The Research Developments and Trend of Municipal Bonds:
A Bibliometric Analysis

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Abstract: - This study aims to explore and analyze the development and trend of the topic of municipal bonds in the fields of economics and business. Research data using peer-reviewed journals, as many as 478 journals sourced from the Scopus database. Data analysis used a bibliometric approach. Bibliometric analysis utilizing the help of R-biblioshiny and VOSviewer. The research results show an interesting trend of this research from various indicators based on the frequencies and citations of the publications. More importantly, some popular research areas and topics have been uncovered to analyze municipal bonds, which serve as useful inferences for future studies in Indonesia. There are many studies on municipal bonds, but there are still few studies that map the topic of municipal bonds with a bibliometric approach with the help of R-Biblioshiny and VOSviewer to get meaningful and valuable results. That is the novelty of this research.

Key-Words: - Bibliometrics, Indonesia, Municipal Bonds, Research Development, Trend

1 Introduction

In recent months, people have been busy discussing the economic situation in several countries due to the COVID-19 pandemic. Several countries worldwide are vulnerable to economic crises due to the pandemic. The global pandemic has caused economic growth to stall, making it easy to get hit by an economic crisis. The impediment of the economy in countries impacts the inhibition of economic development in the regions. Fiscal decentralization is a strategic and popular development policy, [1]. Fiscal decentralization is a strategic and popular development policy. Fiscal decentralization is realized by giving authority to lower levels of government.

Fiscal decentralization policy is carried out to create an equitable distribution of economic development in all regions, fulfill regional aspirations regarding control over state financial resources, encourage accountability and transparency of regional governments, increase public participation in regional development processes, reduce inequality between regions, ensure the implementation of minimum public services, in each region to encourage economic growth and improve people's welfare, [2,3]. The Regional Government is given financial resources to carry out government affairs which the authority of the Regional Government. Fiscal decentralization gives the regions the authority to manage their regional finances.

Law Number 33 of 2004 is used as a guideline for fiscal decentralization in Indonesia. Article 5, paragraph 1 explains that Regional Revenue in the implementation of decentralization consists of Regional Income and Financing. Furthermore, Article 5, paragraph 2 explains that the sources of regional income are regional original income, balancing funds, and other income.

The problem of limited sources of funds originating from Regional Original Revenue or the central government to meet development needs opens up opportunities for local governments to seek other sources of financing. One of them is local bonds. Regional bonds are an alternative for local governments to cover the lack of financing for regional development. However, considering the many cases of local bond defaults in other countries and the risk due to high moral hazard and corruption rates in the regions which can result in investment failures that lead to failure to pay regional bonds, [4].

Municipal bonds can be used to increase costs in regional development. However, local governments cannot issue municipal bonds directly because there are strict requirements for issuing municipal bonds. The difficulty in issuing municipal bonds is due to the complicated mechanism for

issuing municipal bonds, high costs, and the possibility that local governments cannot/fail to pay municipal bonds (default). Local government can issue municipal bonds if the local government's fiscal capacity is in good condition. Therefore, in issuing municipal bonds for the benefit of regional development, it must have a return on investment so that the Regional Revenue and Expenditure Budget (APBD) is not burdened, [5].

The government can issue municipal bonds to finance investment activities in the public sector, which are the affairs of local governments and can provide income and benefits to the community based on applicable laws and regulations. Some of the public activities that municipal bonds can finance are: (i) drinking water services; (ii) waste and waste management; (iii) transportation; (iv) hospital; (v) traditional markets; (vi) shopping areas; (vii) entertainment centers; (viii) tourism and nature conservation areas; (ix) terminals and sub-terminals; (x) housing and flats; and (xi) local and regional ports.

Thus, there is a continuous challenge for local governments in managing to fund their public projects, [6]. Notably, in the recent development of fiscal decentralization, the Indonesian local governments are still working hard in handling and investing the municipal bonds, [7].

Considering the review from the international context, the term regional bonds are not a common name; instead, municipal bonds. As a result, this review adopts the term municipal bonds as it is generally accepted and recognized in the literature. Several previous studies with the theme of municipal bonds have been carried out, some of which are Kolm et al., [8], Adelino et al., [9], Benson & Marks, [10], and Soybel, [11]. There are quite a several studies on municipal bonds, but there still needs to be research that maps municipal bonds using a bibliometric approach. Based on the previous description, this research will conduct municipal bond mapping with a bibliometric approach with the help of R-Biblioshiny and VOSviewer to obtain meaningful and valuable results.

2 Related Works

Research on bibliometrics often has many terms, such as scientometric, traditional literature review, systematic review, or bibliometric analysis. Bibliometric research on municipal bonds still needs to be improved. This section will show some of the previous bibliometric research on municipal bonds topics.

Rosenbloom conducted a study entitled "A review of the local bond market," which aims to assess the significance of this development through an evaluation of recent trends that affect both supply and demand for local bonds and the resulting securities on state and local government borrowing costs, [12]. The discussion focuses on municipal bonds' primary market (new edition), emphasizing market participants, market trends over the last fifteen years, recent market developments, and possible future market directions. In another study, Scorsone & Plerhoples conducted a study entitled "A Review of Municipal Bond Issues in Michigan," which aims to review the condition of Michigan municipal bonds and develop a new debt assessment indicator system, [13].

Several previous studies that have been described show that there still needs to be previous research that focuses on discussing municipal bonds. Our study attempts to be exhaustive by reviewing all the literature and considering various research outlets (journals). Municipal bonds are a multidisciplinary field, thus encompassing a wide range of publication outlets. In addition, the type of municipal bonds literature has been published since previous bibliometric analyzes were carried out in the previous year carried out in the years 1907, [14], 1920, [15], and 1941, [16].

The research above is bibliometric in the old year. To cover the gap in bibliometric research in the field of municipal bonds, this research will conduct a bibliometric analysis of municipal bonds to answer several research questions (RQ) as follows:

RQ 1 : Which are the relevant publications about the research of municipal bonds?

RQ 2 : Who are the prolific authors based on the number of publications per year?

RQ 3 : Which institutions have contributed the most to the research of municipal bonds?

RQ 4 : Which countries of the authors contributed the most to the research of municipal bonds?

RQ 5 : Which countries are cited most in municipal bonds research publications?

RQ 6 : Who are the most-cited authors in the research of municipal bonds?

RQ 7 : What are other relevant keywords in the research of municipal bonds?

RQ 8 : What are the trending topics in the research of municipal bonds?

The bibliometric analysis in this study followed some fundamental protocols in the review process, [17]. Bibliometric analysis is a quantitative analysis often used in various fields of science and is carried out systematically so that others can carry out similar research. In bibliometric analysis, researchers can apply several search limitations so that the journals obtained fit within the defined research scope, [18]. Sources of data from the bibliometric analysis are from national or international databases in the form of scientific writings (books, conference papers, journals, etc.), [19].

The researcher used five steps of bibliometric analysis in this study. The five steps consist of the following:

a) Keyword determination.
b) Examination of search results.
c) Refinement of search results.
d) Compilation of search result data.
e) Data analysis.

Figure 1 shows the five steps in performing a bibliometric analysis. Steps need to be followed so that bibliometric research can produce good results.
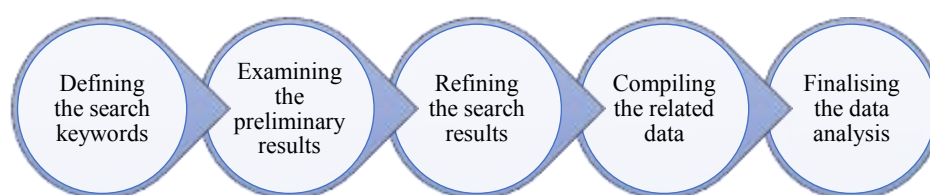

Fig. 1: Five Major Steps of Bibliometric Analysis

2.1 Determining Search Keywords

The research with the theme "Municipal Bonds" was conducted on November 22, 2022. The search for municipal bonds was based on article titles, abstracts, and keywords from journals. Journals sourced from the Scopus database are used in this study because the journals from the Scopus database are reputable journal databases that have been internationally recognized. Hence, they are in great demand by great researchers to publish journals with the Scopus index. Scopus database has high standards and a reputation, making it a database with quality international journals. The analysis carried out by researchers, namely in the field of regional bonds, uses journals of good quality so that the analysis results are more reliable.

