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BIBLIOMETRIC MAPPING OF STUDIES ON GREEN ACCOUNTING IN HEALTH

SAĞLIK ALANINDA YEŞİL MUHASEBE İLE İLGİLİ YAPILAN ÇALIŞMALARIN BİBLİYOMETRİK HARİTALAMASI

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Abstract

The aim of this study is to examine the structure of studies on green accounting in the field of health using the bibliometric technique of science mapping. Data were collected from the Web of Science database between 1945-2022 using 3 different search strategies. 59 publications were analyzed using VOSviewer and R-Studio software. The results showed that 2018 was the most effective year, although there was no steady increase in publication and citation trends. In both analyses, the keywords were clustered around environmental accounting. When the thematic map of the keywords was examined, it was seen that protection, environmental accounting, and externalities were the basic themes. In addition, the country which had the most citation in the field was the United States. Researchers who would like to study green accounting in the field of health should prioritize greenhouse gases, social and environmental accounting, green growth, and biodiversity, which are among the motor themes, in their studies..

Keywords: Green Accounting, Environmental Accounting, Science Mapping.

Öz

Bu çalışmanın amacı sağlık alanında yeşil muhasebe konusunda yapılan çalışmaların yapısını bilim haritalama tekniğiyle incelemektir. Erişilen veriler Web of Science veri tabanından 1945-2022 tarihler arasında 3 farklı arama stratejisi kullanılarak toplanmıştır. Çalışmada yer alan 59 yayın VOSviewer ve R-Stüdyo yazılımı kullanılarak analiz edilmiştir. Analiz sonucunda yayın ve atıf eğilimlerinde düzenli artış olmamakla birlikte en etkili yılın 2018 yılı olduğu görülmüştür. Her iki analizde de anahtar kelimeler çevresel muhasebe kümesi etrafında toplanmıştır. Anahtar kelimelerin tematik haritası incelendiğinde koruma, çevresel muhasebe ve dışssalıkların temel temalarda yer aldığı görülmüştür. Ayrıca bu alanda en fazla atıf alan ülkenin Amerika Birleşik Devletleri olduğu görülmektedir. Sağlık alanında yeşil muhasebe çalışmak isteyen araştırmacılar, çalışmalarında motor temalardan olan sera gazı, sosyal ve çevresel muhasebe, yeşil büyüme ve biyoçeşitlilik konularına öncelik verebilir.

Anahtar Kelimeler: Yeşil Muhasebe, Çevre Muhasebesi, Bilim Haritalama.

GENİŞLETİLMİŞ ÖZET

Çalışmanın Amacı

Bu çalışmanın amacı; sağlık alanında yeşil muhasebe konusunda yapılan çalışmaların yapısını bilim haritalama tekniğiyle incelemektir. Bu çalışma ile hedeflenenler aşağıda yer almaktadır. 1. Sağlıkta yeşil muhasebe alanındaki yayın eğilimlerini incelemek. 2. Ulaşılan yayınlarda yer alan en etkili anahtar kelimeleri ve kelime kümelerini belirleyerek görselleştirmek. 3. Anahtar kelimelerin tematik haritalarını belirleyerek öne çıkan alanları keşfetmek. 4. En çok atıf yapılan ülke ve dergileri belirleyerek görselleştirmek. Bu çalışma ile sağlık alanında yeşil muhasebe konusunu işleyen çalışmalar ön plana çıkarılarak yıllar içerisindeki temaları ve evrimleri ele alınacaktır. Böylece bu alanda çalışma yapmak isteyen araştırmacılara konuyla ilgili bir yol haritası sunulmuş olunacaktır.

Araştırma Soruları

Sağlık alanında yeşil muhasebe ile ilgili yapılan yayınların kavramsal yapısı nasıldır?

Literatür Araştırması

Birçok işletme küresel ve bölgesel kirliliklere neden olmakla birlikte ekonomik kalkınmanın ve büyümenin odak noktası olarak kabul edilmektedir. Ortaya çıkan çevre sorunlarından sonra işletmelerin çevreye karşı duyarlı olma gerekliliği ve çevre ile alakalı çalışmaların muhasebe sürecine dahil edilmesi sonucunda "yeşil muhasebe" ya da çevre muhasebesi" kavramı ortaya çıkmıştır (Antepli ve Aslan, 2018). Literatürde çevre muhasebesi olarak da adlandırılan yeşil muhasebe Moorthy ve Yacob'e (2013) göre, çevresel eko-denetim ve çevresel bilgi ile ilgili olduğu ve bir işletmenin çevresel yönleri ile ilgili malzeme ve maliyet bilgilerinin tanımlanması, izlenmesi, analiz edilmesi ve son olarak raporlanması şeklinde tanımlamaktadır.

Yöntem

Bu çalışmada verilerin analizi ve bilgi haritalarının geliştirilmesi ve görselleştirilmesi için VOSviewer ve Bibliometrix yazılımı birlikte kullanılmıştır. VOSviewer, ilişkiyi belirtmek için bibliyometrik ağların mesafeye dayalı görselleştirmelerini sağlamaktadır (Eck & Waltman, 2014). Bu analiz, modalite aracılığıyla terimlerin yakınlığını gösterir. İlişki, öğeler arasındaki mesafeye göre hesaplanır. Yani terimler arasındaki mesafe ne kadar büyükse, maddeler arasındaki ilişki o kadar zayıftır (Van Eck ve Waltman, 2014). R-bibliometrix paketi, R Studio yazılımları kullanılarak gerçekleştirilen, Aria ve Cuccurullo (2017) tarafından geliştirilen bibliometrix paketidir. Bibliometrix, bibliyografik bağlantı ağları, ortak alıntı ağları, ortak yazarlık ağları ve birlikte oluşum ağları oluşturmak için güçlü işlevlere sahiptir. Eksiksiz bir veri içe aktarma, veri dönüştürme, veri analizi ve bilimsel görselleştirme süreciyle Bibliometrix, temel olarak bibliyometrik analizin gereksinimlerini karşılar. Ayrıca Bibliometrix'in işlevleri sürekli genişlemektedir (Aria ve Cuccurullo, 2017). Tema evrimsel analizi, birlikte oluşum matrisleri oluşturmak ve kümelenmiş stratejik koordinat diyagramları (yoğunluk ve merkeziliğe dayalı) elde etmek için ve tematik küme analizi gerçekleştirmek için kullanılabilir. Tema evrimsel analizleri farklı zaman dilimlerinde öne çıkan konuların ortaya çıkarılmasına ve potansiyel

