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The Impact of New Technologies on the Accounting Profession:

A Bibliometric Review

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Abstract: This article aims to analyze the scientific production on the impact of new technologies, such as blockchain, big data and artificial intelligence, on the professional day-to-day of accountants, quantifying the articles published by year, title of origin, citation, journal impact, as well as identifying publications by author, affiliation, and country. 71 studies are analyzed using bibliometric techniques supported by the VOSviewer software. From the main conclusions, it appears that the journal with the most articles published on the subject is the Journal of Emerging Technologies in Accounting, with 11 published papers and the most influential author in the area and with one of the best h-index is Miklos Vasarhelyi.

Keywords: accountants; accounting; bibliometrics; technology

1 Introduction

In the last decade, companies have started to accumulate huge amounts of data digitally (Perkhofer et al., 2019). Working this data correctly brings opportunities and knowledge, hitherto difficult to attain (Raffoni et al., 2018). It can be stated that currently the effects of technology are clearly felt in all professions (Türegün, 2019).

Over the last 20 years technology has brought improvements in the service capabilities and efficiency of accountants, however the change is far from over and radical changes are coming (Türegün, 2019) . However, it is found that there is still little attention

from researchers regarding the implications and changes brought about by these technologies in the day-to-day life of accountants (Moll & Yigitbasioglu, 2019).

In this sense, the objective of this article is to present an overview of the research that has been carried out on the impact of new technologies on accounting professionals, through the use of bibliometric techniques. This research is carried out by searching for relevant keywords in the area, such as, (i) blockchain, (ii) big data, (iii) artificial intelligence. This search is based on articles indexed in a database of scientific quality such as Scopus. The application of bibliometry in business-related areas is relatively new and, in many cases, underdeveloped (Donthu et al., 2021).

The present work is divided into 5 chapters. The first chapter concerns the introduction. In the next section a literature review is performed, where a framework of the theme is presented. Next, the research methodology is described, the results and the main conclusions of the study are presented.

2 Literature Review

Accounting professionals have come a long way, as far as the evolution of the profession is concerned (Schmitz & Leoni, 2019). In this regard, tools such as blockchain have come to revolutionize the industry (Schmitz & Leoni, 2019), as blockchain and big data are the emerging technologies featured prominently in business (Muheidat et al., 2022).

Blockchain is a digital ledger (Kokina et al., 2017), which through a digital system that uses algorithms to store data and verify transactions (Bonsón & Bednárová, 2019). In an accounting information system supported by blockchain the recorded transactions can be aggregated into financial statements and confirmed as true and accurate (Tan & Low, 2019). Records are stored in blocks and maintained on multiple computers connected via a peer-to-peer network (Bonsón & Bednárová, 2019). Thus, currently, there are several questions, especially about blockchain adoption and its outcomes (Ferri et al., 2020). It is implied that, a blockchain-based accounting information system will likely benefit accounting professionals, but to say that it can transform the profession seems premature for now (Tan & Low, 2019).

Big data on the other hand makes it possible to store and organize large amounts of data with high efficiency (Angrave et al., 2016). If previously companies had to manage very sparse data, today the problem is to work the huge volume of data and metadata (Krahel & Titera, 2015). The processing of this data has been improving in order to be able to extract commercial value[1] from it (Zhang et al., 2020). Big data will have increasingly important implications for accounting (Warren et al., 2015) since it is a huge ally as a source of financial data that supports decision making (Zhang et al., 2020).

In management accounting Big Data will contribute to the development and evolution of effective management control systems and budgeting processes (Warren et al., 2015). And in financial accounting, Big Data will help improve the quality and relevance of accounting information, thereby increasing transparency, and contributing to decision

[1] Through data analysis it is possible to better understand the business environment in which companies, consumers and competitors operate (Zhang et al., 2020).

making (Warren et al., 2015). It should be emphasized that in the world of big data accountants remain important in value creation (Richins et al., 2017).

Today human involvement is implicit in accounting and auditing (Schmitz & Leoni, 2019). There may, however, be concerns or predicted changes (Moll & Yigitbasioglu, 2019; Schmitz & Leoni, 2019) but the accounting profession will remain, however, these tools will certainly be very useful as a complement and way to improve management accounting, financial accounting and auditing tasks (Moll & Yigitbasioglu, 2019). Blockchain can contribute to this change, as it can carry not only real-time transactional data, but also a programmed version of human action, so-called smart contracts (Schmitz & Leoni, 2019).

Accountants must improve their skills to be able to implement and use these new technologies in organizations (Moll & Yigitbasioglu, 2019). For this to be possible, mastering technologies such as artificial intelligence becomes essential (Schmitz & Leoni, 2019). Therefore, having technical skills in blockchain, big data and artificial intelligence besides being fundamental for the evolution of accounting professionals, can prevent information technology professionals from replacing accountants (Qasim & Kharbat, 2020). There is no point in ignoring evolution, nor trying to beat artificial intelligence, but rather using the good that technology has to offer to obtain even better results in decision making (Sutton et al., 2018).

3 Methodology

This section introduces bibliometry, the methodology used in this work.

3.1 Bibliometrics

Bibliometrics is a methodology for analyzing bibliographic material from a quantitative perspective (Merigó et al., 2015; Merigó & Yang, 2017). This analysis has become popular and rigorous for exploring and analyzing large volumes of scientific data (Donthu et al., 2021). It is very useful for classifying information according to different variables, including journals, institutions, and countries (Merigó et al., 2015), and it helps to detect research trends (Donthu et al., 2021; Romanelli et al., 2021). Bibliometrics allows the organization of available knowledge within a specific scientific discipline (Merigó & Yang, 2017). In this sense, bibliometrics helps in providing summarized information on a given subject (Romanelli et al., 2021).

