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RESEARCH ARTICLE

Bibliometric Analysis of Studies Related to Continuous Auditing in Web Of Science

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Abstract

The study aimed to map the changes that continuous auditing has shown over the years, and the studies related to continuous audit were published in the Web of Science database with Voswiever. The article aims to determine the working trends and gaps within the scope of continuous auditing by using quantitative data and a systematic summary of the key concepts related to Continuous Auditing, which is brought to the attention of researchers and determined as a result of bibliometric analysis. Data from studies in various fields examined in Web of Science and determined from 2000 to the present were taken as basis within the scope of analysis. When the distribution of 184 studies on Continuous Auditing was examined in the years in which they were published, most were found to be 2016 (21 studies), 2020 (15 studies), and 2012 (15 studies).
Key Words: *Continuous Auditing, Continuous Monitoring, Internal Auditing, Continuous Assurance, Data Mining*
Jel Codes: *M4, M42*

Web Of Science'da Sürekli Denetim İle İlgili Çalışmaların Bibliyometrik Analizi

Özet

Çalışmada, web of sience veri tabanında yayınlanmış Continuous Auditing- Sürekli Denetim kavramının yıllar içerisinde göstermiş olduğu değişimler ve sürekli denetim kavramı ile ilgili çalışmaların voswiever ile haritalanmasını sağlamak amaçlanmıştır. Makalede, nicel veriler kullanılarak kilit kavramlardan Continuous Auditing-sürekli denetime ile ilgili var olan, araştırmacıların dikkatine sunulan, yazının bibliyometrik analiz kullanılması sonucu belirlenen sistemli bir özetinin sürekli denetim kapsamındaki çalışma yönelimlerinin ve boşlukların belirlenmesi hedeflenmiştir. Web of Science da incelenen ve 2000 yılından günümüze kadar belirlenmiş çeşitli alanlardaki çalışmaların verileri analiz kapsamında baz alınmıştır. Continuous Auditing (Sürekli Denetim) ile ilgili 184 çalışmanın yayınlandığı yıllarındaki dağılımı incelendiğinde, en çok 2016 (21 çalışma), 2020 (15 çalışma) ve 2012 (15 çalışma) tespit edilmiştir.
Anahtar Kelimeler: *Sürekli Denetim, Sürekli İzleme, İç Denetim, Sürekli Güvence, Veri Madenciliği*
Jel Kodu: *M4, M42*

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1. INTRODUCTION

Today, the emergence of computers has significantly changed how business is done in organizations, and how financial information is delivered to stakeholders. The number of businesses using the Internet to carry out their activities and publish their financial reports in real-time is increasing rapidly. This real-time financial reporting and continuous auditing is crucial to ensuring the continuous accuracy and reliability of the information presented. Bibliometric mapping, as an essential research approach in bibliometrics, is a program or software-based analysis technique that involves analyzing and visualizing a wide variety of scientific studies in a particular field. The program aims to present the conceptual, social, or intellectual structure, development process, and dynamics of the scientific research area with visual outputs. VOS viewer is a free, open-source bibliometric mapping program that allows the creation of maps based on network, bibliographic, and textual data, visualizing studies in the literature and exploring them in various contexts. The program creates maps based on existing or researcher-generated data using the author, country, journal, citation, keywords, abstract, and institution data supporting scientific research. Unlike many programs for bibliometric mapping, VOS viewer pays special attention to the graphical representation of bibliometric maps. At the same time, the program presents three different visualizations of a map with relevant data: network, layer, and density (Arslan, 2022,36). The study aims to map the changes in the concept of Continuous Auditing published in the Web of Science database over the years and the studies related to continuous auditing with Voswiever. The article uses quantitative data and aims to determine the study orientations and gaps in the scope of continuous auditing by using bibliometric analysis of a systematic summary of the existing literature on Continuous Auditing, one of the critical concepts presented to the attention of researchers. The data of the studies in various fields examined in Web of Science and determined from 2000 are taken as the basis for the analysis.

