professional values, ethics and attitudes"	Bunea, Ș. 2017. The contribution of accounting disciplines to developing professional and personal skills. *SEA–Practical Application of Science*, V(15):443-450.
5	Analytical and critical thinking (I)	Sensemaking is the process of converting data into something coherent that generates action or decisions	"Critical thinking involves the application of lower and higher orders thinking skills simultaneously to solve new problems and issues"	Thatong, S. 2016. Accounting graduate employers' expectations and the accounting curriculum. Catalyst, 13(1):64-73.
6	Audience and effectiveness (D)	Presentation skills refer to the ability to present information in a clear, effective, and concise manner	"How to effectively communicate complex knowledge and ideas to a variety of audiences"	Reddrop, A. & Mapunda, G. 2019. Listening skills: accountancy educators in retreat? *Australasian Accounting, Business and Finance Journal*, 13(1):76-89.

Annexure 5				
Codebook				
No	Deductive/Inductive code	Definition	Example	Source
7	Basic coding (D)	Changes or design of new software	"Include technology as a feature in all courses, as well as data analytics, deeper statistical knowledge and programming abilities"	Al-Htaybat, K., von Alberti-Alhtaybat, L. & Alhatabat, Z. 2018. Educating digital natives for the future: accounting educators' evaluation of the accounting curriculum. *Accounting Education*, 27(4):333-357.
8	Behavioural skills (I)	Behavioural skills are the skills you use to successfully interact with others in the workplace	"Behavioural skills such as communication, teamwork and self-management"	Stone, R.E. 2019. *Perceptions of students, practitioners, and educators in graduate accounting curriculum: a qualitative study.* San Diego: Northcentral University. (Thesis – PhD).
9	Big data (I)	Huge amounts of data	"Big Data generally describes datasets that contain volumes of differently structured data that traditional technology and information systems are inadequate to process and analyse"	Sledgianowski, D., Gomaa, M. & Tan, C. 2017. Toward integration of Big Data, technology and information systems competencies into the accounting curriculum. *Journal of Accounting Education*, 38:81-93.
10	Broader business knowledge (D)	Understanding how the businesses operate and make money	"Emphasises professional competency (research and analysing complex business scenarios skills) rather than technical ability"	Livingstone, M. & Lubbe, S. 2017. Including pervasive skills in an accounting curriculum at a rural South African university. *Alternation Special Edition,* (20):128-147. https://doi.org/10.29086/2519-5476/2017/sp20a7
11	Business awareness and understanding taking business law into account (D)	Conscious about business issues	"Broader business skills, defined as business awareness, business knowledge or the ability to take a comprehensive and global vision of an organisation"	Webb, J. & Chaffer, C. 2016. The expectation performance gap in accounting education: a review of generic skills development in UK accounting degrees. *Accounting Education*, 25(4):349-367.

Annexure 5				
Codebook				
No	Deductive/Inductive code	Definition	Example	Source
12	Business ethics	The principles of right and wrong behaviour in the business context	"Business ethics refers to the ethical principles and values applied by the organisation to decision-making, conduct and the relationship between the organisation, its stakeholders and society (King IV)"	SAICA. 2019a. *Proposed SAICA competency framework: CA 2025*. Johannesburg. pp. 1-11.
13	Business models (D)	A business model is a structure supporting the feasibility of a business, including its purpose	"The term business model refers to a company's plan for making a profit. It identifies the products or services the business plans to sell, its identified target market, and any anticipated expenses"	Kopp, C. 2020. *Investopedia.* https://www.investopedia.com/terms/b/businessmodel.asp Date of access: 8 Feb 2021.
14	Challenge assumptions (D)	To test speculations or ideas	"be able continually to ask the right kind of questions, and actively challenge our own opinions, as we proceed to the future"	CGMA (Chartered Global Management Accountant). 2018. *Changing competencies and mindsets: creating a vision for the future*. https://www.cgma.org/content/dam/cgma/resources/reports/downloadabledocuments/changing-competencies-mindsets-cgma.pdf Date of access: 8 Feb. 2021.
15	Cloud computing, blockchain, and mobile apps, including but not limited to (D)	New cloud computing. Blockchain is a distributed ledger maintained on a decentralised database and all copies are maintained and validated simultaneously. Software for mobiles is mobile apps	"Cloud technology allows accountants to access corporate information remotely and if used with appropriate accounting software allows them to undertake bookkeeping and accounting tasks from a remote location"	Al-Htaybat, K., von Alberti-Alhtaybat, L. & Alhatabat, Z. 2018. Educating digital natives for the future: accounting educators' evaluation of the accounting curriculum. *Accounting Education*, 27(4):333-357.

Annexure 5				
Codebook				
No	Deductive/Inductive code	Definition	Example	Source
16	Cognitive skills	Cognitive is the art of knowing	"Technical and functional skills and, intellectual skills"	Howcroft, D. 2017. Graduates' vocational skills for the Management Accountancy profession: exploring the accounting education expectation-performance gap. *Accounting Education*, 26(5-6):459-481.
17	Communication media (D)	Means to deliver and receive information		Source not coded in any article
18	Communication skills (I)	Competencies you use when giving information and when receiving information	Communication skills (speech, writing, and listening)"	Bunea, Ș. 2017. The contribution of accounting disciplines to developing professional and personal skills. *SEA–Practical Application of Science*, V(15):443-450.
19	Concept of stewardship (D)	Acting responsible on accountable resources	"The discharge by management of its stewardship responsibilities to those who have provided resources to an entity"	SAICA. 2019b. *SAICA competency framework detailed guidance for the academic programme 2019* https://www.saica.co.za/Portals/0/LearnersStudents/documents/CompetencyFramework2019b.pdf Date of access: 12 Apr. 2019.
20	Confidence (I)	Belief in the ability to succeed	"The 'confidence' component comprises self-confidence and having an optimistic attitude"	Smith, B., Maguire, W. & Han, H.H. 2018. Generic skills in accounting: perspectives of Chinese postgraduate students. *Accounting & Finance*, 58(2):535-559.

