THE IMPACT OF USING ARTIFICIAL INTELLIGENCE AND ERP SYSTEMS IN THE WORK OF ACCOUNTING PROFESSIONALS AND AUDITORS

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Abstract: *Recent developments in IT have changed the way accounting professionals and auditors do business. The research conducted in this article aims to explore how artificial intelligence and ERP systems offer opportunities to increase efficiency, accuracy and improve decision making in companies operating in the accounting and auditing industry. One of the results obtained from the bibliometric analysis indicates that artificial intelligence enables the automation of repetitive tasks, allowing the analysis of a large set of data to support strategic decision making. In addition, the integration of ERP systems streamlines financial processes, improves data management and ensures compliance with regulatory requirements.*
The digitalization of the accounting profession has transformed traditional practices and revolutionized the way accounting professionals operate in today's digital age. By embracing digital tools and platforms, accounting professionals can enhance efficiency, accuracy, and collaboration, ultimately improving the quality of financial reporting and analysis. The role of these technologies (artificial intelligence and ERP systems) is to streamline workflows, increase productivity and adapt to evolving industry requirements.
The research in this article was based on a bibliometric analysis that aimed to observe research trends in this field, through which to observe or identify uncovered areas and future research directions in this field.
Following a comprehensive analysis of the benefits and challenges associated with the adoption of artificial intelligence and ERP systems in accounting and auditing practices, this study aims to provide valuable insights to these professionals as a result of the upward trend of the digitalization phenomenon. As a result of the digitisation of business, the article provides valuable information needed by accounting professionals and auditors to help them remain competitive in a rapidly changing landscape.

Keywords: *artificial intelligence, ERP systems, accounting profession, sustainability.*

JEL Classification: *B26, M40, M41, M42*

1. Introduction

IT systems are used at every step, so that any activity depends a lot on the use of new technologies to make them more efficient, bringing added value to any activity. If we analyze the way in which accounting activities were carried out in the past, the fact that most activities were done manually, we can observe an evolution of all activities as a result of the digitization of processes, the fact that repetitive activities have been replaced facilitating the improvement of the flow of information between the employees of an organization .
The adoption of applications based on artificial intelligence (AI) as expert systems both in the field of accounting and auditing aimed to reduce errors and increase the efficiency of

accounting and financial processes (Berdiyeva et al., 2021). The main role of artificial intelligence is to find fraudulent operations by identifying unusual operations, providing essential functions for data processing and transparency, to ensure the most accurate and complete reporting.
The role of new AI technologies and ERP systems is to ensure the increase of an organization's performance, minimize errors and increase the productivity of employees and the organization.
Most of the time, ERP systems are used by organizations with the aim of centralizing processed data much more easily, providing support for the decision-making process and for managerial accounting (Khamis et al., 2023).
Even if the automation and digitization of certain tasks and processes bring benefits to organizations, the main disadvantages would be the increase in the unemployment rate in these fields as a result of the fact that most tasks become automated.
However, the main objective of the work is to analyze the impact of the use of artificial intelligence and ERP systems in the accounting and auditing profession, trying to identify the main relevant aspects based on bibliometric analysis.
The article is presented further with a vast specialized literature where the main concepts were defined, then it continues with the presentation of the research method and the analysis of the results obtained, and finally the article ends with the main conclusions regarding the case study addressed in the article.

2. Literature review

The future of the accounting and auditing profession depends a lot on the evolution of new technologies, which help or provide support for analytical and cognitive structures and processes. In Industry 4.0, accounting companies must remain competitive and constructive in order to survive the evolution of the digitalization phenomenon.
According to Berdiyeva et al. (2021, p. 58), *"expert systems are artificial intelligence programs introduced during the 1980s that achieve a degree of competence that can replace human expertise in a given decision-making area"*. AI can be considered an important tool that can provide numerous opportunities for accounting and auditing professionals, improving their effectiveness and productivity.
The benefits of automating the tasks of accounting professionals for the following activities (Ezenwa and Nken, 2021):

- reporting (month or quarter closing, internal performance reporting, external statutory)
- accounts payable (automatic approvals)
- customer and supplier data
- validating and posting payments
- creating / processing / delivering invoices and billing
- period-end closing (sub-ledger closing, validation of journal entries, general ledger, consolidation, low-risk accounts reconciliation
- general ledger accounting
- cash management
- inventory accounting
- intercompany transactions
- expense reports
- reimbursement requests
- audit, payroll, tax accounting, fixed assets accounting

Even if the role of new AI technologies and ERP systems is to ensure the correctness of processed data, professional accountants and auditors consider it better to supervise the data entered and processed with their help (Hasan, 2022; Zhang et al., 2020).

According to Hasan (2022) and Svitlana and Olha (2024), AI ensures the fulfillment of 3 objectives specific to a company presented in figure 1.