2. CONCEPTUAL FRAMEWORK

2.1. The Concept of Continuous Audit

"*Continuous audit* is a method that allows independent auditors to provide written assurance by using audit reports as soon as the events that form the basis of the audit subject determined by the business managers occur or shortly after." Continuous Auditing is a process that involves auditing and simultaneously reporting the issues within the scope of the Audit within a short period of time (monthly, weekly, daily, or even instantaneously if there is a demand) after the event occurs. (Çetinoğlu, 2022,5)

A continuous audit consists of any of the methods used by auditors to perform the Audit on an ongoing basis and does not require the preparation of a report on the results of the Audit. A continuous audit can also be defined as a process that tests transactions on an ongoing basis based on criteria prescribed by the auditor and identifies exceptions for the auditor to fulfill additional processes.

2.2. Literature Research on Continuous Auditing

Many studies in the domestic and foreign literature on continuous auditing have examined it from various perspectives. In their study in 1999, Kogan et al. revealed that the increase in electronic commerce makes continuous auditing mandatory.

In their study in 2003, Vasarhelyi and Greenstein stated that the importance of e-commerce activities and the need for constant control are increasing. Studies conducted by Huton et al. 2002 concluded that businesses' more frequent financial reporting increased their revenues. Elliott reached the same conclusion by conducting a study on the same subject in the same year. In 2001, Rezaee et al. He determined that computer-aided information technologies contributed to the concept of continuous

control. In the same year, the work of Krass, Vasarhelyi, and their friends focused on the Enron scandal, and it was revealed that independent auditors accepted the concept of continuous auditing more. In 2004, Van Decker mentioned the importance of continuous auditing to ensure information integration in the electronic environment. Also, in 2004, Vasarhelyi and his colleagues examined Article 404 of the Sarbanes Oxley law. Means and Warren emphasized that continuous auditing is a need by articles 302 and 404 of the Sarbanes Oxley Act in 2005 (Öndeş and Ağgül, 2020, 3553). 2007 Brown, Wong, and Baldwin conducted a study examining continuous auditing in detail. The concept of continuous control was examined from a different perspective by Chou, Du, and Lai in the same year. In their study in 2014, Alles, Kogan, and Vasarhelyi examined the importance of continuous auditing in detail and evaluated continuous auditing, especially in terms of security.

In his study in 2006, Ağca revealed a paradox in which the parties involved could not fully benefit from the advantages brought by information technologies and emphasized that this paradox could be solved with the Continuous Auditing approach put forward in the recent auditing literature. In this study, the continuous auditing approach, which can completely change the traditional auditing approach, is explained based on the basic principles, and whether the approach can be applied in today's conditions is examined from an economic and technical perspective. Kurnaz and Çetinoğlu, in their study titled Current Approaches in Internal Auditing in 2010, revealed all the conceptual aspects of continuous auditing and stated the applicability of continuous auditing in commercial banks. Memiş and Tüm examined the relationship between internal audit and continuous audit in 2011. They stated that continuous audit will assist the top management in evaluating the continuous monitoring function of the institution by ensuring the effective functioning of control systems and auditing processes. In their study in 2012, Marşap, Kurt, and Uçma argued that the applicability of the continuous auditing phenomenon could be possible with an integrated work between internal auditing and independent auditing. In this context, strategic management accounting tools could spontaneously create a control mechanism.

In his 2014 study, Boydaş Hazar discussed continuous auditing from many aspects and examined it in detail. Kıymetli Şen touched upon the importance of continuous control in her studies in 2016 and emphasized that dissemination of the XBRL application would be highly beneficial. Again, in the same year, Cankar stated that auditors should prepare for continuous auditing and gain the technical capacity required by this trend. In 2016, Acar, Öztürk, and Usul argued that businesses should have a strong automation structure to implement continuous auditing, stated that continuous auditing provides a great deal of transparency to businesses, and emphasized that continuous auditing provides excellent advantages to businesses in the competitive environment.

In their research in 2020, Ağgül and Öndeş aimed to reveal the primary purposes of continuous auditing practices and the conditions of implementation of continuous auditing in Turkey's 500 Largest Industrial Enterprises in 2018, as determined by the Istanbul Chamber of Industry (ISO). As a result, all companies participating in the research stated that their expectations from continuous auditing were met. In this context, it can be concluded that the expected benefits of continuous auditing are realized, and companies are satisfied with continuous auditing practices.

