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TRANSFORMING ACCOUNTING THROUGH ARTIFICIAL INTELLIGENCE: TOWARDS SUPERIOR EFFICIENCY AND ACCURACY

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Abstract: *This paper explores the transformative impact of **artificial intelligence (AI)** on accounting, focusing on its ability to enhance efficiency and accuracy in financial processes. AI technologies such as **machine learning (ML), natural language processing (NLP),** and **robotic process automation (RPA)** have evolved from early rule-based systems to dynamic tools that support predictive analytics and strategic decision-making. Through a **bibliometric analysis** of 960 articles published between 2010 and 2024, this research identifies key trends, opportunities, and challenges in adopting AI within the accounting profession. It emphasizes AI's role in modernizing accounting practices, improving financial predictions, and optimizing compliance tasks. Additionally, the analysis underscores the significant increase in AI-related research, especially since 2018, driven by innovations in big data, automation, and neural networks. By mapping the collaboration networks and thematic developments, the study provides insights into future directions for integrating AI into accounting, highlighting the essential role of **performance optimization** and **decision-making support**. The conclusion of the article demonstrates the importance of artificial intelligence in the modernization and efficiency of accounting and management processes.*

Key words: *Artificial Intelligence, Machine Learning, Robotic Process Automation, Accounting Innovation, Predictive Analytics, Big Data*

JEL: L86, M40, M41, M42, O33

1. Introduction

In today's world, **artificial intelligence (AI)** is having a profound impact on various aspects of life, influencing both individuals and businesses, with its rapid development driving constant change (Agusti & Orta-Perez, 2022). At its core, AI aims to assist humans in performing tasks and making decisions by utilizing intelligent machines. As people and businesses strive to integrate this advanced technology into their daily routines, **AI is creating significant shifts in the field of accounting**. According to Emetaram and Uchime (2021), AI's growing presence in accounting is notable due to its potential to allow accountants to provide more value to organizations.

AI's journey in accounting has evolved substantially. Initially, its role was limited to automating routine tasks through **expert systems** in the 1980s and 1990s. These systems, however, followed rigid rules without the capacity for adaptation. The 2000s saw the rise of **robotic process automation (RPA)**, which brought efficiency gains, but still lacked the learning abilities seen in today's AI systems. More recent advancements, such as **machine learning (ML)**, have enabled AI

to process vast amounts of accounting data, identifying patterns and anomalies, thus improving **financial forecasting and risk management.**

In addition to machine learning (ML), **natural language processing (NLP)** has revolutionized **auditing and compliance** by allowing the swift analysis of documents written in natural language, significantly reducing the time needed to spot issues. As AI has become a key tool for **predictive analytics**, it now aids accountants and managers in anticipating financial trends and making more strategic decisions. These technological advancements equip professionals with enhanced capabilities to navigate an increasingly complex financial landscape (Coman et al., 2022).

Early AI applications, such as **expert systems**, sought to replicate human decision-making in specific fields, reaching a level where they could substitute human judgment (Berdiyeva et al., 2021). Today, AI is considered an invaluable resource for professionals in **accounting and auditing**, providing numerous opportunities to improve productivity and effectiveness. However, successful implementation of these technologies requires organizations to develop the necessary skills and policies (Moll & Yigitbasioglu, 2019).

The adoption of emerging technologies like AI, machine learning, and blockchain has led to significant transformations in accounting practices, including the reengineering of procedures, reducing errors in accounting information, and enhancing overall efficiency (Zhang et al., 2020). Moreover, the use of RPA can greatly improve the quality and accuracy of accounting services, while saving time.

According to Fernandez & Aman, 2018 workplace safety is still a top priority, therefore businesses must invest in employees through training on the benefits and drawbacks of these new technologies. Despite the high accuracy provided by artificial intelligence (AI) and ERP systems, many professionals still choose to oversee data entry and processing manually (Hasan, 2022; Zhang et al., 2020).

Mates & Irimus, 2020 state that in the future, the evolution of accounting will be influenced both by technological advances, such as AI and automation, and by legislative adaptations and industry standards, which are constantly changing. The digitization of accounting and management becomes essential as stated by Goncalves et al., 2022 and Gulin et al., 2019, because it has the ability to reshape industry structures and revolutionize business models.

