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A BIBLIOMETRIC ANALYSIS OF THE INTERSECTION BETWEEN ARTIFICIAL INTELLIGENCE AND ACCOUNTING

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ABSTRACT

Purpose: *This study explores the evolving research landscape at the intersection of Accounting and Artificial Intelligence. It aims to identify key trends, influential journals, and emerging topics in this field.*
Methodology: *The research employs bibliometric analysis. The approach consists of a methodical exploration utilizing keywords such as "Artificial Intelligence," and "Accounting" along with a three-part research process: creating a strategy, formulating research questions, and refining search results based on specific inclusion and exclusion criteria.*
Findings: *The examination uncovers important findings about integration of AI and accounting studies. Sweden is identified as a frontrunner in total references, while the United States leads in terms of publication frequency. Journals like the 'Journal of Emerging Technologies in Accounting' and the 'International Journal of Accounting Information Systems' significantly contribute to the field's body of knowledge. The word cloud analysis accentuates significant thematic elements, highlighting terms such as "Accounting," "Artificial Intelligence," and "Technology."*
Practical implications: *Trends and influential journals provide valuable insights for researchers, practitioners, and educators to understand the practical implications of AI in accounting.*
Originality/value: *This research adds to the novelty of the discipline by presenting a thorough summary of AI and accounting studies*
KEYWORDS: *Artificial Intelligence, Accounting, Technology, Bibliometric Analysis, Audit*

1. INTRODUCTION

Artificial Intelligence is a branch of science and technology that focuses on creating and developing intelligent machines and systems. These machines and systems are designed to perform tasks that typically require human intelligence, such as problem-solving, decision-making, natural language processing, and pattern recognition (Qu, 2021). Artificial Intelligence, often abbreviated as AI, is a rapidly growing field that has revolutionized various industries. It encompasses a wide range of technologies and techniques aimed at simulating human cognitive abilities, including learning, reasoning, and perception. AI systems are designed to analyze and interpret complex data, automate repetitive tasks, and adapt to changing environments. One of the key components of AI is machine learning, where algorithms are trained to recognize patterns and make predictions based on data.

The use of AI in accounting offers numerous benefits, including time savings, faster data analysis, increased accuracy, deeper business insights, enhanced client service, improved productivity, efficiency, customer service, and flexible working styles(Lee & Tajudeen, 2020),(Munoko et al., 2020). However, the adoption of AI in accounting is still relatively low, and there are concerns about the ethical implications and risks associated with this technology (Munoko et al., 2020). Despite these challenges, AI is expected to significantly impact the accounting profession, leading to changes in job roles and the need for new skills (Stancu & Dutescu,2021).

This has applications in accounting, where AI can be utilized to automate routine financial tasks, detect anomalies, and improve forecasting accuracy. In the context of accounting, AI has the potential to streamline processes, reduce errors, and provide valuable insights from large volumes of financial data. This can ultimately enhance decision-making and resource allocation within organizations. By leveraging AI technologies,

accountants can focus on higher-value tasks that require human judgment while delegating mundane tasks to intelligent systems.

The integration of AI and accounting is a rapidly evolving area, and staying informed about the latest developments and applications in AI is essential for professionals in the accounting domain.

Artificial intelligence is more effective than natural intelligence since it is more enduring, reliable, less costly, demonstrable, and convenient to replicate and propagate. The use of artificial intelligence in the field of accounting has the ability to revolutionize every aspect of the economy and society as a whole (Török, 2022). The integration of AI in accounting has the potential to revolutionize the field by streamlining processes, improving accuracy, and enhancing efficiency (Peng, 2019). Artificial intelligence can automate repetitive tasks, analyze large amounts of data quickly and accurately, detect patterns and anomalies, and provide valuable insights for decision-making (Qu, 2021). These advancements in AI technology have the potential to greatly enhance the field of accounting by improving financial reporting accuracy, streamlining auditing processes, detecting fraudulent activities, and improving overall financial management. The use of artificial intelligence in accounting is steadily growing and has the potential to greatly impact the profession (Kindzeka & C., 2023). In recent years, the application of artificial intelligence in the field of accounting has become more extensive and in-depth (Peng, 2019). Research studies have focused on various aspects of AI in accounting, such as its impact on financial reporting, auditing, fraud detection, and financial management (Mohammad et al., 2020). The increasing use of AI in accounting has been driven by its potential to revolutionize the field and improve competitiveness, risk management, efficiency, and error reduction in accounting processes (Hasan, 2022). Overall, the integration of artificial intelligence in accounting has the potential to transform the profession by enhancing efficiency, accuracy, and decision-making capabilities (Kindzeka & C., 2023).