3. METHOD

3.1. Purpose of the research

As a result of the bibliometric analysis conducted on continuous auditing, studies on continuous auditing are presented for the review of researchers from a holistic perspective with the help of quantitative data and numerical measurement indicators. In addition, bibliometric mapping is a program or software-based analysis technique that involves the analysis and visualization of a wide range of scientific studies in each field, which is a critical research approach in bibliometrics. The

program aims to present the conceptual, social, or intellectual structure, development process, and dynamics of the scientific research field with visual outputs.

3.2. Data and Analysis

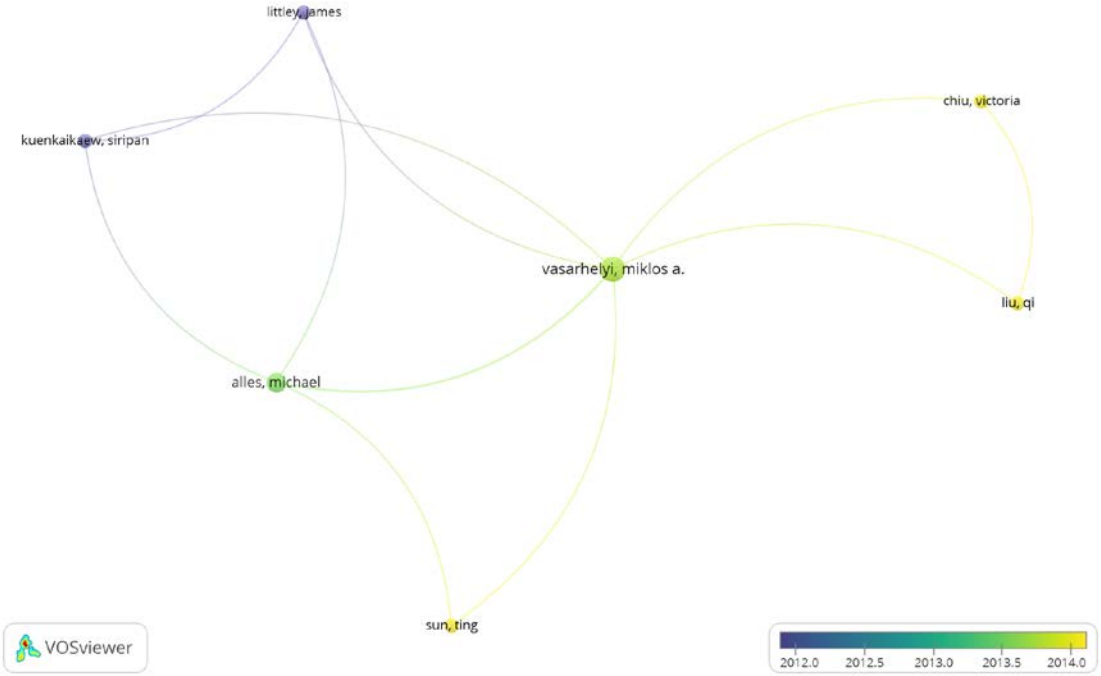
Various bibliometric analysis tools have been used in the literature. In our study, the Vosviewer program was preferred because it provides visualization, mapping, and multidimensional analysis, allows in-depth analysis of data sets, and is considered to be one of the important programs that facilitate researchers in discovering new concepts, evolutions, and relationships in the literature, and is also strong in terms of functionality. In this study, the Web of Science database was used, which uses various control mechanisms with advanced search indicators for advanced data analysis. The Web of Science database provides comprehensive data collection from different disciplines. Determining the Web of Science to be used in bibliometric analyses is very important in terms of the reliability of the research, as it contains qualified and reliable studies in terms of publication ethics. Our study has some limitations. The most critical limitation of the study is that only the studies scanned in WOS (Web of Science) were examined within the scope of the analysis, and databases such as YÖK Thesis Archive in Turkey, Ulakbim (Tr-index), as well as international databases such as Scopus and Pubmed and other sources not included in the scope of the analysis were excluded. Considering these limitations that reveal the distinctive features of bibliometric analysis, it may be recommended to consider subjecting previously published studies to content analysis for similar or further research. In addition, it would be possible to find the most remarkable studies on this topic according to basic indicators such as the number of articles, citations, and keywords. On 01.01.2024, when a search was done by selecting "all fields" in Web of Science with the keyword "continuous auditing," 184 results were found. When the years are examined, the first date is determined as 1996, and the last is 2023. 118 journal articles from various disciplines, 6 editorial content, 3 book chapters, 6 book reviews, 57 papers, and 1 early appearance work type study were accessed. In terms of disciplines, the majority of studies are Business Finance (80), Computer Science Information Systems (46), Management (34), Business Administration (26), Computer Science Artificial Intelligence (17), Computer Science Theory Methods (17), Engineering Electrical and Electronics (17).), Operations Research Management Science (11), Computer Science Interdisciplinary Applications (10), Computer Science Software Engineering (9), Computer Science Hardware Architecture (8), Economics (6), Telecommunications (6), Computer Science Cybernetics (4), Automation Control Systems (3), Information Science Library Science (3), Communication (2) fields. The obtained data, authors, citations, journals, countries, institutions, and keywords were analyzed. Web of Science was used to examine the indexed contents.

