

Chapter 7

Artificial Intelligence in Accounting Business and Education: Theoretical Approach

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In an ever-changing world, the rapid development of technology and the recent boost of various artificial intelligence (AI) tools have impacted various fields, including business and accountancy education. The use, understanding and integration of AI reveal the theoretical issues and practical challenges. Understanding the impact of AI on these areas is critical for developing future business and educational strategies. AI is revolutionising traditional practices, improving data management and financial decision-making accuracy and efficiency. AI is not only transforming business processes; it is also driving change in learning and teaching methodologies. This shift requires a comprehensive theoretical investigation.

The purpose of the research is to explore the theoretical implications of AI in accounting business and education. Research objectives include:

- searching the largest database *Web of Science* (Clarivate Analytics) (*WoS*) for articles with the keywords AI and accounting, and analysing the data using *WoS* tools;

- analysing the keywords of selected articles using the *VOSviewer* tool;
- making a detailed analysis of the first 10 articles in the search list;
- screening the articles with the *RAYYAN* tool and conducting the systematic analysis using the main criteria of the articles.

The research methods include the process of literature analysis, which includes phases of searching for articles, analysis using *WoS*, *VOSviewer*, and *RAYYAN* tools, as well as manual detailed analysis of selected articles and systematic analysis according to the main criteria.

The chapter's content is divided into the following parts: Section 7.1 presents the design of the literature review process. Section 7.2 gives insight into the research and discusses various aspects of AI in accounting. Section 7.3. focuses on presenting the content of the papers selected under systematic analysis, which links the topic of AI in accounting with business and education aspects. The last section concludes the study and indicates directions for future research.

7.1. Design of Literature Review Process

The largest database, *Web of Science* (Clarivate Analytics) (*WoS*), was chosen to search for recent research. The *Web of Science* portfolio of research platforms and workflow tools helps researchers efficiently conduct disruptive research and advance their field, identify which research problems remain unsolved and the best opportunities to contribute, collaborate efficiently with the right peers, and share findings by publishing in the world's leading journals (Clarivate, 2024). In response to the chapter's topic, the search started with the main keywords: artificial intelligence (AI) and accounting (see Figure 7.1).

The search yielded 6,600 papers in a research period covering the last five years. The next step in the research analysis was to examine the categories and set the categories in response to the chapter topic. Figure 7.2 shows the distribution of research in the first 10 *WoS* categories.

The following *WoS* categories were used to capture the essence of the chapter topic: Computer Science Artificial Intelligence, Multidisciplinary, Business Finance, Economics, Business, Management, Education Educational Research, Social Sciences Interdisciplinary. Only articles were selected for further analysis. Complete records of articles were downloaded in RIS format for analysis by the *VOSviewer* tool. *VOSviewer* revealed five clusters with the strongest keywords: artificial intelligence, machine learning, big data, model, and management (Figure 7.3).

Using the *VOSviewer* tool, the map of keyword occurrences was created with 7 as the minimum number of occurrences of a keyword, which resulted in 6 clusters with 119 items out of 5,144. Before the last step of preparation of the map, the list of keywords was revised, and duplicate keywords were removed. The total link strength was 2,182, and the total number of links was 1,361.

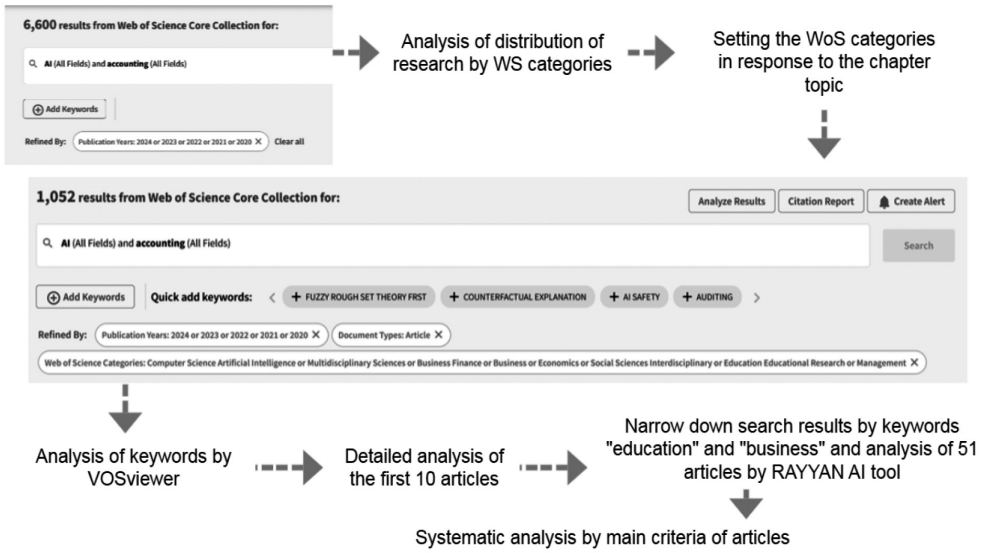


Figure 7.1. Literature analysis process

Source: own presentation.

Field: Web of Science Categories	Record Count	% of 6,600
Computer Science Artificial Intelligence	1,082	16.394%
Engineering Electrical Electronic	699	10.591%
Computer Science Information Systems	544	8.242%
Computer Science Interdisciplinary Applications	444	6.727%
Computer Science Theory Methods	394	5.970%
Environmental Sciences	301	4.561%
Telecommunications	282	4.273%
Robotics	223	3.379%
Materials Science Multidisciplinary	215	3.258%
Multidisciplinary Sciences	207	3.136%

Figure 7.2. The distribution of research by WoS categories

Source: composed by authors using WoS database tools.

The first cluster consisted of 29 items, the second – 21 items, the third – 20 items, the fourth – 19, the fifth – 16, and the sixth – 5. The strongest keywords were artificial intelligence, machine learning, information, management, big data, and system. The distribution of the number of articles during the research period shows increasing relevance of the topic, with 186 articles in 2020, 236 – in 2021, 284 – in 2022, 308 – in 2023, and 38 – in the beginning of 2024, and 210 articles in average.