araştırma konularının tahmin edilmesine yardımcı olmaktadır (Shen vd., 2022). Tespit edilen araştırma temaları, iki özel araç kullanılarak merkezilik ve yoğunluk sıralaması değerlerine göre kategorilere ayrılmaktadır (Cobo vd., 2012; Robles vd., 2021).

Sonuç ve Değerlendirme

Bu çalışmada sağlık alanında yeşil muhasebe konusunda yapılan çalışmaların yapısını bilim haritalama tekniğiyle incelenmiştir. Sağlıkta yeşil muhasebe alanındaki yayın eğilimlerini, en etkili ülke, dergi ve anahtar kelimeleri ve tematik evrimlerini keşfetmek hedeflenmiştir. 59 yayının incelendiği çalışmada VOSviewer ve R-Stüdyo yazılımları birlikte kullanılmıştır. Analiz sonunda yayın ve atıf eğilimlerinde düzenli artış olmamakla birlikte en etkili yılın 2018 yılı olduğu görülmektedir. Her iki analizde de anahtar kelimeler çevresel muhasebe kümesi etrafında toplanmıştır. Anahtar kelimelerin tematik haritası incelendiğinde koruma, çevresel muhasebe ve dışssalıkların temel temalarda yer aldığı görülmüştür. Ayrıca bu alanda en fazla atıf alan ülke ABD, en fazla ilgi duyulan dergi Bradford's Yasasına göre; Ecological Modelling, atıf ağ analizine ise Journal of Enviromental Economics and Management dergileri olmuştur. Sağlık alanında yeşil muhasebe çalışmak isteyen araştırmacılar, çalışmalarında motor temalardan olan sera gazı, sosyal ve çevresel muhasebe, yeşil büyüme ve biyoçeşitlilik konularına öncelik verebilirler. Çalışmanın verilerinin sadece Web of Science veri tabanından alınarak yapılması bu çalışmanın kısıtını oluşturmaktadır. Araştırmacılar bundan sonra yapılacak olan çalışmalara diğer veri tabanlarını da dahil ederek daha zengin bir veri seti elde edebilirler. Ayrıca daha çeşitli analiz programları (Scimat, CiteSpace, Bibexcel, Histcite, Sci2) kullanılarak görseller çeşitlendirilebilir. Alanla ilgili az sayıda çalışma bulunduğundan ayrıntılı bir doküman analizi incelenmesi de önerilmektedir.

1. INTRODUCTION

Hospitals that provide emergency, outpatient, and inpatient services are healthcare institutions that provide individual healthcare services. There are many types of waste in hospitals, such as liquid waste, medical waste, non-medical waste and gaseous waste, and improper separation of these wastes can cause problems for the environment. As health institutions, hospitals have responsibilities to reduce or prevent negative effects that may harm the environment. In line with these efforts, the concept of "Green Accounting" has emerged (Ashari & Anggoro, 2021). Considering environmental resources and the changes in these resources, the system that provides a database to determine policies and develop formulas for the growth and development of a country is also called green accounting (Süklüm, 2019).

Over a relatively long period, the increase in health expenditure has led to constant reviews and recurring debates about the need for green accounting as part of health expenditure reforms. Recently, green accounting innovations have been implemented by European countries and the US, as a part of sustainable health expenditure control, and these innovations have been initiated to increase efficiency and limit costs in an effective environment of health service delivery (Geisller et al., 2011). For this reason, it is very important to give the necessary importance to the notion of green accounting in healthcare institutions and to carry out studies in this direction. Bibliometric mapping provides a visual representation of the knowledge domain, highlighting the key research topics, influential articles, and relationships between different areas of study. It can help researchers identify emerging research trends, gaps in the literature, and potential collaborations. Furthermore, bibliometric maps can be used to assess the impact of specific articles or authors within the research community (Van Eck & Waltman, 2014; Börner et al., 2007).

This study was conducted to map the studies on green accounting in the field of health using bibliometric approaches. It is thought that this study, which reveals the thematic evolutions of the keywords used in studies on green accounting in the field of health, the keywords that come to the fore or remain in the background, and the most influential journals and countries, will be a guide for relevant researchers.

2. CONCEPTUAL FRAMEWORK

Although many businesses cause both global and regional pollution, they are considered as focal points of economic development and growth. The concept of "green accounting or environmental accounting" has emerged as a result of the necessity of businesses to be sensitive to the environment and the inclusion of environmental studies in the accounting process (Antepli & Aslan, 2018). Moorthy and Yacob (2013) define green accounting, which is also called environmental accounting in the literature, as a concept that is related to environmental eco-audit and environmental information, and that includes the identification, monitoring, analysis and finally reporting of material and cost information involved

to the environmental aspects of a business. Raka Sukawati, Astawa, and Silaen (2020) explain green accounting as diverse efforts to gather, analyze, evaluate, and make ready reports on environmental and financial data in order to minimize the impact and cost caused by environmental detriment. On the other hand, Tu and Huang (2015) define green accounting as measuring, recording, and explaining the efficacies of environmental activities on the financial situation of firms through a set of accounting practices. Green accounting activities consist of environmental consciousness, environmental participation, and environmental reporting (Raka Sukawati et al., 2020). Finally, Schaltegger and Burritt (2000) describe green accounting as activities that include the processes of explaining, examining, and recording the economic effects of an environmental activity or environmental problems. In line with these definitions, the characteristics of green accounting can be listed as follows (Özbirecikli, 2002).

