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A Study of Fourth Industrial Revolution on Management Accounting Profession

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Abstract

The Fourth Industrial Revolution (4IR) marks a paradigm shift for industries' enterprises and professions. There will be a radical shift in nearly every facet of enterprises and professions. The recent industrial revolution has created technological upheaval, and the accounting profession is not immune to it. 4IR and the development of smart technology are changing how accountants typically accomplish their jobs. Therefore, a revision of the functions managers and accountants now play is required to account for the shift in the field's established practices, procedures, and ways of doing work. This study intends to update the skills necessary for upcoming management accounting graduates by reviewing the literature on the effects of 4IR on the management accounting profession and graduate preparedness for 4IR employment. The mismatch between talents and the necessary skills for long-term work contentment are two topics covered in previous research. The literature research makes it possible to determine the best ways for universities to address these problems. Higher education institutions stand to gain from the study as they include 4IR into their curriculum to generate graduates who are capable and prepared for the workforce.

Keywords: Accountants, Accounting skills, Career readiness, Fourth industrial revolution, University.

1 | Introduction

The term "Fourth Industrial Revolution" (4IR) refers to the consequences of technological advancement in several global economic sectors as well as in Nigerian industries, including services, banking, accountancy, and industry [1]. When seen in the context of the German author Klaus Schwab's book "4IR," the predictions first appear dire and terrifying. According to Schwab [2], the technological wave spread centrally, in contrast to earlier revolutions that entailed a "matrix" technology that propelled the industrial revolution, such as the steam engine, the automotive industry, and microelectronics. Based on digital connection, noted that several technologies will accelerate this next industrial revolution [3].

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4IR is already underway, and with it have come significant advancements in the work approaches employed by experts in their respective disciplines [4]. According to Bryant [5], his research is based on a poll conducted with 3,000 accountants, of whom 90% agreed to the thought there had been a cultural shift in accounting. 4IR is coming, and it will bring about a transformation that is bigger than the three previous revolutions combined because of its unique features. Some characteristics include the speed at which changes occurred and their breadth and depth, which show how new perspectives can alter organizational systems in a complex and simultaneous manner.

Due to these motivating forces, there is growing anticipation that technological advancements will significantly alter the form and attributes of employment, raising concerns about the quantity of jobs that will be automated or replaced. Numerous predictions concerning the daily advancements in technology in businesses, industries, and the labour market are made by experts in different fields, including economics, technology, and employment. These predictions promise remarkable changes that will have far-reaching and irreversible effects on technology, the economy, and the financial sector [2]. According to Schwab [2], one of the themes of 4IR is the digital revolution, which will mostly be responsible for altering ideas about professional connections including engagement and cooperation between individuals and institutions.

The author emphasizes the challenges that might emerge in regions that are directly or indirectly impacted by this 4IR. Managers' decisions will be made more quickly and accurately because of technological advancements, industry-wide methods and processes, system evolution, new data analysis techniques, and the production of increasingly effective and efficient results from these sophisticated data analyses. This paper's preparation is therefore justified by the topic's relevance to society, the academy's attempt to determine whether accounting professionals and students are ready for the innovations of 4IR, and the market, given that the anticipated changes are expected to have an impact on several industries and may even jeopardize the survival of some professions, including accounting.

The labour of the future is now. Nowadays, technology is radically changing every element of existence [6]. The 4IR saw the introduction of autonomous and smart systems powered by data, along with the Internet of Things, Internet of Systems, and cyber-physical systems, replacing the use of computers and automated machinery from The Third Industrial Revolution (3IR) [7–9]. As a result of the corporate environment becoming more digitally connected, 4IR refers to the advancement of technology that allows humans to make decisions with little to no human involvement [10]. The labour market is seriously threatened by the rapid advancement of digital technology in 4IR. Automation is replacing labour-intensive tasks with machines and technology.

According to Pauceanu et al. [11], by 2025, advanced technology and systems will replace more than half of the jobs held now. Automation and Artificial Intelligence (AI) will perform tasks that people would typically perform AI. The labour market will undoubtedly be severely disrupted by this [12]. The Organization for Economic Co-operation and Development (OECD) concurs, as evidenced by its 2019 OECD employment outlook study. Automation of a knowledge worker's replacement task is shown to be very likely. It was discovered that automated machinery and operations will replace 14% of employment performed by people. Additionally, in this fast-paced digital era of 4IR, about 32% of conventional employment experience drastic shifts and transformations [13].