Bibliometric analysis is particularly useful in AI and accounting research for several reasons. First, it allows researchers to identify the most influential authors and publications in these fields. This helps researchers stay updated on the latest advancements and connect with experts in the field. Second, bibliometric analysis helps identify emerging topics and research trends in AI and accounting . This is important for researchers to understand where research is heading and identify potential gaps or opportunities for future studies. Additionally, bibliometric analysis can help evaluate the impact and influence of research in AI and accounting. By analyzing citation patterns and publication data, researchers can assess the visibility and dissemination of their work, as well as track how their research is being cited and used by other researchers. Lastly, bibliometric analysis allows for a systematic approach to understanding the intersection between AI and accounting.

2. RESEARCH METHODOLOGY

The study employs a bibliometric approach to identify current trends in research and potential areas for future study. Since (Pritchard,1969) popularized this method, it has gained significant traction among scholars. Bibliometrics involves the analysis of published data, employing mathematical and statistical techniques to understand publication patterns such as citation analysis and bibliometric coupling. Furthermore, bibliometric methods utilize bibliographic data to create a structural model of a particular topic or theme. The authors utilized a three-step research procedure involving identifying relevant keywords and databases, gathering data, and conducting an analysis to derive detailed results as described in subsequent subsections. The study aimed to provide an overview of the current role of artificial intelligence in accounting, auditing, and financial reporting.

2.1 Establish a Strategy

We also utilized the approach outlined by Jesson et al. (2011, p. 12) in our investigation, which encompasses these stages:

1. Formulate a clear and specific research inquiry
2. Define a detailed plan of action
3. Conduct an extensive literature search using various sources
4. Apply rigorous inclusion and exclusion criteria
5. Evaluate the quality of selected studies - Examine and analyze the results thoroughly.

2.2 Research question

The research question for this bibliometric analysis was formulated as follows:

1. Which regions are conducting research in the field of AI and accounting?
2. What are the journals and impact of them in the area of artificial intelligence and accounting?
3. What are the emerging research themes and trends in the field of artificial intelligence and accounting?
4. What trends have emerged in AI and accounting research over the past four decades?

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2.3 Search for Pertinent Academic Sources

We decided to utilize dimensions.ai as our primary source for content in order to ensure the scientific rigor and inclusivity of our research. To encompass a broad range of perspectives, we created an initial set of keywords related to our study topic: Artificial intelligence, Accounting, Accounting technology, Auditing, Accounting profession and AI. Our selection was limited to articles in the fields of Accounting and Auditing with a focus on Commerce Management, Tourism and Services. Furthermore, publications written in languages other than English between 1983 and 2023 were excluded to reduce comprehension difficulties and promote replicability within the global community.

2.4 Refine the search results by using inclusion and exclusion criteria

We extensively analyzed the titles, abstracts, and keywords when necessary to assess the significance of publications and exclude those considered irrelevant. We identified 2249 articles deemed relevant through our content analysis in response to our research queries. We assessed the significance of each article, taking into account factors such as writing type (e.g., article, conference proceedings, book, chapter), total citations, and citations per year. Our assessment also involved evaluating the relative influence of the articles within their specific study topics/areas without strict quantitative guidelines. Subsequently, we excluded 135 papers that were deemed less relevant from further analysis. We also removed all duplicate articles and any articles in languages other than English. Additionally, we faced challenges accessing 26 publications as they were not available through our institution. Consequently, we considered 2048 full-text papers for the final analysis.