2.2 Preliminary Search Results

The researcher did the initial research step by entering the keyword "Municipal Bonds" in the Scopus database. The search results provide 608 data. The documents displayed come from conference papers, books, journals, etc. The articles displayed are articles from 1907 to 2022. However, The researcher will eliminate articles from 1907 at this stage because they are irrelevant to the research, and the topics discussed are too outdated.

Table 1. The term "Municipal Bonds" appears for the first time in journals

Author	Title	Source	Description
Weil (1907)	Municipal bonds issues explained	The Annals of the American Academy of Political and Social Science	Research with the title "Municipal bonds issues explained" discusses that the main element of power in municipal bonds lies in the right of the holder to compel payments and in the important duty of the issuing municipality to fulfill both principal and interest by levying taxes on all property within its boundaries.
Terrel (1907)	The protection of municipal bonds	The Annals of the American Academy of Political and Social Science	A minimal investigation into how municipal bonds are issued will reveal the conditions under which the crime of forgery can find its origin. This study provides a brief reference to the conditions under which protection methods are required and a general statement of their essential features without going into details of the almost countless methods compiled.

2.3 Refinement of Search Results

The screening process for the initial results is carried out at the refinement of the search results stage. At this stage, there are two inclusion criteria to filter the initial results, namely:

a) IC1: Journal written in English
b) IC2: Using peer-reviewed journal sources

By setting these two inclusion criteria, it is hoped that the journals obtained for the analysis process are the best and have scientific contributions. So that the analysis results obtained can be more comprehensive and reliable. After the journal is filtered, it is stored in RIS format to be processed in the R-Biblioshiny. A total of 478 articles were filtered after using the filter as follows:

Title-Abs-Key ("Municipal Bonds") And (Limit-To (Language, "English")) And (Limit-To (Srctype, "J")).

2.4 Compilation of Data Statistics

Search data from the Scopus database that has been stored in the form of RIS, then the initial analysis is carried out using Mendeley. Mendeley software stores basic information about journals related to municipal bonds topics. The basic information includes the researcher's name, the journal's title, the year the journal was published, the journal's purpose, the journal's number, volume, the DOI, and the abstract. Furthermore, the data in Mendeley was verified and clarified. Then the use of Mendeley will adjust to the discussion of the research question posed. Mendeley can make it easier for researchers to see abstracts from each journal that the researcher will use in the results and discussion chapters.

3 Result

Data in the form of journals stored in RIS format is then processed using R-biblioshiny and VOSviewer. The analysis results using R-biblioshiny and VOSviewer in the form of images. The pictures are used to answer the research question set at the beginning. In chapter 3, a detailed explanation of the results of the bibliometric analysis will be described. The analysis results will be divided into two: the analysis results using R-biblioshiny (sub-chapters 3.1.1 to 3.1.8) and the results of the analysis using the VOSviewer (sub-chapters 3.2.1 to 3.2.3).

3.1 Data Analysis using R-Biblioshiny

The bibliometric analysis maps data in scientific articles following research questions researchers have set. The researcher can determine the source of the data. The researcher can do data mapping in various research fields. One of the bibliometric analysis tools is R-biblioshiny. R-biblioshiny is one of the packages provided by R-studio. This application displays bibliometric visualization results with statistics and graphics.

3.1.1 Which are the Relevant Publications about the Research of Municipal Bonds (RQ1)

Figure 2 shows the source of the article, along with the number of published studies and their level of relevance to the theme of municipal bonds. There are 20 top destinations shown in figure 2. The darker the circle color indicates the journal's relevance level and the number of journals published with a high research theme. The number of documents issued ranged from 0 to 40 documents.

Public Budgeting and Finance is a journal in the top position with the number of published papers as many as 38 documents. Furthermore, the second

place is occupied by Financial Review, which publishes 15 documents. In third place is the Journal of Financial and Quantitative Analysis, with 13 journal documents. Several journal sources that publish journals with the theme of municipal bonds but in small numbers include Urban Lawyer and Transport Policy.

Public Budgeting and Finance is a journal with The publisher Wiley-Blackwell. This journal is indexed to Scopus Q2. The scope of the journal consists of government budgeting and finance. Public Budgeting and Finance publishes a lot of research on municipal bonds because municipal bonds are included in one of the research scopes of the journal, namely government budgeting and finance.

The second objective of the journal that is most relevant to municipal bonds is Financial Review. Financial Review is also one of the journals with the publisher Wiley-Blackwell. This journal is indexed to Scopus Q2. The Financial Review publishes in all areas of financial economics. Municipal bonds match the sources of the Financial Review journal because financial economics is one of the scopes that fit the theme of municipal bonds.

The third objective most relevant to municipal bonds is the Journal of Financial and Quantitative Analysis. Cambridge University Press publishes the Journal of Financial and Quantitative Analysis. This journal is indexed to Scopus Q1. The journal's scope includes corporate finance, investments, capital, and security markets relevant to financial researchers. Research with the theme of municipal bonds is appropriate to be published in the Journal of Financial and Quantitative Analysis because municipal bonds are included in one of the research scopes of the journal, namely finance.
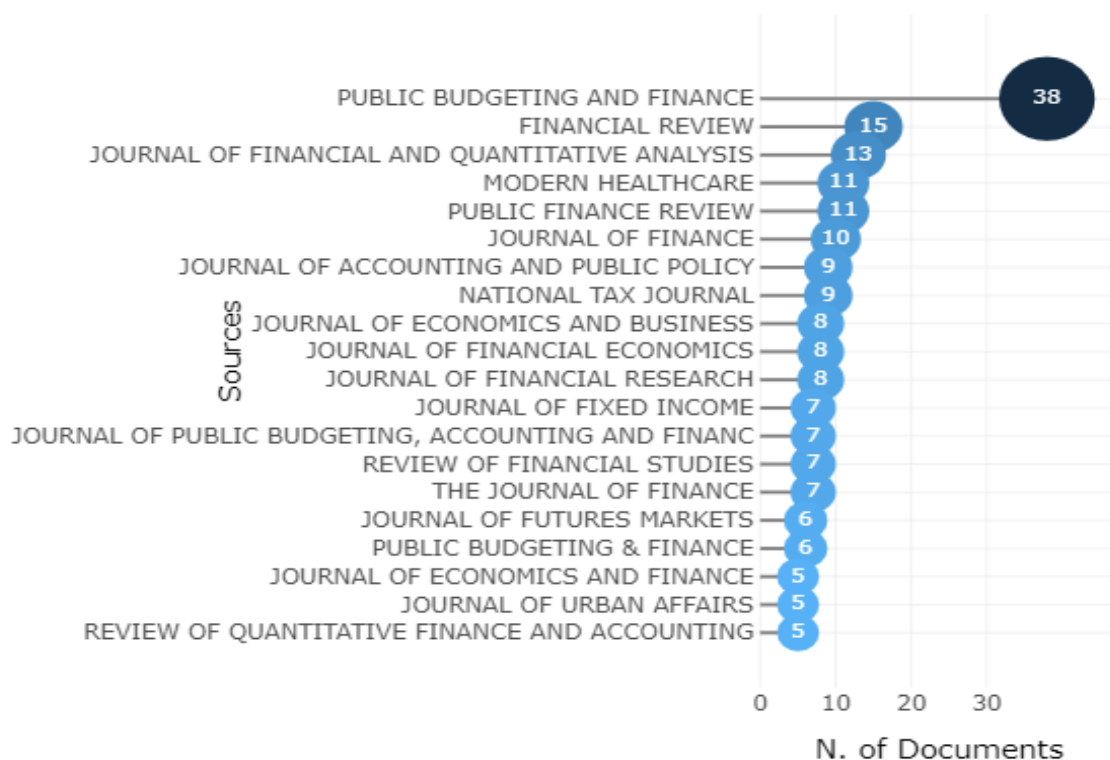

Fig. 2: Most Relevant Sources

3.1.2 Who are the Prolific Authors based on the Number of Publications per Year (RQ2)

Figure 3 shows 20 authors who were productive in researching municipal bonds for 102 years (1920-2022). The author's productivity is measured by the frequency of publishing journals in that period. The red line in the figure indicates the writing period, and the circle indicates the journal published in a particular year. The larger the circle, the more authors were published in journals that year. The bluer the circle, the more often the author's journal is used as a citation. Figure 3 shows that writer Cebula, R.J. is the number one most active and prolific writer. They are followed by Kalotay, A, in the second position, and Liu, G, in the third position. Cebula, R.J. is the number one most active and prolific writer. They are followed by Kalotay, A, in second place, and Liu, G, in third.