Current company operation procedures will be readjusted to the new work style as information technology advances and change the nature of business. As a result, certain vocations will vanish and new ones that demand advanced knowledge and technological expertise will arise [14]. The accounting profession is one of almost all business-related professions impacted by the changes in the technology environment [15–17]. Changes in technology procedures and practices will disrupt the accounting profession [8], [18], [19].

In the digitalized company world, the existing and traditional accounting processes, procedures, and methods will become obsolete. To conform with the 4IR agenda, accountants will accept the automation of present accounting procedures. To better comprehend the effects of 4IR on the accounting profession and accounting graduates' preparedness for 4IR work, this study tries to give some clarification. Accounting

graduates may find it easier to find employment and survive in the rapidly evolving business world if the appropriate skill profiles are identified and their existing skill set is improved. A comprehensive overview of the literature on the effects of 4IR on the accounting profession and the preparedness of recent accounting graduates to participate in 4IR is provided here.

2 | Methodology

The process of doing a literature review primarily consists of two stages [6], [20]. The procedure commences with a literature search, and then the found material will be analyzed [3]. Using the search strategy utilized in Sulong et al.'s [21] study, which split the searches into specialized and broader database searches, the literature search is broadened. To discover pertinent research, a range of databases were used for the broad database search.

Electronic resources, including ResearchGate, Google Scholar, ScienceDirect, ProQuest, and SAGE Journals, were used to extract previous research on 4IR and the accounting profession from journal articles published between 2010 and 2024. Through a filtered search based on a particular emphasis, the concentrated search returned articles. The influence of 4IR on accounting, 4IR-relevant skills, and accounting graduates' preparedness for 4IR work were the main topics of the targeted search, which covered the years 2010 through 2024. The last stage is to evaluate and group the literature according to the primary conclusions will be discussed in the next section.

3 | Findings and Discussion

3.1 | The Impact of the Fourth Industrial Revolution Towards Accounting Profession and Graduate's Career Readiness

3.1.1 | 4IR reshaping the accounting profession

4IR will undoubtedly have a significant and positive influence on accounting. The accounting profession is expected to witness evolution by 2025 due to advancements in business, politics, and technology, as well as changes in public perception of the field [22]. Three main obstacles were identified by [23] for aspiring accountants. Among the anticipated changes that will alter the role of accountants include the development of smart technology, the internationalization of financial reporting or disclosure standards, and the introduction of new or more stringent rules [23]. To satisfy the expectations of the stakeholders under the 4IR transition, will require the accountants to pay more attention to it and adapt.

The accounting profession will need to change from its existing, traditional methods to automated, systematic procedures for most accounting tasks to accommodate the evolution of 4IR. There is a prominent confluence between technology and digital. The accounting sector will undoubtedly witness innovation and growth with AI [24]. 4IR can transform traditional methods into sophisticated, modern ones. The system will digitally organize and analyze financial data, and an accountant's job is to assess the data that the system generates [10]. *Table 1* provides a detailed overview of how accounting activities have changed gradually over time.

Table 1. Gradual transformation of accounting tasks over the period [25].

Accounting Task	Past Situation	Present Situation	Future Situation
Data entry	Accountant	Operator/accountant	AI
Bookkeeping	Accountant	Software	Software/ artificial intelligence
Compliance work	Accountant/auditor	Software	AI
Driving to clients to pick up documents	Accounts staff	Electronic documents passed through email	Electronic documents passed through email

Table 1. Continued.

Accounting Task	Past Situation	Present Situation	Future Situation
Preparing bills, giving requisition	Accountant software-billing software, purchase	Requisition software	Machine learning
Preparing ledger	Accountant	Spread sheet and software	Software
Receipt reconciliation	Accountants need to "balance the chequebook"	Software	Machine-readable data can then be reconciled with them
Personal investigation in auditing	Auditor use software in forensic analysis		AI
Preparing documents and tax calculation	Accountant software	Machine learning	Algorithm
Preparing financial statements	Accountant accountants through the help of erp, sap software	XBLR (automated annual reports)	

Previous studies have examined the technical innovations of 4IR that have been utilized by the profession. Modernised accounting and financial reporting demonstrate how technology is advancing in the accounting field [26]. The financial reports are created utilizing cutting-edge technical advancements such as distributed ledgers based on blockchain, knowledge-based systems, AI applications, and XBLR-based structured digital financial reporting [26].