- *It is a financial accounting in terms of accounting for environmental effects,*
- *It is a cost accounting in terms of making cost information accessible and auditable,*
- *It is a management accounting in terms of presenting the information in the management process,*
- *It is an environmental report in terms of reporting environmental activities and performance,*
- *It is an audit tool in terms of auditing the environmental performance and presenting it to the public by having it certified.*

Increasing consciousness of environmental costs and their integration into corporate performance reporting has led to the evolution of a new environmental dimension of accounting (Novavic Buric et al., 2022). Green accounting, which makes environmental expenditures a part of the operating cost, it argues that environmental performance should be increased by preserving the existing profit, or a new way of thinking should be adopted to meet green accounting rules (Tu & Huang, 2015). Green accounting is concerned to recording the environmental information and costs in the body of financial statements in the past and future, and the uncertainties and questions brought about by environmental capital expenditures raise many difficulties in the accounting profession (Gibbon & Lal Joshi, 1999). Green accounting should be able to respond with a cost-benefit approach to how efficient an organization is in its environmental management process (Nonavic Buric et al., 2022).Green accounting provides important cost data in order to reveal the contributions of enterprises to environmental safety studies and economic development. (Maama & Appiah, 2019). For example, when a hospital wants to assess the environmental costs associated with its energy consumption, it can calculate costs by taking into account the sources of energy consumption, energy efficiency measures and renewable energy use. This allows the hospital to determine the costs associated with energy consumption and evaluate the improvements it can make to increase energy efficiency.

Environmental accounting and reporting are becoming more and more important for stakeholders and organizations because the environmental and social performance of a business has a

considerable effect on financial health (Maama & Appiah, 2019). In recent years, countries and unions such as the United States, Japan, European Countries, the United Nations, and Taiwan have been promoting green accounting guidelines. These countries affect the production activities of the enterprises and take measures to prevent them from harming the environment while producing. Multinational companies are placing more and more emphasis on examining green accounting data before working with suppliers. Businesses in order to protect profits and regulate costs, they should turn to green accounting and make improvements in product designs (Tu & Haung, 2015).

With the emergence of the notion of sustainable development in the 1970s, green accounting became a new branch of accounting science (Ding et al., 2014). The first step in protecting the environment and expanding the use of renewable energy sources is the implementation of green accounting standards that express environmental awareness behaviors in monetary units (Stanojevic et al., 2010). Many businesses, especially SMEs (Small Medium Enterprises) and investors are now interested in being "green" as they value environmental responsibility. The concept of green here provides important information about the environment and economy by dealing dealth with development and better natural resources, sustainable energy sources and green accounts (Abdel-Rahim & Abdel-Rahim, 2016).

3. RESEARCH METHODOLOGY

3.1. Purpose of the Research

The aim of this study is to examine the structure of studies on green accounting in the field of health using the bibliometric technique of science mapping.

The objectives of this study are listed below.

1. To examine the publication trends in the field of green accounting in health.

2. To identify and map the most effective keywords and word clusters in the publications.

3. To discover prominent areas by identifying thematic maps of keywords.

4. To identify and map the most cited countries and journals.

In this study, studies dealing with green accounting in the field of health are examined, and their themes and evolutions over the years are discussed. Thus, a roadmap is presented to researchers who plan to work in this field.

3.2. Research Design

Bibliometrics, as a concept, is a method that provides information about countries, authors, cooperation, keywords, scientific disciplines, and journals of the articles with statistical and mathematical tools (Kurutkan & Orhan, 2018). Bibliometric analysis is a common and accurate method

for examining and analyzing large volumes of scientific data. At the same time, bibliometric approaches are critical for recognizing the strengths and weaknesses of any field of study (Zeinoun et al., 2020; Bormann et al., 2015).

In this study, VOSviewer and Bibliometrix software were used together for the analysis of data and the development and visualization of information maps. VOSviewer provides visualization of bibliometric networks based on distances in order to reveal the relationships between studies. (Eck & Waltman, 2014). This analysis shows the proximity of terms through modality. The relationship is calculated based on the distance between the items. In other words, the greater the distance between terms is, the weaker the relationship between the items becomes (Eck & Waltman, 2014). The R-bibliometrix package was developed by Aria and Cuccurullo (2017) using R Studio software. Bibliometrix is a free and open-source software tool designed for bibliometric analysis. The R-based software package bibliometrix has been extensively designed to analyze all publications. Bibliometric analysis is a quantitative method used to study scientific literature and its impact, using data such as citations, co-authorship, and publication patterns. Bibliometrix allows users to import bibliographic data from various sources, such as Web of Science, Scopus, and PubMed, and analyze the data using a wide range of bibliometric indicators and visualization tools. These indicators include citation analysis, co-citation analysis, bibliographic coupling, and network analysis. Bibliometrix is a powerful tool for researchers, librarians, and other professionals who need to analyze scientific literature for research, evaluation, or decision-making purposes. It provides a user-friendly interface for performing complex bibliometric analyses, and its open-source nature allows for customization and extension of its functionality by users and developers. (Aria & Cuccurullo, 2017).

Thematic evolutionary analysis is a research method used to analyze how themes and concepts evolve over time in a body of literature. It is a combination of thematic analysis and evolutionary analysis, two established methods used in qualitative research and evolutionary biology, respectively. Thematic analysis involves systematically coding data to identify themes and categories, and then interpreting and describing the themes in relation to the research questions or objectives. Thematic evolutionary analysis applies the principles of thematic analysis to a body of literature, such as journal articles or books, and examines how themes and concepts change over time. It involves identifying and categorizing themes and concepts within the literature, and then analyzing how these themes and concepts change over time, either within individual publications or across a larger body of literature. Thematic evolutionary analysis can be used to study a wide range of research questions, such as how scientific concepts and ideas have evolved over time, how different fields of research have developed and interacted over time, or how public attitudes towards certain issues have changed over time.