Bibliometric analysis techniques include two categories, (i) performance analysis[2] and (ii) scientific mapping[3] (Donthu et al., 2021). Performance analysis considers the contributions of article authors, while scientific mapping focuses on the relationships between article authors (Donthu et al., 2021). Performance analysis can be found in most studies because it is standard practice to observe the performance of different research components (e.g., authors, institutions, countries, and journals) (Donthu et al., 2021).

[2] Performance analysis can be found in most reviews, even those that are not dedicated to scientific mapping, because it is standard practice in reviews to present the performance of different research components (e.g., authors, institutions, countries, and journals) (Donthu et al., 2021).

[3] Scientific mapping techniques include citation analysis, co-citation analysis, bibliographic coupling, co-word analysis, and co-authorship analysis (Donthu et al., 2021).

In this study, we emphasize the impact of a publication, which is determined by the number of citations it receives (Donthu et al., 2021). Thus, we analyze the number of citations to obtain the most influential publications in the area in which we developed the study.

The analysis of journals is especially important to decide which ones to pay more attention to when performing a literature review, but also to know the area of publication of each one (Rey-Martí et al., 2016). In this sense, we analyze the number of publications in each journal, the number of citations and its h-index[4] .

In the analysis of authors, we observe the h-index, since this metric groups the total number of articles published by an author and the citations they obtain (Donthu et al., 2021; Thomaz et al., 2011). Thus, a researcher with 10 published articles, each of which received at least 10 citations, has an h-index of 10 (Barnes, 2017). This analysis is performed since the metric corresponds to a popular topic in bibliometric research (Barnes, 2017).

The analysis of co-authorship among researchers allows the analysis of relationships between authors, periods, and the analysis of intellectual development (Donthu et al., 2021). This evaluation allows presenting future researchers with valuable information, particularly in identifying key researchers in each research area (Donthu et al., 2021).

The keyword network analysis is very powerful for emerging research areas, because this method depends on the content of the articles and no article will be missed (Madani & Weber, 2016). In this sense, since this study intends to analyse new technologies in the accounting profession, this analysis is considered important. Thus, cluster analysis is another technique for enriching bibliometric analysis whose main objective is to create thematic or social clusters (depending on the type of analysis being performed) (Donthu et al., 2021). In this analysis we verify the clusters that arise from the keywords.

The study ends with the analysis of co-citations. The benefit of using this analysis, besides allowing us to find the most influential publications is to get to the base studies of a certain theme (Donthu et al., 2021).

Next, the data collection method is described and presented.

3.2 Data Collection

The initial phase of a bibliometric analysis requires defining the keywords to be used in the search and identifying the source or sources for data collection. The data collection is performed in Scopus since it is a scientific database with high coverage of prestigious journals (Mongeon & Paul-Hus, 2016).

The search was performed on December 29, 2022. The keywords and filters used are presented in the following expression, extracted from the Scopus database: (TITLE-ABS-KEY (account*) AND TITLE-ABS-KEY (blockchain) OR TITLE-ABS-KEY ("big data") OR TITLE-ABS-KEY ("artificial intelligence") OR TITLE-ABS-KEY (ai) AND TITLE-ABS-KEY (profession)) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (

[4] Jorge Hirsch's h-index was developed in 2005 and relates the number of published articles to the number of citations (Romero-Torres et al., 2013). A journal has an index equal to h when h of its articles has received at least h citations each (Hernández-González et al., 2016).

SUBJAREA , "BUSI")) AND (LIMIT-TO (LANGUAGE , "English") OR LIMIT-TO (LANGUAGE , "Portuguese")).

The words were searched for in the title, abstract and keywords. In addition to being searched for the words "account*" and "profession", the words "big data", "blockchain", "artificial intelligence" and "AI" were included. The inclusion of these three terms linked to new technologies and the Internet is because they are considered those that have the potential to drastically change and disrupt the work of accountants and accounting researchers in the near future (Moll & Yigitbasioglu, 2019).

3.3 Data processing

Data analysis will be performed using the VOSviewer software. VOSviewer is a freely available computer program for building and viewing bibliometric maps (Castillo-Vergara et al., 2018; van Eck & Waltman, 2010).

VOSviewer's functionality is especially useful for displaying large bibliometric maps in a way that is easy to interpret (van Eck & Waltman, 2010).

4 Results Analysis

The Scopus database search yielded 71 articles. The results obtained are shown in table 1. In total the articles were cited 1625 times and the year of publication is between 1986 and 2022. Of the articles under analysis, 11 have no citations yet, which may be explained by the fact that they are still recent articles.