Leitner-Hanetseder et al. [27] predict that Business Intelligence (BI) and AI will replace the present accounting procedures, which are repetitive and regular jobs. According to Zheng [28], the usage of financial robots would lessen the workload for accountants because their work is normative and repetitive and involves a vast amount of data and information. Robotic Process Automation (RPA) is intended to replace some of the most labour-intensive and traditional financial tasks in accounting, therefore increasing the effectiveness of financial management.

The identification of smart technologies in accounting, such as blockchain and cloud computing, will drastically alter the responsibilities and functions that accountants now do. The revenue administration of the Turkish ministry of treasury and finance launched and oversaw the use of an electronic application called e-accounting application in Turkey [9]. The electronic financial reporting project, which processed independently the audited financial reports in a computerized environment and used the results in financial analyses, is the most recent development resulting from the deployment of e-accounting applications.

The e-accounting applications, as defined by 4IR, have the ability to convert accounting procedures into an electronic cloud environment. Accounting tasks will be completed differently by accountants as a result of the updated accounting processes and procedures. Under 4IR, accountants will have to navigate a new direction and a new method of functioning. The efficacy and efficiency of accountants' work will be greatly enhanced by the use of smart digital and technical advancements. Data processing and other repetitive and regular operations will be entirely handled by AI-based technologies.

Accountants will be able to review their roles and concentrate more on other strategic and visionary responsibilities if they engage in less manual work. Consequently, this will allow accountants to concentrate on data analytics, creative and judgmental analysis, and financial advice work [25]. To generate value for the company by considering long-term goals, accountants will focus more on management operations and less on accounting-related issues [29], [18]. Accountants will thus have more responsibility in recommending and evaluating important business decisions that will propel the firm to new heights [17]. Therefore, there is a significant change in an accountant's job [30].

Under 4IR, the accounting profession is being completely redesigned to focus on real-time accounting, which calls for current data and less dependence on recurring data. Big data generated by the system will be the main

focus of data analysis going forward, rather than historical data. A sophisticated collection of software that contains a large amount of updated, unstructured data is known as big data [31]. Working with AI-based and big data technologies will enable accountants to make the most of system-generated data and create insightful information that consumers can use to make decisions [32].

The accounting profession will go beyond simply producing and reporting data to include understanding the data to produce valuable financial information that helps users make moral decisions. As a result, this will result in improved data quality since it will be more accurate, detailed, and timely. The production of better and more significant data will always raise the calibre of an accountant's services [33].

However, the advent of these technological advancements won't completely replace the need for accountants. Selecting accurate and high-quality data for these intelligent technologies to process requires the expertise of an accountant. Accountants will oversee the validity and dependability of the data utilized [16]. Since only humans can make expert decisions, accountants will examine the output that the data processing process produces. Technology cannot take the place of human knowledge and experience in making valuable decisions [19].

Moreover, Rosi and Mahyuni [34] proposed that the accountant should oversee the tasks carried out by these sophisticated and intelligent technologies. They are in charge of keeping an eye out for and spotting system errors. It takes judgment and human interaction to provide a solution. Furthermore, Leitner-Hanetseder et al. [27] and Losbichler and Lehner [35] held the view that tasks requiring human decision-making and judgment need human-machine collaboration.

In certain processes that are hard for technologies to do alone, humans and technology coexist as co-actors. For example, performance management and monitoring activities [28], [36], forecasting procedures, and other traditional processes [35]. As a result, there is a human-machine partnership to do certain accounting tasks [37]. To succeed in the digital age, accountants will need to adapt to and deal with technological progress.