Cebula, R.J. is a prolific writer because he is active in writing. This is evidenced by 1991 producing one journal, 2004 producing one journal, 2014 producing two journals, 2016 producing one journal, 2018 producing two journals, and 2020 producing three journals. He was followed by Kalotay, A with writing activities, namely in 2014, producing two journals; in 2016, producing one journal; in 2017, producing two journals; in 2018, producing one journal; in 2019, producing one journal; and in 2021, producing two journals. Furthermore, Liu, G in the third position, indicated his writing activities, namely in 2008, 2009, 2010, 2012, and 2014 each produced one journal, and in 2018 produced two journals.

Then Schurhoff, N and Green, R.C are the authors who receive the highest number of citations per year (188 citations). The work of Schurhoff, N, and Green, R.C. is cited in an average of 11-12 journals per year. Both of their journals are the most widely cited journals published in 2007. Schurhoff, N and Green, R.C published journals entitled "Financial intermediation and the costs of trading in an opaque market" and "Dealer intermediation and price behavior in the aftermarket for new bond issues." Both journals are relevant to municipal bonds, so they are used as citations in other research journals.

In addition, NA is an avid writer who publishes journals on municipal bonds from 1920 to 2022. NA is a journal that does not contain author information in it. NA may consist of several authors. NA published seven journals in the period 1920 to 2022. In 1920, 1981, and 2022 it published one journal, while in 1978 and 2000, it published one journal.
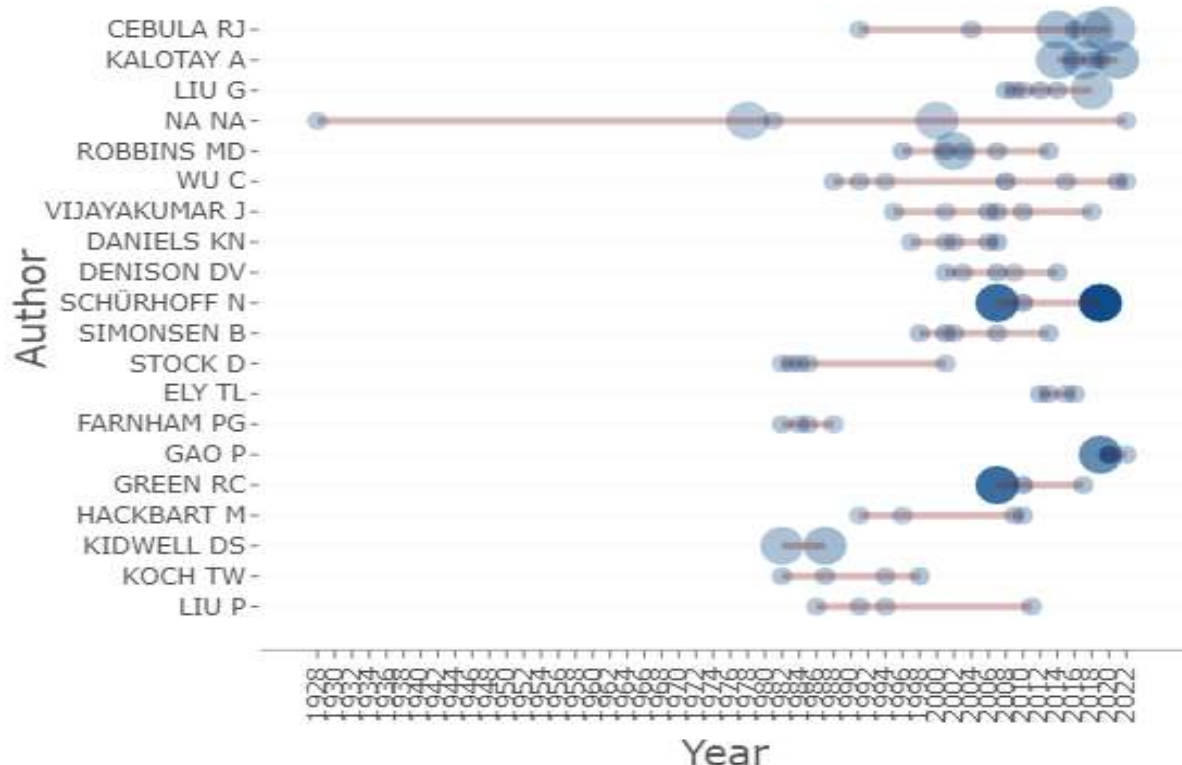

Fig. 3: Top Author's Production Over The Time

3.1.3 Which Institutions have Contributed the Most to the Research of Municipal Bonds (RQ3)

Figure 4 shows the most relevant affiliations in municipal bonds research. The longer the line and the darker the blue, the more journals are published. Figure 4 shows the top 20 affiliates with publications ranging from 5 to 19 journals.

The University of Kentucky occupies the first position as the affiliate that publishes the most municipal bonds journals, with 19 journals. The second position is occupied by Virginia Commonwealth University, with seventeen journals. The third position is occupied by Jacksonville University, with ten journals.

Some authors from the University of Kentucky are Painter, M., Adelino, M., Cunha, I., Ferreira, M.A., Denison, D.V., Hackbart, M., and Moody, M.J. Then several authors from Virginia Commonwealth University are Daniels, K.N., Vijayakumar, J., Diro Ejara, and Huff, R.F. Finally, some authors from Jacksonville University are Cebula, R.J., Angjellari-Dajci, F., Foley, M., and Nair-Reichert, U.

Several factors may influence authors with University of Kentucky affiliations to publish municipal bonds journals. The University of Kentucky provides more than 200 majors. Of the more than 200 majors at the University of Kentucky, several majors can make researchers focus on municipal bonds, namely economics, economics minor, public policy & administration, and pre-law. This course allows students to research municipal bonds so that students' chances of publishing a journal on municipal bonds are higher than other universities.

Several relevant affiliates publish only a few journals on municipal bonds, including the Yale School of Management, Western Illinois University, and Wesleyan University. Researchers from these affiliations may focus on something other than municipal bonds but concentrate on other areas, thus publishing only a few journals related to municipal bonds.

Interestingly, 19 of the top 20 most relevant affiliates are in the United States. This shows that researchers from the United States are interested in researching municipal bonds.
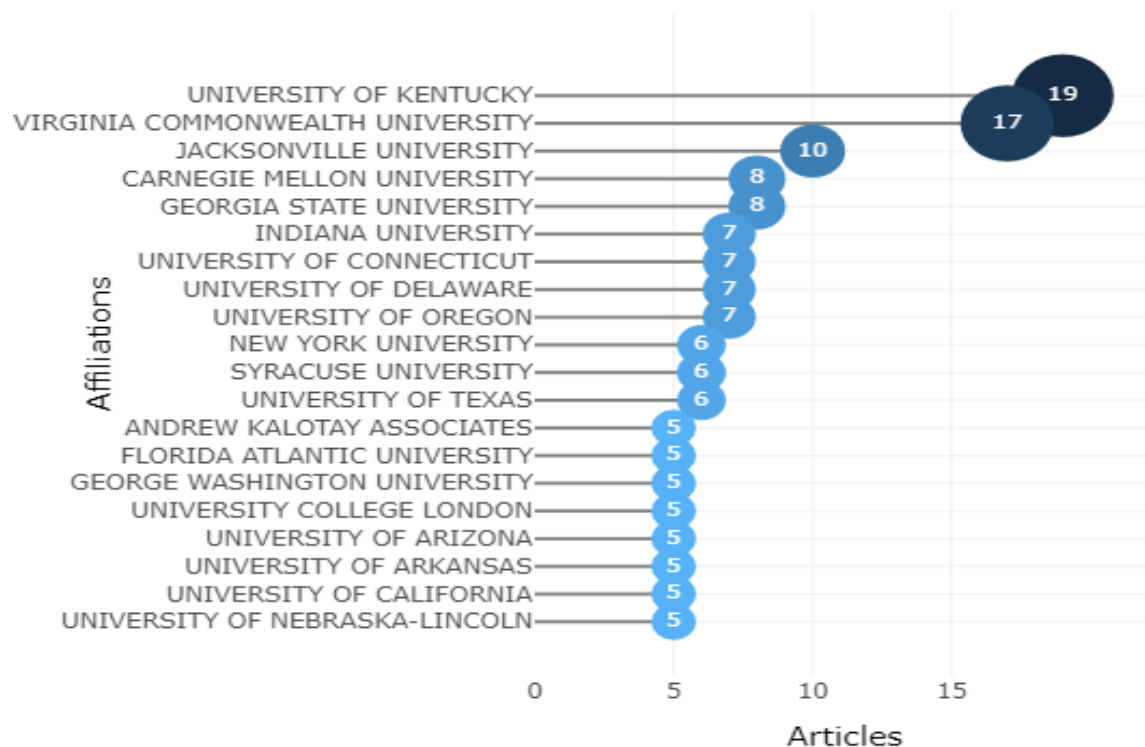