Table 1. Sample Size

Article Title	Authors	Publication Year	Journal	Nº Citations
HR and analytics: why HR is set to fail the big data challenge	Angrave, D., Charlwood, A., Kirkpatrick, I., Lawrence, M., Stuart, M.	2016	Human Resource Management Journal	207
How big data will change accounting	Warren, J.D., Moffitt, K.C., Byrnes, P.	2015	Accounting Horizons	163
Consequences of big data and formalization on accounting and auditing standards	Krahel, J.P., Titera, W.R.	2015	Accounting Horizons	109
The role of internet-related technologies in shaping the work of accountants: New directions for accounting research	Moll, J., Yigitbasioglu, O.	2019	British Accounting Review	107
Accounting and Auditing at the Time of Blockchain Technology: A Research Agenda	Schmitz, J., Leoni, G.	2019	Australian Accounting Review	106
Big data analytics: Opportunity or threat for the accounting profession?	Richins, G., Stapleton, A., Stratopoulos, T.C., Wong, C.	2017	Journal of Information Systems	101
Data analytics in auditing: Opportunities and challenges	Earley, C.E.	2015	Business Horizons	94
The Ethical Implications of Using Artificial Intelligence in Auditing	Munoko, I., Brown-Liburd, H.L., Vasarhelyi, M.	2020	Journal of Business Ethics	64
An accounting information systems perspective on data analytics and big data	Huerta, E., Jensen, S.	2017	Journal of Information Systems	58
Blockchain as the Database Engine in the Accounting System	Tan, B.S., Low, K.Y.	2019	Australian Accounting Review	41
Thinking Outside the Block: Projected Phases of Blockchain Integration in the Accounting Industry	Karajovic, M., Kim, H.M., Laskowski, M.	2019	Australian Accounting Review	37
Blockchain technology, business data analytics, and artificial intelligence: Use in the accounting profession and ideas for inclusion into the accounting curriculum	Qasim, A., Kharbat, F.F.	2020	Journal of Emerging Technologies in Accounting	36

Applying deep learning to audit procedures: An illustrative framework	Sun, T.S.	2019	Accounting Horizons	30
The current state and future direction of IT audit: Challenges and opportunities	Dzuranin, A.C., Mălăescu, I.	2016	Journal of Information Systems	29
Big Data Analytics and Other Emerging Technologies: The Impact on the Australian Audit and Assurance Profession	Kend, M., Nguyen, L.A.	2020	Australian Accounting Review	28
Relevance of big data to forensic accounting practice and education	Rezaee, Z., Wang, J.	2019	Managerial Auditing Journal	27
How much automation is too much? Keeping the human relevant in knowledge work	Sutton, S.G., Arnold, V., Holt, M.	2018	Journal of Emerging Technologies in Accounting	26
Big Data information governance by accountants	Coyne, E.M., Coyne, J.G., Walker, K.B.	2018	International Journal of Accounting and Information Management	25
Interactive visualization of big data in the field of accounting: A survey of current practice and potential barriers for adoption	Perkhofer, L.M., Hofer, P., Walchshofer, C., Plank, T., Jetter, H.-C.	2019	Journal of Applied Accounting Research	25
Using blockchain to aggregate and share misconduct issues across the accounting profession	Sheldon, M.D.	2018	Current Issues in Auditing	23
Blockchain in Accounting Research and Practice: Current Trends and Future Opportunities*	Pimentel, E., Boulianne, E.	2020	Accounting Perspectives	22
Overview and impact of blockchain on auditing	Bonyuet, D.	2020	International Journal of Digital Accounting Research	22
Utilizing blockchain and smart contracts to enable audit 4.0: From the perspective of accountability audit of air pollution control in China	Dai, J., He, N., Yu, H.	2019	Journal of Emerging Technologies in Accounting	20
A profession in transition: actors, tasks and roles in AI-based accounting	Leitner-Hanetseder, S., Lehner, O.M., Eisl, C., Forstenlechner, C.	2021	Journal of Applied Accounting Research	19
The role of business analytics in the controllers and management accountants' competence profiles: An exploratory study on individual-level data	Oesterreich, T.D., Teuteberg, F.	2019	Journal of Accounting and Organizational Change	17
Using visualization software in the audit of revenue transactions to identify anomalies	Cunningham, L.M., Stein, S.E.c	2018	Issues in Accounting Education	15
Ascertaining auditors' intentions to use blockchain technology: evidence from the Big 4 accountancy firms in Italy	Ferri, L., Spanò, R., Ginesti, G., Theodosopoulos, G.	2020	Meditari Accountancy Research	14
The robots are coming …but aren't here yet: The use of artificial intelligence technologies in the public accounting profession	Bakarich, K.M., O'brien, P.E.	2021	Journal of Emerging Technologies in Accounting	13
Blockchain architecture: A design that helps CPA firms leverage the technology	Vincent, N.E., Skjellum, A., Medury, S.	2020	International Journal of Accounting Information Systems	12
Impact of technology in financial reporting: The case of Amazon Go	Türegün, N.	2019	Journal of Corporate Accounting and Finance	11
Digital technology and changing roles: a management accountant's dream or nightmare?	Andreassen, R.-I.	2020	Journal of Management Control	11
Clinging to excel as a security blanket: Investigating accountants' resistance to emerging data analytics technology	Schmidt, P.J., Church, K.S., Riley, J.	2020	Journal of Emerging Technologies in Accounting	10
Working in contexts for which transparency is important: A recordkeeping view of explainable artificial intelligence (XAI)	Bunn, J.	2020	Records Management Journal	8
A framework for auditor data literacy: A normative position	Appelbaum, D., Scott Showalter, D., Sun, T., Vasarhelyi, M.A.	2021	Accounting Horizons	7
The Use of Blockchains to Enhance Sustainability Reporting and Assurance*	Bakarich, K.M., Castonguay, J.J., O'Brien, P.E.	2020	Accounting Perspectives	7
"Big results require big ambitions": big data, data analytics and accounting in masters courses	Mcbride, K., Philippou, C.	2022	Accounting Research Journal	7
A model to integrate data analytics in the undergraduate accounting curriculum	Qasim, A., Issa, H., El Refae, G.A., Sannella, A.J.	2020	Journal of Emerging Technologies in Accounting	7
Exploring the playground: Blockchain prototype use cases with hyperledger composer	Kinory, E., Smith, S.S., Church, K.S.	2020	Journal of Emerging Technologies in Accounting	7