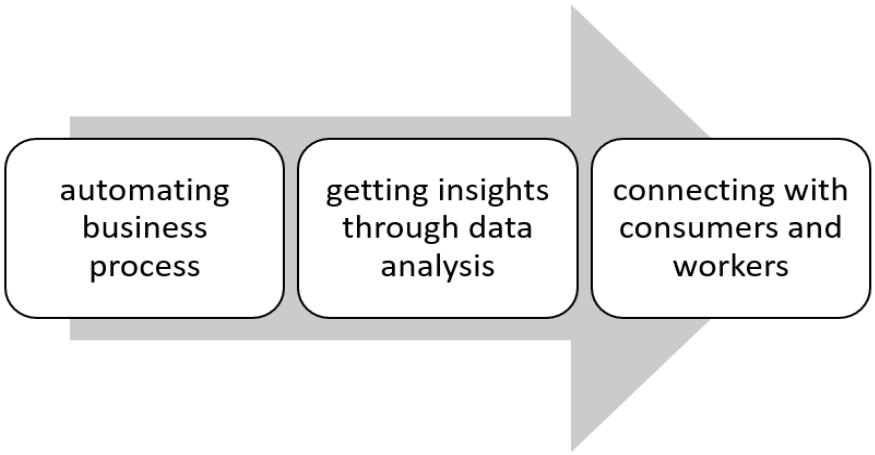

Figure 1: Three objectives specific to a company
Source: Hassan, 2022

ERP systems offer support in the processing of accounting data, more specifically in managerial accounting with the role of informing managers (Khamis et al., 2023). Management accounting *"also includes the preparation of financial reports for non-management groups such as shareholders, creditors, regulatory agencies, and tax authorities"* (Mihaila, 2014 cited by Khamis et al., 2023). The main benefits identified in accounting and auditing as a result of the use of AI and ERP systems are: saving time, higher data accuracy, fast data analysis, in-depth perspective of business processes, standardized services for clients (Munoko et al, 2020; Solaimani et al., 2020). Other benefits identified by Srbinoska and Donovska (2023) were: *"high quality of reporting, up-to-date decision making, better resource use given the increased efficiency and reduced processing time"*. The disadvantages of these systems are *"high costly and specific know-how"*.

3. Research methodology

The research in this article was based on a bibliometric analysis that aimed to observe research trends in this field, through which to observe or identify uncovered areas and future research directions in this field.
The sample of articles used for the case study was selected from the Web of Science in April 2024 based on the following keywords: *artificial intelligence, ERP systems, accounting profession, audit, performance and sustainability*.
To analyse the sample, the authors used the RStudio application, using the Biblioshiny package, which is an R-tool for comprehensive science mapping analysis. Bibliometric analysis is a unique tool, developed in the statistical computing and graphic R language, according to a logical bibliometric workflow (Bibliometrix, 2024).
This analysis is a structured analysis of a large body of information, to show a *"big picture"* on a certain analyzed topic.
The foundation for this quantitative research was a dataset extracted from the Web of Science database. The search was guided by the following query string:
(TS=("Artificial Intelligence" AND "Accounting") OR TS=("Artificial Intelligence" AND "Auditing") OR TS=("ERP" AND "Auditing") OR TS=("ERP" AND "Accounting") OR TS=("Technology Impact" AND "Accounting Professionals") OR TS=("Technology Impact"

AND "Auditing Professionals") AND TS=("PERFORMANCE") AND TS=("sustainability")) covering the period from January 1, 2010, to March 31, 2024. Initially, a total of 1497 articles were selected. To refine the analysis for greater relevance to the field, the search was narrowed down by limiting the Web of Science reference areas to (WC ="Business Finance" OR "Management" OR "Business" OR "Economics"), resulting in a final count of 472 documents.

The commencement of the study involved a descriptive bibliometric analysis to map the academic dynamics of the field. This phase included examining annual publication trends, geographic dispersion of studies, identifying significant sources, as well as pinpointing the most prolific authors in the area.

In the subsequent phase, a keyword co-occurrence analysis was conducted to gauge the intensity of co-occurrence connections and to pinpoint the terms with the strongest links. The outcome was an illustrative network of the major themes and their interrelations, highlighting keywords as the core representation of the research content and the primary interests within the domain.

4. Results analysis

A longitudinal examination of academic literature can provide insightful perspectives on the shifting scientific focus within a particular field of study. The analysis depicted in Figure 2 scrutinizes the annual distribution of publications from 2010 to 2024, focusing on the key terms that have been previously identified as particularly significant for the domain under study. This graphical representation unveils the temporal dynamic of scholarly output and may indicate shifts in research priorities or an upsurge in scholarly activity within the thematic spectrum.