Annexure 5				
Codebook				
No	Deductive/Inductive code	Definition	Example	Source
21	Conflict resolution (D)	The management of disagreement	"Knowing how to manage conflicts and solve problems"	Slomski, V.G., da Silva Souza, L.R., Pereira, A.C. & da Silva, A.C.R. 2016. Academic management actions facing reforms in curriculum and in competencies required to graduating from an accounting sciences course. *Creative Education*, 7(07):910-921. http://dx.doi.org/10.4236/ce.2016.77095
22	Consultation (D)	Exchange of views for the purpose of exploring a subject. "Consulting and advising are two distinct terms that are often lumped together when thinking about business processes and improvement"	"Classic skills include the current accounting material, but also analytical and evaluative skills, elements of leadership, consultancy, advisory skills and entrepreneurship, as students' future tasks in accounting/auditing firms would transfer to becoming an advisor, a consultant and an analyst for clients"	Al-Htaybat, K., von Alberti-Alhtaybat, L. & Alhatabat, Z. 2018. Educating digital natives for the future: accounting educators' evaluation of the accounting curriculum. *Accounting Education*, 27(4):333-357.
23	Continuous improvement (D)	Continual updates	"Continuous improvement is the ongoing effort to improve products, services or processes"	Campbell, A. 2020. The continuous improvement approach to leading change. https://www.cpapracticeadvisor.com/firm-management/article/21129991/the-continuous-improvement-approach-to-leading-change Date of access: 8 Feb. 2021.
24	Cooperation and collaboration (D)	Working together	"It involves working with others respectfully and effectively to create, use and share knowledge, solutions to problems, and innovations"	Thatong, S. 2016. Accounting graduate employers' expectations and the accounting curriculum. Catalyst, 13(1):64-73.

Annexure 5				
Codebook				
No	Deductive/Inductive code	Definition	Example	Source
25	Critical analysis (D)	Critical thinking and evaluation to provide insight	"Critical analysis such as reviewing, interpreting and evaluating financial data, business systems and operational data and controls were also practised in the workplace by the professional accountants"	Rufino, H., Payabyab, R.G. & Lim, G.T. 2017. Competency Requirements for Professional Accountants: Basis for Accounting Curriculum Enhancement. Review of Integrative Business and Economics Research, 7(3):116-128.
26	Cultural tolerance or diversity and knowledge of foreign language	Tolerate all ethnics and other languages	"The importance of cultural fit to the recruitment process cannot be overstated"	Parry, N. & Jackling, B. 2015. How do professional financial services firms understand their skill needs and organise their recruitment practices? *Accounting Education*, 24(6):514-538.
27	Curriculum changes or development	Creating, change or update of a learning plan	"The curriculum should be systematically reviewed and frequently updated to stay abreast current trends and accurately reflect employer demands"	Abayadeera, N. & Watty, K. 2016. Generic skills in accounting education in a developing country: exploratory evidence from Sri Lanka. *Asian Review of Accounting*, 24(2):149-170.
28	CV Writing, interview, and job search (I)	CV Writing, interview and job search skills	"As important, they highlight CV writing, interview skills, job search, time management and practical research skills"	Trpeska, A.A.M. & Lazarevska, Z.B. 2018. Accounting students' and employers' perceptions on employability skills in the SEE Country. *European Financial and Accounting Journal*, 13:55-72.
29	Decision-making (I)	Determine option to follow	"Being able to formulate a procedural problem-solving, able to take the right decisions based on the analysis of information"	Oktalina, G. & Simanungkalit, E.F.B. 2016. *Creative thinking skills within accounting in college curriculum of Indonesia.* Paper delivered at the 2016 Global Conference on Business, Management and Entrepreneurship, Bandung. https://doi.org/10.2991/gcbme-16.2016.17

Annexure 5				
Codebook				
No	Deductive/Inductive code	Definition	Example	Source
30	Defining business success (value creation; profit motive vs sustainable businesses) (D)	A successful business making profit and aware of impact on environment	"The various users have completely different interest. The auditor interested in the financial statements of the company; investors want to know methods and techniques of obtaining profit indicators and calculating dividends"	Slyozko, T. & Zahorodnya, N. 2016. *The Fourth Industrial Revolution: the present and future of accounting and the accounting profession. Polgari Szemle*. https://polgariszemle.hu/aktualis-szam/136-nemzetkozi-kitekintes/868-the-fourth-industrial-revolution-the-present-and-future-of-accounting-and-the-accounting-profession Date of access: 7 Aug. 2019.
31	Development of competencies across entire university programme	University subjects teaching interlinked competencies	"Developing professional competencies and graduate attributes throughout a programme, the whole-of- programme approach, rather than relying on individual courses for pervasive skills development"	Livingstone, M. & Lubbe, S. 2017. Including pervasive skills in an accounting curriculum at a rural South African university. *Alternation Special Edition,* (20):128-147. https://doi.org/10.29086/2519-5476/2017/sp20a7
32	Different types of entities and the role they play in society (D)	Various legal structures of businesses	Not coded in the articles	
33	Distributed processing (IoT) (D)	IoT is a network of interconnected computing devices, appliances, and objects enabled with chips and sensors to send and receive data	"Through the artificial intelligence and the Internet, the boundaries between the physical space and the digital virtual space are broken down"	Hong, S. & Seo, C.-R. 2018. Developing a blockchain based accounting and tax information in the 4th Industrial Revolution. *Journal of the Korea Convergence Society*, 9(3):45-51.