The process of thematic evolutionary analysis typically involves several steps, including:

- Data collection: Collecting a body of literature to be analyzed, such as journal articles or books.

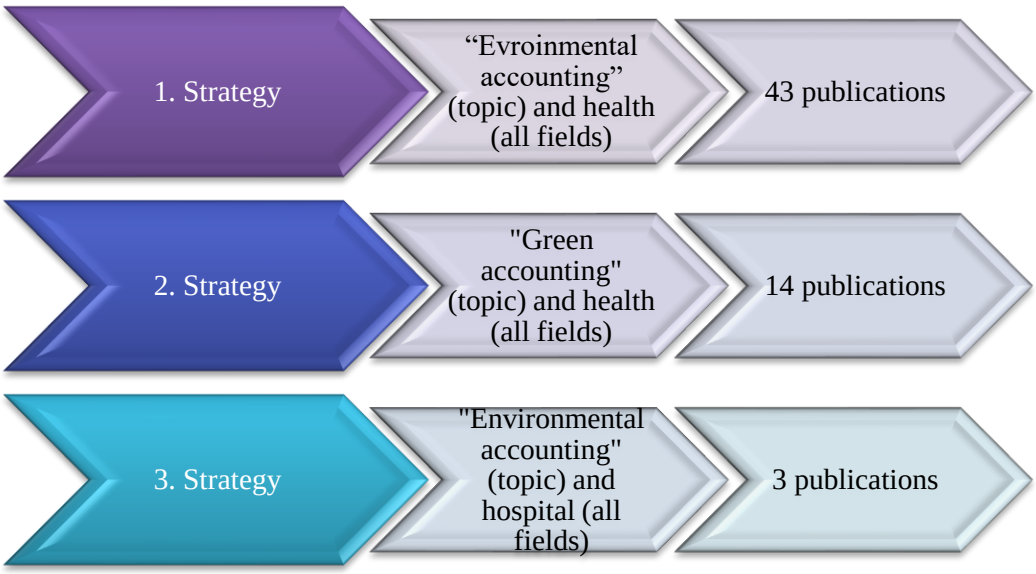
- Coding: Systematically coding the data to identify themes and concepts.
- Analysis: Analyzing the themes and concepts to identify patterns and trends in how they have evolved over time.
- Interpretation: Interpreting the results in relation to the research questions or objectives.

Thematic evolutionary analysis is a useful research method for gaining insights into the evolution of ideas, concepts, and fields of research over time. It can provide valuable information for researchers, policymakers, and other stakeholders who need to understand how trends and patterns have developed over time and what they might mean for the future. (Cobo et al., 2012; López-Robles et al., 2021).

3.3. Research Model and Data Collection Techniques

In this study, the Web of Science (WoS) Core Collection was used for bibliometric analysis. WOS is the most frequently used database in the academic field (Merigó et al., 2015).

Figure 1. Search Strategy



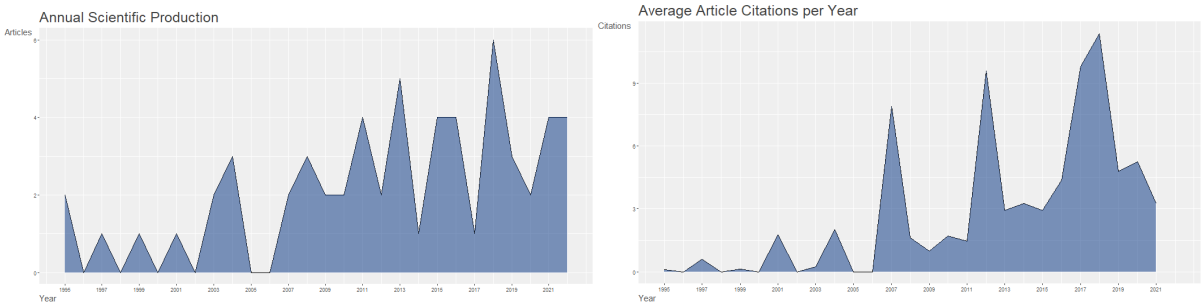
The data includes the studies that took place between 01.01.1945 and 31.12.2022. 3 different searches were performed, and the data were combined. In the first search, the "environmental accounting" topic and the health all fields' options were searched. As a result, a total of 43 publications were reached. In the second search, 14 publications were reached by scanning the "green accounting" topic and health all fields' options. In the third search, the "environmental accounting" topic and the hospital all fields' options were searched and 3 studies were found. One of the studies was excluded because it was included in the other search. All publication types such as articles and book chapters and publications written in all languages were included in the data set. While searching, "Science Citation Index Expanded (SCI-EXPANDED)--1945-31.12.2022, Social Sciences Citation Index (SSCI)--1956-31.12.2022, Social Sciences Citation Index, (SSCI)--1956-31.12.2022, Arts & Humanities Citation

Index (AHCI)--1975-31.12.2022, Arts & Humanities Citation Index (AHCI)--1975-31.12.2022, Conference Proceedings Citation Index – Science (CPCI-S)--1990-31.12.2022, Conference Proceedings Citation Index – Science (CPCI-S)--1990-31.12.2022, Conference Proceedings Citation Index – Social Science & Humanities (CPCI-SSH)--1990-31.12.2022, Conference Proceedings Citation Index – Social Science & Humanities (CPCI-SSH)--1990-31.12.2022 Book Citation Index – Science (BKCI-S)--2005-31.12.2022 Book Citation Index – Science (BKCI-S)--2005-31.12.2022, Book Citation Index – Social Sciences & Humanities (BKCI-SSH)--2005-31.12.2022, Book Citation Index – Social Sciences & Humanities (BKCI-SSH)--2005-31.12.2022, Emerging Sources Citation Index (ESCI)--2005-31.12.2022, Emerging Sources Citation Index (ESCI)--2005-31.12.2022" were selected and no index restriction was applied. As a result, a total of 59 studies were analyzed. The results were downloaded in CSV format for processing using VOSviewer to visualize and analyze trends in bibliometric form.