Undoubtedly, the integration of technology into the daily tasks and activities of accountants will highlight the necessity for the accounting industry to acquire new knowledge and competencies [32], [34]. The advancement of accounting understanding ought to be coordinated with 4IR growth. In the fast-paced 4IR age, an accountant's ability to maintain current accounting abilities will be essential to their survival. Providing instruction and training might aid in the development of knowledge and skills that meet the 4IR criteria. The rise of 4IR lies in the production of competent human capital and intellectual resources [38].

The duties and responsibilities of accountants are evolving, thus it's important to have the competencies and abilities necessary for these new tasks. To meet the requirements for accountant qualification under the 4IR, future accountants will face more difficult obstacles [39]. The skill profile of accountants is expected to evolve, which will have an impact on the education system's ability to produce future market-ready accountants [29]. There is no denying the effect on the upcoming job market and accounting graduates.

3.2 | Skills Profile for Future Accountants

Employers in the market are more concerned about candidates' capacity to deal with smart technologies as a result of the growth of this technology in 4IR. Accounting professionals anticipated that the automation of accounting procedures would need the hiring of graduates qualified to operate in this new environment. Young graduates must acquire and develop technology abilities since robots and technologies are replacing most accountants' labour [18].

According to Raporu [22], the growth of smart technologies, the globalization of business and professions, modifications to regulations and governance, as well as shifts in public perceptions of business and the accounting profession, will all contribute to the transformation of the accounting profession by 2025. Future accountants' present competencies and skills will shift as a result of these variables. The knowledge and skill profile for aspiring accountants in 4IR has thus been outlined by Stancheva-Todorova [15]. It includes

knowledge and skills about digital technologies, big data and data analytics, robotics and artificial intelligence, cyber security, and tax implications, including legal and regulatory requirements.

To operate in the 4IR field, an accountant must update their skill set with an emphasis on strong technical abilities, ethics, and communication skills [15]. According to Khanh [40], Purnamasari et al. [41], and Rhodes and Rhodes [42], gaining IT knowledge and skills is crucial as we approach the digital era. Graduates who are proficient with IT tools are offered advantages. Moreover, it is imperative to instil in recent accounting graduates the proper mix of hard and soft skills pertinent to 4IR. A list of pertinent technical and soft skills appropriate for 4IR work was provided by Kruskopf et al. [10].

Technical skills are defined as the ability to analyze, comprehend, and possess sufficient knowledge about the capabilities and operation of data security and software. Young accountants will be able to engage and function effectively with smart technology thanks to their abilities. Communication, conflict resolution, leadership, risk management, creativity and strategic decision-making, emotional intelligence, sales expertise, flexibility, and a focus on customer service are among the soft talents [37]. According to Kruskopf et al. [10], these will assist graduates in developing into knowledgeable financial information providers who can provide value to the company.

Furthermore, De Villiers [43] has established five fundamental abilities that are pertinent in managing a complicated and dynamic company environment. The abilities are referred to as self-management skills, problem-solving and critical thinking skills, leadership and teamwork skills, and ethical and moral principles. Tsiligiris and Bowyer [44] did another investigation to find the appropriate abilities that are compatible with the 4IR job. The authors outlined four critical competencies that will support accountants in navigating the disruptive effects of technology on business and accounting. The competencies pertain to technology and data, business, ethics, and soft skills. These are regarded as success-oriented talents.

Having these abilities will make it easier for accountants to adjust to changes in their line of work and role. Acquiring non-financial competencies such as leadership, information technology, and analytical abilities will enable future accountants to deal with the demands of business and society and operate effectively with technology [16]. These abilities are helpful as the modern accountant's job requires a strategic, long-term outlook that is in line with 4IR. In addition to the skills described above that have been found in earlier research, The World Economic Forum [45] has listed eleven essential and crucial abilities for 4IR. With these abilities, accountants will be more equipped to meet the challenges of the 2020 future of work.

Complex problem-solving, critical thinking, creative thinking, people management, interpersonal coordination, emotional intelligence, judgment and decision-making, service orientation, capacity to negotiate, and cognitive flexibility are among the acknowledged talents [45]. These abilities are unquestionably the highlight of the choices made by 4IR applicants. The graduates will benefit from having these talents as they will enable them to succeed in their future careers. Before beginning a 4IR job, accounting graduates must master these abilities and build a good skills profile.