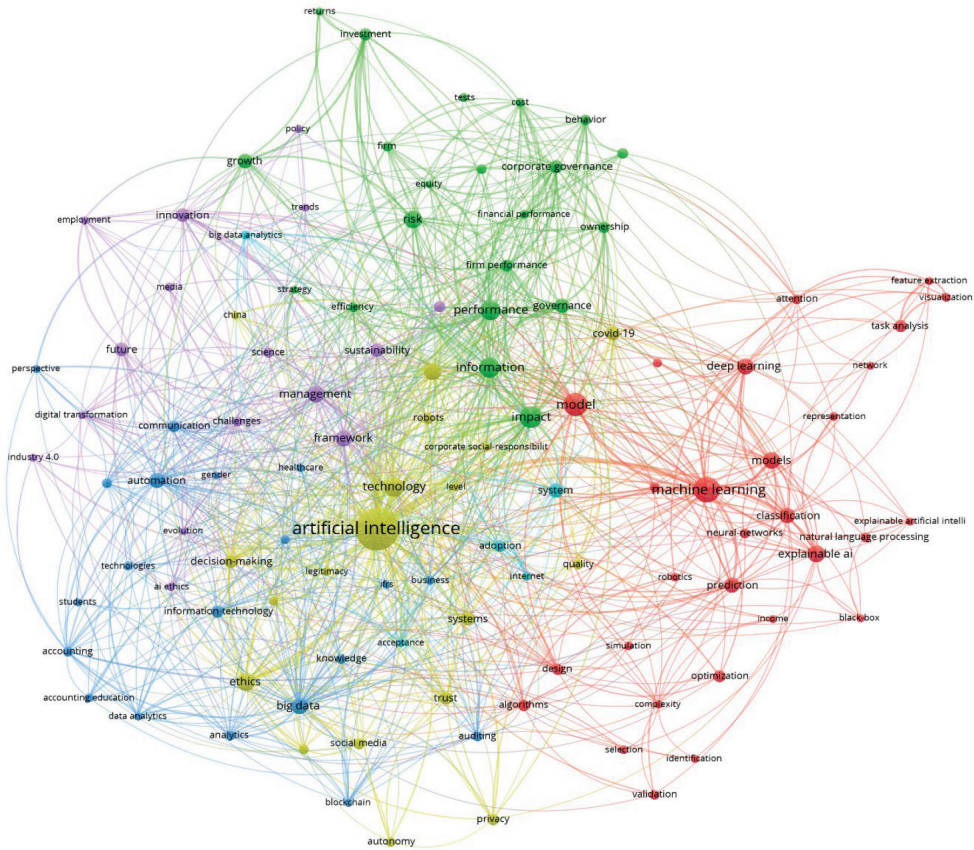


Figure 7.3. Analysis of keywords by the VOSviewer

Source: composed by authors using the VOSviewer tool.

Over the last five years, the amount of research in the field of AI in accounting has increased reasonably, with the highest increase in 2021, which was almost 27% compared to the previous year. In 2022, this number was 20%, and in 2023, it was 8%. No comparison can be made with 2024, as the number of articles represents only the number of articles published in the first two months of that year.

The following section reveals the traditional detailed analysis of articles, the results of the *RAYYAN* analysis, and the systematic analysis of the articles selected based on specific criteria.

7.2. Debate on Various Aspects of Artificial Intelligence in Accounting: Results of the Traditional Detailed Analysis of Literature

The traditional manual detailed analysis of the first ten articles (having both search keywords AI and accounting) out of 1,052 results from the WoS core collection shows that researchers have analysed various aspects of AI in accounting.

By analysing AI in accounting, some authors concentrated on educational issues. Leitner-Hanetseder et al. (2021) summarised their opinion that accounting would be subject to changes in the use of new (smart) technologies and big data, which will require different tasks and the upgrading of the qualifications as well as new forms of collaborations and interactions (in particular human-machine interactions). The authors identified eight core accounting roles in 2030, derived inductively during the Delphi study. In total, five out of the eight roles already exist, and three might be completely new in AI-based accounting. Authors systemised the main traditional roles in accounting and gave insights for their development: 1) transactions recorder – AI-based technology which extracts information from machine-readable digital data formats as a self-learning system, will post it to the correct account; humans will supervise the results and take care of exceptional cases the AI-based technology is not able to solve; 2) data and information manager – free data exchange standards will enable AI-based technology such as automated feature tools to collect and suggest internal/external and unstructured/structured data relevant for the task; humans will decide about the usage and/or supervise the selection of data; 3) data miner – AI-based technology (such as business intelligence tools) will use predictive analytics tools to analyse and recognises anomalies, interrelations, trends and patterns within big data; humans will be able to focus on major incidents; 4) dashboard designer – humans will design interactive dashboards with AI-based tools, which will meet the needs of the user in an iterative way in nearby real time; 5) advisor – AI-based technology will suggest data-driven decision options based on prescriptive analytics, humans will interpret the AI outcome and will understand the overall engagement process and have to weigh up options and will decide or communicate to stakeholders and advise due to their expert knowledge and experience. Leitner-Hanetseder et al. (2021) also revealed three new roles: 1) AI technology expert – humans will train and supervise AI-based technologies, such as a trainee, in a specific task and how to interact with humans to provide human and AI-based technology collaboration; 2) process manager – humans using AI-based will process mining tools identify processes for automation, select the relevant AI technology or component and make

sure that the collaboration of AI-based technology and humans work; 3) legal and ethical supervisor – humans will be responsible for guiding AI-based technology and monitoring whether the data-driven decisions made by humans meet legal and ethical requirements (Leitner-Hanetseder et al., 2021).