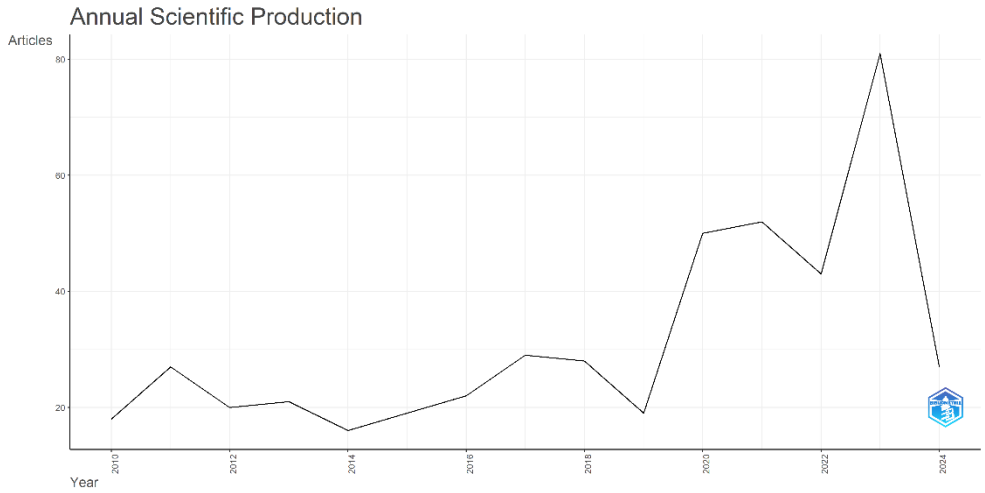

Figure 2: Annual Scientific Production
Source: Authors own creation using Bibliometrix (Biblioshiny), 2024

The chronological study of academic publications between 2010 and 2024 reveals a notable fluctuation in the volume of published works. Detailed analysis indicates a marked expansion in the number of publications, reaching a peak of 81 articles in 2023, which denotes an increased scientific interest in the selected research themes. The early phase of the examined period shows a moderate publication frequency, which then exhibits a gradual increase, culminating in 51 papers in 2021. This trend can be interpreted as aligning with theoretical and practical advancements in the field of artificial intelligence and ERP

systems, with direct implications for accounting and auditing practices, and points to an escalating dynamism of academic research in these interdisciplinary areas.
Figure 3 presents a geographical analysis of the literary contribution in the field of artificial intelligence and ERP systems application in accounting and auditing. The distribution of publication frequency highlights a clear leadership by the United States, with 368 works, followed by a strong academic presence in China, accounting for 113 publications. The United Kingdom also makes a significant contribution to the literature, with 89 works. Interest in this research field is also evident in Romania, with a total of 79 contributions, marking a notable global presence. Australia with 65 works, Italy with 59, Ukraine with 55, Germany with 50, Portugal with 39, and Canada with 38, showcase vibrant and diverse research activities across multiple regions. This geographical representation clearly shows that research in the area of accounting and auditing assisted by artificial intelligence and ERP systems is a topic of global interest, demonstrating widespread commitment and involvement in this interdisciplinary field.

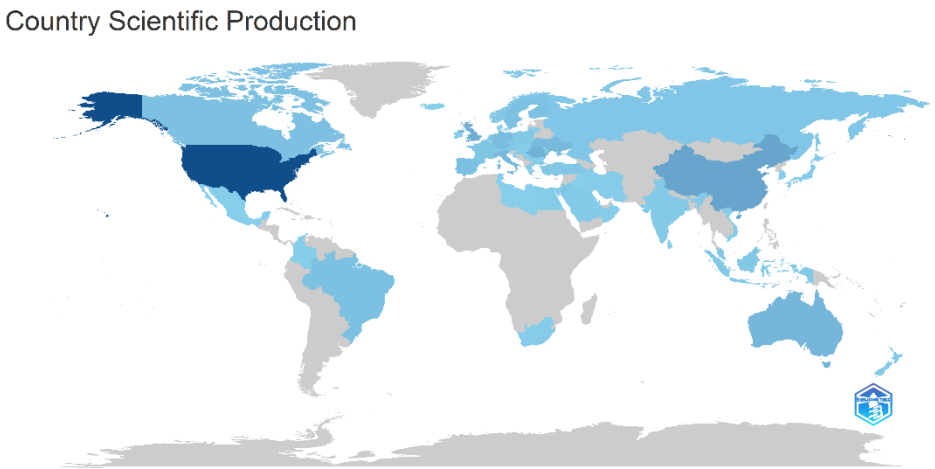

Figure 3: Country Scientific Production
Source: Authors own creation using Bibliometrix (Biblioshiny), 2024

A bibliometric examination of the distribution of scientific works across various academic journals demonstrates a wide array of editorial channels that support and disseminate studies in the realm of artificial intelligence application in auditing and accounting.