Fig. 4: Most Relevant Affiliations

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3.1.4 Which Countries of the Authors Contributed the Most to the Research of Municipal Bonds (RQ4)

Figure 5 shows the Corresponding Author's Country in graphic form. The graph shows the top 20 countries with journal frequencies in the range of 0 to 220 journals with the theme of municipal bonds. Two colors in the chart represent Intra-country (SCP) and intercountry (MCP) collaboration indices. The blue graph shows journal publications written by authors from the same country (a single country), while the red chart shows journal publications from different countries (multiple countries).

The graph shows that the United States is the most frequently affiliated country, with 203 journals divided into 189 single-country journals and 14 journals with several countries. They are followed by China, with ten journals divided into seven single-state journals and three journals with several countries. And finally, the United Kingdom has seven journals divided into seven single-country journals and 0 journals from several countries.

One of the papers with authors from the United States is "Municipal bond mutual fund performance and active share," which was researched by Gurwitz et al., [20]. This journal examines the performance of US open-ended municipal bond mutual funds that were actively managed between 1999 and 2020. Furthermore, one of the papers with authors from China is "The price of political polarization:

Evidence from municipal issuers during the coronavirus pandemic," which was researched by Chen et al., [21]. The study estimates the financial costs posed by political polarization among citizens in US local governments during the COVID-19 pandemic. They measure local political polarization by using citizen votes in the presidential election.
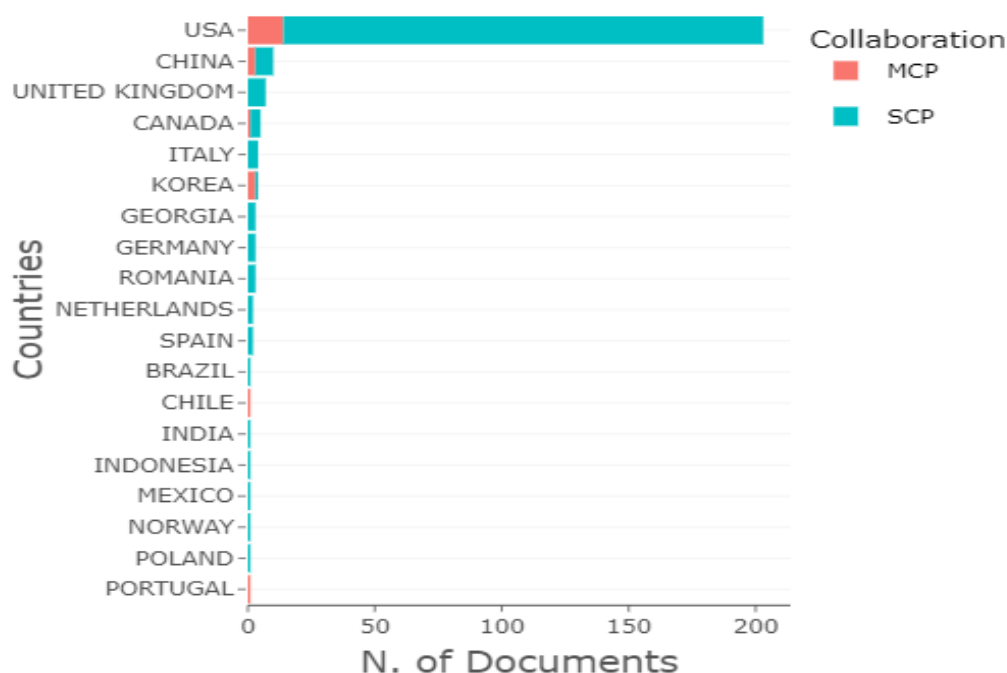

Fig. 5: Corresponding Author's Country

3.1.5 Which Countries are Cited Most in Municipal Bonds Research Publications (RQ5)

Figure 6 shows the frequency of most cited countries in municipal bonds journals from 1920 to 2022. The longer the line and the darker the blue indicates that a country is frequently mentioned in the municipal bonds journal. The results show that the United States is in the first place because it has been cited 2,839 times. Then followed by Spain because it has been cited 105 times, and finally, Canada and the United Kingdom because it has been cited 73 times. Meanwhile, the countries that have never been quoted in the municipal bonds journal are Poland and Slovenia.

One of the journals citing the United States is Cebula's journal entitled "An exploratory analysis of the impact of budget deficits and other factors on the ex-post real interest rate yield on tax-free municipal bonds in the United States", [22]. This empirical study uses borrowed funds to investigate the impact of the federal budget deficit and other factors, particularly financial market factors, on ex-post real interest rate yields on high-yielding government bonds in the United States. Then, the journal citing the country of Spain is the journal belonging to Cestau et al. with the title "Municipal bond markets", [23]. This study aims to understand optimal market design and the impact of post-crisis regulation, sustainability, and financial technology.

Moreover, the journal that cites Canada is a journal belonging to Lai & Zhang with the title "On the value of municipal bond insurance: An empirical analysis," which aims to document the time variation of the insurance value of municipal bonds estimated from the yield of the insured bonds and not insured on the different issue, [24].
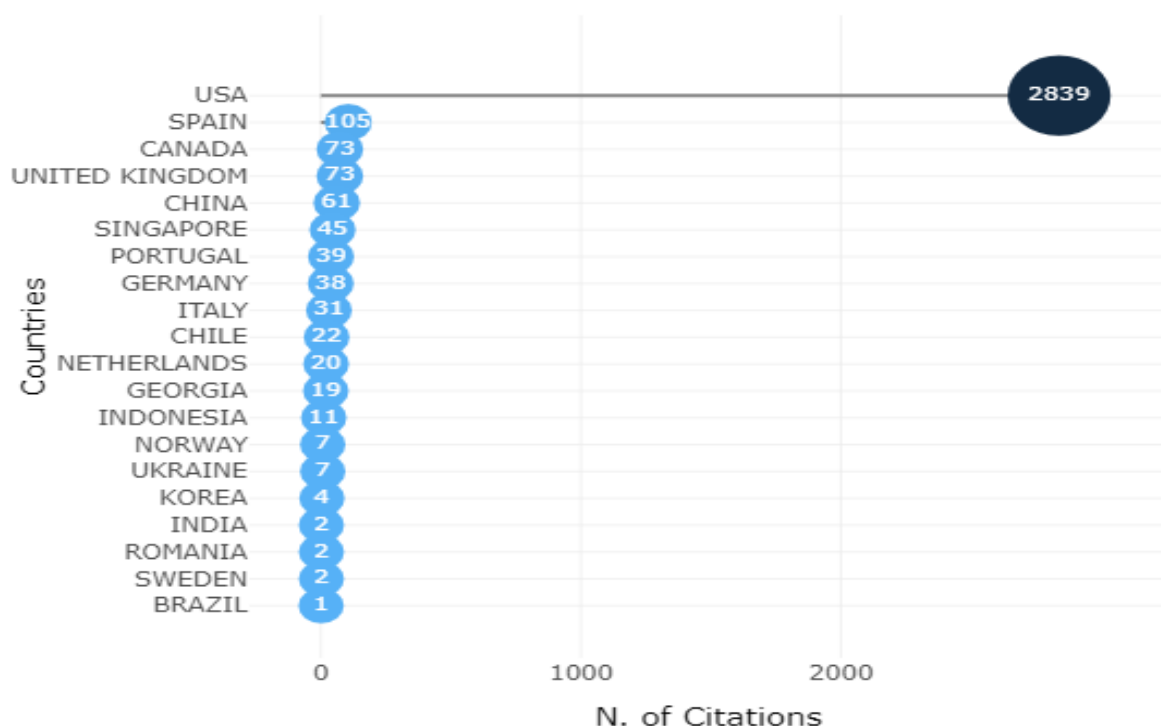

Fig. 6: Most Cited Countries

3.1.6 Who are the Most-Cited Authors in the Research of Municipal Bonds (RQ6)

Figure 7 shows journals' most frequently cited documents from 1920 to 2022 on municipal bonds. The image provides information on the 20 most commonly cited papers and the number of citations. The longer and darker the blue, the more others cite a document.