Holmes and Douglass (2022) provided insights from accounting professionals on the impact of AI adoption and the associated risks on the accounting profession. They conducted the survey and concluded that participants have an overall positive perception of AI and believe it will enhance their job performance by reducing repetitive tasks and the risk of human error. In addition, results show that the growth of AI technology will change the focus of accounting curriculums to include specialised computer skills. Besides, the authors concluded that skills in data management, data cleansing, and correcting inaccurate or incomplete data are valued more by industry and public accountants than accounting educators. They suggest that accounting programs should equip students to be life-long learners in accounting so they can grow with the changes in the profession. The authors have given an interesting opinion on relatively rapid changes in the main accounting functions, predicting the changes for the year 2030, although, from the perspective of the year 2024, we think that even if AI technology is used more and more, the changes will not come so fast as they require significant recourses. However, we should agree on the need for imperative changes in accounting programmes to help students prepare for the future reshaped by AI.

Interesting research on learning tasks in accounting textbooks was conducted by Stütz et al. (2022). The authors analysed 3,361 tasks from 14 accounting textbooks in terms of different characteristics with the help of AI. Their results indicated that in terms of process orientation, the tasks yielded above-average results compared to the other categories. The authors provide the opinion that the focus on business processes is seen as vital when it comes to the education of future accountants. By analysing the provision of real-world information in the tasks, the authors concluded that tasks lack a detailed and realistic description of occurring social processes, value processes, and cash flows. This lack can subsequently lead to learning difficulties and limit learners' ability to perform in the real work environment, as they cannot link the real world and the accounting world as part of their training. Although the descriptions of goods, cash flows, and social processes are both positively related to one another and to other categories (e.g., the identification of problems, translation, and operation within the accounting system), this could lead to an insufficient illustration of the connection between real business processes and their impact on corporate goals. Considering that accountants work with (digital) documents on a daily basis, textbook tasks do not foster the important skill of correctly handling them, with only 3% of the tasks containing realistic documents. The authors stated that the vast majority of the tasks do not contain a problem or clearly outline the problem, including potential solution paths, leading to the assumption that many tasks focus on the reproduction or application of knowledge, which indicates a knowledge/skill

gap in training, although identifying, analysing, and solving unstructured accounting problems are vital skills demanded by potential employers (Stütz et al., 2022). Besides, the authors outlined the ability to gather and assess information as a vital skill when educating future accountants. However, findings indicated that tasks do not (or in only a limited fashion) promote skills regarding the evaluation of information, as no task required assessing the relevance of included information, and most tasks did not require searching for additional information.

Regarding modelling competencies, research results indicated that accounting tasks split the complete modelling cycle into separate steps and mainly focus on applying formal accounting rules. In contrast, translating an economic phenomenon into accounting and interpreting and validating the solution is required less frequently. The authors provided an opinion that this focus on individual steps and separation of tasks does not allow learners to go through the complete modelling cycle. Thus, tasks in accounting textbooks focus on skills that allow accountants to acquire routine in dealing with accounting rules and concepts. Choosing the right concept for a business situation and validating the usefulness of the chosen concepts seem to be less important. The focus on operations within the accounting system is problematic and out-of-date, as many calculations and postings are performed automatically by modern accounting systems and, therefore, do not need the assistance of human accountants. Detecting mistakes and outliers and improving business processes means learners need to know if and how business situations affect variables such as a company's profitability or liquidity, so students need to interpret data and business situations rather than document them (Stütz et al., 2022). We can only agree with the opinion of Stütz et al. (2022) that the involvement of AI in the automation of routine accounting processes significantly changes accounting practice, which should also be reflected in educational programmes.

Some researchers analysed the application of AI in different accounting fields and issues related to its practical implementation. Norzelan et al. (2024) investigated the technological acceptance of AI by surveying 71 heads or representatives of the Shared Service Industry in finance and accounting units in Malaysia. Based on the results obtained from the study, the authors concluded that effort expectancy, social influence and facilitating conditions were not the crucial factors in predicting the technology acceptance of AI. Therefore, the authors suggested that the organisation should focus on the three factors: performance expectancy, attitude, and skill and technical capability to ensure future technology like AI can be embedded smoothly within the organisation. They thought AI could reduce routine tasks, streamline processes, and increase cost savings and efficiency by increasing the organisation's Return on Investment (ROI). Besides, individuals should also overcome their anxiety or fear toward AI and positively view AI's capabilities as AI technology has the potential to change society and significantly impact the quality of life by automating repetitive and time-consuming tasks. AI frees employees to focus on higher-value activities that can lead to job satisfaction, reduced stress and improved work-life balance (Norzelan et al., 2024).

Zhao and Wang (2024) explored the potential applications of ChatGPT in accounting and evaluated the benefits and challenges associated with its integration. The authors delved into various domains within accounting, including automation of routine tasks, financial and managerial analysis, auditing, taxation, and client interactions by examining real-world examples and synthesising existing research. They concluded that ChatGPT has the potential to lead to effective and streamlined accounting tasks and revolutionise accounting processes by bringing significant benefits to accountants. According to the opinion of Zhao and Wang (2024), ChatGPT can support auditors in fraud detection and flag potential anomalies to enhance the effectiveness of audit processes. ChatGPT can also aid in tax procedures to help interpret complex tax regulations and assist in accurate tax reporting. As a virtual assistant, ChatGPT can provide accounting guidance and explain accounting concepts to clients. The authors also emphasise that it is vital to acknowledge the challenges and risks associated with ChatGPT, including concerns about data quality and biases, user privacy and security, ethical considerations, and integration complexities.

Another team of researchers investigated the real ethical impact of AI on managerial accounting during both pre- and post-adoption stages by focusing on four types of stakeholders: developers, managers in charge of AI adoption, managerial accountants and regulators, and investigated ethical impacts on each group (Zhang et al., 2023). The authors conducted 47 interviews with companies adopting or using AI, an AI system developer, and regulatory agencies and discovered 15 stakeholders' ethical concerns at the pre- and post-adoption stages. They concluded that at the pre-adoption stage, the major ethical risks include data security, privacy, misuse, accountability of beneficiaries and AI vendors' competence. Since some of the impacts of AI on managerial accounting and decision-making can be observed immediately and others may be seen only after years of use, they further identified challenges at the post-adoption stage from two perspectives: 1) ethical issues in the use of AI and 2) long-term impacts of AI on employees and organisations. The first perspective focused on how ethical risks may influence managerial accountants' behaviours, such as gaps between user expectations of AI and actual use, transparency and trust of AI, bias, result distortion, and user competence. Zhang et al. (2023) stressed that these ethical risks may start from the trial operations of AI and continue throughout its use. As managerial accountants receive more training and user experience, ethical concerns may be reduced, such as expectation gaps and user competency. However, other concerns, such as bias, result distortion, and AI transparency and trust, may continue to exist. Long-term impacts of AI on employees and organisations also include AI accessibility, accountability of stakeholders when using AI, isolation, benefits and challenges, learning curve, and power over the user (Zhang et al., 2023).