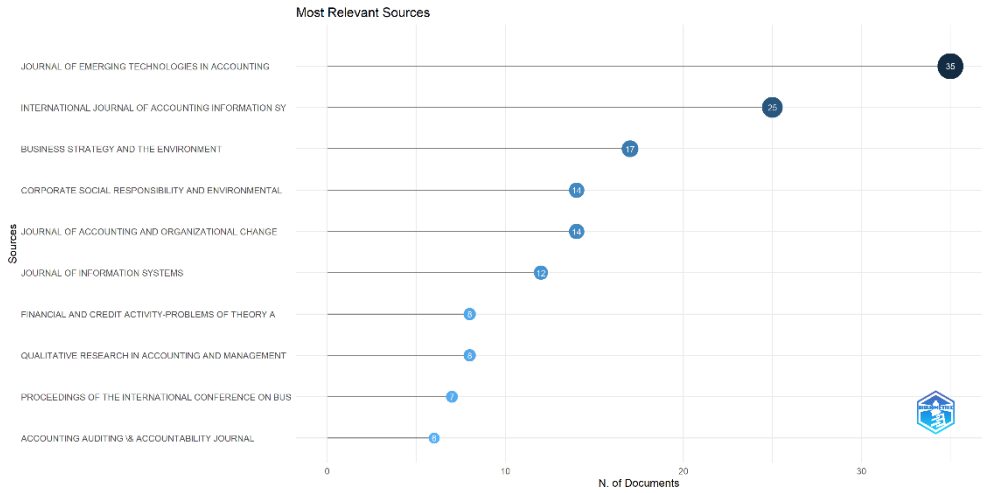

Figure 4: Most Relevant Source
Source: Authors own creation using Bibliometrix (Biblioshiny) , 2024

The chart in Figure **4** represents a scatter plot of the most relevant sources addressing the impact of artificial intelligence (AI) and enterprise resource planning (ERP) systems in accounting and auditing. We observe that the most prolific source is the "Journal of Emerging Technologies in Accounting," with 35 documents, indicating that this publication may be a leading journal in research related to emerging technologies in the accounting field.

The "International Journal of Accounting Information Systems" also appears prominently, with 25 works, suggesting a focus on how accounting information systems integrate new technologies, including AI and ERP.

Journals such as "Business Strategy and the Environment" and "Corporate Social Responsibility and Environmental Management" also have a significant number of works (both with 14 documents), which could indicate an exploration of the impact of AI and ERP technologies not only from the perspective of financial performance but also from that of sustainability and corporate social responsibility.

The "Journal of Accounting and Organizational Change" and the "Journal of Information Systems," with 12 works each, suggest that these research areas are dynamic and evolving, reflecting organizational and technological changes in accounting and auditing.

Other sources, such as "Financial and Credit Activity-Problems of Theory and Practice," "Qualitative Research in Accounting and Management," and the "Proceedings of the International Conference on Business," with 8 and respectively 7 documents, show the diversity of discussion forums and research perspectives.

Finally, the "Accounting Auditing & Accountability Journal," with 6 documents, rounds out the picture of the leading scientific journals contributing to the academic dialogue on the integration of AI and ERP into accounting and auditing practices. This variety of sources illustrates the interdisciplinary and multifaceted field of the study of technological impact in accounting and auditing.

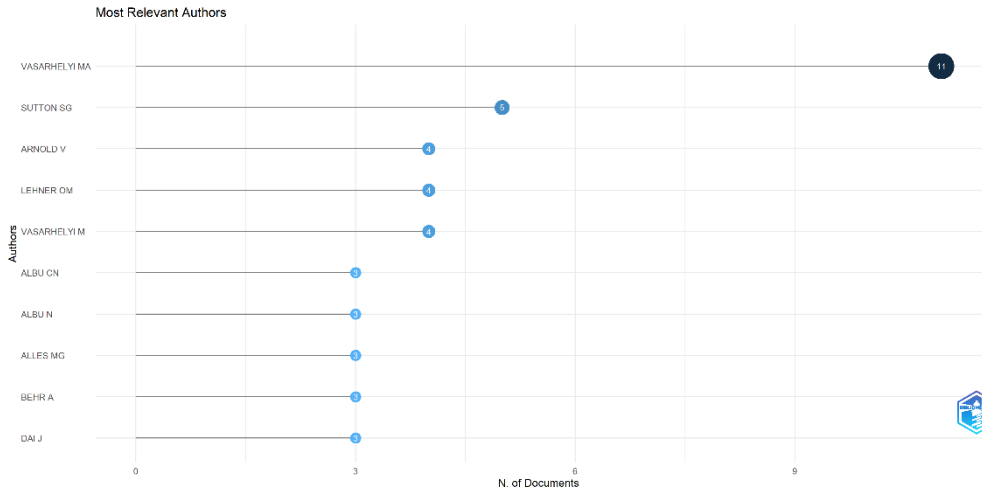

Figure 5: Most Relevant Authors
Source: Authors own creation using Bibliometrix (Biblioshiny), 2024