Text mining using latent semantic analysis: An illustration through examination of 30 years of research at JIS	Guan, J., Levitan, A.S., Goyal, S.	2018	Journal of Information Systems	7
Reflections on the human-algorithm complex duality perspectives in the auditing process	Tiron-Tudor, A., Deliu, D.	2022	Qualitative Research in Accounting and Management	6
Disruptions of account planning in the digital age	Zimand Sheiner, D., Earon, A.	2019	Marketing Intelligence and Planning	6
The evolution of accounting technology education: Analytics to STEM	Moore, W.B., Felo, A.	2022	Journal of Education for Business	5
Twenty-first century skills in finance: prospects for a profound job transformation	Lavrinenko, A., Shmatko, N.	2019	Foresight and STI Governance	4
A Framework and Resources to Create a Data Analytics-Infused Accounting Curriculum	Dow, K.E., Jacknis, N., Watson, M.W.	2021	Issues in Accounting Education	4
Listening skills: Accountancy educators in retreat?	Reddrop, A., Mapunda, G.	2019	Australasian Accounting, Business and Finance Journal	3
Auditing in the 1990s: Implications for Education and Research	Elliott, R.K.	1986	California Management Review	3
The effect of emergent technologies on accountant`s ethical blindness	Sherif, K., Mohsin, H.	2021	International Journal of Digital Accounting Research	3
A framework model for continuous auditing in financial statement audits using big data analytics	Feung, J.L.C., Thiruchelvam, I.V.	2020	International Journal of Scientific and Technology Research	3
Teaching blockchain to accounting students	Stratopoulos, T.C.	2020	Journal of Emerging Technologies in Accounting	3
A Review of Big Data Research in Accounting	Aboagye-Otchere, F., Agyenim-Boateng, C., Enusah, A., Aryee, T.E.	2021	Intelligent Systems in Accounting, Finance and Management	2
Artificial intelligence in accounting: GAAP's "FAS133"	Le Guyader, L.P.	2020	Journal of Corporate Accounting and Finance	2
Accounting Research Opportunities for Cryptocurrencies	Vincent, N.E., Davenport, S.A.	2022	Journal of Emerging Technologies in Accounting	1
Exploring current opportunity and threats of artificial intelligence on small and medium enterprises accounting function; evidence from south west part of ethiopia, oromiya, jimma and snnpr, bonga	Abdi, M.D., Bayu, K.B.	2021	Academy of Accounting and Financial Studies Journal	1
The Impact of Artificial Intelligence on Expertise Development: Implications for HRD	Ardichvili, A.	2022	Advances in Developing Human Resources	1
The strategic transformation of accounting into a learned profession	Aldredge, M., Rogers, C., Smith, J.	2021	Industry and Higher Education	1
Accounting and non-financial firm data tokens in permissioned DLT networks	Ibáñez, E.M.	2021	International Journal of Intellectual Property Management	1
Artificial Intelligence: Reshaping the Accounting Profession and the Disruption to Accounting Education	Holmes, A.F., Douglass, A.	2022	Journal of Emerging Technologies in Accounting	1
Blockchain and the future of business data analytics	Heister, S., Kaufman, M., Yuthas, K.	2021	Journal of Emerging Technologies in Accounting	1
Audit data analytics, machine learning, and full population testing	Huang, F., No, W.G., Vasarhelyi, M.A., Yan, Z.	2022	Journal of Finance and Data Science	1
Big Data analytics and financial reporting quality: qualitative evidence from Canada	Saleh, I., Marei, Y., Ayoush, M., Abu Afifa, M.M.	2022	Journal of Financial Reporting and Accounting	1
Using Smart Contracts to Establish Decentralized Accounting Contracts: An Example of Revenue Recognition	Chou, C.-C., Hwang, N.-C.R., Schneider, G.P., (...), Li, C.-W., Wei, W.	2021	Journal of Information Systems	0
Emotional Intelligence, Intellectual Intelligence, And Spiritual Intelligence Towards Professional Quality Of Accountant Development Artificial Intelligence As A Moderating Variable In The Era Of Industrial Revolution 4.0	Prianthara, I.B.T., Darmawan, N., Adriati, I.G.A.W., Munidewi, I.A.B.	2021	Academy of Strategic Management Journal	0

Blockchain in accounting, accountability and assurance: an overview	Spanò, R., Massaro, M., Ferri, L., Dumay, J., Schmitz, J.	2022	Accounting, Auditing and Accountability Journal	0
Accounting Treatments for Cryptocurrencies in Malaysia: The Hierarchical Component Model Approach	Angeline, Y.K.H., Chin, W.S., Teoh Teng Tenk, M., Saleh, Z.	2021	Asian Journal of Business and Accounting	0
Clients' digitalization, audit firms' digital expertise, and audit quality: evidence from China	Rahman, M.J., Ziru, A.	2022	International Journal of Accounting and Information Management	0
Extent of artificial intelligence into accounting and auditing work - An analytical attempt of job and duties	Abukhader, S.M.	2020	International Journal of Business Process Integration and Management	0
Management accounting and the concepts of exploratory data analysis and unsupervised machine learning: a literature study and future directions	Nielsen, S.	2022	Journal of Accounting and Organizational Change	0
Smart ledger: The blockchain-based accounting information recording protocol	Zhang, Y., Pourroostaei Ardakani, S., Han, W.	2021	Journal of Corporate Accounting and Finance	0
The effects of blockchain technology on the accounting and assurance profession in the UAE: an exploratory study	Abdennadher, S., Grassa, R., Abdulla, H., Alfalasi, A.	2022	Journal of Financial Reporting and Accounting	0
Big Data Analytics Knowledge and Skills: What You Need as a 21st Century Accounting	Zin, Norlaila Mda; Kasim, Eley Suzanaa; Kasim E.S.; Kandasamy, Indra Devic; Khairani, Noor Sufiawatid;Noor, Noryati Mda;Sufian, Nur Insyirah Mohamede	2022	Management and Accounting Review	0
Factors Affecting the Use of Data Analytics in External Auditing	Jacky, Y., Sulaiman, N.A.	2022	Management and Accounting Review	0

The journals with the most published and most cited articles are presented in table 2. The journal with the most articles is the Journal of Emerging Technologies in Accounting, with 11. However, the journal with the most citations is Accounting Horizons. And the journal with the highest h-index is Journal of Business Ethics. The year with the most publications is 2020, as evidenced in Table 3.