Rawashdeh (2023) conducted a cross-sectional survey of accounting professionals to provide an in-depth understanding of how AI's integration in accounting contributes to job displacement, reshapes decision-making processes and reverberates across economic and social dimensions. The author revealed the

multifaceted consequences that arise from AI's integration into the accounting field, such as a cascade of impacts on decision-making, economic frameworks, workflow methodologies and societal dynamics. Rawashdeh (2023) argued that the assimilation of AI within accounting practices precipitates job displacement and shifts in work methodologies. AI's prowess, enabling the automation of erstwhile human-centric tasks – spanning repetitive chores, intricate data analysis and pivotal decision-making – paves the way for such displacements. From the perspective of employers, the economic calculus may tilt towards AI adoption to pare down expenses, elevate productivity and amplify profitability. Besides, research results showed a positive association between AI incorporation in accounting and social dislocation stemming from job displacement (Rawashdeh, 2023).

Le Guyader (2020) analysed how the “FAS133-AI” experience has become a model for how accounting can use AI solutions, and regulators may demand them. The author concluded that the training regime for new AI functionality and the new AI itself creates the unintended risk that the staff will be trained in AI but not in the concepts, rules, and details of the underlying accounting standards. Where a standard such as FAS133 brings capital markets notions into the accounting solution, and only a subset of accountants gain the requisite finance training, the AI solution decreases the need to acquire that extended expertise. Le Guyader (2020) gives insights into the challenges to the profession from the emergence of AI, including the need for accountants to become experts in AI and related technology as users. The author emphasises the importance of the capacity and willingness of accounting professionals to educate their members on the underlying accounting rules the AI solution is meant to address (Le Guyader, 2020).

Other scholars analysed AI adoption in different sectors and countries. Monteiro et al. (2023) identified the intensity of AI adoption in the manufacturing industry and internal control system quality as critical factors for the accounting information system quality. Based on a sample of Portuguese companies' managers, the authors found that the intensity of AI adoption has a strong connection with the manufacturing industry besides, manufacturing companies, because they gather large amounts of data and complex production data, adopt AI to transform complex data into actionable and insightful information. Researchers concluded that the intensity of AI adoption contributes positively to the internal control system quality and that AI improves the quality of accounting information systems and internal control systems (Monteiro et al., 2023). The authors suggested that AI adoption should be part of the company's strategy, as it reduces accounting errors committed by humans and improves the effectiveness and quality of accounting information systems and, consequently, the internal control system. Researchers also found that internal control system quality favours the relationship between the intensity of AI adoption and accounting information system quality (Monteiro et al., 2023).

Lee and Tajudeen (2020) investigated the use and impact of AI-based accounting software among organisations in Malaysia by performing face-to-face interviews

with representatives from nine organisations using AI-based accounting software. The authors provided results on various adoptions of AI-based accounting software across organisations, such as tools to deposit document images, capture invoice information automatically, monitor invoice approvals, manage risks, and track users' activities. Researchers suggested that AI-based accounting software has accelerated productivity, improved efficiency, enhanced customer service, supported flexible working styles, increased process governance, and saved manpower (Lee and Tajudeen, 2020). The analysis of the adoption and application of AI in practice also reveals the tendencies of the huge impact of AI on different areas of accounting and the need to be prepared for the changes.

In summary, some researchers examined how AI changes the accounting profession, roles, tasks and responsibilities, and its role in displacing jobs. Other researchers have focused on assessing how AI is accepted by finance leaders, accounting professionals and industries, how the technology affects efficiency, decision-making and ethical considerations in accounting practice, and its impact on internal controls and information quality. The authors show how AI changes the landscape of accounting education, requiring new skills, learning approaches, and educational requirements. Researchers also consider the interaction of AI with established accounting standards, such as GAAP's FAS133, and highlight the evolving nature of financial reporting and compliance in the age of AI.

Analysis of the first 10 articles revealed the importance of AI implementation in practice, its benefits, factors, ethical issues, and impact on shaping the future of accounting.

7.3. Artificial Intelligence in Accounting Business and Education: Results of Systematic Literature Review

The process of literature analysis was continued by narrowing the search using the keywords: "education" and "business" and the function of the *WoS* database "search within results". The search yielded 51 articles analysed using the *RAYYAN* literature analysis tool. The results of the screening are shown in Figure 7.4.

Under the *RAYYAN* tool, all 51 articles were screened. One source was removed as a book with no access, as were 4 other articles. 24 sources were excluded, with reasons given in Figure 7.4. 22 articles were assessed manually. Table 7.1 shows the results of the systematic analysis of the articles according to the main criteria.

Figure 7.5 shows the main emphasis and research objects of the 22 analysed articles.