Annexure 5				
Codebook				
No	Deductive/Inductive code	Definition	Example	Source
34	Education of accountancy graduates	The teaching of accountancy students	"Future education programmes for accounting graduates may need to address a shift in skill sets required by accounting employees as the traditional tasks previously undertaken by graduates' change"	Chaplin, S. 2017. Accounting education and the prerequisite skills of accounting graduates: are accounting firms' moving the boundaries? Australian Accounting Review, 27(1):61-70.
35	Educational demands	Student demand of education	"Being able to access unlimited content online, their educational demands focus on application and use of material in practice (Seemiller & Grace, 2016)"	Al-Htaybat, K., von Alberti-Alhtaybat, L. & Alhatabat, Z. 2018. Educating digital natives for the future: accounting educators' evaluation of the accounting curriculum. *Accounting Education*, 27(4):333-357.
36	Educators' perceptions	Awareness of educators	"Accounting students, practitioners, and educators, however, perceive accounting education as possessing serious problems and agree that the curricula found in today's undergraduate accounting degree programmes are not appropriately preparing students for the advanced skills and knowledge to meet industry's future needs (Low, Botes, Rue, & Allen, 2016)"	Stone, R.E. 2019. Perceptions of students, practitioners, and educators in graduate accounting curriculum: a qualitative study. San Diego: Northcentral University. (Thesis – PhD).
37	Emotional Intelligence Handle relationships empathetically and judiciously (D)	Emotional intelligence is the capacity of individuals to take others emotions as well as their own emotions into account	"First, the study identifies that some of the 19 EI skills (e.g. teamwork and collaboration, building bonds, service) are relevant for accounting graduates entering the workforce and should be developed in university Accounting programmes. The study also finds that the other EI skills (e.g. change catalyst, empathy) might be less relevant for entry-level positions in the accounting profession"	Coady, P., Byrne, S. & Casey, J. 2018. Positioning of emotional intelligence skills within the overall skillset of practice-based accountants: employer and graduate requirements. *Accounting Education*, 27(1):94-120.

Annexure 5				
Codebook				
No	Deductive/Inductive code	Definition	Example	Source
38	Emotional intelligence skills (I)	The understanding and management of your own emotions	"As a form of social intelligence 'that involves the ability to monitor one's own and others' feelings and emotions, to discriminate among them and to use this information to guide one's thinking and action'"	Coady, P., Byrne, S. & Casey, J. 2018. Positioning of emotional intelligence skills within the overall skillset of practice-based accountants: employer and graduate requirements. *Accounting Education*, 27(1):94-120.
39	Employability	Employability is the ability to gain employment due to the appropriate skills, knowledge, and attributes	"Simply, it comprises the achievements, skills, understanding, and personal attributes that make graduates more likely to gain employment and be successful in their chosen occupations, that are of benefit to themselves, society, and the economy (Yorke, 2004)"	Altrawneh, G.A. 2016. An empirical evaluation of accounting graduates' employability skills from Jordanian employers' perspective. *International Business Research*, 9(1):55 -65. http://dx.doi.org/10.5539/ibr.v9n1p55
40	Entrepreneurship (D)	Identification of business development ideas	"Classic skills include the current accounting material, but also analytical and evaluative skills, elements of leadership, consultancy, advisory skills and entrepreneurship"	Al-Htaybat, K., von Alberti-Alhtaybat, L. & Alhatabat, Z. 2018. Educating digital natives for the future: accounting educators' evaluation of the accounting curriculum. *Accounting Education*, 27(4):333-357.
41	Environmental related (D)	Environmental accounting	Environmental accounting	Saito, M. 2016. What should we contribute to develop an effective accounting curriculum? International Review of Business, (16):17-32.
42	Gap between education and labour on skills requirements	The difference in perception between education and labour on skills requirements	"Evidence of inappropriate quality of accounting graduates and perceptions by professionals for the accounting education being outdated or irrelevant for the market (Albrecht and Sack, 2000; De Lange, Jackling, and Gut, 2006; Gabbin, 2002)"	Trpeska, A.A.M. & Lazarevska, Z.B. 2018. Accounting students' and employers' perceptions on employability skills in the SEE Country. *European Financial and Accounting Journal*, 13:55-72.

Annexure 5				
Codebook				
No	Deductive/Inductive code	Definition	Example	Source
43	Gap between students' perceptions and employers' requirements	The difference in view between students and employers	"Wells *et al.*'s (2009) study indicates a gap exists between expectations of graduates and what university course programmes are providing in NZ universities"	Tan, L.M. & Laswad, F. 2018. Professional skills required of accountants: what do job advertisements tell us? *Accounting Education*, 27(4):403-432.
44	Global and other external influences (including sustainable development goals) (D)	Factors influencing global business	"Albrecht and Sack (2000) highlighted the technological innovation, trend towards global business environment and concentration of power in certain investors as major developments that will influence accountants"	Trpeska, A.A.M. & Lazarevska, Z.B. 2018. Accounting students' and employers' perceptions on employability skills in the SEE Country. *European Financial and Accounting Journal*, 13:55-72.
45	Impact of issues (D)	Considering the impact of a problem or a solution	You will be required to apply your technical knowledge in order to assess and question the information provided. In particular, there will often be an aspect of "not taking figures at their face value". You may also be required to empathise with specific stakeholders and explain the impact of issues in the scenario on them.	ACCA (Association of Chartered Certified Accountants). 2018. *Embracing change. Shaping futures.* https://www.accaglobal.com/content/dam/ACCA_Global/Students/prof/sbr/5175_Stepping_up_from_Financial_Reporting.pdf Date of access: 9 Feb. 2021.
46	Impact on business models (D)	Impact of big data on business models	"The new digital business model is primarily data-driven, with data analytics in the process of becoming one of the most important corporate processes for strategic management and value creation"	Al-Htaybat, K., von Alberti-Alhtaybat, L. & Alhatabat, Z. 2018. Educating digital natives for the future: accounting educators' evaluation of the accounting curriculum. *Accounting Education*, 27(4):333-357.
47	Implementation (D)	The process of executing a solution	"Because leaders are being called on more frequently than at any other time in history to craft and implement new strategies, it is essential to resolve this skills gap"	Speculand, R. 2014. Bridging the strategy implementation skills gap. Strategic Direction, 30(1):29-30.