The first position is a document from Jarrow R.A, entitled "A Markov Model for the Term Structure of Credit Risk Spreads," which has been quoted 671 times with an average of 26 times per year, [25]. In the second position is a document from Harris L.E, entitled "Secondary Trading Costs in the Municipal Bond Market," which has been quoted 131 times with an average of 8 times per year, [26]. Next in the third position is a document from Butler A.W, with the title "Corruption, Political Connections, and Municipal Finance," which has been quoted 121 times with an average of 9 times per year, [27].

In addition to showing the most cited documents, figure 7 also provides other information. In the chart of the most cited documents, two authors' works are widely cited, namely Butler, A.W, and Green R.C., each publishing two documents. Two of Butler's A.W. works are "Corruption, Political Connections, and Municipal Finance" and "Distance Still Matters: Evidence from Municipal Bond Underwriting," with

121 and 96 quotes, respectively, [27, 28]. Meanwhile, Green R.C.'s two works are "Financial Intermediation and the Costs of Trading in an Opaque Market" and "Dealer intermediation and price behavior in the aftermarket for new bond issues," with 119 and 69 quotes, respectively, [29, 30].

Figure 7 also provides information that the most cited journals are from 2004, as many as three journals. The journal sources that contributed the most to the documents cited were The Journal of Finance, which consisted of six journals.
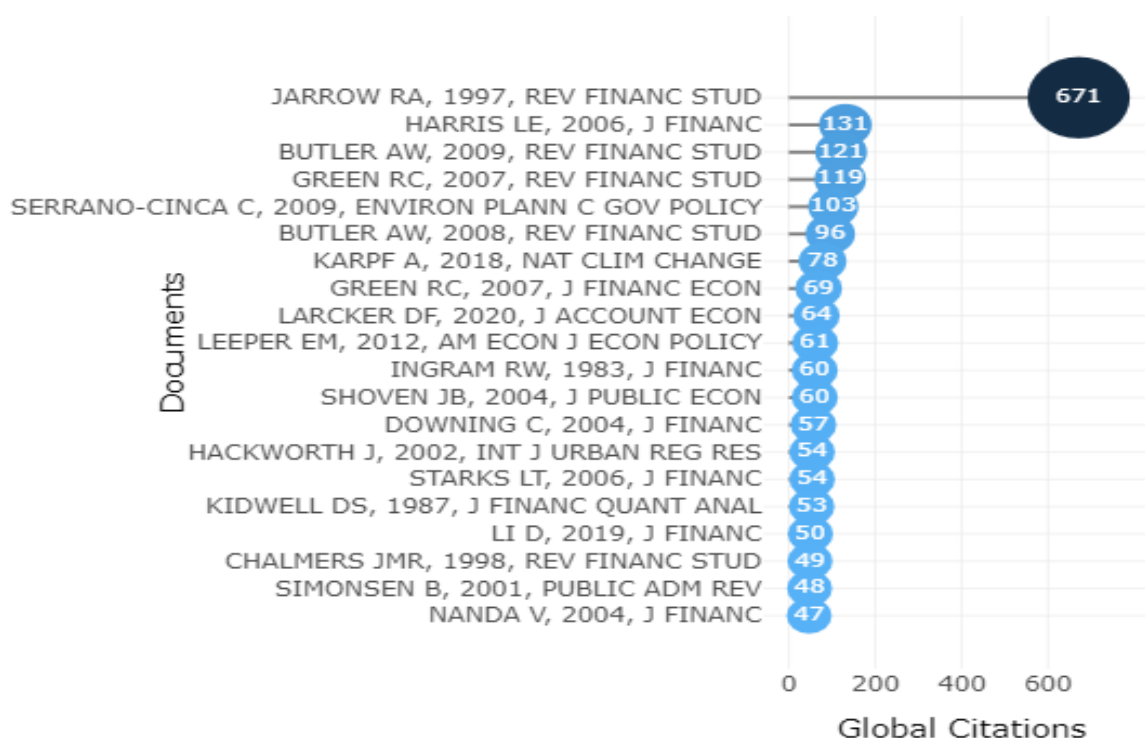

Fig. 7: Most Global Cited Documents

3.1.7 What are Other Relevant Keywords in the Research of Municipal Bonds (RQ7)

Figure 8 shows the top 20 keywords most relevant to municipal bonds. The longer the line and the darker the blue, the more relevant a word will be to the topic of municipal bonds in 6 to 63 events. The first word with the highest occurrences is "United States," with 63 occurrences. In second place is "Financial Management" with 43 occurrences. Furthermore, the third position is "Investment," with 32 occurrences. Interestingly, of the 20 keywords most relevant to municipal bonds, four are related to finance, followed by investment and tax.

Some studies that use the relevant word "Financial Management" are researched by Evans M with the title "Getting their appetite back. In need of capital, not-for-profit hospitals take advantage of dropping interest rates", [31], Bernert P.M et al. with the title "The impact of competition among health care financing authorities on market yields and issuer interest expenses", [32], and Blake J.W et al. with the title "8 strategies for hospital borrowers in 2011", [33].

Several studies that use the relevant word "Investment" are research by Cebula R.J with the title "The community reinvestment act and real municipal bond interest rate yields in the united states: evidence from the municipal bond market", [34], Medda F.R & Cocconcelli L with the title "Municipal bonds as a means of accelerating local infrastructure investment", [35], and Fernandez V & Lucey B.M with the title "Portfolio management under sudden changes in volatility and heterogeneous investment horizons", [36].
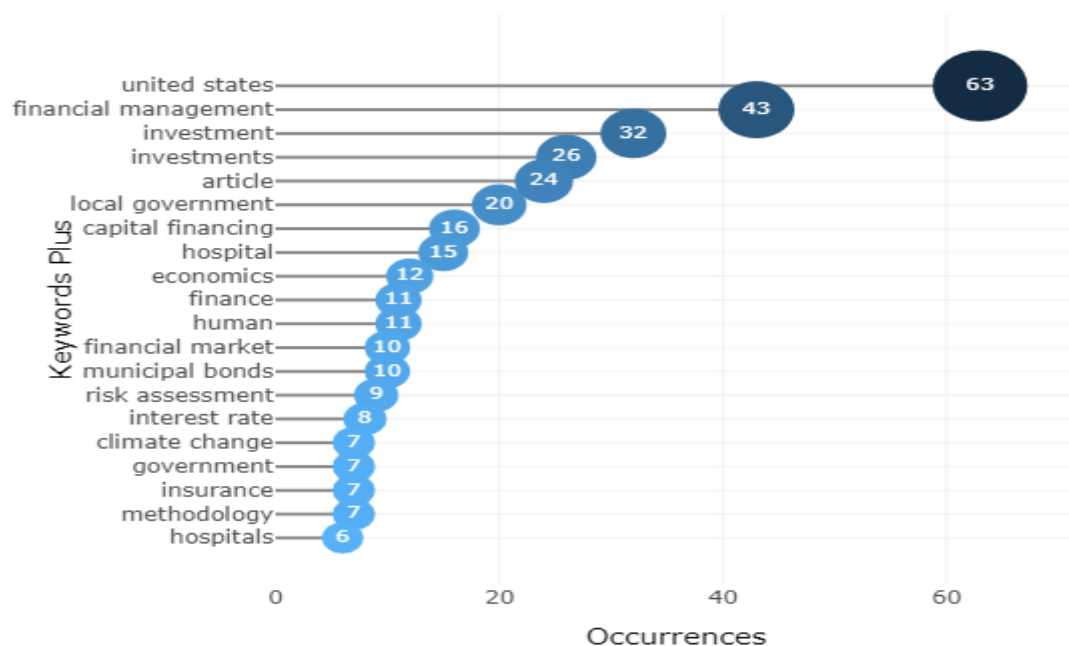

Fig. 8: Most Relevant Words

3.1.8 What are the Trending Topics in the Research of Municipal Bonds (RQ8)

Figure 9 on trending topics shows the trend of topics that often appear on the theme of regional bonds from year to year. Figure 9 shows that the longer the line, the more frequently a topic appears in municipal bonds research. The bigger the circle, the more researchers will use this keyword in a year. There are topics that only last a short time, like 2-3 years, and there are also topics that last longer (more than three years). Topics in each year are collected based on journal topics published annually. The period of a topic persisting can be seen from the horizontal axis shown in the figure. Figure 9 shows 26 trending topics from 1920 to 2022.