3.3 | Accounting Graduate's Career Readiness for Employment under 4IR

According to Yusof and Jamaluddin [46], graduates must be able to master and promote wider abilities to be hired, rather than relying just on a technical understanding of the field from academic institutions. According to Abdullah et al. [47], a graduate's preparedness for the workforce is determined by how successfully they can apply the abilities they acquired at their institution to land a job. The idea of career readiness places a focus on graduates' capacity to enter the profession with ease and guarantees that they have the skills necessary to be employable for an extended time [48].

Graduates will be able to enter the workforce, hold onto their jobs, and improve them over time with the appropriate skills. The graduate's employment preparedness in 4IR is summed up in *Table 2*. These investigations revealed a range of responses from the students, with some believing they were prepared for

4IR work while others were still unsure of how 4IR would affect their future. This raises an issue for the industry: Is the next generation prepared to join the profession and embark on 4IR?

Table 2. Graduates readiness for employment in 4IR.

Authors	Sample	Method	Finding
Teng et al. [49]	Undergraduate students from two universities (China and Malaysia)	Questionnaire, Survey	Graduates will be able to enter the workforce, hold onto their jobs, and improve them over time with the appropriate skills. The graduate's employment preparedness in 4IR is summed up in Table 2. These investigations revealed a range of responses from the students, with some believing they were prepared for 4IR work while others were still unsure of how 4IR would affect their future. This raises an issue for the industry: Is the next generation prepared to join the profession and embark on 4IR?
Purnamasari et al. [41]	Ninety accounting students from Indonesia	Qualitative method which consists of interviews and focus group discussion	Because their educational institutions did not adequately educate them about the 4IR job market, accounting students are still ill-prepared to enter it. Their worries about being ready for the digital age stem mostly from three things: their lack of knowledge about how information technology and systems operate; the inadequate facilities and infrastructure provided by their academic institutions to support teaching and learning in the new digital era; and, finally, their incapacity as educators to use technologies to deliver learning materials in teaching and learning activities.
Rahmat et al. [50]	One hundred and ninety (190) undergraduate diploma and first-degree students from five Malaysian public universities.	Online survey questionnaire	The undergraduate students thought they had the necessary abilities to work under 4IR. Cognitive flexibility, critical thinking, negotiation, decision-making, and service orientation are the five main talents that have been identified. This suggests that if individuals possess these vital abilities, they can satisfy the expectations of their employers.
Omar and Hasbolah [19]	Undergraduate accounting students at the University of Selangor	Questionnaire Survey	Most accounting students are familiar with the 4IR. They are eager to learn more about this Industrial 4.0 era and are driven to participate in it. Lastly, students understand how 4IR will impact their ability to find work in the future labour market.
Adnan et al. [51]	ASEAN student leaders from five polytechnics located in Brunei, Indonesia and Malaysia.	Qualitative method which consists of interviews and focus group discussion	ASEAN tertiary students have no idea what skills are required for 4IR. The pupils' level of preparation was low as a result, and they lacked the necessary tools to engage in 4IR employment. Discouragement towards 4IR may stem from worries about potential disruptions caused by this era's technological advancements.
Pauceanu et al. [11]	Public university students in the United Arab Emirates.	Questionnaire Survey	Students still don't know what employability skills are required of them under 4IR. The way that students see 4IR employability abilities is not in line with what the UAE job market would need in the future.

Employers' remarks about graduates' skills and critiques of them over time have become commonplace. In most previous research, there was a discernible difference between the capabilities employers were looking for and the talents graduates possessed [52–56]. Employers' expectations were frequently unmet, and the high rate of skill mismatches has an impact on future labour performance and efficiency. If young graduates don't have the necessary skills that companies expect, they may not be able to survive long in the workforce.

According to Heang et al. [57], young accounting graduates in Malaysia have early employment issues, indicating that they are not yet prepared to enter the workforce. Among the issues noted are a lack of technical knowledge and expertise, particularly in communication, time and stress management, adapting to a new work environment, and using sophisticated and smart technology [57]. These have turned into the cause of graduates' lack of readiness for the workforce as they lack confidence in their capacity to function in the quickly evolving workplace.