Annexure 5				
Codebook				
No	Deductive/Inductive code	Definition	Example	Source
48	Implications of actions (D)	The future effect of the action	"This could be done by requiring students to critically consider the ethical implications of actions required in response to problem-based scenarios"	Barac, K. & Du Plessis, L. 2014. Teaching pervasive skills to South African accounting students. Southern African Business Review, 18(1):53-79.
49	Independent and questioning mindset (D)	Self-dependent and enquiring attitude	Source not coded in any article	
50	Influence and consensus building (D)	Convincing, affecting, and coherence other to change their mind or behaviour	"The capability to deliver powerful presentations, persuade or convince other people and to negotiate effectively to the concerned parties"	Rufino, H., Payabyab, R.G. & Lim, G.T. 2017. Competency Requirements for Professional Accountants: Basis for Accounting Curriculum Enhancement. *Review of Integrative Business and Economics Research*, 7(3):116-128.
51	Influence and negotiation (D)	Bringing others together and trying to reconcile differences	"Negotiation skills (with people from different backgrounds and with different value systems)"	Parvaiz, G.S., Mufti, O. & Wahab, M. 2017b. Skills acquisition shortfall: a study of professional accounting education. *Business & Economic Review*, 9(2):135-164. doi: dx.doi.org/10.22547/BER/9.2.6
52	Initiative (D)	Own discretion or aptitude in taking action	"There is no doubt that the job market is becoming more complex and varied, which requires an employable graduate who is flexible, creative, uses initiative, is a good team worker and can be capable of self-management"	Altrawneh, G.A. 2016. An empirical evaluation of accounting graduates' employability skills from Jordanian employers' perspective. *International Business Research*, 9(1):55 -65. http://dx.doi.org/10.5539/ibr.v9n1p55

Annexure 5				
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No	Deductive/Inductive code	Definition	Example	Source
53	Innovation (D)	Adapt to change. Using imagination	"Creative thinking skill was the capacity to combine or synthesise ideas, images, or expertise in a way that is original and thought-provoking experience, react, and imaginative works are characterised by a high level of innovation, divergent thinking, and risk taking"	Oktalina, G. & Simanungkalit, E.F.B. 2016. *Creative thinking skills within accounting in college curriculum of Indonesia.* Paper delivered at the 2016 Global Conference on Business, Management and Entrepreneurship, Bandung. https://doi.org/10.2991/gcbme-16.2016.17
54	Integrated nature of quantitative and qualitative metrics (financial and non-financial information) (D)	Statistical analysis of available indicators	"Furthermore, some academics suggested that statistical knowledge should be enhanced, and that programming knowledge should be acquired"	Al-Htaybat, K., von Alberti-Alhtaybat, L. & Alhatabat, Z. 2018. Educating digital natives for the future: accounting educators' evaluation of the accounting curriculum. *Accounting Education*, 27(4):333-357.
55	Integration of 4IR related knowledge within accounting courses	Accounting courses containing 4IR related skills	"Learning experience needs to be designed with the labour market in mind and to strike a balance between innovative and stable, thus classic and contemporary new technology related skills need to be incorporated reflecting generational needs"	Al-Htaybat, K., von Alberti-Alhtaybat, L. & Alhatabat, Z. 2018. Educating digital natives for the future: accounting educators' evaluation of the accounting curriculum. *Accounting Education*, 27(4):333-357.
56	Intellectual and personal qualities	Intelligence and relational ability	"They are critical thinking; achieve given targets by the management; right personality; smart appearance; and work ethics, attitudes and values"	Abayadeera, N. & Watty, K. 2016. Generic skills in accounting education in a developing country: exploratory evidence from Sri Lanka. *Asian Review of Accounting*, 24(2):149-170.
57	Internal functions of an entity (D)	The way the business operates internally	"Because of specialised and extensive business knowledge, accountants with increased IT knowledge will be valuable collaborative business partners"	Coyne, J.G., Coyne, E.M. & Walker, K.B. 2016. A model to update accounting curricula for emerging technologies. Journal of Emerging Technologies in Accounting, 13(1):161-169.

Annexure 5				
Codebook				
No	Deductive/Inductive code	Definition	Example	Source
58	Interpersonal skills (I)	Those we use every day to communicate and interact with others, including listening, speaking, and questioning skills	"Interpersonal skills – are about the ability to secure outcomes through interpersonal interactions (e.g. people skills, listening, empathy, communication, motivation, and team management)"	Tan, L.M. & Laswad, F. 2018. Professional skills required of accountants: what do job advertisements tell us? *Accounting Education*, 27(4):403-432.
59	Issues identification (D)	Recognition of matters influencing decision-making	"This aspect grows in importance in the real world where the unstructured situations make it more difficult and more important to ascertain the issues and problems clearly before finding a solution"	Joseph, G., George, A. & Strickland, S. 2015. Perspectives on information literacy in the accounting curriculum. In: Rupert, T.J., eds. Advances in accounting education: teaching and curriculum innovations. Bingley: Emerald Group Publishing Ltd. pp. 89-111.
60	Knowing when to seek expert assistance (D)	Requesting advice from someone with special skill or knowledge	"Accountants follow samples from past years and consult senior managers for direction"	Camacho, L. 2015. The communication skills accounting firms desire in new hires. *Journal of Business & Finance Librarianship*, 20(4):318-329.
61	Knowledge sharing (D)	Disclosing and exchanging needed information	Knowledge sharing enable the organisation to grow	Salleh, K. 2010. Tacit knowledge and accountants: knowledge sharing model. Paper delivered at the 2010 second International Conference on Computer Engineering and Applications Bali Island, Indonesia. https://doi.org/10.1109/ICCEA.2010.227
62	Leadership skills (I)	Giving guidance and direction. Also leading in new situations	"Leadership encompasses the competencies required to collaborate with others and inspire teams to achieve organisational goals"	SAICA. 2019a. *Proposed SAICA competency framework: CA 2025*. Johannesburg. pp. 1-11.