2.5 PRISMA Diagram

The method utilized for the bibliometric analysis entailed gathering and examining data from the dimension.ai database by conducting a systematic search in the title, abstract, and keywords using "Artificial intelligence" and "accounting" as key terms. The search was restricted to articles from journals of Accounting, Auditing, and Accountability within the time frame spanning from 1983 to 2023. The database returned 2,249 matches as a result of this search. The retrieved articles were then further filtered based on relevance, resulting in a final dataset of 2,048 articles. Figure 1 shows the steps we followed when utilizing a flow diagram to represent the flow of information throughout the stages of a systematic review. It presents the quantity of records identified, included, and excluded, along with the reasons for exclusions.

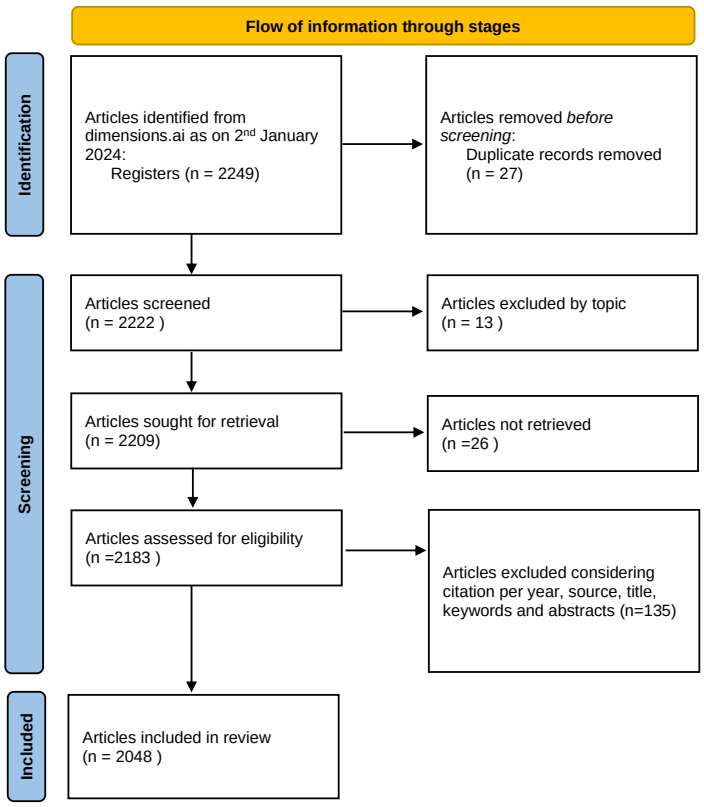


Figure 1 Source – (Page et al., 2021

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3. RESULTS FROM BIBLIOMETRIC

3.1 Most cited countries

The figure 2 Shows The Total Citations (TC) of top 5 countries.Sweden has the highest total citations (TC = 120) and average article citations(120 per article) overall. This suggests Swedish publications have made the most significant scholarly impact. The United States ranks second in total citations (TC = 58) but lower in average article citations (14.5 per article). This implies the US produces high citation totals through publishing a greater number of papers, versus the very high per article impact of Swedish publications. Germany, Switzerland, and the Netherlands follow with far lower totals and averages. In summary, sweden leads in per article influence, indicating a strong research concentration. Meanwhile the US model relies on high output to drive citations.