Technologies and software solutions are today indispensable in maximizing organizational performance, and artificial intelligence (AI) is among the most innovative examples. Through AI, companies benefit from modern tools that can take over part of human activities, thus contributing to improving performance both financially and non-financially (Saleh et al., 2021).

However, technologies such as cloud computing, AI and blockchain are predicted to transform the field of accounting through capabilities to exchange information on demand, automate certain tasks, identify risky transactions and facilitate the detection of those requiring regulation (Chukwudi, Echefu, Boniface & Victoria, 2018).

The integration of digitization, through the adoption of ERP and AI systems, has brought important changes for accounting professionals, especially in streamlining redundant tasks. Thus, repetitive activities have been largely eliminated, and ERP and AI systems are now responsible for processing and storing data in organizational databases.AI does not replace accountants but enhances their skills, allowing them to focus on more complex tasks, such as providing strategic advice and developing

innovative business models. Accountants who adopt AI or ERP systems and develop the necessary skills to work efficiently with these technologies will be well-prepared for success in the future. (Barna et al, 2024)

2. Basic content.

The research in this article was based on a quantitative research method, using bibliometric analysis. The analysis was carried out using the the RStudio application, using the Biblioshiny package, in which the authors used a sample consisting of 960 Web of Science articles selected in August 2024 based on the following keywords such as: "Artificial Intelligence In Account*" Or "AI In Account*" Or "RPA in Account*" Or "Robotic Process Automation In Account*" Or "Machine Learning In Account*" And "Performance". This sample consisted of articles published between 01.01.2010 – 31.07.2024.

The Figure 1 shows a clear upward trend in the number of papers published during the analyzed period. Starting from 2010, the number of papers was relatively low and constant until around 2017, after which it started to increase significantly. A sharp increase can be seen starting from 2018, with a more obvious jump between 2021 and 2022, where the number of works almost doubles. The largest number of works is registered in 2023, exceeding 200 works.

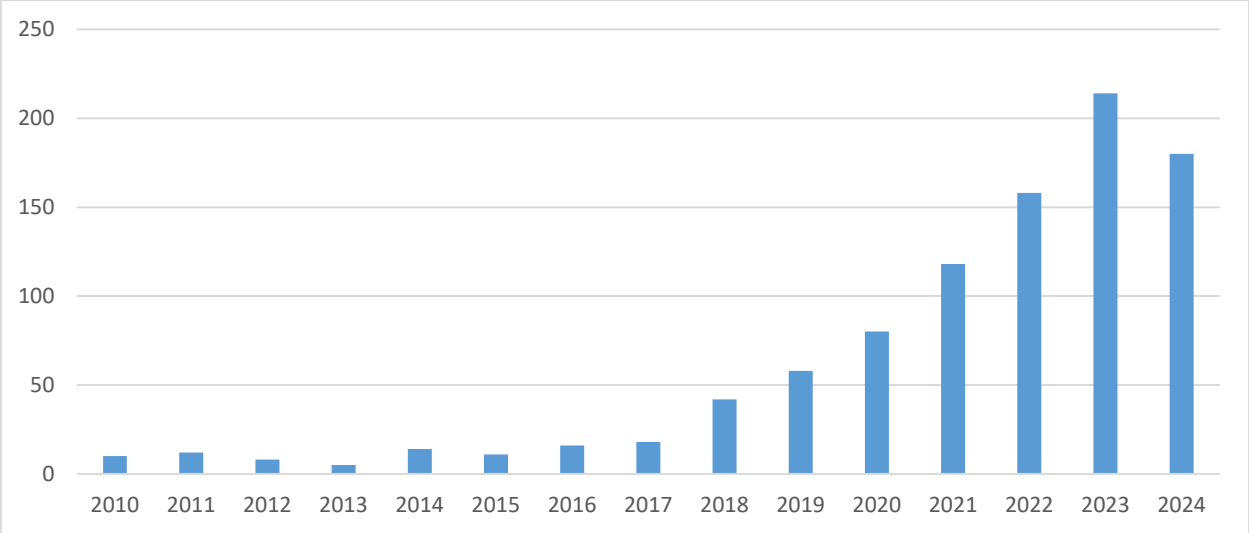

Figure 1 Number of articles published and their annual distribution during the period 2010-2024

Source: Authors creation using Bibliometrix (Biblioshiny), 2024

The Figure 2 represents the most relevant sources of scientific publications in the field of artificial intelligence and accounting. The vertical axis lists the sources, while the horizontal axis represents the number of documents published in each source.