4. Findings

4.1. Co-Author Analysis

As a result, the co-authorship analysis created a network map with at least 1 study and at least 1 citation criterion to determine the authors who are most in contact with each other and who are in collaboration. As a result of the analysis conducted in the context of the authors with the highest connections, seven authors united in a single cluster, and 12 connections were identified. Specific to the cluster, the 7 most connected authors have connections in 11 units. It was determined that the most cited authors (Vasarhelyi, Miklos A. with 107, Elam, R., Mcmickle, Pl., Razaee, Z. and Sharbatoghlie, A. with 92 citations each) were not the most linked. The authors who have done the most work do not appear to be among the most connected (Vasarhelyi, Miklos A., He, Yuning and Ye, and Huanzhuo, respectively).

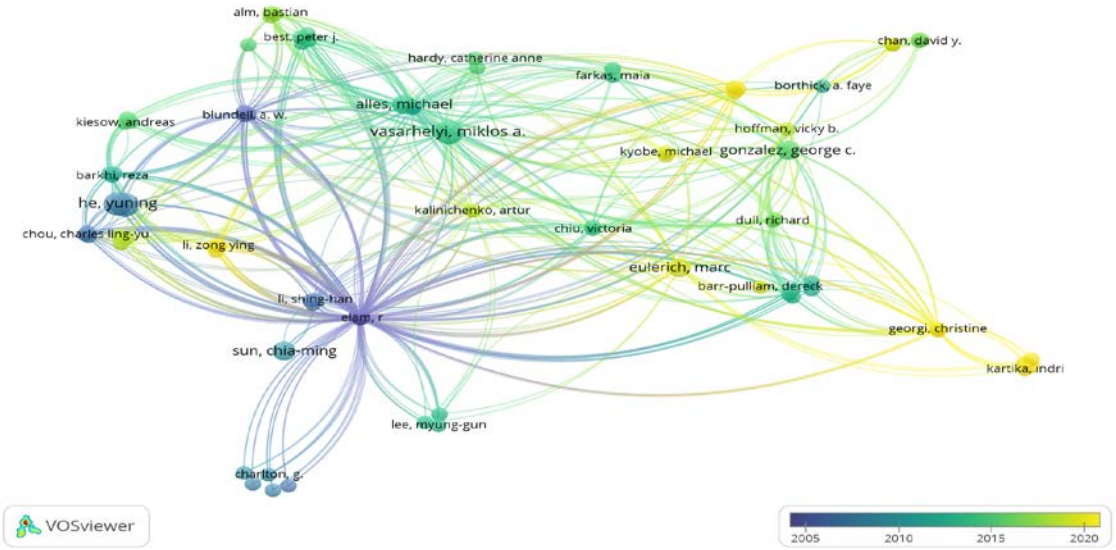
Figure 1. Joint Author Ties and Their Density by Years, Showing Collaboration Between Authors



4.2. Authors' Citation Analysis

To identify citation networks, a network map was created for author citation analysis with the criteria of at least 1 publication and at least 1 citation. In the analysis made on 83 units that were seen to be connected, a total of 7 clusters, 629 connections, and a total connection strength of 682 were detected. The most cited authors are Vasarhelyi, Miklos A., with 107 citations; Elam, R., Mcmickle, Pl., Razaee, Z., and Sharbatoghlie, A., with 92 citations each. The relevant authors also rank first in terms of total link strength.