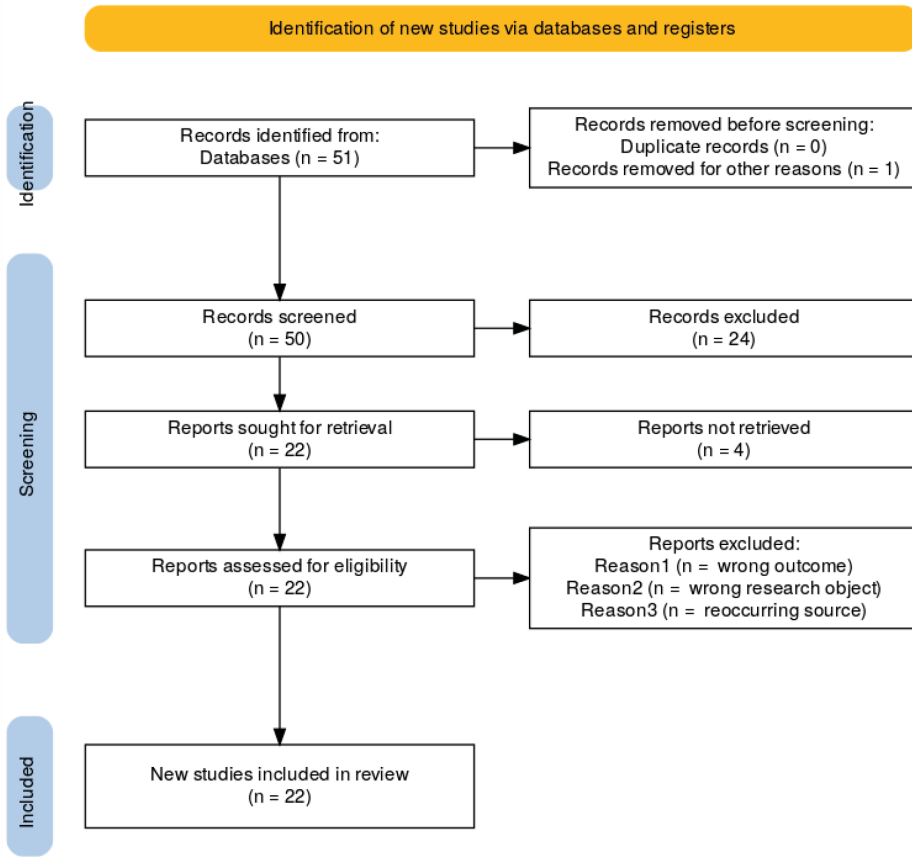


Figure 7.4. Literature analysis results by the PRISMA

Source: composed by authors using the RAYYAN tool.

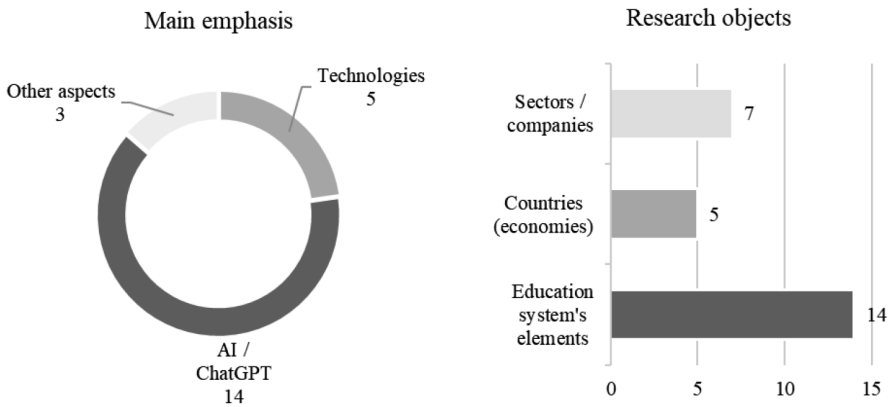


Figure 7.5. The main emphasis and research objects of the analysed literature

Source: own presentation.

Table 7.1. Results of the systematic literature analysis (n = 22)

1) Onyshchenko et al. (2022), INDUSTRY 4.0 AND ACCOUNTING: DIRECTIONS, CHALLENGES, OPPORTUNITIES	
Main results	Authors suggest that technology will not supplant accountants, but on the contrary, will help to enrich their knowledge, skills and abilities; will set aside time for accountants to analyse and manage the company’s activities; make it easier for accountants to perform routine actions and operations. The evolution of digital transformation in the accounting information system will accelerate the accountant’s work for more accurate, efficient and real-time reporting.
Research methods and data	A qualitative research design, the method of indirect observation, causal analysis and predictive synthesis, induction and description, critical analysis and comparison of analytical reports, surveys, research proposals for literature review and desk research of current business press reports, professional reports, Industry 4.0 technology company webpages, and modern accounting technologies, 64 economies (countries).
2) Ng (2023), TEACHING ADVANCED DATA ANALYTICS, ROBOTIC PROCESS AUTOMATION, AND ARTIFICIAL INTELLIGENCE IN A GRADUATE ACCOUNTING PROGRAM	
Main results	The results suggest strong evidence of student learning related to the course learning objectives that give insights for preparing students and academic accounting departments to develop strategies to integrate data analytics and emerging technologies into the curriculum.
Research methods and data	A statistical analysis of precourse/ postcourse student reflections and feedback surveys to evaluate a quality assurance initiative.
3) Damerji and Salimi (2021), MEDIATING EFFECT OF USE PERCEPTIONS ON TECHNOLOGY READINESS AND ADOPTION OF ARTIFICIAL INTELLIGENCE IN ACCOUNTING	
Main results	The findings from the study indicate that technology readiness has a significant influence on technology adoption. However, mediation analysis using hierarchical regression showed that the relationship between technology readiness and technology adoption of AI is affected by both perceived ease of use (PEOU) and perceived usefulness (PU).
Research methods and data	An online questionnaire, hierarchical regression, HEIs students.
4) Qasim et al. (2022), EMBRACING EMERGING TECHNOLOGIES AND ARTIFICIAL INTELLIGENCE INTO THE UNDERGRADUATE ACCOUNTING CURRICULUM: REFLECTIONS FROM THE UAE	
Main results	The study explores the extent to which the current accounting curriculum in the UAE reflects the current digital transformation in the country.
Research methods and data	Analysis of government initiatives toward AI transformation, adoption of AI, Blockchain Technology (BT), and Data Analytics (DA) in corporations and government agencies in the UAE and existing accounting curricula.
5) Онешко et al. (2023), ACCOUNTING AND FINANCIAL REPORTING IN THE IT SPHERE OF UKRAINE: OPPORTUNITIES OF ARTIFICIAL INTELLIGENCE	
Main results	The research has accurately scrutinised AI efficacy in elevating the precision of financial reporting, even in the face of disruptive crises. The empirical findings of this study have yielded illuminating revelations, underscoring the unequivocal positive influence of AI on the accuracy of financial reporting and its integral role in crisis mitigation.