The most prolific journal is *Expert Systems with Applications*, with 84 documents, highlighting the dominant role of this publication in research on expert systems applications in accounting and artificial intelligence.

Other important sources include the *Journal of Emerging Technologies in Accounting* with 27 documents, reflecting the interest in emerging technologies in this field.

Financial And Credit Activity-Problems of Theory and Practice and the *International Journal of Accounting Information Systems* have also published a significant number of papers (18 and 17 documents, respectively).

The remaining sources, such as *Technological Forecasting and Social Change* and the *European Journal of Operational Research*, show a diversification of journals that address topics related to technology and the automation of accounting processes.

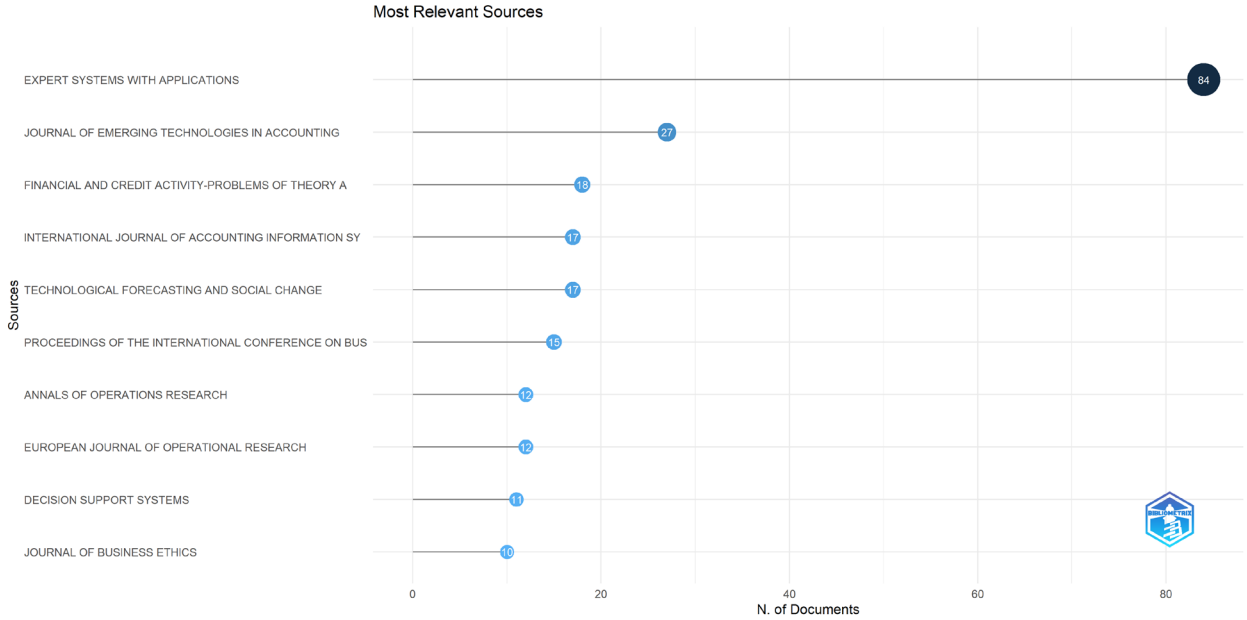

Figure 2 Most Relevant Source

Source: Authors creation using Bibliometrix (Biblioshiny), 2024

The graph in figure 3 highlights the most prolific authors in the analyzed field, according to the number of published works. In this analysis, *Vasarhelyi MA* stands out as the most productive author, with 8 papers, followed by *Li Y* and *Zhang J*, each with 6 papers.