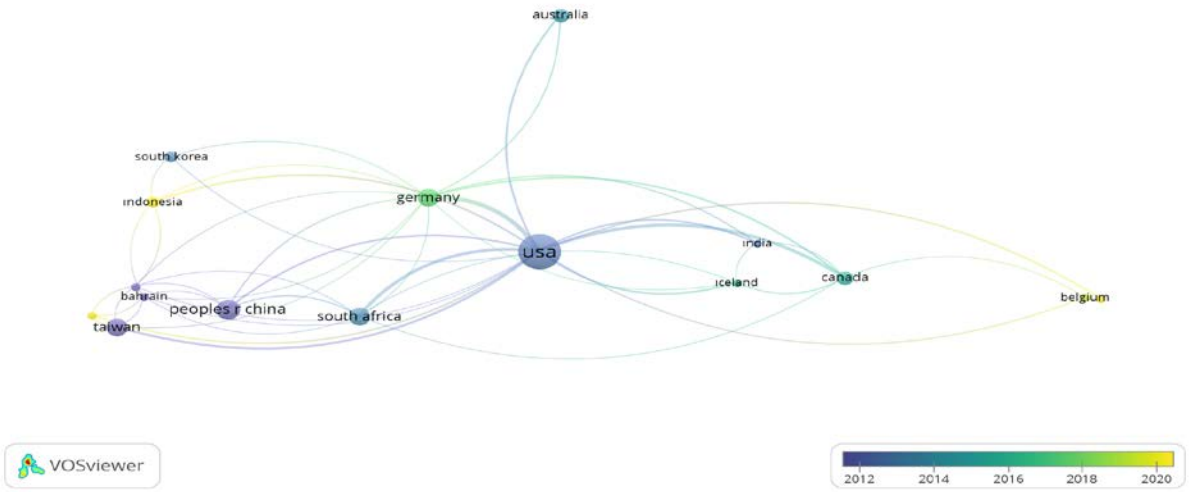
Figure 2. Authors' Citation Links and Density by Years



4.3. Citation Analysis of Countries

In the context of a country publishing at least 1 study and receiving 1 citation, an analysis of 16 observation units connected was carried out to create a network map of the citations received by publications according to their country. 5 clusters, 46 connections, and 119 total connection strengths emerged. The most cited countries were determined as the USA (537 citations), the People's Republic of China (104 citations) and Germany (61 citations). Considering the total connection power, the USA and Germany are in the first two places, while the People's Republic of China is in the 4th place and Canada is in the 3rd place. Considering the number of studies, the ranking is determined as USA (19 publications), China (6 publications), and Germany (5 publications).

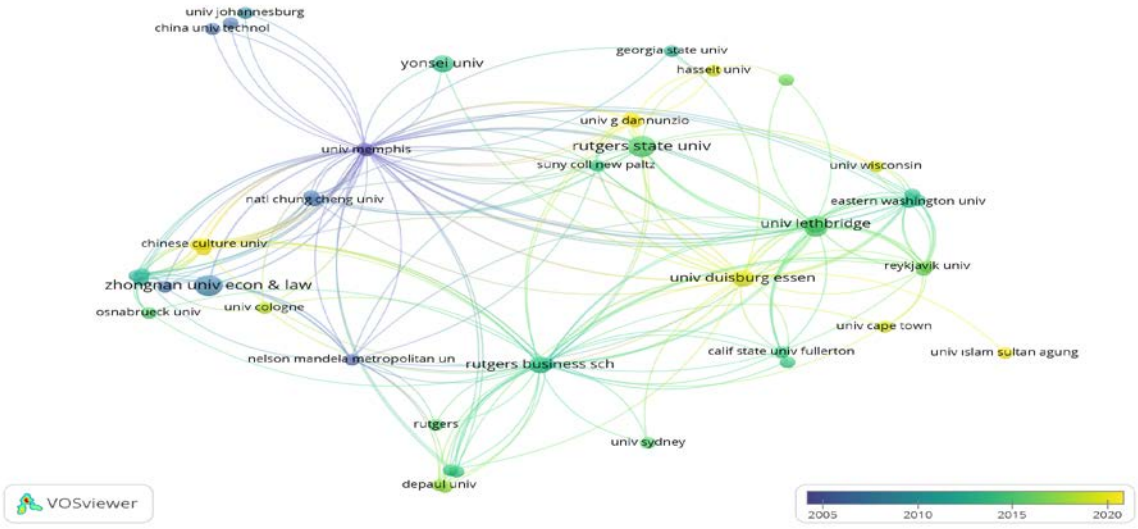
Figure 3. Citation Links of Countries and Their Density by Years