Table 7.1, cont.

Research methods and data	The intricate application of AI within the context of Ukraine's IT sector, with a specific focus on accounting and financial reporting, integrates Bayesian analysis and repeated measures of ANOVAs; the dataset consists of 113 participants.
6) Liao et al. (2024), HYPERBOLE OR REALITY? THE EFFECT OF AUDITORS' AI EDUCATION ON AUDIT REPORT TIMELINESS	
Main results	Results show that auditors with AI education can shorten annual audit report times by using programming, applied technology, and logical-thinking skills, thereby enhancing audit report timeliness. Auditors' AI educational background and CPA experience are complementary in mitigating audit report lag, particularly in companies with higher client portfolio risk.
Research methods and data	Descriptive statistics, correlation analysis, an individual-level auditor setting to investigate the role of AI education in audit report timeliness, and manually collected data on auditors with AI educational backgrounds comprising 8201 company-year observations of A-share listed companies in China between 2014 and 2020.
7) Ahmed et al. (2022), MOTIVATORS AND BARRIERS OF ARTIFICIAL INTELLIGENT (AI) BASED TEACHING	
Main results	The findings demonstrate that schools must equip teachers with the resources, support, and recognition they need to adopt AI-based pedagogies. Furthermore, higher education institutions (HEIs) must offer their academic members adequate resources, including money and technological equipment. According to studies, self-motivation is the least influential factor in university instructors' adoption of AI. Teachers and administrators who are overworked are less likely to be willing to experiment with new technologies. They place greater importance on public recognition and educational benefits than personal development. Teachers may be incentivised to utilise innovative and novel teaching methods through financing programs or other incentives.
Research methods and data	The study is based on a questionnaire; pair-wise comparisons using a statistically significant sample of 218 Malaysian university professors.
8) Alshurafat et al. (2023), FACTORS AFFECTING ACCOUNTING STUDENTS' MISUSE OF CHATGPT: AN APPLICATION OF THE FRAUD TRIANGLE THEORY	
Main results	The results show that all fraud triangle factors are significant determinants of student academic dishonesty and student misuse of ChatGPT. Based on the findings of this research, students indicate that ChatGPT presents an accessibility to cheat, as it caters to the three components of the fraud triangle: opportunity, rationalisation and pressure. Therefore, educational institutions should adopt and enforce strict policies and guidelines on academic integrity, while educators should incorporate innovative and effective teaching strategies to promote a deeper understanding of the material.
Research methods and data	Data on how accounting students used ChatGPT to cheat was acquired from 238 accounting students in Jordanian public universities over two months through previously tested and validated questionnaires. The main tool for gathering data was a questionnaire distributed online using Microsoft Forms; statistical analysis.
9) Li and Zhao (2022), RESEARCH ON THE INFLUENCE OF ARTIFICIAL INTELLIGENCE TECHNOLOGY WITH WEB 3.0 ON ACCOUNTING EDUCATION AND ITS COUNTERMEASURES	
Main results	Results show that accountants must establish the concept of lifelong learning, constantly improve their learning ability, and constantly update their knowledge structure to meet the requirements of accounting practice reform. On the one hand, the

	education sector should guide students in establishing the concept of lifelong learning, not only because the economic business and accounting standards are constantly changing but also because the development of AI technology requires students to have the quality of lifelong learning. Accounting education should improve students' ability to innovate and self-learn and enable them to develop lifelong learning methods and abilities.
Research methods and data	The study investigates the accounting industry as an example, discusses the application of AI in accounting practice, analyses its impact on the reform of accounting education, and finally proposes countermeasures and suggestions for accounting education to deal with technological challenges with blended learning for increasing student retention and engagement in an E-learning environment.
10) Selamat and Ngalim (2022), PUTRA SALAMANIS BOARD GAME: THE GAME OF BOOKKEEPING FOR FUNDAMENTAL FINANCIAL ACCOUNTING LEARNING	
Main results	The paper introduces the Putra Salamanis game developed by the authors, inspired by the well-known board game Monopoly, as a suitable board game for teaching financial accounting fundamentals. In this game, business transactions are recorded based on the double-entry rule. This requires students to recognise the five accounting elements of assets, liabilities, equities, revenue, and expenses, which are vital in accrual basis accounting.
Research methods and data	A pilot group of students who engaged in the game provided positive feedback, implying that the game facilitated students' learning and understanding of the basic concept of double-entry bookkeeping and accrual accounting.
11) Hadi and Abdel-Razzaq (2024), PROMOTING SUSTAINABLE LEARNING AMONG ACCOUNTING STUDENTS: EVIDENCE FROM FIELD EXPERIMENTAL DESIGN	
Main results	Significant results were found throughout the different academic classifications (seniority): freshman students, junior students and senior students. Further, differences in the mean scores for freshman and junior accounting students were different between the male and female students, indicating that both male and female senior students' attitudes toward sustainability in accounting education were higher than those of male and female freshman and junior accounting students. The study concluded that students achieve an adequate understanding of sustainability in accounting education related to the relativism category of the Perry model of intellectual development.
Research methods and data	The study used a quantitative research design where data were collected at a single point in time. Further, an independent sample t-test, one-way ANOVA and factorial design were performed on 132 responses conveniently collected from accounting students in the College of Business Administration (COBA) at Prince Mohammad Bin Fahd University (PMU) in Al Khobar, Saudi Arabia.
12) Hu et al. (2021), CONSTRUCTION OF AN AI-DRIVEN RISK MANAGEMENT FRAMEWORK FOR FINANCIAL SERVICE FIRMS USING THE MRDM APPROACH	
Main results	The results indicate that the improvement priority, which runs in the order of (a) AI algorithm model, (c) AI regulatory and compliance, (d) AI conduct, and (b) AI technology based on the magnitude of the impact, can effectively improve the performance of AI-driven risk management for financial service firms.
Research methods and data	This study proposes a fusion multiple rule-based decision-making (MRDM) approach that integrates a rule-based technique into MCDM techniques to help decision-makers choose the optimal model for achieving aspiration-level effects in a risk control strategy.