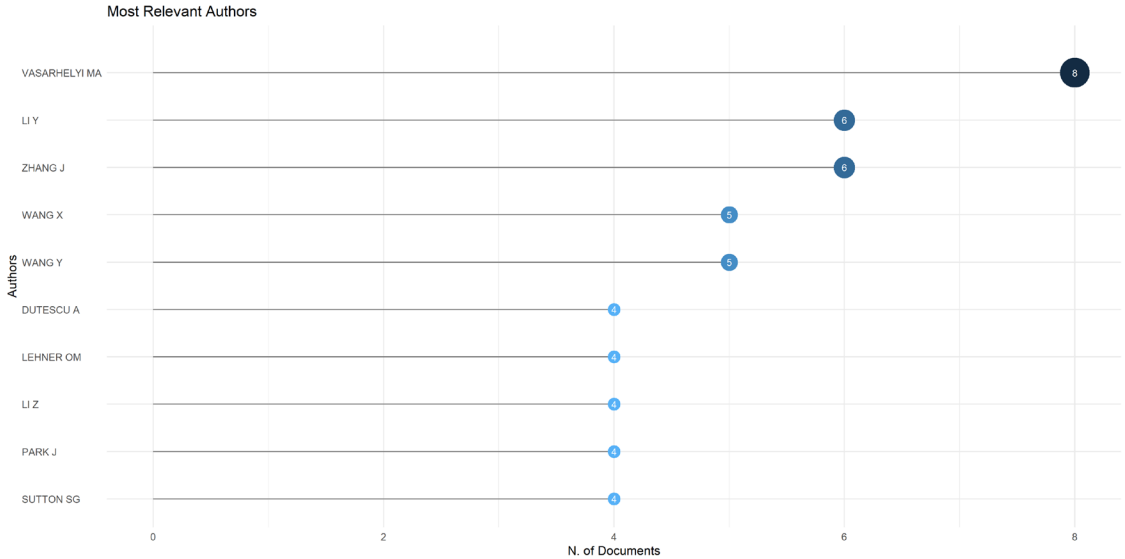

Figure 3 Most Relevant Authors

Source: Authors creation using Bibliometrix (Biblioshiny), 2024

Figure 4 complements this perspective by providing a visualization of collaborative networks between authors through a „network" diagram. In this network, we see how authors interact and collaborate with each other. *Vasarhelyi MA*, for example, is not only prolific but also a central node in the network, collaborating with other important authors such as *Zhang CA* and *Schreyer M. Also*, *Zhang J* is another key author with an extensive network of collaborators including *Wang X, Wang Y* and *Zhao Y*, suggesting significant influence in the field.