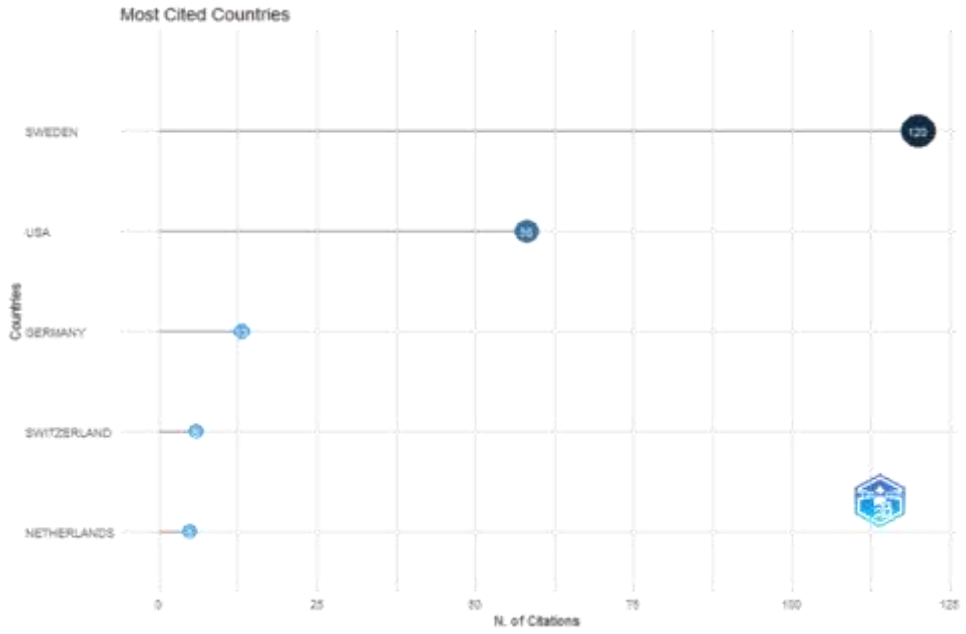


Figure 2

3.2 Countries scientific production

Region	Frequency
USA	440
UK	184
CHINA	113.5
AUSTRALIA	111
ITALY	75
CANADA	63
GERMANY	60
INDONESIA	60
INDIA	47
MALAYSIA	44

Table 1

This table 1 shows the frequency(Freq) of publications from top 10 countries. The United States has the highest frequency of publication overall (Freq = 440), reflecting its substantial research output and influence. The UK follows as the leading European source (Freq = 184). China leads Asian nations (Freq = 114), slightly outpacing Australia (Freq = 111) globally. Among other regions, Italy represents Southern Europe (Freq = 75), Canada Northern America (Freq = 63), Germany Western/Central Europe (Freq = 60), and India South Asia (Freq = 47). Indonesia and Malaysia follow for Southeast Asia. In summary, the bibliometric analysis on AI and accounting revealed that Sweden has the highest total citations, indicating significant scholarly impact in this field. Furthermore, the United States has the highest frequency of publication, reflecting its substantial research output and influence in the intersection of AI and accounting.

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3.3 Influential Top Ten Academic Journals in Research