4.4. Citation Analysis of Institutions

To create an inter-institutional citation network map, analysis was carried out through 47 observation units that are related to each other, focusing on the criteria of publishing at least 1 work and receiving 1 citation from an institution. Rutgers State University (3 studies), Zhongnan Univ. While Econ & Law (3 works) and University of Duisburg Essen (2) are represented by studies, the address institutions of the most cited works are Rutgers State University (130 citations), University of Memphis (92 citations) and University of Mississippi (92 citations). In total, 8 clusters, 208 connections, and total connection strength were determined to be 235.

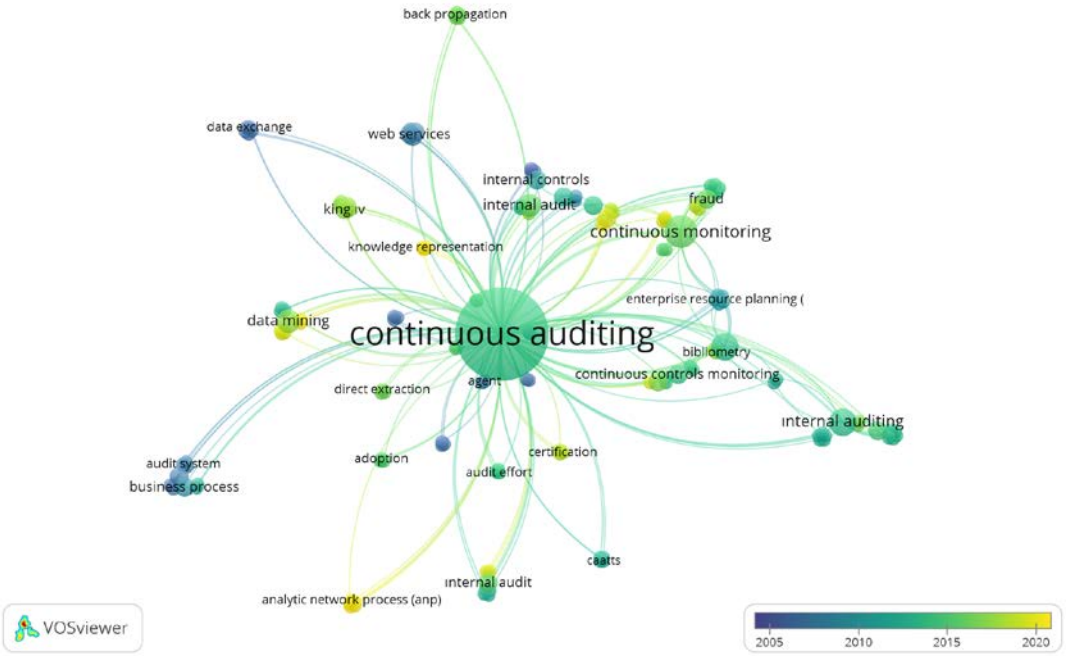
Figure 4. Network Connections of Institutions and Density by Years



4.5. Keyword Analysis

When the most frequently used keywords in the studies within the scope of Continuous Auditing are examined, Continuous Auditing is repeated 46 times, Continuous Monitoring is repeated 6 times, internal auditing is repeated 4 times, Continuous Assurance is repeated 4 times and Data Mining concepts were first determined with 3 iterations. The strongest expressions in total connection strength were determined as Continuous Auditing, Continuous Monitoring, and Internal Auditing and as a result of the analysis, which was conducted in connection with 148 observation units that were in a relationship with each other at least 3 times, revealed a total of 29 clusters, 417 connections, and 450 total connection strengths.