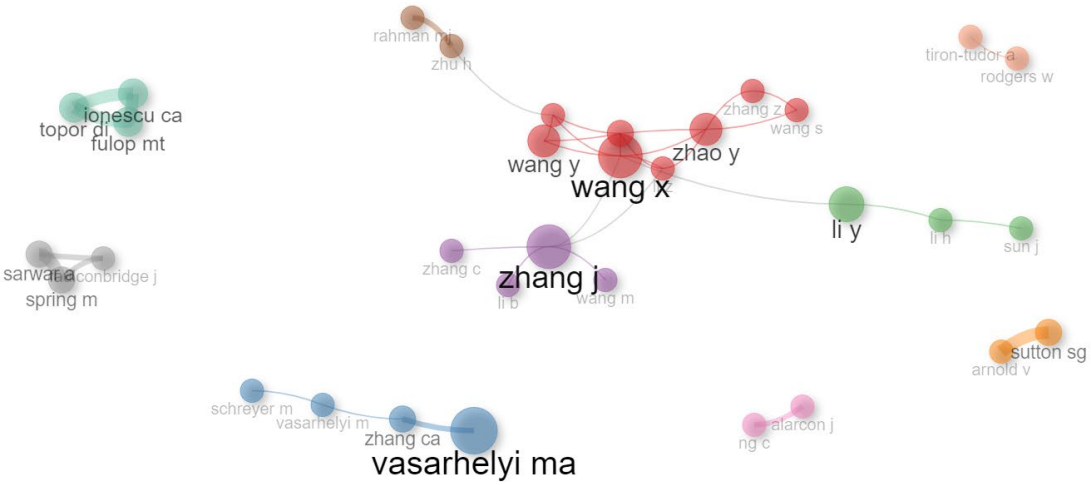

Figure 4 Collaboration Network

Source: Authors creation using Bibliometrix (Biblioshiny), 2024

This word cloud in figure 5 provides a visualization of the most frequent and important themes or keywords associated with artificial intelligence (AI) research in accounting and management.

Figure 5 WordCloud

Source: Authors creation using Bibliometrix (Biblioshiny), 2024

"Artificial Intelligence" is the central and largest term, indicating that artificial intelligence is the dominant theme in the literature. It reflects the importance of AI in transforming the fields of accounting and management. "Management" is also an essential word, management being closely related to the implementation and use of AI in organizations, especially in decision-making processes and performance optimization. Another major term, "performance", suggests that a significant focus in AI research is on improving performance in accounting and management. The term "information" indicates the importance of managing and analyzing data within artificial intelligence (AI), whether it is large data sets (Big Data), information systems or advanced data processing technologies. The concept of "Big Data" is also central, indicating the significant role of large data sets used in combination with AI to extract valuable insights and streamline accounting activities. "Technology" plays a central role in the implementation of AI, emphasized by its frequency in this type of textual analysis. The term "impact" draws attention to the researchers' goal of measuring the influences of AI in various sectors, especially in accounting and management. "Innovation" suggests academic interest in innovative aspects of AI, such as emerging technologies and methodologies that bring improvements to accounting practice.

The terms "neural networks, systems, models" refer to the technical and methodological components of AI, including the use of neural networks and predictive models to increase accuracy and efficiency in accounting. "Decision-making" is also a key element, highlighting the role of AI in decision support, whether it is risk management, investment planning or financial operations. Words like "analytics, optimization, automation" highlight the use of AI in detailed data analysis, process improvement and automation of activities in accounting and management.

This word cloud highlights the most frequently discussed topics and themes in applied AI research in accounting and management. Major themes include artificial intelligence, management, performance, information and Big Data, all suggesting the researchers' focus on optimizing performance and efficiency with these advanced technologies.. This information provides an overview of emerging research trends and directions in this field.