A misperception of the function of an accountant may also contribute to a mismatch in abilities [58]. The existing skill set produced among accounting graduates is inadequate, as the 4IR age is expected to bring about changes in the function of an accountant. Graduates with additional capabilities than standard accountants are in high demand from employers. As a result, the disparity in capabilities may be impacted by the company's performance, raising concerns about productivity and quality of service, thus endangering the company's ability to grow or even thrive in the cutthroat market [59]. Employers anticipate that graduates will expand internationally, be prepared for the workforce, and contribute to society and business.

3.4|The Role of the University

As a source of human labour, higher education institutions are crucial in matching supply to demand and conditions in the labour market [60]. Universities must prepare the next generation of leaders and highly skilled workers for the labour market [38]. Universities, as a vital link in the education supply chain, have the power to completely shift the trajectory of the job market. According to Li [38], universities are dedicated to fulfilling the needs and expectations of the labour market.

This is demonstrated by the creation of educational programs that are pertinent to the markets of today, creative curricular design, altered delivery methods, and several other tactics employed to produce graduates who are qualified for the 4IR workforce. However, over time, the issue of university graduates' incompatibility with market expectations has grown to be alarming. Blame is frequently placed on the educational system for producing a lack of competent workers [54].

Studies by Al Mallak et al. [61], Bunney and Therry [62], Hadiyanto and Suratno [63], Heang et al. [57], Kavanagh and Drennan [55], and Kirstein [64] revealed employers' and accounting students' unhappiness with the skills development offered by their institutions. These studies propose many changes, including shifting the focus from technical knowledge to the development of soft skills, altering the syllabus's structure and content, and upgrading the mode of instruction to keep up with 4IR.

Unquestionably, if education institutions remain unchanged, the calibre of accounting graduates will suffer greatly. Higher education establishments should prioritize rewriting the education curricula [62]. According to Altarawneh [65], the focus of teaching and learning should be all-encompassing rather than only theoretical to produce well-rounded candidates. Gaining soft skills will improve graduates' employability, thus acquiring them should receive more emphasis. Education programs must be improved to support the development of employability skills, which are essential for 4IR employment.

Furthermore, Lawson et al. [66] proposed that the focus of accounting education should be on the integration of competencies into the curriculum and the implementation of these talents while adding value to the businesses to guarantee that accounting graduates are relevant for long-term employment demands. In addition, integrating technology into current curricula and making them forward-looking might be one way to generate graduates who are competent for the 4IR job market [10]. Technology will be used in accounting courses and programs to enable graduates to become comfortable handling and working with technology

including conversant with future technologies. Therefore, the advent of online distance learning has the potential to establish a relevant learning environment and serve as an excellent means of introducing new graduates to technology and technological adaption [67].

4|Conclusion and Recommendation

Candidates who are prepared and well-suited for the 4IR job market are necessary for assimilation and adaptation to the 4IR working environment. For a corporation to grow and develop internationally in a rapidly changing environment, the accounting profession must provide solid assistance. Accountants must evolve with the company to become knowledgeable employees who can provide value and give professional financial information. Academic institutions produce the well-trained people that employers want. It is strongly advised that skill sets be updated to reflect current needs to guarantee the profession's relevance in 4IR.

Future accounting graduates' acceptance into the workforce is facilitated by redefining abilities that align with the 4IR feature. In light of this new era, higher education institutions should prioritize developing the skill profiles of future accountants. However, the development of the abilities necessary for the 4IR job may be impacted by the shift in the teaching and learning methodology. A new vision for higher education institutions to transition to education 4.0 has been generated by the movement towards 4IR. The rise of education 4.0 needs to be led by remote and online learning. Subsequent investigations ought to examine the efficacy of this novel pedagogical approach in augmenting the professional preparedness of accounting graduates while cultivating the essential competencies required for 4IR professions.

Contribution to Knowledge

The main contribution of the research is the discovery that the technology brought by 4IR has a significant impact on the job that accountants will do in the future. This study shows a significant change in the skill sets of aspiring accountants, necessitating that higher education institutions generate highly skilled accounting graduates for the 4IR labour market.

Author's Contribution

OEO: Conceptualization, design, writing.

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Conflict of Interests

The authors declared there are no conflicts of interest for this study.

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