Table 7.1, cont.

13) De Villiers (2021), SEVEN PRINCIPLES TO ENSURE FUTURE-READY ACCOUNTING GRADUATES – A MODEL FOR FUTURE RESEARCH AND PRACTICE	
Main results	The study derived the seven Cs model, which includes critical, conceptual thinking and the spirit of enquiry; complicate, grapple and fail; create, innovate and experience; concise communication; collaboration; consciousness, respectfulness and ethical fibre; and curiosity, lifelong learning and specialised generalists. Accounting graduates must be inquisitive, agile, self-directed, lifelong learners who can think for themselves and steer their careers.
Research methods and data	The seven principles are derived from an extensive literature review and qualitative data analysis from focus groups, thought leader discussions, and semi-structured interviews with thought leaders and workshops.
14) Prokofieva (2023), INTEGRATING DATA ANALYTICS IN TEACHING AUDIT WITH MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE	
Main results	The study reveals the conceptual framework of audit analytics and guides on implementing it in teaching audit. The focus of the provided implementation is on domain-specific knowledge and skills in auditing. Data analytics supplements and automates auditing tasks and positively affects the acquisition and retention of auditing-related knowledge and skills. The suggested implementation guidance provides a roadmap for integrating data analytic competencies into the accounting curriculum to enhance students' learning and improve employability and graduate outcomes in the rapidly changing business environment.
Research methods and data	The study conducted the process model methodology by developing a procedural meso-level model that focuses on guiding end-to-end flows of tasks in audits applicable to real-world audit engagements. The process modelling results were evaluated in the focus group with accounting academics and audit professionals. The hybrid approach of curriculum development and implementation was evaluated in a series of workshops and a survey with participants (students).
15) Domini et al. (2022), FOR WHOM THE BELL TOLLS: THE FIRM-LEVEL EFFECTS OF AUTOMATION ON WAGE AND GENDER INEQUALITY	
Main results	The results show that within-firm wage inequality is a pervasive phenomenon in the French economy; most wage dispersion in France is accounted for by differences among workers belonging to the same firm rather than by differences between sectors, firms, or occupations; the increase in wages brought about by the adoption of automation and AI is enjoyed by all workers in the adopting firm, irrespective of their initial wage or gender; spike events related to the adoption of automation- and AI-related capital goods are not followed by an increase in within-firm wage inequality or gender wage inequality. Instead, wages increase by 1% three years after the events at different percentiles of the distribution.
Research methods and data	An event-study approach on a sample of firms importing automation- and AI-related goods was used for the research. The dataset contains data from all French firms with employees over the 2002-2017 period, obtained by merging different administrative sources, using the unique identification number of French firms, a dataset by the French customs office, and a confidential database provided by the French national statistical office.

16) Strzelecki and ElArabawy (2024), INVESTIGATION OF THE MODERATION EFFECT OF GENDER AND STUDY LEVEL ON THE ACCEPTANCE AND USE OF GENERATIVE AI BY HIGHER EDUCATION STUDENTS: COMPARATIVE EVIDENCE FROM POLAND AND EGYPT	
Main results	The findings show that performance expectancy, effort expectancy, and social influence significantly influence behavioural intention. Furthermore, when considered alongside facilitating conditions, behavioural intention influences actual user behaviour. The results augment comprehension of technology acceptance in the context of AI tools and provide valuable input for formulating strategies that promote the effective incorporation of ChatGPT in higher education. The study underscores the need for effective awareness initiatives, bespoke training programmes, and intuitive tool designs to bolster students' perceptions and foster the broader adoption of AI tools in education. The integration of ChatGPT in HEIs holds the potential to deliver personalised and relevant learning experiences to students, streamline administrative procedures and advance research and community engagement. However, it is essential to employ ChatGPT ethically, considering the need to develop individual and institutional capabilities.
Research methods and data	The study relies on data collected from six universities in two countries and is assessed through descriptive statistics and structural equation modelling techniques. It also takes into account participants' gender and study level. In the pilot study, 36 students were surveyed and requested to provide feedback on the comprehensibility of the scales. After the pilot study, the survey was administered to students at the universities located in Katowice, Poland, and Cairo, Egypt. The survey remained accessible for one month.
17) Tiron-Tudor and Deliu (2021), REFLECTIONS ON THE HUMAN-ALGORITHM COMPLEX DUALITY PERSPECTIVES IN THE AUDITING PROCESS	
Main results	The results debate the complex duality between algorithms and human-based actions in the institutional settings of auditing activities by highlighting the actual stage of algorithms, machines, and AI emergence in audits and providing real-life examples of their use in the audit. Furthermore, they emphasise the strengths and weaknesses of algorithms compared to human beings. Based on the results, a discussion on the human-algorithms interaction from the lens of the Human-in-the-Loop (HITL) approach concludes that the Auditor-Governing-the-Loop may be a possible scenario for the future of the auditing profession.
Research methods and data	The research uses a qualitative reflexive thematic analysis, considering the academic literature, professional reports, and websites of the "Big Four" audit firms and internationally recognised accounting bodies. The authors conducted a reflexive thematic analysis of scientific literature and professional technical reports issued by large audit firms, international standards setters and organisations.
18) Dabbous and Boustani (2023), DIGITAL EXPLOSION AND ENTREPRENEURSHIP EDUCATION: IMPACT ON PROMOTING ENTREPRENEURIAL INTENTION FOR BUSINESS STUDENTS	
Main results	This study proposes a model to investigate entrepreneurial intentions among business students in higher education in Lebanon. The model includes five factors that affect entrepreneurship intentions: entrepreneurial education, performance expectancy of AI solutions, risk aversion, social support, and business climate. Furthermore, it assesses the role of perceived behavioural control as a mediator. The estimation results highlight that the performance expectancy of AI and entrepreneurship education can influence the intention to become an entrepreneur by enhancing the perception of the capacity to create and operate a new venture. The findings highlight the need to account for entrepreneurship education and AI development when analysing entrepreneurial intentions.

Table 7.1, cont.