4. FINDINGS

This part of the current study includes the findings.

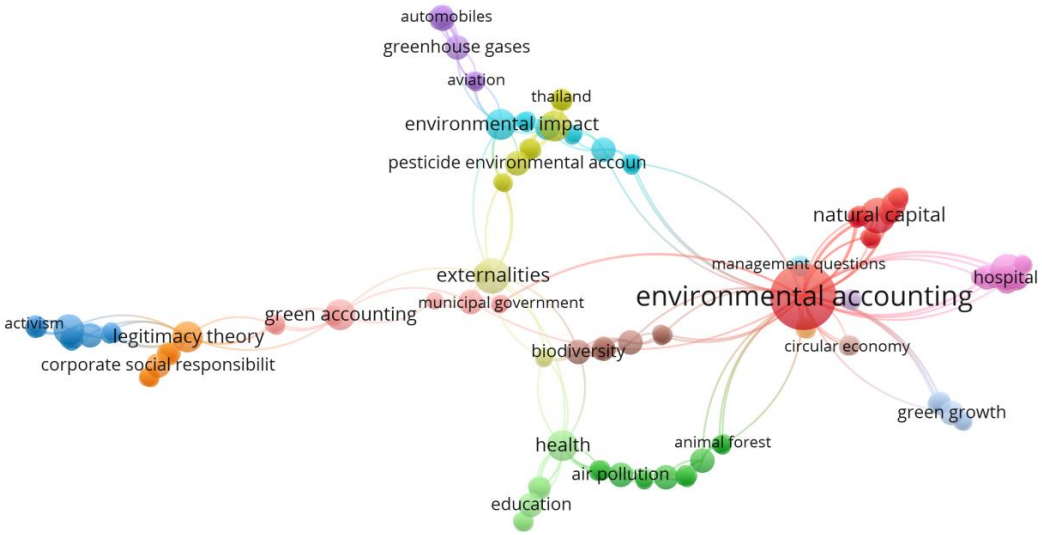
Figure 2. Number of Publications and Citations by Years



(a) **(b)**

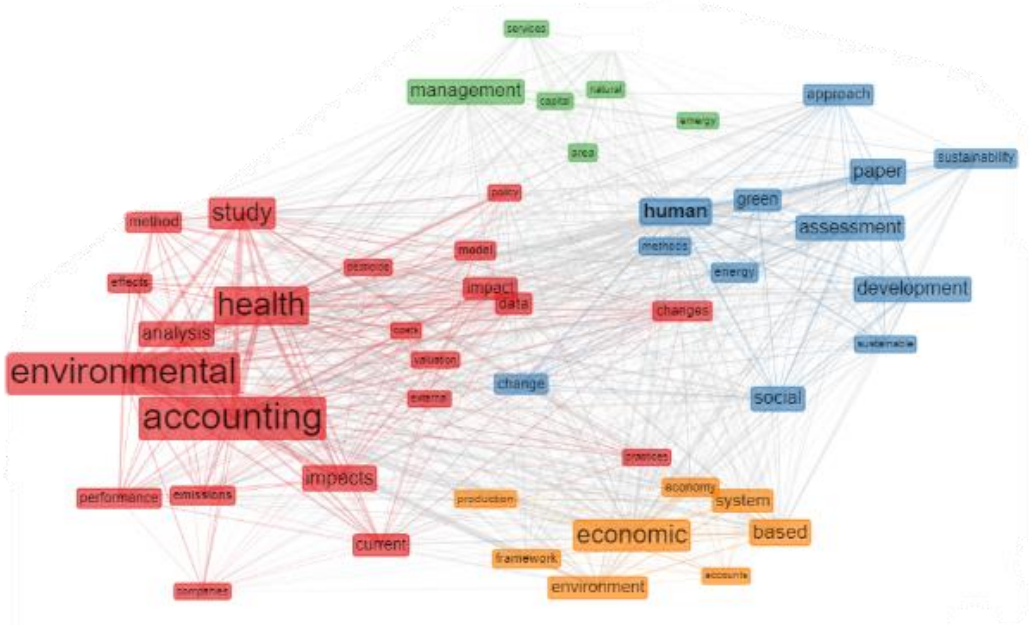
Figure 2 examines the publication and citation trends of studies in the field of green accounting in health are examined. Figure 1(a) shows the number of publications by year. Of the 59 publications examined, 43 were articles, 10 were (conference) papers, 1 was a letter to the editor, and 5 were reviews. Although the publications did not increase steadily, it is seen that most publications were in 2018 with 6 publications. Figure 1(b) indicates the number of citations by year. As with the number of publications, the highest number of citations occurred in 2018.

Figure 3. Keyword Co-occurrence Network (Vosviewer)



Keywords focus on the main points of a study (Su & Lee, 2010). Keyword analysis determines the main research areas of research (Darko et al., 2019). Co-occurrence analysis can be conducted using a variety of statistical methods, including simple frequency counts, co-occurrence matrices, and network analysis techniques. These methods can be used to visualize and analyze the relationships between words or concepts in a given corpus, and to identify patterns of co-occurrence that can be used to inform research and decision-making in a variety of domains (Griffith et al., 2016). Therefore, in Figure 3, the VOSviewer software is used to generate the keyword co-occurrence network. Considering the threshold value of 223 keywords in total as 1, 169 words were linked to each other and the image in the figure was obtained. When the keywords divided into 9 clusters are examined, the Red cluster is "**Environmental accounting**", the Turquoise cluster is "**Environmental impact**", the Yellow cluster is "**Externalities**", the Pink cluster is "**Sustainability**", the Purple cluster is "**Greenhouse gas**", the Brown cluster is "**Biodiversity**", the Blue cluster is "**Social and Environmental Accounting**", Orange Cluster "**Legitimacy Theory**" and Green Cluster "**Health**". When the total link levels were examined, the most linked keyword was environmental accounting (59), which was followed by natural capital (18), social and environmental accounting (16), health (15), Legitimacy theory (15), and Sustainability (15).