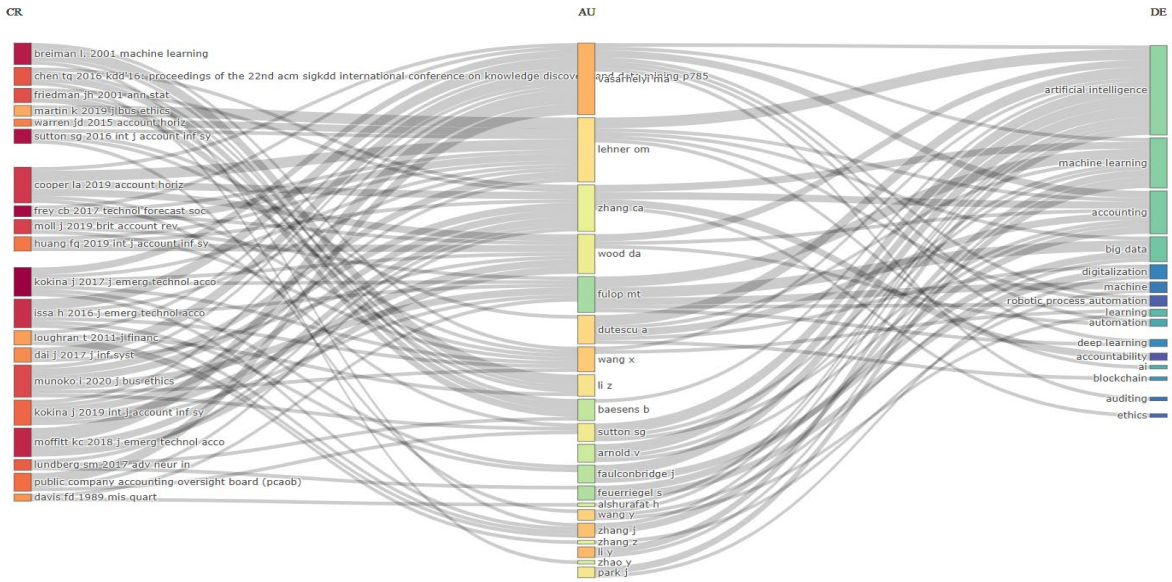

Figure 6 Three-Field Plot

Source: Authors creation using Bibliometrix (Biblioshiny), 2024

This diagram in Figure 6 represents the interactions and influences between cited references (academic papers), leading authors in the field, and major themes associated with artificial intelligence (AI) and accounting.

The Left Column (CR) lists reference works that are frequently cited in studies on the application of artificial intelligence (AI) in accounting. "Breiman L. 2001. Machine Learning" is a seminal work in the field of machine learning, influencing research related to the use of these methods in accounting, for example, for financial forecasting or fraud detection. Also here, "Kokina J. 2017. J Emerging Technol Acco" is an important reference on emerging technologies in accounting, including AI, and is often cited by other researchers.

The Middle Column (AU) highlights authors who have made significant contributions to the integration of artificial intelligence in accounting. These researchers explored various aspects of this topic, from the effectiveness of AI in audit activities, to the automation of accounting processes and the use of big data in financial decision-making. Vasarhelyi MA is a central author with an extensive portfolio of papers on the application of AI in accounting, frequently cited on topics related to "Artificial Intelligence" and "Machine Learning". Lehner OM is also another prominent author, who has researched the impact of AI on the transformation of accounting and auditing processes, with a focus on "Digitalization" and "Robotized Process Automation".

The Right Column (DE) identifies key themes in articles dealing with AI and accounting. Each theme represents a core or emerging research topic at the intersection of the two fields. "Artificial Intelligence" is a central element with multiple connections, suggesting that AI is playing a key role in the modern transformation of accounting, where it is being used to automate processes as well as increase accuracy and efficiency. "Machine Learning" is a topic closely related to AI, used to develop predictive models in accounting, anomaly detection and analysis of complex financial data. "Accounting" is the overarching theme that links all research, focusing on how advanced technologies such as AI can be integrated to improve traditional accounting practices.

Lines connecting references to authors and then themes illustrate the flow of knowledge and scholarly influences. It is noticeable how A seminal paper on machine learning such as Breiman's 2001 is cited by several authors exploring the application of machine learning in accounting, which in turn contributes to major topics such as "Artificial Intelligence" and "Machine Learning".

This chart illustrates how artificial intelligence, particularly through machine learning and big data applications, is becoming increasingly integrated into the accounting field. The highlighted research reflects a strong interdependence between leading authors and essential topics, underscoring the importance of AI in modernizing and streamlining accounting processes. This provides a clear picture of the influence of existing literature on contemporary research themes and future directions in digitized accounting.

This thematic map in Figure 7 is a visual tool that helps us understand the status and importance of these topics within a specific field, such as accounting or applied artificial intelligence in business.

The themes in the "Motor Themes" quadrant are considered to be well developed and highly relevant to the field. These are the main drivers of research and development in this field. "Artificial Intelligence" and "Management" are driving themes, they are both central and well developed, indicating that AI is essential in modern management, having a significant impact on accounting and decision-making processes. "Innovation", "Firm" and "Perspective" are other important themes,

suggesting that innovation and managerial vision play a crucial role in the adoption and implementation of AI.

The themes in the "Niche Themes" quadrant are well developed, but are not considered essential or central to the overall domain. These are specialized and may be of interest to specific niches. "Accruals", "Board", "Incentives" and "Stock" are examples of topics that are well defined but less central to the broad discussions of AI and accounting. These may represent specific aspects of financial management and corporate governance.