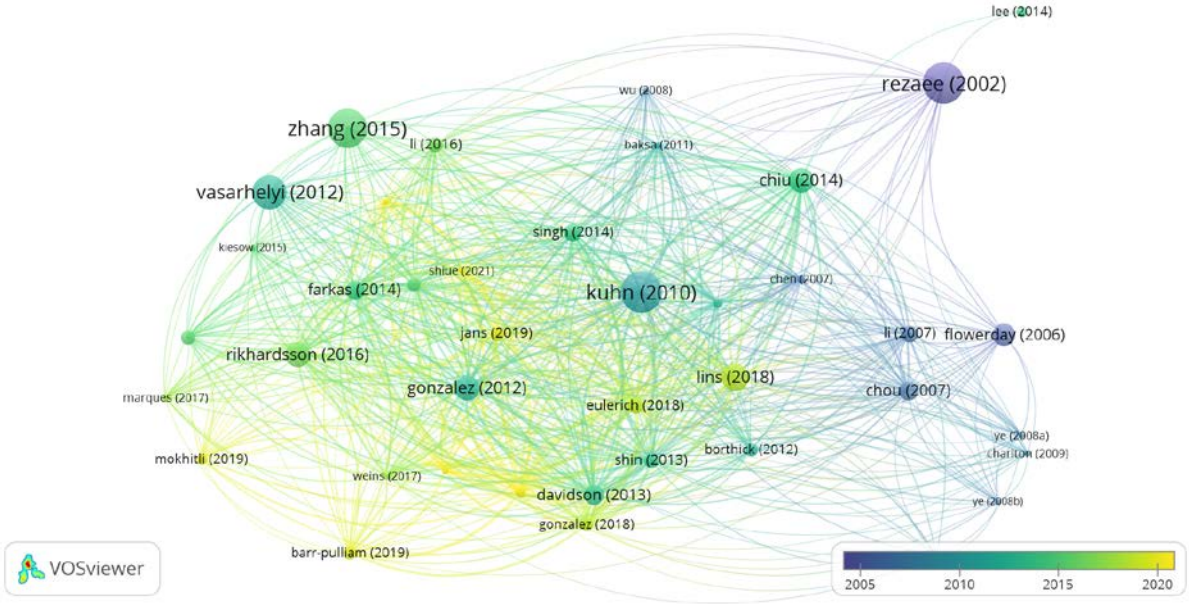
Figure5. The Most Frequently Used Keyword Links and Their Density by Years



4.6. Bibliographic Match Analysis of Texts

Bibliographic matching refers to the citation of a common work cited by two independent sources. According to the analysis made with 47 unit works that were selected with the criterion of having at least 1 citation and that had connections between them, 5 clusters of 818 connections and 2962 total connection strength were obtained. The publications with the most bibliographic matches are Rezaee (2001) with 92 citations, Kuhn (2017) with 90 citations, and Zhang (2015) with 82 citations. The works with the highest total connection strength were Eulerich (2018), Eulerich (2020) and Gonzalez (2018).

Figure 6. Bibliographic Matching Links of Text and Their Density by Year



4.7. Bibliographic Match Analysis of Authors

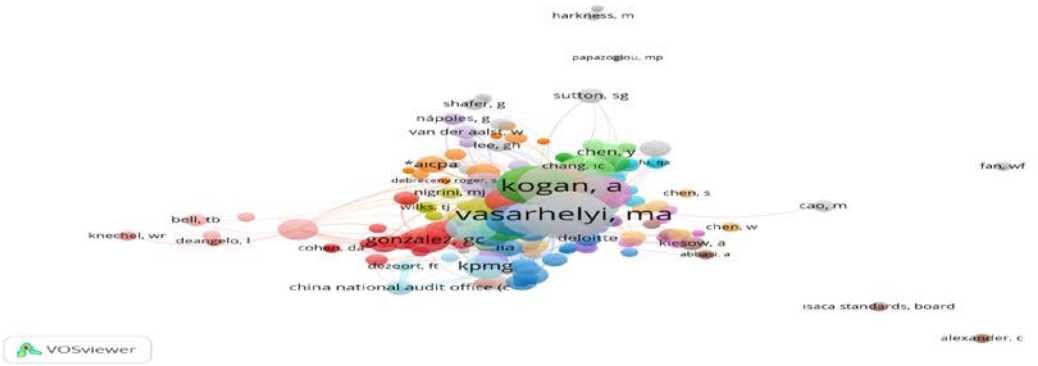
As a result of the analysis carried out within the scope of 104 units, which were determined as criteria to have published at least 1 interrelated study and received 1 citation, 8 clusters, 4124 connections, and 22234 total connection strength were determined. The authors with the most bibliographic matches were determined as Vasarhelyi, Elam R. (3435 link strength) with 107 citations, Peter Love (2444 link strength) with 487 citations, and Stephan Lewandowsky (2228 link strength) with 482 citations.