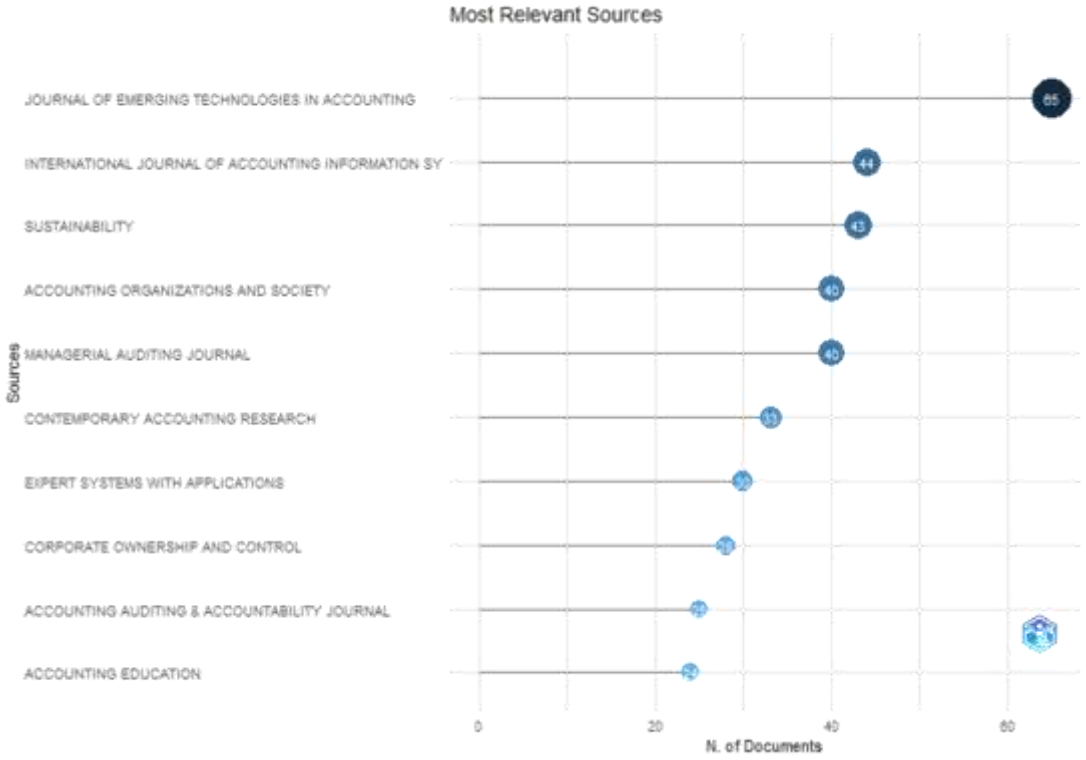


Figure 3

The chart in Figure 3 displays the leading ten journals that have published papers on the subject of Artificial Intelligence in accounting. Out of over 600 journals that have contributed to this topic, the journal with the highest number of articles is 'JOURNAL OF EMERGING TECHNOLOGIES IN ACCOUNTING' with a total of 65 articles. It is followed by 'INTERNATIONAL JOURNAL OF ACCOUNTING INFORMATION SYSTEMS' with 44 articles. Together, these three top journals ('JOURNAL OF EMERGING TECHNOLOGIES IN ACCOUNTING', 'INTERNATIONAL JOURNAL OF ACCOUNTING INFORMATION SYSTEMS', and 'SUSTAINABILITY') represent approximately 47.06% of all published papers on this subject matter.

3.4 Source Local Impact

Element	h_index	g_index	m_index	TC	NP
ACCOUNTING ORGANIZATIONS AND SOCIETY	25	40	0.55555556	2822	40
JOURNAL OF EMERGING TECHNOLOGIES IN ACCOUNTING	25	46	1.19047619	2201	65
INTERNATIONAL JOURNAL OF ACCOUNTING INFORMATION SYSTEMS	24	44	1	2244	44
MANAGERIAL AUDITING JOURNAL	18	30	0.46153846	915	40
ACCOUNTING AUDITING & ACCOUNTABILITY JOURNAL	16	25	0.53333333	879	25
ACCOUNTING HORIZONS	14	14	0.73684211	1178	14
DECISION SUPPORT SYSTEMS	14	17	0.4516129	1493	17
EXPERT SYSTEMS WITH APPLICATIONS	14	30	0.41176471	1203	30
JOURNAL OF INFORMATION SYSTEMS	13	19	0.5	1222	19
BUSINESS STRATEGY AND THE ENVIRONMENT	12	17	2	657	17

Table 2

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This table outlines important bibliometric indicators for the top 10 most influential accounting research journals from 1983 to 2023. The analyzed parameters include h-index, g-index, m-index, total citations, and number of publications. The journal with the highest h-index is Accounting, Organizations and Society (h=25), suggesting that it has published a noteworthy number of highly cited papers. On the other hand, Business Strategy and the Environment has the highest g-index value (g=17), indicating a larger number of well-received articles.

In terms of citation impact, Accounting, Organizations and Society also leads in total citations (TC=2822), demonstrating its extensive influence and readership. Additionally,,Business Strategy andthe Environment holds thehighest m- index as a measure of publication efficiency(m=2), implying that it produces highly cited papers relative to its size.