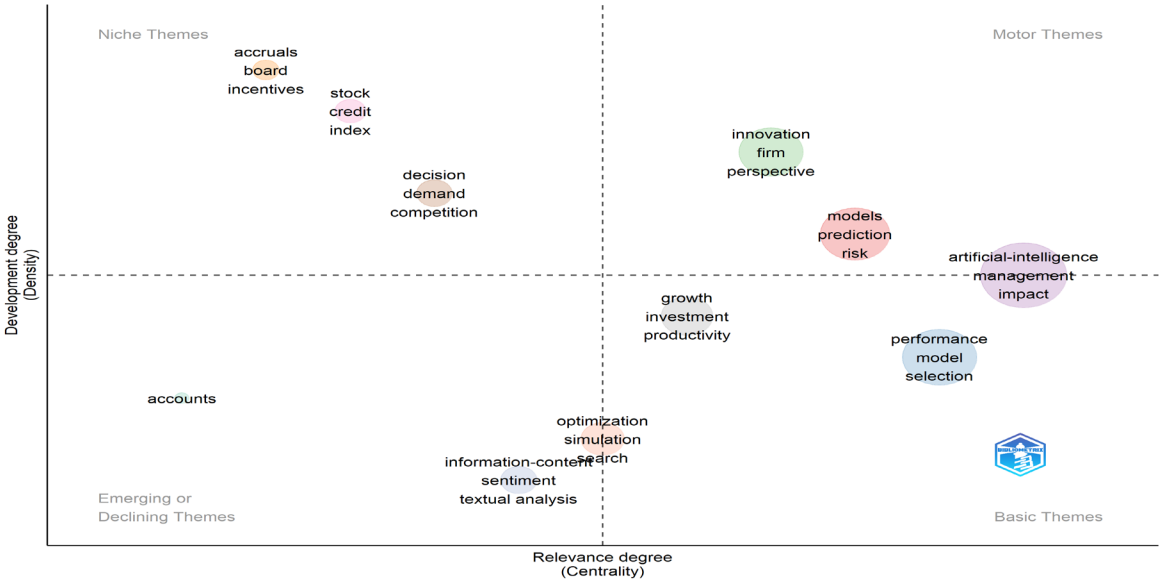

Figure 7. Thematic Map

Source: Authors creation using Bibliometrix (Biblioshiny), 2024

The presented topic map in the Figure 7 reflects a distribution of current and emerging topics in accounting research related to artificial intelligence. In the "Basic Themes" quadrant (bottom right) you are found the essential topics that form the basis of the domain. These topics are considered critical, but are still at an early stage of development, requiring further exploration to contribute to the advancement of the entire field. For example, topics such as "Performance" and "Model" are fundamental to the integration of AI into accounting practices, but require maturation to be implemented at large scale.

Instead, the "Emerging or Declining Themes" quadrant (bottom left) highlights topics that are either at the beginning of their development phase or starting to lose relevance. These are not domain essential and include topics such as "Accounts" and "Text Analysis". Although accounts remain a traditional and essential aspect of accounting, they may seem less innovative in today's context, where interest is turning to using AI to optimize and innovate processes.

This map thus provides an overview of research directions: the "Motor Themes" quadrant highlights the main areas that dictate future development, while the " Niche Themes" and "Basic Themes" quadrants indicate areas that require in-depth attention to become central themes in research. The "Emerging or Declining Themes" quadrant signals topics that are either early stage or may be replaced by more advanced technologies and methodologies.

3. Conclusions.

The integration of artificial intelligence (AI) into accounting represents a crucial step towards optimizing efficiency and accuracy in financial processes, bringing significant transformations to the field. The evolution from expert systems in the 1980s-1990s to modern technologies such as machine learning (ML), natural language processing (NLP), and robotic process automation (RPA) has allowed accountants to focus on higher-value tasks while automating repetitive ones. Our study highlights the impact of these technologies on improving financial predictions and risk assessment, facilitating better strategic decision-making.

The data analyzed in our research, based on 960 articles published between 2010 and 2024, demonstrates a significant increase in interest in AI-related research in accounting, especially after 2018. This paper reflected the growing importance of artificial intelligence in business accounting by updating accounting procedures, highlighting the relevance of big data, automation and neural networks. AI is confirmed to significantly influence the future of accounting by identifying research avenues of interest and developing topics through the use of maps and thematic analyses.