Figure 5 depicts the most prominent authors within the realm of artificial intelligence and enterprise resource planning systems in the context of accounting and auditing. The table ranks these scholars by the number of their scholarly contributions to the field, offering a clear view of who the most prolific individuals are in terms of publication volume. At the pinnacle, we observe VASARHELYI MA, whose substantial number of documents—11 in total—underscores his leading position. This is followed by SUTTON SG and ARNOLD V, with a considerable number of publications themselves. The sequence continues, delineating the academic footprint of each author, with LEHNER OM and ALBU CN also contributing notably to the domain.

The visual arrangement in this table serves not just to identify individual scholarly output but also to signify the depth of research engagement and influence across the academic community. Such a ranking not only recognizes individual accomplishment but also paints a picture of the collaborative network that drives forward the boundaries of knowledge in this interdisciplinary field.

In Figure 6, we have presented a word cloud, which is a data visualization form that highlights the most frequently used terms within a text or dataset. This word cloud displays the frequency of keyword usage in the analyzed publications, with the size of each term being proportional to its occurrence frequency in these publications.

Figure 6: WordCloud
Source: Authors own creation using Bibliometrix (Biblioshiny), 2024

The terms "artificial intelligence," "big data," "erp" (Enterprise Resource Planning), and "blockchain" denote a strong focus on emerging technologies and their impact on the fields of management and accounting. Terms like "performance", "implementation", "technology", "management" and "information systems" are among the largest, and thus are the central themes or primary areas of interest in the literature associated with the analyzed dataset. "Artificial intelligence" features with a frequency of 56 occurrences in articles, followed by "impact" mentioned 53 times, and "management" with a frequency of 52.

Words such as "audit", "accountability", "governance" and "control" suggest that a significant part of the research addresses the application of technologies in audit processes and corporate governance, highlighting concerns related to accountability and internal control.
The emergence of terms from various fields signals an interdisciplinary character of the research, reflecting the integration of information technology with management, accounting, and auditing.
Terms like "adoption", "determinants", "challenges" and "future" indicate an interest in studying the factors that influence the adoption of technologies, current challenges, and future research directions.
The presence of words like "decision-making" and "strategy" underscores the relevance of data analysis in supporting the decision-making process and in formulating strategies within organizations.
The word "education" suggests a focus on training and developing competencies necessary to navigate the continually changing landscape of technology in the financial-accounting field, for inclusion in a scientific article.

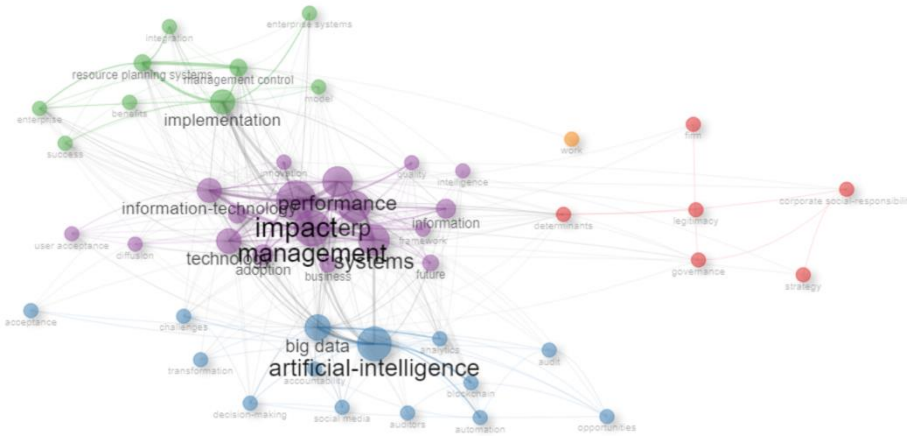

Figure 7: Co-occurrence Network
Source: Authors own creation using Bibliometrix (Biblioshiny) , 2024

To emphasize the dynamic and complex nature of research in the field, as well as to demonstrate the vast network of interconnected subjects that influence accounting and auditing practices in the digital age, we employed a keyword network analysis, represented in Figure 7. It is observed that terms such as "performance", "impact" and "management systems" appear as large, centrally connected nodes, indicating that these are key concepts in the discussion on the effects of artificial intelligence and ERP in the accounting domain.
Words like "big data" and "analytics" are closely linked with "artificial intelligence" illustrating how these themes are interdependent and relevant in the current context of accounting and auditing.
Through nodes like "transformation" and "innovation" the diagram shows an openness to topics that reflect changes and technological progress in the sector.
Terms such as "challenges" and "opportunities" situated near "artificial intelligence," suggest that the literature is exploring not only the advantages of AI and ERP but also the difficulties encountered in their implementation and adoption.
The presence of terms like "corporate social-responsibility" and "governance" indicates attention to corporate responsibility and governance in the era of digitalization.