Overall established journals introduced in the years ranging from 1980s to1990s such as Accounting Organizations and Society and Accounting Horizons excel across various impact metrics. However, newer entrants published after 2000 such as Journal of Emerging Technologies in Accounting & International Journal related to accounting information systems display rapid growth and significance.

3.5 Title Analysis - Generating a Word Cloud



Figure 4

The Word cloud, as presented in Figure 4, illustrates a type of bibliometric mapping that aims to identify the frequency and patterns of co-occurring terms or keywords within scholarly literature. This approach involves comparing the occurrence frequency of each term or keyword in the literature, ultimately revealing important themes and the thematic structure of a research field. In this analysis, multiple keywords were analyzed for co-occurrences, with each term requiring at least 5 occurrences. The top five identified keywords are "Accounting," "Artificial", "Intelligence," "Technology," and "Impact" with frequencies of 230, 173, 169 ,65 and 46 respectively.

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3.6 Word frequency: changes in abstracts and titles over time.

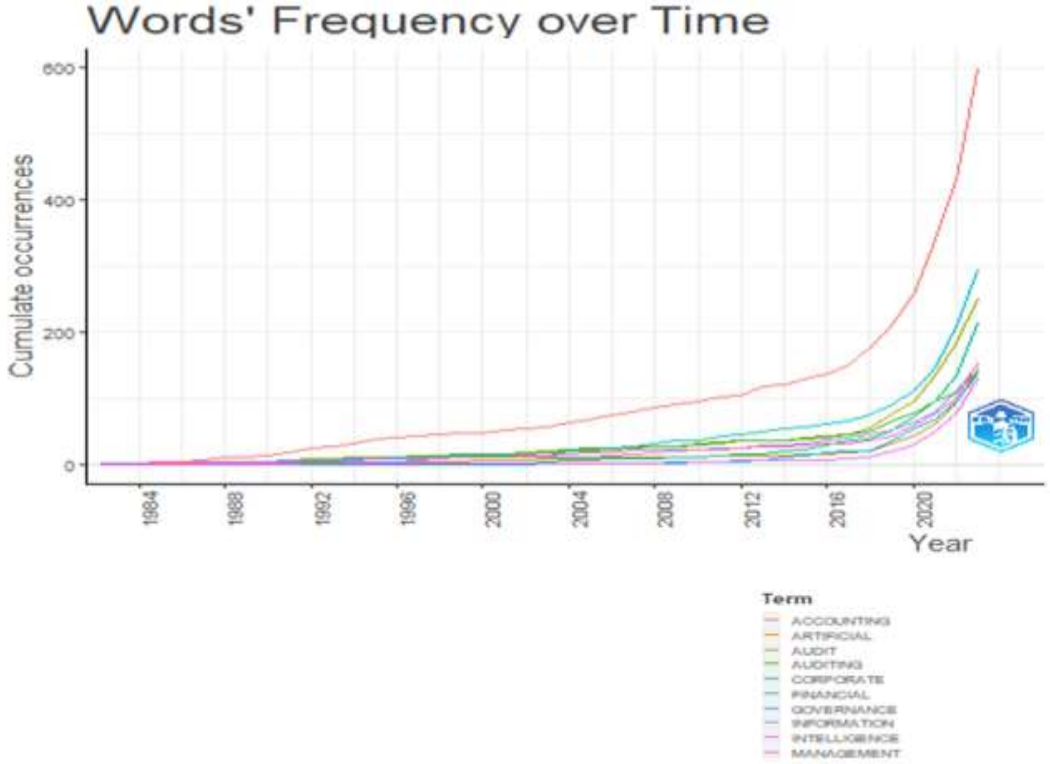


Figure 5

Figure 5 depicts a study of the frequency of words in article titles and abstracts, highlighting the common trends and key terms used during a specific period. The term "Accounting" was consistently dominant over four decades. In 2023, the most prevalent words were: ACCOUNTING, FINANCIAL, AUDIT, CORPORATE, MANAGEMENT, INFORMATION, ARTIFICIAL INTELLIGENCE, AUDITING, GOVERNANCE, and with frequencies of 598 ,294 ,251 ,214 ,153 ,150 142 ,141 ,135,,and 129 respectively.