Table 2. Journal Analysis

Posição	Revistas	Nº Documentos	Nº Citações	H-Index
1	Accounting Horizons	4	309	81
2	Marketing Intelligence and Planning	1	6	75
2	Australian Accounting Review	4	212	40
3	Human Resource Management Journal	1	207	82
4	Journal of Information Systems	5	195	36
5	Qualitative Research in Accounting and Management	1	6	30
5	Journal of Emerging Technologies in Accounting	11	125	18
6	British Accounting Review	1	107	72
7	Journal of Accounting and Organizational Change	2	17	29
8	Foresight and Sti Governance	1	4	18
7	Business Horizons	1	94	97
8	Managerial Auditing Journal	1	27	61
9	Journal of Corporate Accounting and Finance	3	13	16
8	Journal of Business Ethics	1	64	208
9	International Journal of Accounting Information Systems	1	12	56
10	Journal of Finance and Data Science	1	1	16
11	California Management Review	1	3	139

12	Advances in Developing Human Resources	1	1	49
9	Journal of Applied Accounting Research	2	44	27
10	Current Issues in Auditing	1	23	15
11	Accounting, Auditing and Accountability Journal	1	0	105
12	Journal of Education for Business	1	5	48
13	Issues in Accounting Education	2	19	27
10	Accounting Perspectives	2	29	19
11	International Journal of Digital Accounting Research	2	25	14
12	Meditari Accountancy Research	1	14	27
13	Accounting Research Journal	1	7	19
14	Australasian Accounting, Business and Finance Journal	1	3	14
15	Industry and Higher Education	1	1	27
16	International Journal of Business Process Integration and Management	1	0	19
17	Intelligent Systems in Accounting, Finance and Management	1	2	14
18	International Journal of Accounting and Information Management	2	25	25
19	Academy of Accounting and Financial Studies Journal	1	1	14
20	International Journal of Scientific and Technology Research	1	3	22
21	Asian Journal of Business and Accounting	1	0	13
22	Records Management Journal	1	8	21
23	International Journal of Intellectual Property Management	1	1	12
24	Academy of Strategic Management Journal	1	0	21
25	Journal of Financial Reporting and Accounting	2	1	10
26	Journal of Management Control	1	11	20
27	Management and Accounting Review	2	0	3

Table 3. Publication year

Publication Year	Number of Articles
2022	14
2021	14
2020	17
2019	13
2018	5
2017	2
2016	2
2015	3
1986	1

At table 4 we presented the 10 most cited authors, from the 170 authors who were involved in the development of 71 articles. The three authors with the highest h-index are (i) Dumay, John, (ii) Nielsen, Steen and (iii) Vasarhelyi, Miklos A.

When we perform the analysis of co-authorship, as shown in figure 1, there is a great dispersion in the publication relationships among the authors. The author with the most co-authored papers is Vasarhelyi, Miklos A. Furthermore, this author is involved in fairly recent work.

Table 4. Authors most cited

Authors	Number of documents	Citations	H Index Scopus
Dumay, John	1	0	43
Nielsen, Steen	1	0	36
Vasarhelyi, Miklos A	3	72	31
Rezaee, Zabihollah	1	27	27
Sutton, Steve G.	1	26	26
Ardichvili, Alexandre	1	1	26
Teuteberg, Frank	1	17	23
Skjellum, Anthony	1	12	23
Stuart, Mark	1	207	22
Massaro, Maurizio	1	0	22