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63	Listening, interviewing and discussion (D)	Spoken listening and interviewing skills	"Oral communication skills and ethics are ranked by employers as the most important graduate skills"	Abayadeera, N. & Watty, K. 2016. Generic skills in accounting education in a developing country: exploratory evidence from Sri Lanka. *Asian Review of Accounting*, 24(2):149-170.
64	Machine learning, robotic process automation and artificial intelligence including but not limited to (D)	Cognitive computing systems are not programmed, they imitate humans and automatically learn and improve with experience like machine learning, robotic process automation and artificial intelligence. Non-cognitive systems are programmed	"The technological developments that give rise to new augmented accounting practices are 3D printing, which poses questions for material and labour costing, artificial intelligence which matters with regard to production efficiency, growth opportunities and the creation of a new relationship of man and machine. Artificial intelligence is performing tasks through expert computer systems with the use virtual reality"	Al-Htaybat, K., von Alberti-Alhtaybat, L. & Alhatabat, Z. 2018. Educating digital natives for the future: accounting educators' evaluation of the accounting curriculum. *Accounting Education*, 27(4):333-357.
65	Manage teams/project (D)	Controlling and giving directions to co-workers. Also, time management and organise and delegate tasks	"A senior person who will coordinate accounting operations, as well as hire, train, and oversee employees"	Abayadeera, N. & Watty, K. 2016. Generic skills in accounting education in a developing country: exploratory evidence from Sri Lanka. *Asian Review of Accounting*, 24(2):149-170.
66	Marketing skills (I)	The ability to promote and sell the business	"Develop broader skills related to public practice, such as analytical reasoning, interpersonal, negotiating and communication skills, and marketing skills"	Trpeska, A.A.M. & Lazarevska, Z.B. 2018. Accounting students' and employers' perceptions on employability skills in the SEE Country. *European Financial and Accounting Journal*, 13:55-72.

Annexure 5				
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67	Mindful reasoning (D)	Sensible argument taking all Things into account	"Thus, it would be interesting to investigate whether the ability to mindfully observe and attend to stimuli relates differently to insight and analytic approaches to creative problem-solving"	Zedelius, C. M., & Schooler, J. W. (2015). Mind wandering "Ahas" versus mindful reasoning: alternative routes to creative solutions. *Frontiers in Psychology*, 6(834): 1-13. https://doi.org/10.3389/fpsyg.2015.00834
68	Mitigating steps (D)	Plans designed to manage or eliminate or reduce risk	"You should have the appropriate policies in place to adequately protect your systems and data. Certain transactions will require you to produce these policies. You should also audit and test your policies to ensure they are accomplishing what they are intended to"	Post, J. 2017. 14 Nov. 4 ways to manage cybersecurity risks in business and transactions [Blog post]. https://www.thompsoncoburn.com/insights/blogs/cybersecurity-bits-and-bytes/post/2017-11-14/4-ways-to-manage-cybersecurity-risks-in-business-and-transactions Date of access: 8 Feb. 2021
69	Moral and ethical decision-making (D)	Making a decision based on principle and what is right. This includes personal integrity	"Ethical values should be considered as a desired skill because ethical reasoning is vital for the future of business and professionalism"	Abayadeera, N. & Watty, K. 2016. Generic skills in accounting education in a developing country: exploratory evidence from Sri Lanka. *Asian Review of Accounting*, 24(2):149-170.
70	Network building (D)	Expanding the number of professional relationships	"Importantly, as these developments and changes render the environment unpredictable and fast- paced, the workforce of the future needs to be agile and flexible, and functions in networks, and needs to embrace disruptions and uncertainty"	Al-Htaybat, K., von Alberti-Alhtaybat, L. & Alhatabat, Z. 2018. Educating digital natives for the future: accounting educators' evaluation of the accounting curriculum. *Accounting Education*, 27(4):333-357.

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No	Deductive/Inductive code	Definition	Example	Source
71	New technologies (I)	New development in technology	"We are living and working in a knowledge world economy. Information and communication technology have transformed and are transforming how we learn"	Thatong, S. 2016. Accounting graduate employers' expectations and the accounting curriculum. *Catalyst*, 13(1):64-73.
72	Numeracy skills (I)	Skill with numbers and mathematics	"ICAEW (2008) identified a skills shortfall in both numerical and writingen skills"	Webb, J. & Chaffer, C. 2016. The expectation performance gap in accounting education: a review of generic skills development in UK accounting degrees. *Accounting Education*, 25(4):349-367.
73	Observant and aware (I)	Paying attention to detail	"Pays attention to details and is accurate"	Tan, L.M. & Laswad, F. 2018. Professional skills required of accountants: what do job advertisements tell us? *Accounting Education*, 27(4):403-432.
74	Organisational and business management skills (D)	Company and commercial management skills	"Effective organisational skills reduce stress, save time and ensure that important deadlines are met"	Smith, E. 2020. 7 Skills for a successful management career. https://www.prospects.ac.uk/jobs-and-work-experience/job-sectors/business-consulting-and-management/7-skills-for-a-successful-management-career Date of access: 2 Nov. 2020
75	Organisation culture advocacy (D)	Values and behaviours that contribute to the unique business environment	"Organisation culture plays a crucial role in creating as conducive work environment which improves the effectiveness of the organisation"	Kalaiarasi, MV, Sethuram, S. 2017. Literature review on organisation culture and its influence. *International Journal of Advanced Research in Engineering & Management*, 3(8):9-14.