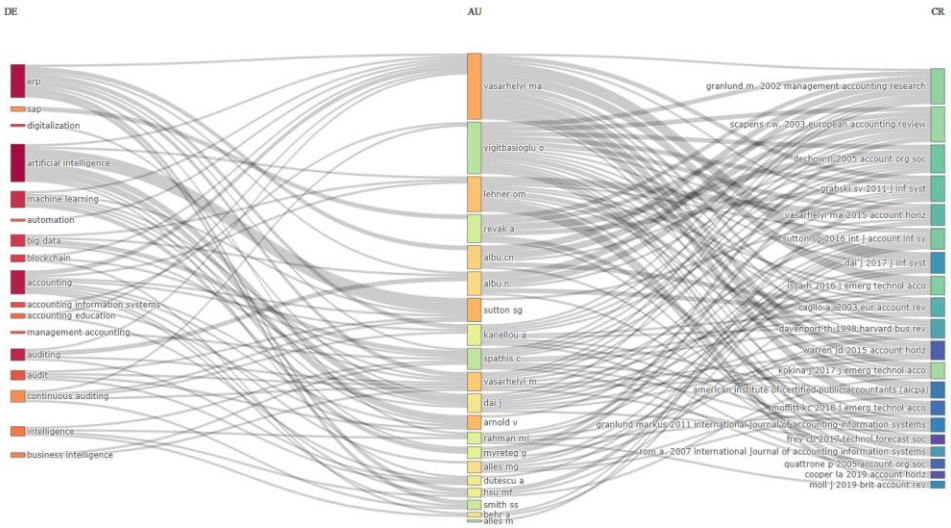

Figure 8: Three-Field Plot
Source: Authors own creation using Bibliometrix (Biblioshiny) , 2024

Figure 8 represents a tripartite graph, which visualizes the relationships between keywords (DE), authors (AU), and cited works (CR) in the field of accounting and auditing, with an emphasis on the impact of technologies such as ERP and artificial intelligence.
We observe significant interconnectedness within the academic community, with many authors contributing to a variety of subjects, suggesting an interdisciplinary and collaborative approach in research. There is a dense network of connections between certain authors and specific keywords, indicating that these individuals are major contributors in their respective fields. Certain authors, such as Vasarhelyi, Sutton, and Albu, have a significant influence, as evidenced by their multiple connections to key terms and reference works. They can be considered thought leaders in research on artificial intelligence and ERP systems in accounting and auditing.
There are pivotal works that seem to be key references in the field, indicating impactful papers in accounting and auditing. Frequently cited journals and works, such as "Management Accounting Research" and "International Journal of Accounting Information Systems", are key sources in the field, providing foundational research or significant reviews of the literature.
Terms that appear central, such as "erp", "artificial intelligence", "machine learning", and "big data", reflect the current research interest core, underlining the significance and impact of information technology on managerial accounting and auditing practices.
The map suggests that certain thematic areas, such as the application of AI in accounting and auditing, are growing and becoming increasingly relevant to researchers.
We proceed with a Thematic Map, the result of a bibliometric analysis designed to organize and visualize themes from a corpus of scientific literature.
Utilizing the Biblioshiny software, we crafted a thematic map (Figure 9), which seeks to organize and visualize themes from a body of scientific literature, categorizing research topics into four quadrants based on two dimensions: 'Degree of Development' (or Density) and 'Degree of Relevance' (or Centrality).