Figure 4. Keyword Co-occurrence Network (Bibliometrix)



The co-occurrence network of keywords in R-Bibliomterix is shown in Figure 4. Accordingly, keywords are clustered around 4 clusters. It is seen that the most dominant cluster was the Red cluster representing **Environmental accounting**. The Orange cluster represented **Economics**, the Blue cluster **Human**, and the Green cluster **Management**.

Figure 5. Thematic Map (Bibliometrix)

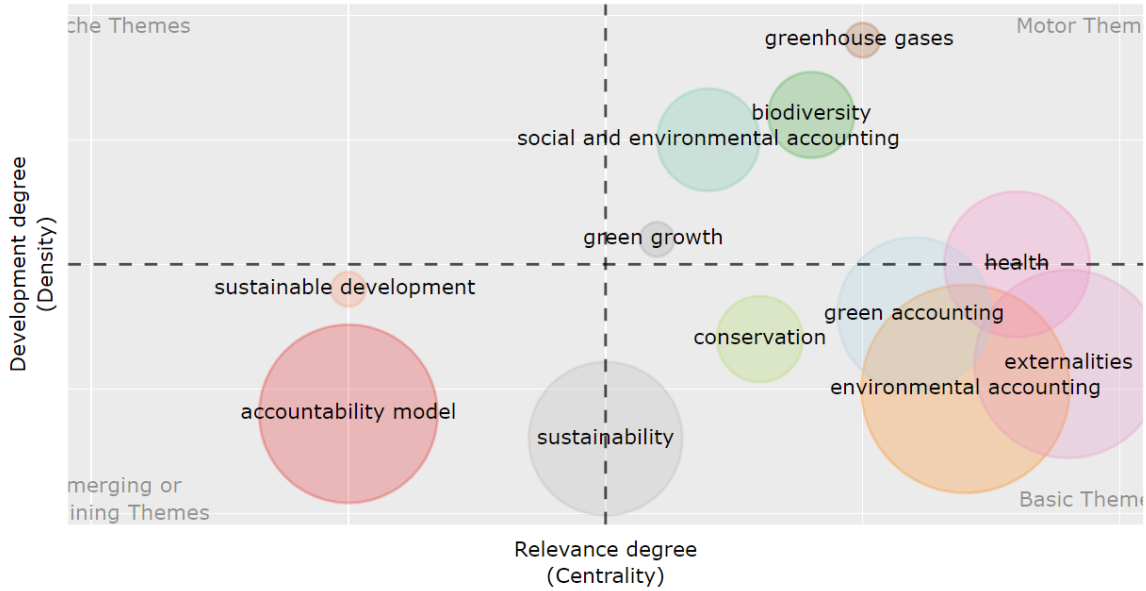
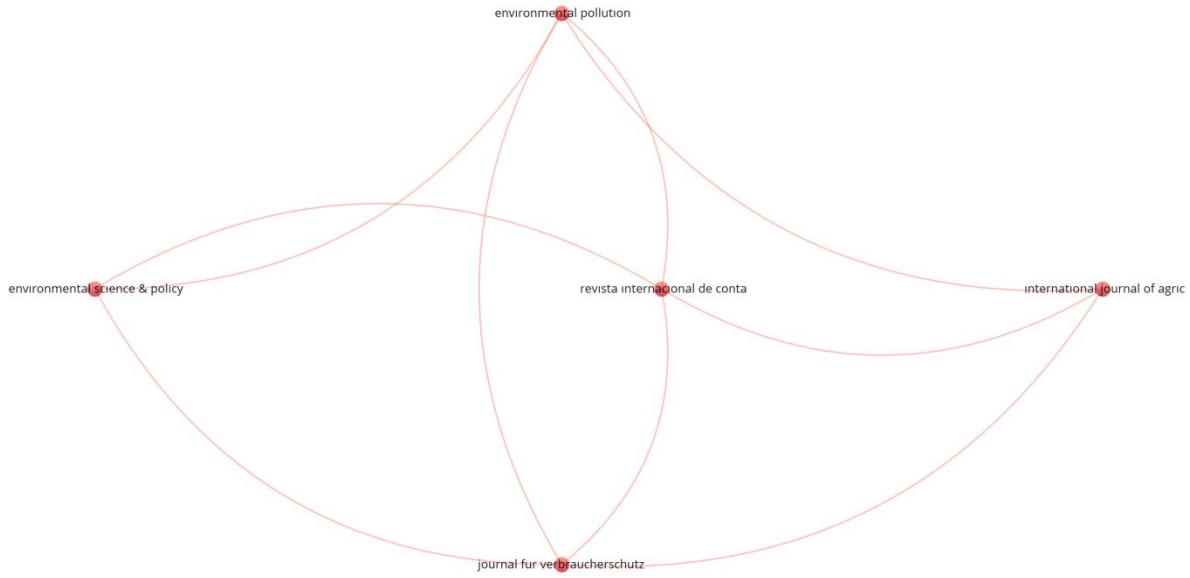


Figure 5 shows the thematic map of the keywords that emerged from the studies in the field of Green Accounting in Health. There are 4 different keyword analyzes when analyzing in the bibliometrix program. These are plus keywords, author words, title keywords, and summary keywords. In this analysis, author keywords were used (Kaya ve diğerleri, 2022). Thematic maps show the evolution and popularity of keywords over the years. It is based on centrality (x-axis) and density (y-axis). The