Figure 9 provides information on trending topics in the latest year. The first position is the topic of "debt," which appears five times from 2019 to 2022. The second position is the "governance approach," which appears five times from 2021 to 2022. Furthermore, in the third position is the topic of "climate change: " which appeared seven times from 2014 to 2021.

Based on Figure 9, the topic that appears most frequently in municipal bonds research is "United States." The word "United States" appeared 63 times between 1990 and 2017. The second most frequent topic among municipal bonds researchers was "financial management," which appeared 43 times from 1984 to 2000. The third most frequent topic was "investment." Thirty-two times in the period from 1988 to 2014.

Other information that Figure 9 provides is a topic that researchers have long used. The topic "Financing" is a topic that has been used frequently for 33 years, from 1978 to 2011, followed by the "United States" used for 27 years from 1990 to 2017. Furthermore, finally, the topic "Investment" was used for 26 years, from 1988 to 2014.

3.2 Data Analysis using VOSviewer

The VOSviewer analysis was used to complement the bibliometric analysis. Data in RIS format is used for analysis using VOSviewer. Analysis by showing a graphical representation in the form of a map can be done with the help of VOSviewer, [37]. VOS viewer is widely used because of its ability to work with large data sets, displaying sizable bibliometric maps in a way that is easy to understand and interpret. Based on the study of Van Eck & Waltman, VOSviewer can handle large maps and display co-citation maps from prominent scientific journals, [38]. VOS viewer can also create publication maps, country maps, author maps, or journal maps based on a co-citation network or build keyword maps for modeling topics. In addition, as a free tool, VOS viewer is currently being used to complete research related to data mining, article clustering, and article mapping from database sources, [39]. VOS viewer also provides cluster analysis that shows the relationship between one topic and another, especially in municipal bonds research, [37, 40].
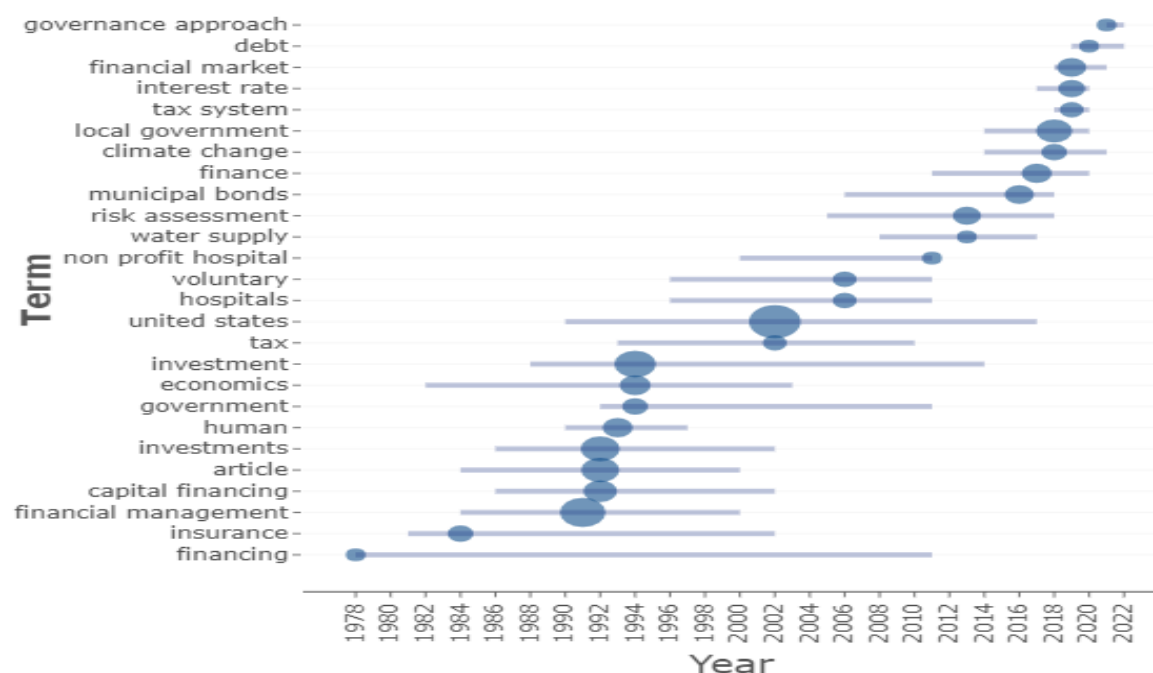

Fig. 9: Trending Topics

3.2.1 Network Visualization

The image below is the output of the Network Visualization. Network Visualization serves to show the network between visualized topics. Figure 10 illustrates the network visualization of items (keywords) related to the research topic, item, or keyword. From Figure 10, it can be seen the relationship between topics and absorption capacity in terms of article titles and keywords. Network Visualization serves to show the network between visualized topics. In-network visualization, keywords are represented by their labels and, by default, a circle. The size of the label and item circle is determined by the number of times the keyword appears in the title and abstract. The more often the keyword appears, the larger the item's label and the circle will be. Based on 478 journals searched through Scopus with the theme "Municipal Bonds" using the VOSviewer application, the results were that there were 4 clusters marked in blue, red, yellow, and green.

a) Cluster 1: Cluster 1 is marked in blue. The most dominant topic is municipal bonds. Within cluster 1, several additional branches/topics are rarely researched, namely insurance, risk, management, etc.

b) Cluster 2: Cluster 2 is marked in red. The most dominant topic is local governance. Within cluster 2, several additional branches/topics are rarely researched, namely infrastructure, bonds, municipal finance, etc.

c) Cluster 3: Cluster 3 is marked in yellow. The most dominant topic is the united states. Within cluster 3, several additional branches/topics are rarely researched: tax system, income, interest rate, etc.