Figure7. Bibliographic Matching Links of Authors and Their Density by Year

4.8. Authors' Co-Citation Analysis

Different sources cited in a publication are called co-citation. According to the analysis performed on 23 units with a minimum number of citations of 10, a total of 2 clusters, 251 links and 3109 total link strength were detected. The most commonly cited authors are Vasarhelyi M.A. (51), Kogan A. (47) and Alles M.G. It was determined as (39).

Figure 8. Common Citation Links of Authors and Their Density by Year



5. CONCLUSION

Unlike systematic literature review, bibliometric analysis is an analytical method used to obtain formal and quantitative data about the current state of a field. It facilitates tracking academic trends through visualization software. The ultimate goal of the bibliometric approach, which can be confused with the concepts of the metric age such as scientometric, webometric, cybermetric, altmetric, infometric, is to obtain quantitative data and numerical measurement indicators regarding research performance. The researchers' experience and knowledge should inspire interpretations based on these measurements in the field. Thanks to bibliometrics, quantitative findings about the

outputs produced in a field, weak and strong research areas, literature gaps, collaboration networks, country, author, university, journal productivity, potential opportunities, and widespread effects can be obtained. (Dirik, Eryılmaz and Erhan, 2023). In the study, when the distribution of 184 studies within the scope of Continuous Auditing was examined in terms of publication years, it was determined that the most accumulation occurred in 2016 (21 studies), 2020 (15 studies), 2012 (15 studies) and 2017 (14 studies); the authors who have done the most work are Vasarhelyi, Miklos A., Alles Michael and Kogan, Alexander; The type of publication is mainly journal articles (118), editorial articles (6) and book chapters (3); In terms of research areas, Business Finance (80), Computer Science Information Systems (46), Management (34), Business Administration (26), Computer Science Artificial Intelligence (17), Computer Science Theory Methods (17), Engineering Electrical and Electronics (17), Operations Research Management Science (11), Computer Science Interdisciplinary Applications (10), Computer Science Software Engineering (9), Computer Science Hardware Architecture (8), Economics (6), Telecommunications (6), Computer Science Cybernetics (4), Automation It was determined in the fields of Control Systems (3), Information Science Library Science (3), Communication (2). In terms of the distribution of publications by country, the leadership is held by publishers originating from the USA (67), China (23), Germany (164), and Canada (11). First, there were studies in English (178), then in Spanish (3) and Portuguese (2). It was determined that the publications scanned in SSCI (45), ESCI (61), and AHCI (1) indices were predominant. When the publications are examined based on the concept of Continuous Auditing, the most used keywords are continuous auditing repeated 46 times, continuous monitoring repeated 6 times, internal auditing repeated 4 times, Continuous Assurance repeated 4 times, and data mining expressions with 3 repetitions take the lead. These and similar studies to be conducted at various times will ensure that those interested in the subject are informed scientifically and with detailed summaries. Our study has some limitations. The most critical limitation of the study is that within the scope of the analysis, only examining the studies scanned in WOS (Web of Science) and excluding the YÖK Thesis Archive in Turkey, Ulakbim (Tr-index), as well as international databases such as Scopus and Pubmed and other sources that are not included in the scope of analysis. Considering these limitations, which reveal the distinctive features of bibliometric analysis, it may be recommended to consider subjecting previously published studies to content analysis for similar or further research. In addition, it will be possible to find the most remarkable studies on this subject according to basic indicators such as the number of articles, citations, and keywords.

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