The research also emphasizes the role of automation in reducing errors and increasing the efficiency of accounting data processing. New technologies such as blockchain and cloud computing are bringing important changes to the way financial data is managed within companies.

However, implementing these technologies and training employees to use them remain significant challenges for organizations.

In conclusion, digitization and innovation are becoming fundamental elements for redefining organizational structures and business models, in a context where technology and accounting are becoming increasingly interconnected, thus preparing a future where the two fields are deeply integrated.

Bibliographical references.

1. Agusti, M., & Orta-Perez, M. (2022, July 6). Big Data and Artificial Intelligence in the Fields of Accounting and Auditing: A Bibliometric Analysis. Spanish Journal of Finance and Accounting.
2. Barna, L.E.L., Ionescu, B.Ș. & Hurducaci Gorea, C.C. Professional Skills of Future Accountants Working in a Digitized Environment Dominated by ERP Systems or Artificial Intelligence. Proceedings of the International Conference on Business Excellence, 2024, The Bucharest University of Economic Studies, vol. 18 no. 1, pp. 1290-1305. https://doi.org/10.2478/picbe-2024-0107
3. Berdiyeva O, Islam M.U. Saeedi M, 2021 „Artificial Intelligence in Accounting and Finance: Meta-Analysis" International Business Review, 2021, https://www.researchgate.net/publication/353641654_Artificial_Intelligence_in_Accounting_and_Finance_Meta-Analysis
4. Chukwudi, O., Echefu, S., Boniface, U., & & Victoria, C. (2018). Effect of Artificial Intelligence on the Performance of Accounting Operations among Accounting Firms in South East Nigeria. Asian Journal of Economics, Business and Accounting, 7, 1-11.
5. Coman, D.M.; Ionescu, C.A.; Duică, A.; Coman, M.D.; Uzlau, M.C.; Stanescu, S.G.; State, V. Digitization of Accounting: The Premise of the Paradigm Shift of Role of the Professional Accountant. Appl. Sci. 2022, 12, 3359. https://doi.org/10.3390/app12073359
6. Emetaram, E., & Uchime, H. N. (2021). Impact of Artificial Intelligence (AI) on Accountancy Profession. Journal of Accounting and Financial Management, 7, pp. 15-25.
7. Fernandez, D., & Aman, A. (2018). Impacts of Robotic Process Automation on Global Accounting Services. Asian Journal of Accounting (doi.org) and Governance, 9.
8. Goncalves, M.J.A., Ferreira da Silva, A.C., Ferreira, C.G. (2022), The Future of Accounting: HowWill Digital Transformation Impact the Sector?, Informatics 2022, 9, 19,https://doi.org/10.3390/informatics9010019

9. Gulin, D., Hladika, M., Valenta, I. (2019), Digitalization and the Challenges for the AccountingProfession, Entrenova, no. 12-14
10. Hassan, R.A. (2022). Artificial Intelligence (AI) in accounting & auditing: A Literature review.Open Journal of Business and Management 10:440-65
11. Mates, D., & Irimus, R. M. (2020, 12). Profesia contabilă în contextul globalizării. CECCAR BUSINESS REVIEW, pp. 58-63.
12. Moll, J., & Yigitbasioglu, O. (2019). The role of internet-related technologies in shaping the work of accountants: New directions for accounting research. The British Accounting Review, 51(6).
13. Saleh, M. M., Jawabreh, O. A., Hamadneh, N. N., Tahir, M., Al Omari, R., & Shnieka, N. (n.d.). The Effect of Artificial Intelligence (AI) on the Quality and Interpretation of Financial Statements in the Hotels Classifiedin the AQABA Special Economic Zone (ASEZA). preprints.org > doi: 10.20944/preprints202105.0541.v1.
14. Zhang, Y., Xiong, F., Xie, Y., Fan, X., & Gu, H. (2020). The Impact of Artificial Intelligence and Blockchain on the Accounting Profession. IEEE Access, 8.