Annexure 5				
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76	Perform data analysis (D)	Knowledge and skills regarding modelling and big data sets can be used to improve decision-making	"Data analytics has been defined as processes by which insights are extracted from operational, financial, and other forms of electronic data internal or external to the organisation"	Tschakert, N., Kokina, J., Kozlowski, S. & Vasarhelyi, M. 2017. How business schools can integrate data analytics into the accounting curriculum. *The CPA Journal,* 87:10-12.
77	Personal skills (I)	Personal skills are abilities considered as strengths	"Personal skills relate to attitudes and behaviours (IFAC, 2010). These skills allow individual learning and personal improvement and include capabilities such as self-management, using initiative and the ability to self-learn (IFAC, 2010)"	Douglas, S. & Gammie, E. 2019. An investigation into the development of non-technical skills by undergraduate accounting programmes. *Accounting Education*, 28(3):304-332.
78	Pervasive skills	Capabilities required by graduate accountants for employability and career advancement	"There are various definitions of employability skills. They are commonly termed as generic skills, non-technical skills, capabilities, key/core competencies, personal transferable skills, soft skills and attribute"	Tan, L.M. & Laswad, F. 2018. Professional skills required of accountants: what do job advertisements tell us? *Accounting Education*, 27(4):403-432.
79	Pressure and time management (I)	Managing stress and time	"Meeting accounting deadlines is critically important for employers, and so graduates' pressure and time management skills will be a concern for them"	Howcroft, D. 2017. Graduates' vocational skills for the Management Accountancy profession: exploring the accounting education expectation-performance gap. *Accounting Education*, 26(5-6):459-481.
80	Problem-solving (I)	To work out a solution	"Intellectual skills are skills which allow problems to be solved, decisions to be made and judgement to be exercised and includes skills such as critical analysis, problem-solving and analytical thinking (IFAC, 2010)"	Douglas, S. & Gammie, E. 2019. An investigation into the development of non-technical skills by undergraduate accounting programmes. *Accounting Education*, 28(3):304-332.

Annexure 5				
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No	Deductive/Inductive code	Definition	Example	Source
81	Professional accounting bodies	Professional organisations guiding the curriculum	“The IFAC requirements on the skills and competences that must be possessed by accountants who complete the initial phase of professional training (the bachelor cycle)”	Bunea, Ș. 2017. The contribution of accounting disciplines to developing professional and personal skills. *SEA–Practical Application of Science*, V(15):443-450.
82	Professional ethics	Moral principles guiding behaviour	"Professional ethics refers to the fundamental ethical principles and values applied by a professional CA(SA) to decision-making, conduct and the relationship between the professional, its stakeholders and society."	SAICA. 2019a. *Proposed SAICA competency framework: CA 2025*. Johannesburg. pp. 1-11.
83	Reading skills (I)	The ability to pronounce words, read fluently, recognise the tone of writing, understand the meaning/message/ purpose of writing. Also being able to draw conclusions from one’s writing, using evidence in that writing, and most of all, being able to read	“Educators place three skills in joint fourth place in terms of graduate competence: ‘critically read written works’, ‘identify and solve unstructured problems’ and ‘use relevant software’”	Howcroft, D. 2017. Graduates’ vocational skills for the Management Accountancy profession: exploring the accounting education expectation-performance gap. *Accounting Education*, 26(5-6):459-481.
84	Recommendations (D)	Critical evaluate the options and present a recommendation. The recommendations could be presented as a report	“Students focus on identifying insightful questions, structuring the problem, researching alternative solutions, analysing data (or working with data scientists), and communicating recommended complex data solutions”	Ballou, B., Heitger, D.L. & Stoel, D. 2018. Data-driven decision-making and its impact on accounting undergraduate curriculum. *Journal of Accounting Education*, 44(2018):14-24.

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85	Reliance on IT technologies (I)	Confidence in information technology	"Many studies have highlighted the fact that increased reliance on IT technology could replace a lot of work and specific tasks performed by traditionally trained accountants and auditors (Albrecht and Sack, 2000; Crawford, Helliar, and Monk, 2011)"	Trpeska, A.A.M. & Lazarevska, Z.B. 2018. Accounting students' and employers' perceptions on employability skills in the SEE Country. *European Financial and Accounting Journal*, 13:55-72.
86	Research skills (I)	"The systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions"	"Research skills: Ability to recognise the need to use research tools and sources as well to apply such insights gained to business problems"	Ballou, B., Heitger, D.L. & Stoel, D. 2018. Data-driven decision-making and its impact on accounting undergraduate curriculum. *Journal of Accounting Education*, 44(2018):14-24.
87	Resilience and crises management (I)	"Resilience is the ability of an organisation to anticipate, respond to, and adapt to market conditions and involves both preparing and acting when disaster strikes." Resilience is also being flexible. "Crisis management is not just reactive; it is about taking the relevant measures to prepare for a potential crisis"	"Identify resilience as an area where there are differences between the existence of opportunities and the importance of the skill to employers and graduates"	Webb, J. & Chaffer, C. 2016. The expectation performance gap in accounting education: a review of generic skills development in UK accounting degrees. *Accounting Education*, 25(4):349-367.
88	Risks and attacks (D)	Possibility of loss of data or aggressive non-friendly action due to malicious attacks	"Information security and data integrity is primary goals of controls"	Coyne, J.G., Coyne, E.M. & Walker, K.B. 2016. A model to update accounting curricula for emerging technologies. *Journal of Emerging Technologies in Accounting*, 13(1):161-169.