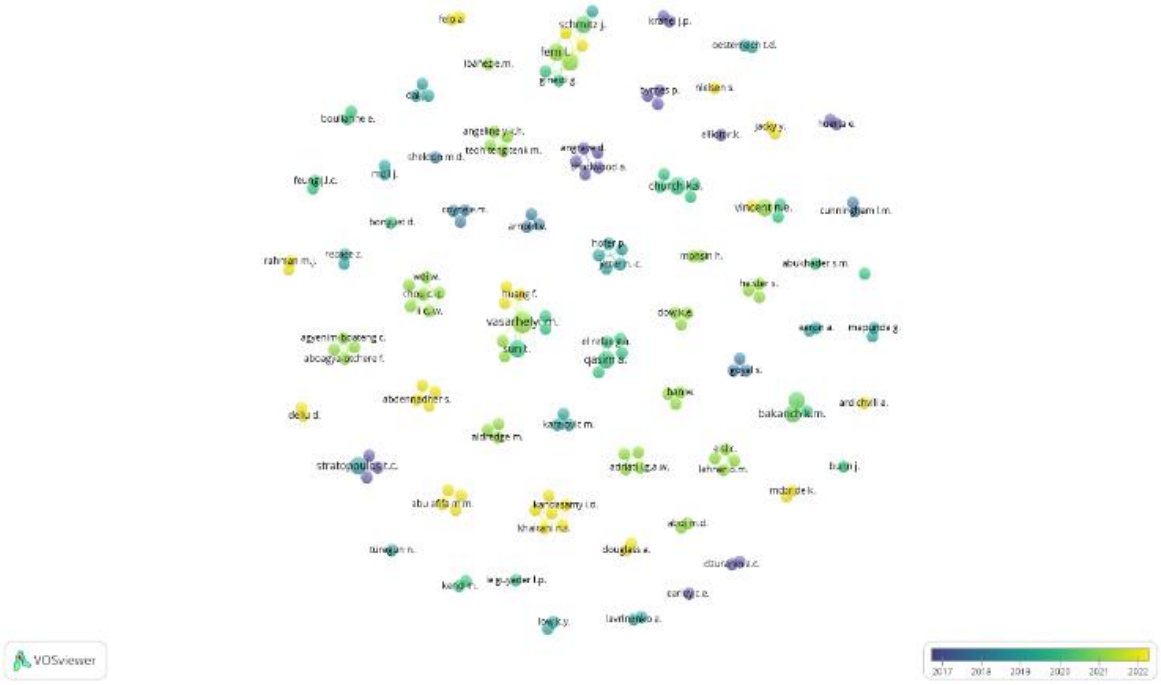

Figure 1. Co-authorship analysis

In total the sample of articles under analysis contains 211 keywords. The words were extracted and organized in the network shown in figure 2. The analysis of the keywords considered that they should be repeated at least 3 times in the 71 articles under observation. In the image we can identify 3 clusters. Cluster 1 with the words (accounting curriculum, accounting education, accounting profession, audit, big data, big data analytics, data analytics), cluster 2 with the words (accounting, auditing, blockchain, emerging technologies and smart contracts) and cluster 3 with the words (automation, artificial intelligence, and machine learning). From the analysis of the presented clusters, we were able to obtain the relationships between keywords in the 71 studies under observation. As expected, in the center of the clusters are 3 of the keywords used as search in the Scopus database, (i) big data, (ii) blockchain and artificial intelligence.

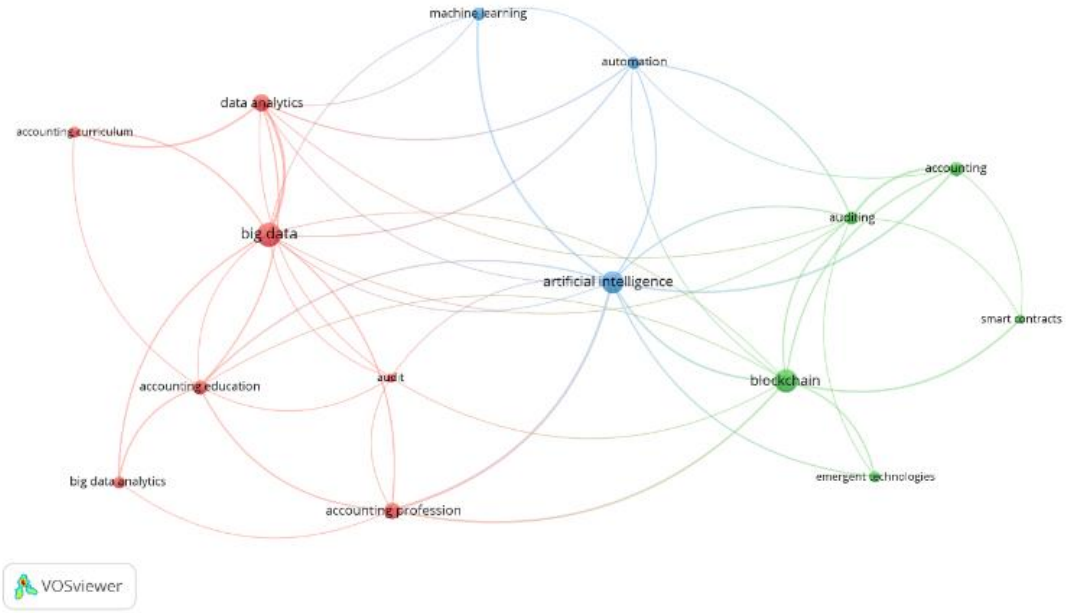

Figure 2. Visualization of the keyword network

Finally, the co-citation analysis results in the data presented in table 5. The 71 studies under analysis in this work referenced 3178 other works. Table 5 shows the 17 most cited papers. Each of these papers was cited at least 4 times in our sample. The most cited paper is "Blockchain: emerging industry adoption and implications for accounting", referenced in 14 of the papers in our sample. This analysis also shows that 4 of the most cited articles are themselves members of the sample under study, (i) Consequences of big data and formalization on accounting and auditing standards, (ii) Big data analytics: opportunity or threat for the accounting profession? (iii) Data analytics in auditing: opportunities and challenges and, (iv) Accounting and auditing at the time of blockchain technology: a research agenda.

Table 5. Reference co-citation analysis

Autores	Journal	Article	Year	Nº Citations in the sample
Kokina, J., Mancha, R., Pachamanova, D.	Journal of Emerging Technologies in Accounting	Blockchain: emergent industry adoption and implications for accounting	2017	14
Dai, J., Vasarhelyi, M. A.	Journal of Information Systems	Toward blockchain-based accounting and assurance	2017	11
Alles, M.G.	Accounting Horizons	Drivers of the use and facilitators and obstacles of the evolution of big data by the audit profession	2015	6
Krahel, J.P., Titera, W.R.	**Accounting Horizons**	**Consequences of big data and formalization on accounting and auditing standards**	**2015**	**6**
Yermack, D.	Review of Finance	Corporate governance and blockchains	2017	6