Research methods and data	350 questionnaires were sent by e-mail to a dataset of students who acquired a business education at a well-known university in Lebanon. 223 surveys were included in the sample after removing unengaged respondents and questionnaires with missing values.
19) Leander and Burriss (2020), CRITICAL LITERACY FOR A POSTHUMAN WORLD: WHEN PEOPLE READ, AND BECOME, WITH MACHINES	
Main results	The uses of AI and developing a critical literacy engaged with AI offers newly complicated opportunities to reconsider the relations of literacy (and media); to identify this transformation, humanist perspectives on texts, images and identities need to enter into a new circulation with posthumanist perspectives in order to remain relevant for current techno-social relations. Authors imagine a posthuman critical literacy that moves humanity beyond critique and toward transformation – toward a more socially just and ethical world.
Research methods and data	Literature analysis, interviews with professionals who use forms of AI extensively in their work.
20) Hu et al. (2023), GOVERNANCE OF ARTIFICIAL INTELLIGENCE APPLICATIONS IN A BUSINESS AUDIT VIA A FUSION FUZZY MULTIPLE RULE-BASED DECISION-MAKING MODEL	
Main results	Research results show that the priority dimensions for improvement are AI application strategy, AI governance, data infrastructure, data quality, and human factors. This research proposes a systematic and reliable improvement project for accounting and auditing professions when they adopt AI in their internal audit process. Motivated by a model ensemble, a comprehensive decision framework established herein integrates FCM, DRSA, FDEMATEL, INRM, FDANP, and modified VIKOR.
Research methods and data	This study employs a questionnaire, which was developed in three major steps. In the first step, the authors followed the guidance on the AI internal audit framework (IIA 2017a, b, c, d) and extended this framework by reviewing related literature. From detailed evaluation, discussion, and literature reviews, they summarised the collected data, represented them in a hierarchical structure, and set up four dimensions and 23 criteria. The authors invited ten chief audit executives or heads of internal audit departments and 8 senior engineers of enterprises with imported AI technology from Guangzhou and Shenzhen to complete the preliminary questionnaire to assess AI in China's internal auditing industry.
21) Ullal et al. (2020), THE EFFECT OF ARTIFICIAL INTELLIGENCE ON THE SALES GRAPH IN INDIAN MARKET	
Main results	The results show that disclosure of the identity of AI reduces purchase chances drastically; purchase rates dip and calls are disconnected when the identity of AI is revealed as Indians perceive AI as less capable and have less knowledge, which cannot understand human feelings and requirements. The research outcomes reveal that the effectiveness of AI is the same as that of experienced salesmen and 2.7 times better than inexperienced salesmen closing sales calls. The sales graph experienced a dip of over 86.23% when it was revealed to the customer that the interface was with the machine, not humans, reducing the call's duration substantially. The results show that Indians do not believe in AI and still prefer human interface as they do not trust machines over human emotions. The effectiveness of AI has drastically reduced despite its superiority over humans in various aspects. The authors identify the strategies to overcome the trust deficit among Indian customers. The outcomes show how AI can be used and how marketing could be done using AI in conservative markets such as India.

Research methods and data	The experiment was conducted by one of the leading Chennai-based data collection and experimentation agencies, ranked number 1 in India with over 7 million customers. All the customers were online buyers who used e-commerce portals frequently and were active social media users. 4,500 responses were collected after filtering out all the unanswered or connected calls. The company has software to make calls and provide services that allow customers to have conversations in natural settings. The machines here, backed by AI, are well-trained to perform the routine tasks of experienced salespeople.
22) Papakonstantinidis et al. (2024), EMBRACE OR RESIST? DRIVERS OF ARTIFICIAL INTELLIGENCE WRITING SOFTWARE ADOPTION IN ACADEMIC AND NON-ACADEMIC CONTEXTS	
Main results	Findings yield insights into non-academic writers' readiness and implications of AI writing software (AIWS) adoption. Business non-academic professionals view AIWS as a tool for efficiency and content quality, while writers in academic contexts express concerns about biases, manipulation, and job displacement. These findings highlight the complex interplay between cognitive factors, behavioural outcomes, and age in accepting and utilising AI writing software. The stronger direct effect observed among academics suggests that cognitive factors primarily drive their acceptance of AI writing tools. On the other hand, professionals' acceptance is influenced by affective factors mediated by cognitive factors. Additionally, the moderation effect of age further emphasises the need to consider age-related differences in adopting AI writing software, particularly among professionals.
Research methods and data	The study adopted a quantitative methodological approach. A comprehensive survey comprised 22 questions pertaining to focal constructs from the NCGAS scale and respondent characteristics. The three scale dimensions typically included in a TAM questionnaire were used in the construction of this survey: cognitive (COG), affective (AFF), and behavioural (BEH). In a questionnaire, the cognitive dimension focuses on individuals' beliefs and perceptions regarding the technology being studied. A survey of 219 participants included academia and business respondents.

Source: composed by references provided in the table.

7.4. Conclusions

The analysis of the articles shows the main trend of the importance of AI or other technological advances, their impact on business practice, and, most importantly, the need to adapt educational curricula to changing conditions. The study's results and the business implications highlight the critical role of AI in revolutionising accounting and business operations. The integration of AI enables improved decision-making, predictive analytics and operational efficiency. This paradigm shift means that businesses and accounting professionals must adapt to embrace AI-driven methodologies to remain competitive and efficient. Regarding educational implications, the findings highlight the urgent need to revamp educational curricula. Integrating AI and other technological advances into the preparation of the profession requires an education system that is responsive and adaptable to these changes. This means not only incorporating AI knowledge and skills into curricula, perhaps even

changing the assessment strategy but also preparing students for an ever-changing economic and technological environment.

Future research should aim to assess the effectiveness of revised curricula incorporating AI and technology-focused subjects and assessment strategies. Subsequent studies could evaluate the impact on student preparedness for the modern workplace and their ability to innovate within AI-driven business and accounting environments. Studies that observe how AI implementation affects business performance, accounting accuracy, and decision-making processes over time can present the challenges and benefits of AI implementation. Additionally, it is crucial to evaluate the ethical considerations and societal implications of deploying AI in business and the education field of accounting.

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