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No	Deductive/Inductive code	Definition	Example	Source
89	Role of business in society - Strategic management (D)	Strategic business in relation to the rest of the world	"So, we need to incorporate units on strategic management, leadership and entrepreneurship, for graduates to be able to provide a complete advisory experience to a client"	Al-Htaybat, K., von Alberti-Alhtaybat, L. & Alhatabat, Z. 2018. Educating digital natives for the future: accounting educators' evaluation of the accounting curriculum. *Accounting Education*, 27(4):333-357.
90	Scepticism (I)	Scepticism is an attitude towards specific claims, an attitude of questioning claims, of demanding to see evidence for those claims. Scepticism is one aspect of critical thinking	"Furthermore, it is necessary to adopt critical and sceptical thinking skills that provide individuals with the ability to utilise big data analytics critically"	Al-Htaybat, K., von Alberti-Alhtaybat, L. & Alhatabat, Z. 2018. Educating digital natives for the future: accounting educators' evaluation of the accounting curriculum. *Accounting Education*, 27(4):333-357.
91	Securing and safeguarding (D)	Predict, prevent or uncover fraud	"Technological knowledge and awareness of hacking abilities will not allow the current accounting graduate to predict, prevent or even uncover such financial fraud"	Al-Htaybat, K., von Alberti-Alhtaybat, L. & Alhatabat, Z. 2018. Educating digital natives for the future: accounting educators' evaluation of the accounting curriculum. *Accounting Education*, 27(4):333-357.
92	Self-development	Ongoing lifelong learning	"Accounting education must encourage students to continually learn and relearn to sustain their competencies once they enter the accountancy profession"	Rufino, H., Payabyab, R.G. & Lim, G.T. 2017. Competency Requirements for Professional Accountants: Basis for Accounting Curriculum Enhancement. *Review of Integrative Business and Economics Research*, 7(3):116-128.
93	Self-managed learning	Self-education	"Personal skills relate to attitudes and behaviours (IFAC, 2010). These skills allow individual learning and personal improvement and include capabilities such as self-management, using initiative and the ability to self-learn (IFAC, 2010)"	Douglas, S. & Gammie, E. 2019. An investigation into the development of non-technical skills by undergraduate accounting programmes. *Accounting Education*, 28(3):304-332.

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94	Servant leadership (D)	A servant leader leads by taking the well-being of the people around him into account.	"As servant leaders, they will understand that for firms to thrive they must be run in a manner in which caring about employees, customers, and the community are core values of the firm".	Kass, F. & Friedman, H.H. 2007. *Accountants and auditors as servant leaders.* Paper delivered at the 2007 Northeast Decision Sciences Institute Annual Meeting Baltimore, Maryland. https://ssrn.com/abstract=2423138 Date of access: 8 Feb. 2021.
95	Service skill (I)	Giving assistance ability	"Client relationships and client service"	Coady, P., Byrne, S. & Casey, J. 2018. Positioning of emotional intelligence skills within the overall skillset of practice-based accountants: employer and graduate requirements. *Accounting Education*, 27(1):94-120.
96	Social skills (I)	Manner when engaging with other people	"The new recruit is not complete without the possession of the right social and presentation skills that offer a 'professional' image to the client (Anderson-Gough *et al.*, 2000)"	Parry, N. & Jackling, B. 2015. How do professional financial services firms understand their skill needs and organise their recruitment practices? *Accounting Education*, 24(6):514-538.
97	Strategic professional relationship (D)	Networking with same occupation colleagues. Client relations	"Agility, the ability to create and maintain a network through social skills and the right technical skills are important elements future accounting education need to be incorporated"	Al-Htaybat, K., von Alberti-Alhtaybat, L. & Alhatabat, Z. 2018. Educating digital natives for the future: accounting educators' evaluation of the accounting curriculum. *Accounting Education*, 27(4):333-357.
98	Strategic thinking (D)	Strategic thinking is the thinking process to achieve a set goal or plan for the future	"Graduates must possess functional competencies (for example measurement, identification, reporting) personal competencies (such as problem-solving and decision-making)"	Lubbe, I. 2017. Challenges for curriculum design: considerations for a four-year business and accounting degree in South Africa. *South African Journal of Accounting Research*, 31(1):60-82.

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99	Sustainability and long-term thinking (D)	"Strategic - relating to the identification of long-term or overall aims and interests and the means of achieving them"	"Big data that are generated from other sources to be able to assess corporate future risks and opportunities, to achieve corporate strategic and sustainability objectives"	Al-Htaybat, K., von Alberti-Alhtaybat, L. & Alhatabat, Z. 2018. Educating digital natives for the future: accounting educators' evaluation of the accounting curriculum. *Accounting Education*, 27(4):333-357.
100	Talent management (developing others) (D)	Skill development of others	"Such a person also performs financial analysis, builds a business strategy, and manages relationships with investors and auditors"	Olvera, M.E.R., Reyes, N.L.G. & Ochoa, J.A. 2015. Integrated curriculum design revision-The case of the School of Accounting and Administrative Sciences of the UMSNH. *Higher Education Studies*, 5(2):25-37.
101	Tax policy (D)	Tax or fiscal related	"Competencies include external reporting, planning, analysis and control, taxation, management information systems, assurance and internal control, professional values, ethics and attitudes"	Bunea, Ș. 2017. The contribution of accounting disciplines to developing professional and personal skills. *SEA–Practical Application of Science*, V(15):443-450.
102	Teaching methods for knowledge and skills and attributes	Manner of instruction for knowledge and skills and attributes	"Knowledge could be communicated through "actively learned" topics, where course activities or assignments emphasise one or more of the KSAs as part of a learning objective"	Ballou, B., Heitger, D.L. & Stoel, D. 2018. Data-driven decision-making and its impact on accounting undergraduate curriculum. *Journal of Accounting Education*, 44(2018):14-24.