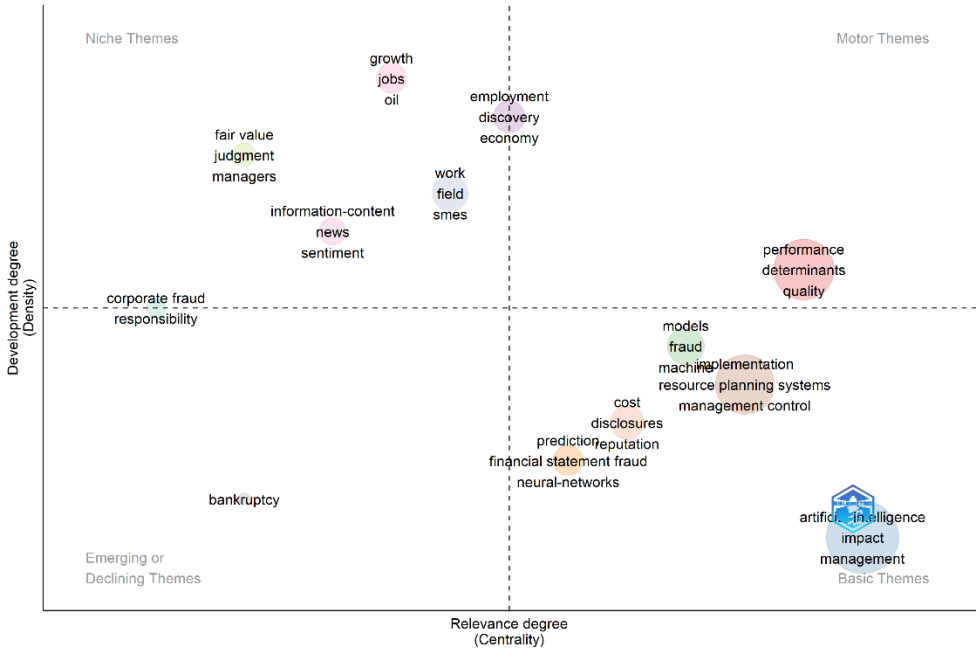

Figure 9: Thematic Map
Source: Authors own creation using Bibliometrix (Biblioshiny) , 2024

Within the niche themes category, keywords such as "fair value", "judgment" and "managers" are featured. These terms have been focal points in literature, centering on the fair valuation in financial reporting, the role of professional judgment in auditing, and the influence of artificial intelligence on managerial decisions. Although these topics have been thoroughly explored, they are considered niche because they do not constitute the core focus across the majority of work in the field.
In the Motor Themes category, terms like "models", "fraud" and "disclosures" represent dominant research themes that propel the discourse within this sphere. "Models" pertain to the development of accounting or audit models that are augmented by AI and ERP technologies, whereas "fraud" and "disclosures" are crucial for grasping how these technologies can facilitate fraud detection and enhance financial reporting transparency.
The keywords "resource planning systems" and "management control" within the basic themes segment establish the foundational dialogue regarding the impact of ERP and AI. Resource planning systems are indispensable for efficient business management, and management control is a fundamental tenet being reshaped by the advent of AI.
In the Emerging or Declining Themes section, terms like "corporate fraud" and "responsibility" are present. "Corporate fraud" may signal an increasing interest in leveraging artificial intelligence to prevent and detect fraud within the corporate realm, while "responsibility" could point to a burgeoning emphasis on the ethical and social responsibility of businesses in the era of advanced technology adoption. Placement closer to "Emerging" suggests a theme is gaining prominence; a shift towards "Declining" might indicate the current literature is distancing from these concerns.

5. Conclusion

The steady increase in publications reflects an accelerated adoption and integration of AI and ERP systems within the accounting and auditing sectors. This trend indicates that the field is rapidly evolving to incorporate these technologies, which are becoming crucial for modern financial practices. The peak in scholarly articles by 2023 suggests that significant

technological advancements in AI and ERP systems have been recognized as having profound impacts on efficiency, accuracy, and the overall effectiveness of accounting and auditing practices. These technologies facilitate automated processes, enhance data accuracy, and allow for real-time financial analysis, which are invaluable in today's fast-paced business environments.

The widespread geographic contribution highlights a global recognition of the importance of AI and ERP systems in reshaping accounting and auditing practices. Countries leading in research output are likely at the forefront of implementing advanced technological solutions in their financial sectors, influencing global standards and practices.

The interdisciplinary nature of the research signifies collaboration between technologists, accountants, auditors and academic researchers. This collaboration is essential for developing solutions that are not only technologically advanced but also aligned with the practical needs of the financial industry.

The proliferation of publications across a variety of journals, particularly in those like the "Journal of Emerging Technologies in Accounting" and the "International Journal of Accounting Information Systems" indicates a significant and growing academic interest in the intersection of AI and ERP systems with accounting and auditing practices. This suggests that these technologies are not only gaining traction but are also transforming traditional practices within these fields.

The identification of key contributors such as VASARHELYI MA, SUTTON SG, and ARNOLD V, who have extensively published on relevant themes, points to a concentrated effort by scholars to advance understanding and application of AI and ERP systems. Their work not only enriches the academic literature but also guides practical implementations and policy formulations in these fields.

The analysis of keyword frequency and co-occurrence highlights the transformative impact of emerging technologies like AI and ERP on accounting and auditing, revealing a focus on operational efficiencies, strategic management, interdisciplinary integration, and ethical governance, while also emphasizing the challenges and future research directions in implementing these technologies.