d) Cluster 4: Cluster 4 is marked in green. The most dominant topic is an investment. Within cluster 4, several additional branches/topics are rarely researched, namely tax, economic aspect, human, etc.
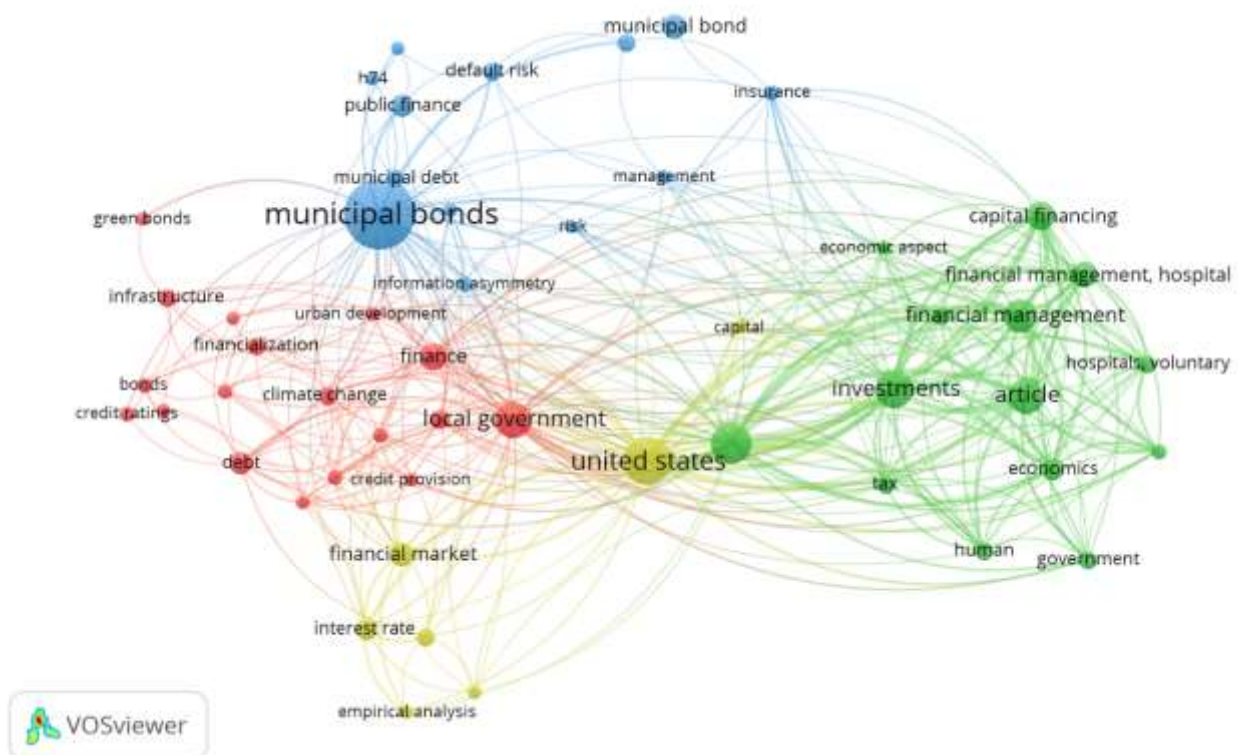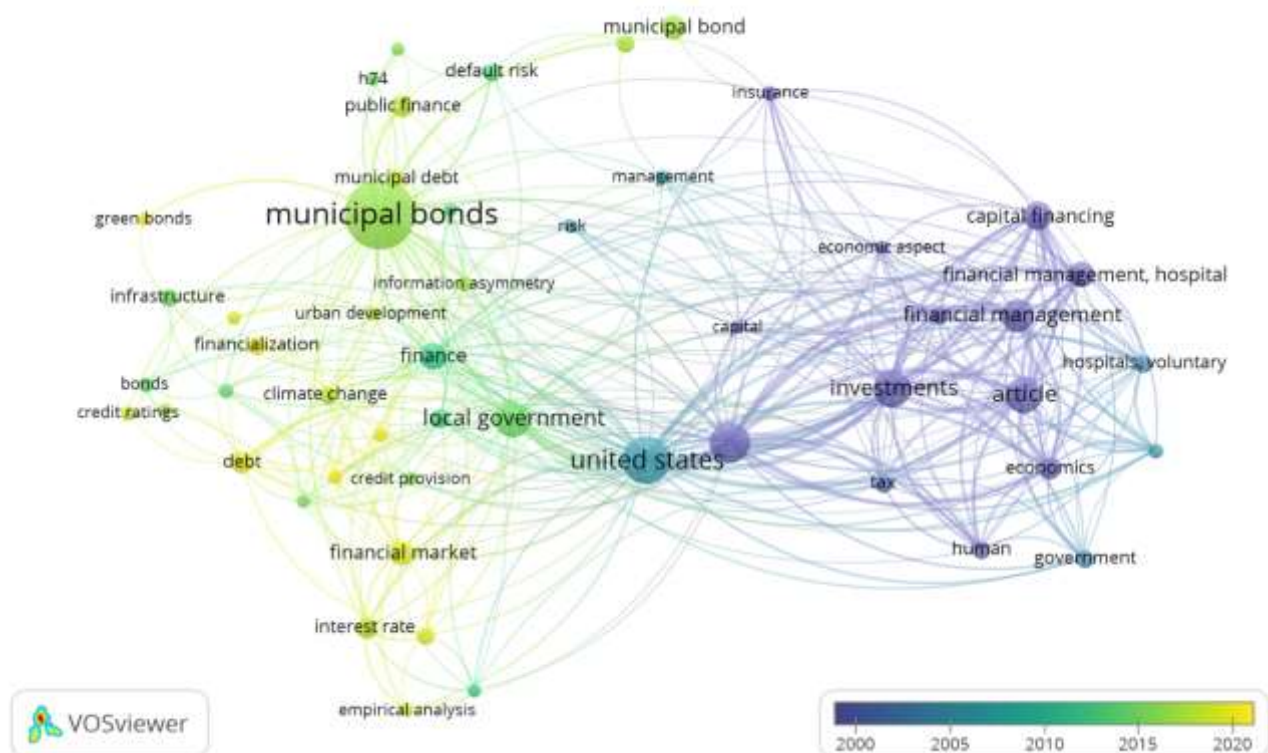

Fig. 10: Scopus Database Network Visualization Using VOS viewer

3.2.2 Overlay Visualization

The image below is the output of the Overlay Visualization. Overlay Visualization serves to help researchers to analyze the evolution of research themes per year. Figure 11 shows the relationship between the topic and year description (in the bottom right corner), where the yellower color of the connecting line, the younger the year of research. This study uses 478 journals searched through Scopus with the theme "municipal bonds" from 1907 to 2022 using the VOSviewer application. The results obtained from Overlay Visualization are that ordinary words are rarely used, such as green bonds, governmental accounting, income, and debt, so that these keywords can be used in further research. In addition, the Figure above shows the relationship between the topic and year description (in the lower right corner), where the lighter the yellow color on the connecting line, the younger the research year. The caption in the lower right corner contains a description that the year is less than 2000 as the oldest color until 2022 as the youngest color.

Research on municipal bonds has been studied from 1907 to 2022. Furthermore, in the period from 2000 down to early 2005, many studies related to investment and financial management. In range 2010 and early 2015, there was a lot of research on municipal bonds and finance. While in the range of 2016 and above, many studies were carried out on the tax system, debt, financial crisis, etc.

3.2.3 Density Visualization

Figure 12 illustrates the density visualization of the keywords in the research on municipal bonds. It provides an opportunity for researchers to identify the impact of potential topics as new contributions to work in municipal bonds research. Regarding the relevance of research topics, we can see that, for example, the keyword "municipal bonds" rarely have to be researched with the keyword "empirical data" simultaneously because it is in a different cluster. The researcher can combine these two topics to form one new study. Overall, the financial aspects of municipal bonds have received high density and attention in this research field. Figure 12 shows that the most discussed theme is municipal bonds (the lighter the circle color). The theme of the united states and local government then follows them.
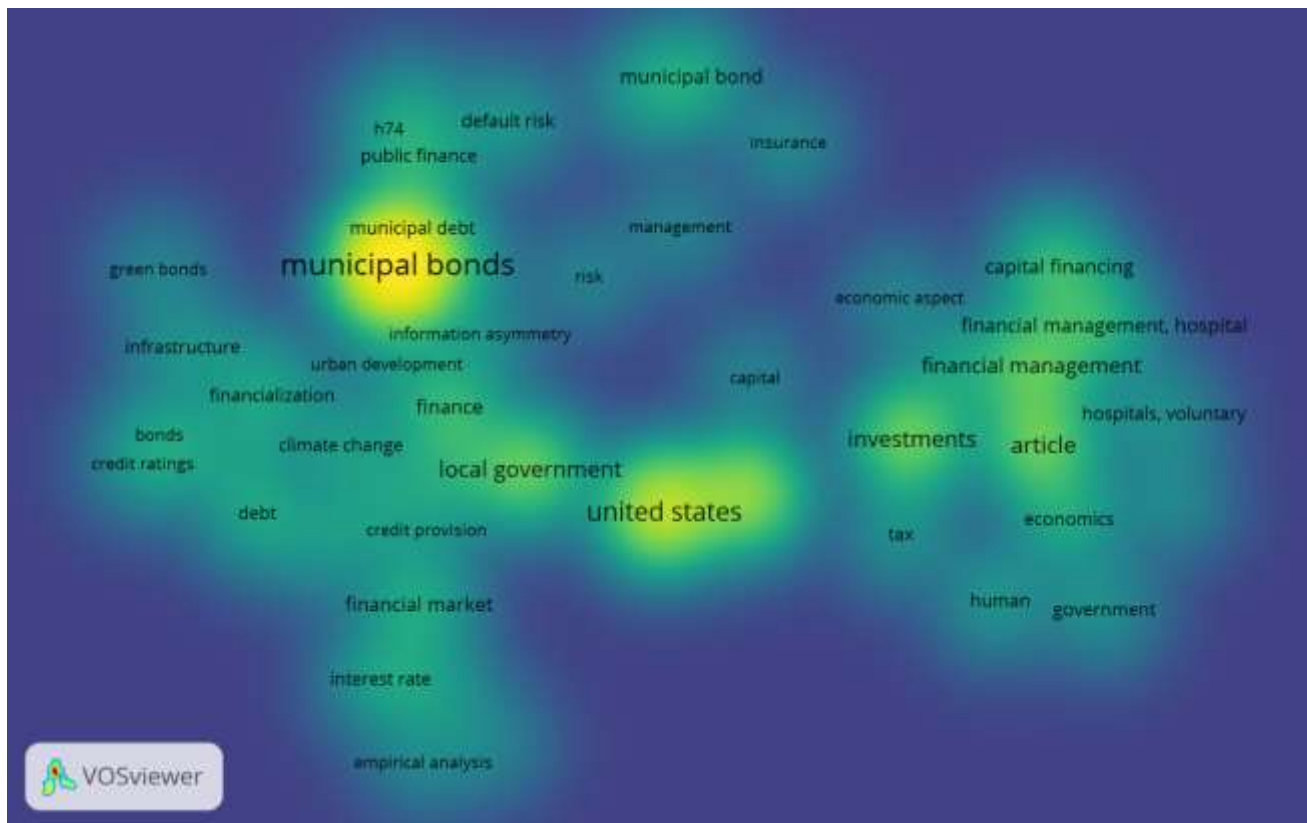