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103	Teamwork skills (I)	A group of interdependent individuals who work together towards a common goal understanding group dynamic	"Ability to work effectively in a team"	Tempone, I., Kavanagh, M., Segal, N., Hancock, P., Howieson, B. and Kent, J. 2012. Desirable generic attributes for accounting graduates into the twenty-first century: the views of employers. *Accounting Research Journal*, 25(1):41-55. https://doi-org.nwulib.nwu.ac.za/10.1108/10309611211244519
104	Technical skills / Routine skills	Technical or discipline knowledge - knowing how to do Chartered Accountancy related subjects	"Technical accounting topics: Knowledge of standards and processes needed to perform tasks and make judgements within specific accounting domains (e.g., financial, managerial, auditing, tax, systems)"	Ballou, B., Heitger, D.L. & Stoel, D. 2018. Data-driven decision-making and its impact on accounting undergraduate curriculum. *Journal of Accounting Education*, 44(2018):14-24.
105	Technology skills (I)	Skills related to use of computer	"It is also notable that employers considered the non-EI skill of information technology to have above average development but below average expected development in university"	Coady, P., Byrne, S. & Casey, J. 2018. Positioning of emotional intelligence skills within the overall skillset of practice-based accountants: employer and graduate requirements. *Accounting Education*, 27(1):94-120.
106	The nature of data (e.g. underlying characteristics and storage) (D)	Inherent attributes of data	"Specific technological developments have included the increasing capacity and declining cost of digital storage media accompanied by the development of database software to facilitate the efficient and effective storage and retrieval of data"	Wells, P.K. 2018. How well do our introductory accounting text books reflect current accounting practice? Journal of Accounting Education, 42:40-48.
107	User tools (word processing, presentation software, spreadsheet software) (D)	Know how to operate Word, Excel, PowerPoint, SAP, and other audit and accounting software	"Intermediate proficiency with Microsoft tools and sufficient familiarity with structure and navigation of enterprise resource planning system to process transactions. Excel for analysis was most important"	Tan, L.M. & Laswad, F. 2018. Professional skills required of accountants: what do job advertisements tell us? *Accounting Education*, 27(4):403-432.

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No	Deductive/Inductive code	Definition	Example	Source
108	Work experience also internship	"Practical knowledge, skill, or practice derived from direct observation of or participation in events or a particular activity"	"Fortin and Legault (2010) found that practical experience programmes significantly contributed to the development of 32 generic competencies investigated in their study"	Abayadeera, N. & Watty, K. 2016. Generic skills in accounting education in a developing country: exploratory evidence from Sri Lanka. *Asian Review of Accounting*, 24(2):149-170.
109	Work independently (D)	Work on your own. Plan your own work and do time management	"Hancock *et al.*'s (2009) findings reveal that employers held communication, teamwork and self-management as the most critical generic skills for the career success of accounting graduates"	Abayadeera, N. & Watty, K. 2016. Generic skills in accounting education in a developing country: exploratory evidence from Sri Lanka. *Asian Review of Accounting*, 24(2):149-170.
110	Work-ready graduates as demanded by employers	Employer expectation of graduate skills or entry-level accounting graduates	"It comprises the achievements, skills, understanding, and personal attributes that make graduates more likely to gain employment"	Altrawneh, G.A. 2016. An empirical evaluation of accounting graduates' employability skills from Jordanian employers' perspective. International Business Research, 9(1):55 -65. http://dx.doi.org/10.5539/ibr.v9n1p55
111	Written communication skills (I)	Written interaction via physical and electronic medium	"Nearly 80% of practitioners' workdays are spent using written and oral communication skills"	Camacho, L. 2015. The communication skills accounting firms desire in new hires. *Journal of Business & Finance Librarianship*, 20(4):318-329.

Key: (D) Deductive code, (I) Inductive code

Codes mark in grey additionally identified during document analysis, not deductive or inductive

Annexure 6: Ethics clearance

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT

Private Bag X6001, Potchefstroom
South Africa 2520

Tel: 018 299-1111/2222
Web: http://www.nwu.ac.za

Economic and Management Sciences Research
Ethics Committee (EMS-REC)

18 August 2020

Dr J J Swart and Dr L van den Berg
Per e-mail
Dear Dr Swart and Dr van den Berg

EMS-REC FEEDBACK: 31072020
Student: Landsberg, E (10545786)(NWU-00783-20-A4)
Applicant: Dr JJ Swart / Dr L van den Berg – MCom in Accountancy

Your ethics application on, *Investigating the preparedness of the accountancy curricula for the 4th Industrial Revolution,* which served on the EMS-REC meeting of 31 July 2020, refers.

Outcome:

Approved as a minimal risk study. A number NWU-00783-20-A4 is given for one year of ethics clearance.

Due to the Covid-19 lock down ethics clearance for applications that involve data collection or any form of contact with participants are subject to the restrictions imposed by the South African government.

Kind regards,

Mark Rathbone

Digitally signed by Mark Rathbone
DN: cn=Mark Rathbone, o=North-West University, ou=Business management, email=mark.rathbone@nwu.ac.za, c=ZA
Date: 2020.08.21 06:50:03 +02'00'

Prof Mark Rathbone
Chairperson: Economic and Management Sciences Research Ethics Committee (EMS-REC)

Jomoné Müller
Language Practitioner
SATI No. 1002831
BA Hons (Language practice)

www.jmuller.co.za
Tel: +27 84 406 0029
jomone@jmuller.co.za

DECLARATION OF LANGUAGE EDITING

17 March 2021

To whom it may concern

This is to confirm that I, the undersigned, have language edited the completed research of Estelle Landsberg for the degree *Master Commerce in Accountancy* entitled: *Investigating the preparedness of the accountancy curricula for the 4th industrial revolution.*

No changes were permanently affected and were left to the discretion of the author. The responsibility of implementing the recommended language changes rests with the author of the thesis.

Yours truly

Jomoné Müller