3.7 Overall growth in publications

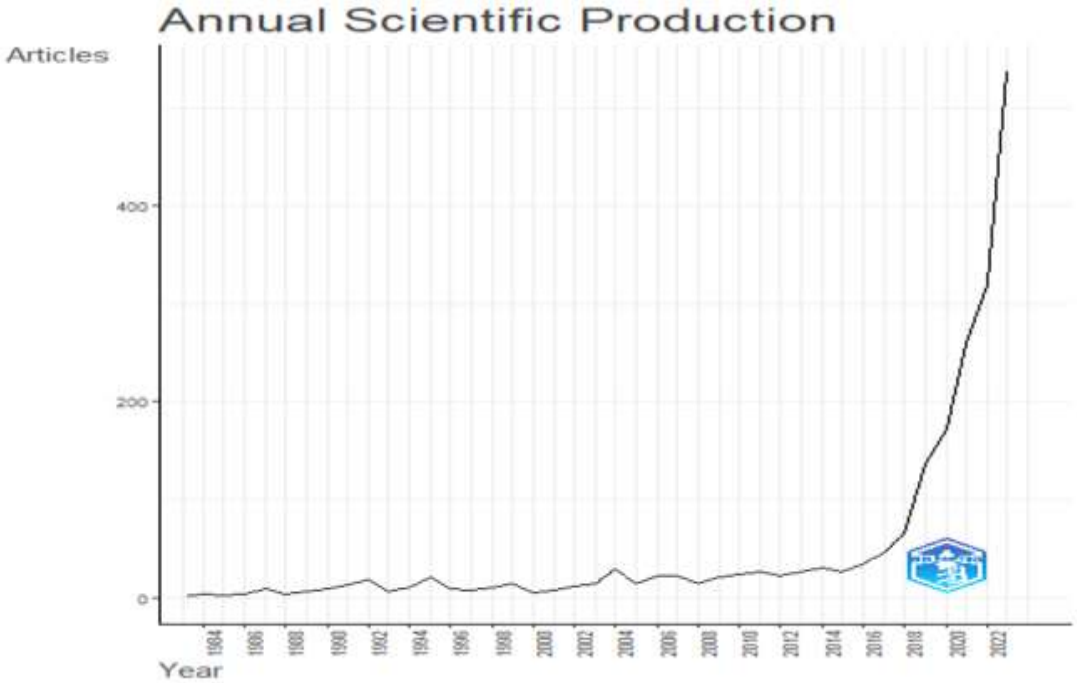


Figure 6

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Figure 6 presents the frequency of publications on "Artificial Intelligence in accounting" from 1983 to 2023. It is evident that there has been a noticeable growth in the number of publications over the years, with a sharp increase after 2019. The most successful publication years were observed to be 2022 and 2023, during which the highest numbers of papers were published - specifically, 537 and 320 respectively. This demonstrates a strong upward trend in research output related to artificial intelligence in accounting.