Fig. 11: Scopus Database Visualization Overlay Using VOS viewer

Fig. 12: Scopus Database Density Visualization Using VOS viewer

4 Discussions

Municipal Bonds are regional loans offered to the public through public offerings in the capital market, [41]. Issuance of municipal bonds means providing benefits to local governments as a source of financing solutions to encourage regional economic growth. However, despite the benefits of municipal bonds to local governments, Indonesia has never issued municipal bonds. The local government has never issued municipal bonds due to the shallowness of the Indonesian capital market, the lack of financial management capacity at the local government level, and the low creditworthiness of local governments. Therefore, this study maps out several studies related to municipal bonds. The bibliometric analysis has mapped the relevant publications, profiling authors, contributing institutions, and contributing countries, which countries discuss municipal bonds, the most cited authors, keywords that often appear when discussing municipal bonds, and topics trending in municipal bonds. The mapping of several studies related to municipal bonds can add insight for readers and stakeholders regarding municipal bonds.

Bibliometric analysis has been carried out on the topic of municipal bonds. From 1907 to 2022, research was developed on municipal bonds. This is evidenced by the variety of journal sources that publish municipal bonds, the variety of researchers discussing municipal bonds, research samples, and increasingly diverse keywords. The systematic research on municipal bonds has been described in the results chapter.

Many journal scopes publish financial-related journals. However, journals that publish articles on municipal bonds are still limited. One of the journal sources that publish the most municipal bonds journals is Public Budgeting and Finance. Public Budgeting and Finance is a journal with the publisher Wiley-Blackwell. This journal is indexed to Scopus Q2. The scope of the journal consists of government budgeting and finance. Public Budgeting and Finance publishes much research on municipal bonds because municipal bonds are included in one of the research scopes of the journal, namely government budgeting and finance. From these results, if other researchers or even power holders want to look for journals related to municipal bonds, they can directly look for sources in Public Budgeting and Finance. In addition, other researchers can also publish their research on municipal bonds in the journal Public Budgeting and Finance. Other researchers can also publish journals in other destinations, such as Financial Review and the Journal of Financial and Quantitative Analysis.

Journal authors are also often noticed by researchers who wish to research municipal bonds. Researchers will check the author's background to ensure the writing's validity. The analysis results show that Cebula R.J is the most prolific writer in publishing the journal municipal bonds. Cebula R.J. is a prolific writer because he has been actively writing from 1991 to 2020 with ten journals that have been produced. When viewed from affiliation, the University of Kentucky ranks first. This is supported by the many majors related to economics, finance, and administration. Suppose other researchers want to write a municipal bonds journal. In that case, they can read Cebula R.J's writings because he is the most prolific writer, so Cebula R.J's works follow the development of municipal bonds from time to time. In addition, journals from University of Kentucky researchers can also be used as references because many of his writings discuss municipal bonds so that researchers can trust the results.

The country that is often discussed in municipal bonds journals is the United States of America. Research on municipal bonds is often conducted in the United States because almost all states issue bonds, [42]. This is indicated by the high participation of the United States population to become investors in the United States capital market. One of the factors that encourage Americans to believe in investing is strict regulations. One of the investments made by the community is the purchase of municipal bonds. In addition, the United States has a history of being able to repay its debts to bondholders.

Jarrow's journal is a Markov Model for the Term Structure of Credit Risk Spreads, [25]. Municipal bonds researchers most cite that. The journal Jarrow discusses developing a Markov model to measure credit risk spreads, [25]. The research model measures the bankruptcy process by considering the state space, time, and Markov chain. In the field of municipal bonds, this model helps measure the risk of issuing municipal bonds.

Municipal bonds research creates different word trends from year to year. The word "debt" is a trend word by researchers in the journal municipal bonds. The word "debt" can be a trending word because municipal bonds are debt securities issued by local governments. Many researchers have explained the meaning of municipal bonds in their journals. Several studies that use the word "debt" in their journal are Spreen & Gerrish in 2022 with the title "Taxes and tax-exempt bonds: A literature review", [43], Liu et al. in 2022 with the title "Account-level analytic hierarchical mixing modeling for credit risk

of Chinese Government financing vehicle portfolios", [44], and Phinney in 2022 with the title "The policing of Black debt: how the municipal bond market regulates the right to water", [45]. Each journal uses a different topic and analysis but still involves the word "debt" in its research. In addition to topics that are trending among researchers lately, some keywords are used the longest by researchers. The keyword used the longest by researchers is "financing." Researchers often use the topic of financing because municipal bonds are related to debts given by the community to the regions to finance public sector investment activities that provide income and benefits for the community. These trending and frequently used topics show that researchers are still focused on debt, governance approaches, and climate change. Research on municipal bonds is still tied to these topics, so there are still many other interesting topics to examine and analyze if they are related to municipal bonds.

The visualization of VOSviewer provides some new insights. The graph shows several keywords from municipal bonds that are often discussed, including municipal bonds, local governance, the united states, and investment. Some municipal bonds research is limited to this topic. However, many interesting topics can be researched and still need to be used in journals. Keywords rarely researched include risk, management, tax system, income, and interest. Furthermore, the keywords frequently studied recently are tax system, debt, and financial crisis. The results show why there are topics that should be discussed more. These topics are topics that have only emerged in recent years. Researchers can focus their writing on improving research on rarely studied topics so that others can get helpful information about the relationship between topics rarely discussed and municipal bonds.

5 Conclusion

Bibliometric analysis with the help of R-Biblioshiny and VOSviewer for municipal bonds has been successfully carried out. Municipal bonds research has been conducted since 1907 until 2022 and will continue to grow in the following years. In summary, the results of the research that have been described in the previous chapters are as follows:

a) The most relevant publication source for municipal bonds research is Public Budgeting and Finance.

b) The most prolific authors in publishing municipal bonds journals are Cebula, R.J.

c) The affiliate that contributes the most to municipal bonds research is the University of Kentucky.
d) The author country that publishes the most municipal bonds journals is the United States of America, both single-affiliated and multi-affiliated.
e) The country most cited in municipal bonds research is the United States.
f) The author and his journal most cited in municipal bonds research are Jarrow RA, in 1997, entitled "A Markov Model for the Term Structure of Credit Risk Spreads." Jarrow's (1997) research has been cited 671 times.
g) The keywords relevant to municipal bonds research are United States, Financial Management, and Investment.
h) Debt, Governance Approach, and Climate Change are trending topics in municipal bonds research.

This research contributes to the development of municipal bonds research using a bibliometric approach, filling the gap in research on municipal bonds that have yet to exist in recent years. This study's data were sourced from Scopus, and scientific writings were limited to journals and only in English. This can be a limitation of this research so that further research can use data from other sources such as ScienceDirect, Wiley online library, springer, and web of science. In addition, further researchers can add journal boundaries that will be used in the bibliometric analysis. From the results of the bibliometric analysis, readers or even stakeholders can explore municipal bonds in other countries through various credible journals so that local governments can issue municipal bonds to improve regional development.

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Contribution of Individual Authors to the Creation of a Scientific Article

-Benny Hutahayan made research concepts, analyzed them using bibliometrics, and compiled the results.
-Moh. Fadli supervises research, validates research, and mentors.
-Satria Amiputra validates research and research supervision.
-Reka Dewantara conducts a review and provides comments on the background.

Conflict of Interest
The authors have no conflict of interest to declare.