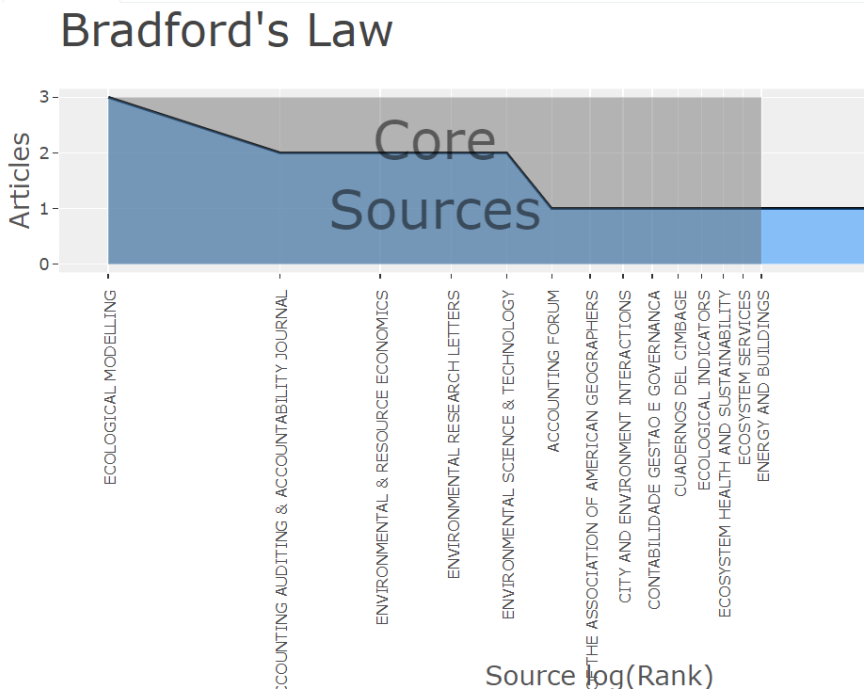
centrality highlights the importance of the chosen theme. Intensity measures the development process of the theme. Greenhouse gases, Green growth, Biodiversity, and Social and environmental accounting were in the motor themes. Words in motor themes should be developed and structured (Cobo et al., 2012). The accountability model and sustainable development were included in emerging or declining themes. These themes contained weaker keywords than other themes. Conservation, environmental accounting, and externalities were in the basic themes. These themes were relevant to the research field but needed further development. In addition, while sustainability was included in both basic and emerging or declining themes, Health and Green accounting were found in both basic and motor themes.

Figure 6. Citation Network of Journals (Vosviewer)



As seen in Figure 6, the citation analysis of the journals that published the most studies on green accounting in the field of health was performed by using the VOSviewer software. Accordingly, it is seen that 5 out of 53 journals were in connection. Environmental Pollution, Journal für Verbraucherschutz und Lebensmittelsicherheit, and Revista Internacional de Contaminación Ambiental were the journals with the most links with 4 total links. Apart from these, the Journal of Environmental Economics and Management was the most cited journal in this field with 233 citations.

Figure 7. Bradford's Law (Bibliometrix)



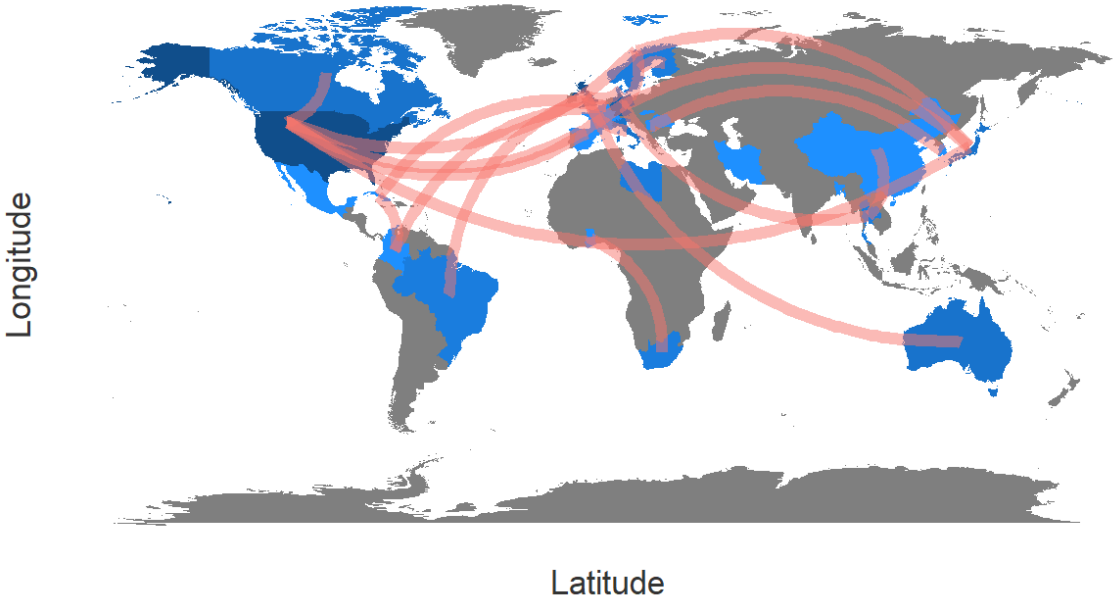
Bradford's law, introduced by Bradford, helps to identify the journals that can be acceptable the main journals of the subject (Bradford, 1985). According to Bradford's law, the total articles are divided into three groups. (Tepe et al., 2021). In Figure 7, according to Bradford's Law in Bibliometrix, it can be seen that the most popular journal is Ecological Modelling. According to Bradford's Law in Bibliometrix, it is seen that the most popular journal was Ecological Modeling, which was followed by the Accounting Auditing & Accountability Journal, Environmental & Resource Economics, Environmental Research Letters, and Environmental Science & Technology.