Cao, M., Chychyla, R., Stewart, T.	Accounting Horizons	Big data analytics in financial statement audits	2015	5
Issa, H., Sun, T., Vasarhelyi, M. A.	Journal of Emerging Technologies in Accounting	Research ideas for artificial intelligence in auditing: the formalization of audit and workforce supplementation	2016	5
Richins, G., Stapleton, A., Stratopoulos, T.C., Wong, C.	**Journal of Information Systems**	**Big data analytics: opportunity or threat for the accounting profession?**	**2017**	**5**
Zhang, J., Yang, X., Appelbaum, D.	Accounting Horizons	Toward effective big data analysis in continuous auditing	2015	5
Brown-Liburd, H., Issa, H., Lombardi, D.	Accounting Horizons	Behavioral implications of big data's impact on audit judgment and decision making and future research directions	2015	4
Coyne, J. G., Mcmickle, P. L.	Journal of Emerging Technologies in Accounting	Can blockchains serve an accounting purpose?	2017	4
Earley, C.E.	**Business Horizons**	**Data analytics in auditing: opportunities and challenges**	**2015**	**4**
Frey, C.B., Osborne, M.A.	Technological Forecasting and Social Change	The future of employment: how susceptible are jobs to computerisation?	2017	4
Issa, H., Kogan, A.	Journal of Information Systems	A predictive ordered logistic regression model as a tool for quality review of control risk assessments	2014	4
Kokina, J., Davenport, T.H.	Journal of Emerging Technologies in Accounting	The emergence of artificial intelligence: how automation is changing auditing	2017	4
Schmitz, J., Leoni, G.	**Australian Accounting Review**	**Accounting and auditing at the time of blockchain technology: a research agenda**	**2019**	**4**
Yoon, K., Hoogduin, L., Zhang, L.	Accounting Horizons	Big data as complementary audit evidence	2015	4

5 Conclusions

This study was carried out with the purpose of presenting the theoretical framework that has been most prominent in the scientific community, regarding the impact that new information technologies, namely, (i) blockchain, (ii) big data, and (iii) artificial intelligence, have had on the field of accounting professionals. The research was conducted using bibliometric analysis and VOSviewer software was used for data processing.

The study focuses on the analysis of 71 papers, published between 1986 and 2022 in several journals, indexed in Scopus. Since 2019 there has been an increase in publications in the area under analysis.

The studies are published in diversified journals; however, the Journal of Emerging Technologies in Accounting stands out, with 11 published papers. The number of papers does not mean, however, more citations, since the Journal of Accounting Horizons, with only 4 papers, has the highest number of citations. The paper with the highest number of citations is HR and analytics: why HR is set to fail the big data challenge, from the Human Resource Management Journal. This makes its authors also the most cited of the sample. It should, however, be noted that none of them is in the top 3 with the highest h-index.

In the co-author analysis the author Miklos Vasarhelyi stands out, who is involved in several recent works on the impact of new technologies on the accounting profession. This is one of the most influential authors in the field and with one of the best h-index. It

can be said that this is the author who has shared the most knowledge in the area under study.

The analysis of the keywords of the 71 articles in the study sample allowed us to obtain 3 clusters that can be useful for further research by using filters with the words contained in these clusters. Cluster 1 (accounting curriculum, accounting education, accounting profession, audit, big data, big data analytics, data analytics), cluster 2 (accounting, auditing, blockchain, emerging technologies and smart contracts) and cluster 3 (automation, artificial intelligence and machine learning).

The co-citation network analysis of the articles' bibliographic references allowed us to arrive at the most influential articles for the studies under analysis. Thus, it was possible to obtain a range of important articles for the theme under study that are not in our sample.

5.1 Limitations and suggestions for future research

The research was carried out only in the Scopus database, which limits the data analyzed. In future research, we suggest the inclusion of other databases, such as Web of Science.

The keywords used in the search could also be more comprehensive, the inclusion of terms such as "technology", will allow us to increase and diversify the range of articles to be analyzed.

References

Angrave, D., Charlwood, A., Kirkpatrick, I., Lawrence, M., & Stuart, M. (2016). HR and analytics: Why HR is set to fail the big data challenge. *Human Resource Management Journal*, *26*(1), 1–11. https://doi.org/10.1111/1748-8583.12090

Barnes, C. (2017). The h-index Debate: An Introduction for Librarians. *The Journal of Academic Librarianship*, *43*(6), 487–494. https://doi.org/10.1016/J.ACALIB.2017.08.013

Bonsón, E., & Bednárová, M. (2019). Blockchain and its implications for accounting and auditing. *Meditari Accountancy Research*, *27*(5), 725–740. https://doi.org/10.1108/MEDAR-11-2018-0406/FULL/PDF

Castillo-Vergara, M., Alvarez-Marin, A., & Placencio-Hidalgo, D. (2018). A bibliometric analysis of creativity in the field of business economics. *Journal of Business Research*, *85*, 1–9. https://doi.org/10.1016/J.JBUSRES.2017.12.011

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, *133*, 285–296. https://doi.org/10.1016/J.JBUSRES.2021.04.070

Ferri, L., Spanò, R., Ginesti, G., & Theodosopoulos, G. (2020). Ascertaining auditors' intentions to use blockchain technology: evidence from the Big 4 accountancy firms in Italy. *Meditari Accountancy Research*, *29*(5), 1063–1087. https://doi.org/10.1108/MEDAR-03-2020-0829/FULL/PDF

Hernández-González, V., Sans-Rosell, N., Jové-Deltell, M. C., & Reverter-Masia, J. (2016). Comparison between Web of Science and Scopus, Bibliometric Study of Anatomy and

Morphology Journals. *International Journal of Morphology*, *34*(4), 1369–1377. https://doi.org/10.4067/S0717-95022016000400032