3.8 Annual Citation

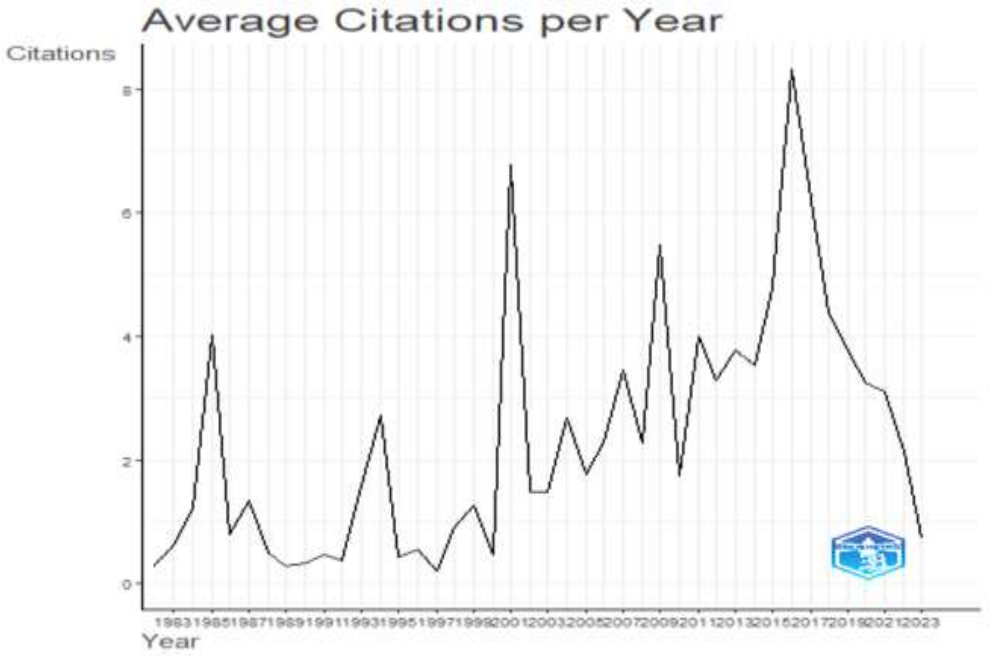


Figure 6

This figure examines the average total number of citations per article and per year for papers published between 1983 and 2023. The data shows that the highest Mean TC per article was observed in 1983 at 50.25 citations, while the peak Mean TC per year occurred in 2017 with 6.22 citations.

Analyzing this specific time span reveals a consistent pattern where older papers tend to accumulate more citations over time. For example, papers published in 1983 had an average of 0.62 Mean TC per year by the end of 2023 (40 years after publication), whereas those published in the same year as the dataset indicated only a mean of just o.o74 by that time. This trend highlights how older publications require more time to gather citations.

The variation in Mean TC across publication years from 1983-2023 suggests differences due to sample sizes, fields of research, and citation practices evolving over time. Notably higher values during certain periods like mid-1980s and early2000s perhaps indicate growth surges within specific research domains.

In summary, older papers generally amass more citations due to their longer existence but vary because shifts occur within field norms, practices, and sample size standards throughout this period.

4. CONCLUSION AND FUTURE PROSPECTS

In conclusion, the analysis of the intersection between artificial intelligence and accounting has provided valuable insights into the global landscape of research and publication trends. Sweden emerged as the leader in total citations, underscoring its significant scholarly impact in this field. The United States, on the other hand, demonstrated the highest frequency of publication, indicating its substantial research output and influence.

The identification of influential academic journals revealed that 'JOURNAL OF EMERGING TECHNOLOGIES IN ACCOUNTING' and 'INTERNATIONAL JOURNAL OF ACCOUNTING INFORMATION SYSTEMS' were among the top contributors in this field, representing a significant portion of all published papers on the subject matter. The exploration of bibliometric indicators for the top 10 influential accounting research journals further emphasized the impact of established journals from the 1980s to 1990s and the rapid growth and significance of newer entrants published after 2000.

Additionally, the word cloud analysis highlighted key thematic elements, with "Accounting," "Artificial", "Intelligence," and "Technology" emerging as prominent themes within the literature. Finally, the analysis of word frequency in titles and abstracts revealed the prevalent terms in 2023, offering insights into the evolving focus areas within the intersection of artificial intelligence and accounting.

The examination of publication growth over the years depicted a notable increase in the number of publications, particularly after 2019. The years 2022 and 2023 stood out as the most successful in terms of published papers, reflecting a strong upward trend in research related to artificial intelligence in accounting. Furthermore, the examination of annual citation trends showcased the evolution of citation practices over four decades, demonstrating how older papers tend to accumulate more citations over time but also emphasizing variations influenced by shifts in field norms and practices.

Future prospects in this area of study may involve a deeper investigation into the specific impact of artificial intelligence on accounting practices and the potential implications for the field. Moreover, continued monitoring of publication trends and thematic shifts can provide further understanding of the dynamic nature of research in this domain.

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