Figure 8. Citation Network of Countries (Vosviewer)

As seen in Figure 8, the citation network was carried out through the VOSviewer software to see the most effective countries and the relationship between the studies in the field of green accounting in health. In the software, 7 out of 32 countries met the threshold value. Among these, the country with the highest number of citations was the USA with 710 citations, while the country with the highest

number of links was found to be England (9). Among these countries, England and Italy, USA and Canada, and Thailand and Mexico were grouped among themselves.

Figure 9. Scientific Production of Countries (Bibliometrix)



The representation of the scientific production of the countries on the world map via the Bibliometrix software is given in Figure 9. In this map, it is seen that the country with the highest production was the USA with 39 publications, which was followed by England (18), Japan (11), Italy (9), and Germany (8).

5. DISCUSSION AND CONCLUSIONS

In this study, the structure of studies on green accounting in the field of health was examined using the technique of science mapping. It is examined to explore the publication trends, the most influential countries, journals and keywords, and thematic evolutions in the field of green accounting in health. VOSviewer and R-Studio software were used in the study which examined 59 publications. A result of the analysis, it is seen that 2018 was the most effective year, although there was no regular increase in publication and citation trends. In both analyses, the keywords were clustered around the environmental accounting cluster. When the thematic map of the keywords was examined, it was seen that protection, environmental accounting, and externalities were included in the basic themes. In addition, the most cited country in this field was the USA. According to Bradford's Law, the most popular journal was Ecological Modeling, and according to citation network analysis, it was the Journal of Environmental Economics and Management. Researchers who would like to study green accounting in the field of health should give priority to the motor themes of greenhouse gases, social and environmental accounting, green growth, and biodiversity in their studies. Based on the literature review, studies on green accounting were examined by bibliometric analysis in a study conducted by

Karcıoğlu and Tosunoğlu (2022). The data were taken from Wos and a total of 839 publications were examined.

A bibliometric analysis of green accounting studies in Indonesia was conducted by Ferieka et al. (2022). Study data were retrieved from the dimensions database using the keywords "green accounting" and "Indonesia" to reach 423 publications. Publications were analyzed with R-Bibliometrix as in this study. The study concluded that the journal that attracted the most attention from the authors was "Accounting Auditing & Accountability in the theme of Green accounting, the words that most correlated were "work, corporate, reporting, environment, and accounting", and the country with the highest number of citations was Australia with 1700 citations. In a study by Nidhi and Anand (2022), in which a bibliometric analysis of green accounting was performed, articles published in Scopus since 1976 were examined using Bibliometrix. By reviewing 533 publications, they found that research in the field of green accounting was long stable and only accelerated after 2003. They concluded that the most publications were in the Social and Environmental Accounting journal, the most frequent words were decision making, environmental impact, and environmental economics, and the most cited countries were the UK, USA, and Australia.

In a mixed-method study, Debrah et al. (2022) systematically reviewed 995 publications on green accounting, whose data were validated by ScienceDirect, Google Scholar, Web of Science and Scopus using both bibliometric and qualitative analysis. Various bibliometric studies have also been conducted on carbon accounting in the literature (Ascui, 2014; Zheng et al., 2021; Csutora & Harangozo, 2017; Stechemesser & Guenther, 2012). Apart from bibliometric studies, in a study conducted in the field of green accounting in health institutions, Sepetis and Kada (2009) found that hospitals should focus on environmental management practices and integrate their systems into environmental accounting to gain a competitive advantage. In the study conducted by Khoirina (2016) at Semen Gresik Hospital, it was determined that green accounting studies were not applied effectively. Environmental cost accounting was demonstrated in a study conducted by Rimbano (2019) at the Siti Aisyah Hospital in Lubuklinggau. In addition, it was seen that wastes were managed correctly in these hospital and environmental costs were also incurred. Ashari and Anggoro (2020) found in their study in public hospitals in Malang Raya that green accounting practice had a 15.0% effect on business sustainability and the remaining 85.0% was affected by other factors aside from green accounting. Ashari and Anggoro (2021) showed in a study conducted at Public Hospitals in Malang Raya that green accounting practices based on financial activities, social activities, and environmental activities were applied properly and consistently. In the study conducted by Ashari and Anggoro (2021), it was concluded that green accounting practices partially affected the sustainability of the business, while the organizational dimension did not affect the sustainability of the business.

Health institutions, similar to other businesses, harm the environment with some activities. Especially since there is a lot of waste in health institutions, the disposal of these wastes in a way that will not harm the environment should be one of the most important priorities of the institutions. In the study conducted by Çilhoroz and Işık (2018), the amount of waste in hospitals was found as follows; vegetable waste oils (5.973.5 lt), domestic wastes (413.3 tons) and medical wastes (106.2 tons). The least produced waste is nuclear medicine waste (5.5 tons). In terms of public hospitals, the most produced waste is vegetable waste oil (11,211.5 lt), while the least produced waste is nuclear medicine (10.5 tons). In private hospitals, the most produced waste is vegetable waste oil (736 lt), while no radiology waste water is produced. Efforts to protect the environment are also a cost factor for health institutions. Therefore, environmental awareness has begun to emerge in the field of accounting over time. Scientific studies also play a major role in increasing the use of green accounting in health. Although bibliometric studies related to green accounting and environmental accounting exist in the literature, there is no study examining green accounting in the field of health, which will also serve as a guide for the relevant researchers in addition to revealing the originality of the study. The main limitation of this study is that the study data were taken from the Web of Science database. Future studies may obtain richer data by including other databases. In addition, images may be diversified by using various analysis programs (Scimat, SciVal, Publish or Perish, CiteSpace, Bibexcel, Histcite, Sci2).

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