Tripartite graph illustrates a significant interconnectedness and collaboration within the academic community on ERP and AI in accounting and auditing, highlighting the influence of key authors like Vasarhelyi, Sutton, and Albu, and identifying central themes such as "erp", "artificial intelligence", "machine learning" and "big data", which underscore the deep impact and growing relevance of these technologies in shaping contemporary research and practices in the field.

The Thematic Map created using Biblioshiny software effectively organizes and categorizes key research topics within the field of accounting and auditing, illuminating how emerging technologies like AI and ERP are reshaping critical aspects of the discipline. This map reveals a structured analysis of thematic dimensions, showing that while niche themes like "fair value" and "judgment" continue to be explored, more dominant themes such as "models," "fraud," and "disclosures" are driving the academic discourse by demonstrating the practical applications of these technologies in enhancing transparency and efficiency. Furthermore, foundational themes involving "resource planning systems" and "management control" underscore the integral role of these technologies in modern business management, while emerging concerns like "corporate fraud" and "responsibility" highlight a growing focus on the ethical implications of technology in business practices. This analysis not only reflects the current landscape but also predicts future shifts in focus, indicating a dynamic field that is increasingly influenced by technological advancements.

The ongoing research interest points to the need for continued exploration into how AI and ERP systems can be further optimized for accounting and auditing. Future research could focus on the development of more sophisticated tools that can handle increasingly complex financial data, address emerging challenges such as cyber security in financial systems, and explore the ethical implications of automated financial decision-making.

With the rapid integration of AI and ERP systems into accounting and auditing, there is a growing demand for professionals who are not only skilled in traditional financial practices but also proficient in these new technologies. This shift necessitates changes in educational curricula and professional training programs to prepare the next generation of accountants and auditors. (Damerji and Salimi, 2021).
In summary, the integration of AI and ERP systems in accounting and auditing is not only a topic of academic interest but also a practical evolution that is reshaping the landscape of financial management and corporate governance. The contributions from diverse journals and leading scholars highlight the multifaceted impacts of these technologies, suggesting ongoing shifts in the practices, strategies, and ethical considerations within the professions.

6. Acknowledgements

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References

1. Berdiyeva, O.; Islam, M.U. and Saeedi, M. (2021), *Artificial Intelligence in Accounting and Finance: Meta-Analysis*, Nust Business Review, vol. 3 (01), pp. 56-79
2. Bibliometrix (2024), *Biblioshiny: the shiny app for bibliometrix*, [ONLINE] available at: https://www.bibliometrix.org/home/index.php/layout/bibliometrix, accessed on April 14, 2024
3. Damerji, H. and Salimi, A. (2021). *Mediating effect of use perceptions on technology readiness and adoption of artificial intelligence in accounting*. Accounting Education. 30. pp. 1-24. 10.1080/09639284.2021.1872035.
4. Ezenwa, E. and Nkem, U.H. (2021). *Impact of Artificial Intelligence (AI) on Accountancy Profession*, Journal of Accounting and Financial Management, E-ISSN 2504-8856, P-ISSN 2695-2211, Vol 7., No. 2, pp. 15-25
5. Hasan, A.R. (2022). *Artificial Intelligence (AI) in Accounting & Auditing: A Literature Review*, Open Journal of Business and Management, no. 10, ISSN Online: 2329-3292, pp. 440-465
6. Khamis, L.; Alasfoor, F.; Khawaja, N. and Abu Wadi, R. (2023). *Artificial Intelligence, ERP and Managerial Accounting*, Emerging Trends and Innovation in Business and Finance – Contributions to Management Science, pp. 779-791
7. Munoko, I.; Brown-Liburd, H. and Vasarhelyi, M. (2020). *The Ethical Implications of Using Artificial Intelligence in Auditing*, Journal of Business Ethics, vol. 167, pp. 209-234, https://doi.org/10.1007/s10551-019-04407-1
8. Solaimani, R.; Rashed, F.; Mohammed, S. and Wahid ElKelish, W. (2020). *The impact of artificial intelligence on corporate control*, Corporate Ownership & Control, vol. 17, no. 3, pp. 171-178
9. Srbinoska, D.S. and Donovska, S. (2023). *Automation of accounting processes: the impact of artificial intelligence and ERP systems on accounting*, Pregdni rad, pp. 87-108
10. Svitlana, K. and Olha, R. (2024). *Artificial intelligence in accounting*, Scientia Fructuosa, no. 2, ISSN 2786-7978, pp. 145-157
11. Zhang, Y.; Xiong, F.; Xie, Y.; Fan, X. and Gu, H. (2020). *The Impact of Artificial Intelligence and Blockchain on the Accounting Profession*, IEEE Access, vol. 8, pp. 110461-110477, DOI: 10.1109/ACCESS.2020.3000505