Kokina, J., Mancha, R., & Pachamanova, D. (2017). Blockchain: Emergent Industry Adoption and Implications for Accounting. *Journal of Emerging Technologies in Accounting*, *14*(2), 91–100. https://doi.org/doi.org/10.2308/jeta-51911

Krahel, J. P., & Titera, W. R. (2015). Consequences of big data and formalization on accounting and auditing standards. *Accounting Horizons*, *29*(2), 409–422. https://doi.org/10.2308/ACCH-51065

Madani, F., & Weber, C. (2016). The evolution of patent mining: Applying bibliometrics analysis and keyword network analysis. *World Patent Information*, *46*, 32–48. https://doi.org/10.1016/J.WPI.2016.05.008

Merigó, J. M., Gil-Lafuente, A. M., & Yager, R. R. (2015). An overview of fuzzy research with bibliometric indicators. *Applied Soft Computing*, *27*, 420–433. https://doi.org/10.1016/J.ASOC.2014.10.035

Merigó, J. M., & Yang, J.-B. (2017). Accounting research: A bibliometric analysis. *Australian Accounting Review*, *27*(1), 71–100. https://doi.org/10.1111/auar.12109

Moll, J., & Yigitbasioglu, O. (2019). The role of internet-related technologies in shaping the work of accountants: New directions for accounting research. *British Accounting Review*, *51*(6). https://doi.org/10.1016/J.BAR.2019.04.002

Mongeon, P., & Paul-Hus, A. (2016). The journal coverage of Web of Science and Scopus: a comparative analysis. *Scientometrics*, *106*(1), 213–228. https://doi.org/10.1007/S11192-015-1765-5

Muheidat, F., Patel, D., Tammisetty, S., Tawalbeh, L. A., & Tawalbeh, M. (2022). Emerging Concepts Using Blockchain and Big Data. *Procedia Computer Science*, *198*, 15–22. https://doi.org/10.1016/J.PROCS.2021.12.206

Perkhofer, L. M., Hofer, P., Walchshofer, C., Plank, T., & Jetter, H. C. (2019). Interactive visualization of big data in the field of accounting: A survey of current practice and potential barriers for adoption. *Journal of Applied Accounting Research*, *20*(4), 497–525. https://doi.org/10.1108/JAAR-10-2017-0114

Qasim, A., & Kharbat, F. F. (2020). Blockchain Technology, Business Data Analytics, and Artificial Intelligence: Use in the Accounting Profession and Ideas for Inclusion into the Accounting Curriculum. *Journal of Emerging Technologies in Accounting*, *17*(1), 107–117. https://doi.org/10.2308/JETA-52649

Raffoni, A., Visani, F., Bartolini, M., & Silvi, R. (2018). Business Performance Analytics: Exploring the potential for Performance Management Systems. *Production Planning & Control*, *29*(1), 51–67. https://doi.org/10.1080/09537287.2017.1381887

Rey-Martí, A., Ribeiro-Soriano, D., & Palacios-Marqués, D. (2016). A bibliometric analysis of social entrepreneurship. *Journal of Business Research*, *69*(5), 1651–1655. https://doi.org/10.1016/J.JBUSRES.2015.10.033

Richins, G., Stapleton, A., Stratopoulos, T. C., & Wong, C. (2017). Big data analytics: Opportunity or threat for the accounting profession? *Journal of Information Systems*, *31*(3), 63–79. https://doi.org/10.2308/ISYS-51805

Romanelli, J. P., Gonçalves, M. C. P., de Abreu Pestana, L. F., Soares, J. A. H., Boschi, R. S., & Andrade, D. F. (2021). Four challenges when conducting bibliometric reviews and how to deal with them. *Environmental Science and Pollution Research*, *28*(43), 60448–60458. https://doi.org/10.1007/S11356-021-16420-X

Romero-Torres, M., Acosta-Moreno, L. A., & Tejada-Gómez, M. A. (2013). Ranking de revistas científicas en Latinoamérica mediante el índice h: Estudio de caso Colombia. *Revista Española de Documentación Científica*, *36*(1), 1–13. https://doi.org/10.3989/redc.2013.1.876

Schmitz, J., & Leoni, G. (2019). Accounting and Auditing at the Time of Blockchain Technology: A Research Agenda. *Australian Accounting Review*, *29*(2), 331–342. https://doi.org/10.1111/AUAR.12286

Sutton, S. G., Arnold, V., & Holt, M. (2018). How much automation is too much? Keeping the human relevant in knowledge work. *Journal of Emerging Technologies in Accounting*, *15*(2), 15–25. https://doi.org/10.2308/JETA-52311

Tan, B. S., & Low, K. Y. (2019). Blockchain as the Database Engine in the Accounting System. *Australian Accounting Review*, *29*(2), 312–318. https://doi.org/10.1111/auar.12278

Thomaz, P. G., Assad, R. S., & Moreira, L. F. P. (2011). Using the impact factor and H index to assess researchers and publications. *Arquivos Brasileiros de Cardiologia*, *96*(2), 90–92. https://doi.org/10.1590/S0066-782X2011000200001

Türegün, N. (2019). Impact of technology in financial reporting: The case of Amazon Go. *Journal of Corporate Accounting & Finance*, *30*(3), 90–95. https://doi.org/10.1002/jcaf.22394

van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, *84*(2), 523–538. https://doi.org/10.1007/S11192-009-0146-3/FIGURES/7

Warren, J. D., Moffitt, K. C., & Byrnes, P. (2015). How big data will change accounting. *Accounting Horizons*, *29*(2), 397–407. https://doi.org/10.2308/ACCH-51069

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*, 110461–110477. https://doi.org/10.1109/ACCESS.2020.3000505