



Bibliometric analysis with VOS Viewer of journal trends in risk management, firm performance, and firm value

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ABSTRACT

Risk management that can be implemented optimally will help companies map risks. Risks that the company can adequately overcome will undoubtedly make the company's business processes run well, which is characterized by good company pro forma (performance). Company performance includes many aspects of a company, especially financial aspects. This improved company performance will undoubtedly be related to the company's value. Thus, there is a relationship between risk management, company performance, and company value, so it needs to be analyzed more deeply and thoroughly, one of which is by bibliometric analysis. The method combines convergent parallel types (Convergent Parallel Mixed Methods). Researchers collected quantitative data in the form of 500 publications from 2007-2022 with the PoP (Perish or Publish) application, and the data was tidied up with Mendeley Desktop and then carried out bibliometric analysis with VOSviewer software to produce visual displays, namely Network Visualization, Overlay Visualization, and Density Visualization. The visual display shows colourful lines interconnected to form a network that shows the relationship of publication citations between one another and nodes of varying colours and sizes that indicate the number of citations. The results of the analysis of publications on Risk Management, Company Performance, and company value show there are several other topics outside of these variables interconnected, consisting of 8 clusters. Each cluster consists of several issues and publications connected, as seen from the network on Network Visualization, Overlay Visualization, and Density Visualization.

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1. INTRODUCTION

Companies constantly face various risks when carrying out their business processes. Risk is the possibility of occurrence that will hurt achieving specific goals. Of course, The negative impact ranges from mild to severe. Based on the sources of its causes, risk can be divided into four parts: internal risk, external risk, financial risk, and operational risk. Internal risk is a risk that comes from within the company, such as fraud committed by

employees, while external risk is a risk that comes from outside the company, such as competition. Financial risks are caused by economic and monetary factors, such as inflation, while human, natural, and technological factors cause operational risks. (Lokobal et al., 2014)

Risk management that can be implemented optimally will help companies map risks. This risk map will help the company identify which risks will have a small, medium, heavy, or even hefty impact. Thus, the company can determine strategies to deal with these risks. A risk management approach that covers all aspects and is carried out in an integrated manner is called enterprise risk management (ERM).

The complexity of business processes, competition, and various changes that can affect company activities so that companies need risk management to manage their risks. In recent years, research on financial risk management has experienced significant growth in response to increasing complexity and uncertainty in the global business environment (Bahari, 2023). Therefore, companies need to implement an appropriate method to face uncertainty and challenges related to risk in the future. This research aims to explore and track variables related to risk management through research trends with bibliometric analysis so that it can help industry implement risk management better in this era of disruption.

Risks that can be adequately resolved by the company will certainly make the company's business processes run well. Implementing a risk management system will support the creation of good company performance because the risk is successfully managed correctly. Company performance is characterized by an increase in the company's pro forma in many aspects, especially the company's financial performance. This improved company performance will undoubtedly be related to the company's value. Thus, there is a relationship between risk management, company performance, and company value, so it is necessary to analyze more deeply and thoroughly, one of which is by conducting a literature review.

Literature reviews on risk management, firm performance, and firm value can be found in scientific journals. This scientific journal will help parties who need information related to risk management, company performance and firm value. Journals can be a reference for practitioners and future researchers. Therefore, we aim to discover how publication trends relate to risk management, company performance, and firm value. Trends in risk management journals, company performance, and firm value can be done by bibliometric analysis with VoS Viewer. Journals can be accessed from various sources, one of which is Google Scholar.

Bibliometric analysis is an appropriate tool to see trends and search variables that relate to risk management based on literature from sources such as scientific journal. So, risk management can be explored through future research which is related to new variables found in the results of bibliometric analysis. Information obtained from bibliometric analysis can help companies and financial institutions to implement the strategic of risk management (Assa & Loindong, 2023).

Risk management aims to create a level of protection that mitigates vulnerability to threats and potential consequences, thereby reducing risks to acceptable levels. The benefits of risk management include: 1) Companies or organizations can avoid costs because risk management already exists, and 2) Companies or organizations are greatly helped because they can detect whether risks can be avoided or not. 3) Companies or organizations will benefit if they can assess risks carefully (Herawan & Dewi, 2021). According to the organization (COSO, 2012) in its guidebook entitled COSO Enterprise Risk Management – Integrated Framework, Corporate Risk Management or Enterprise Risk Management is a process influenced by company management, applied to every company strategy, and designed to provide confidence. Sufficient to achieve company goals. Integrating risk and risk transfer strategies, integrating risk management into the

company's business processes, and integrating the three methods above will form an ERM risk management framework (Rustam, 2018).

According to (Moehariono, 2014), performance is a description of the level of achievement of implementing an activity program or policy in realizing an organization's goals, objectives, vision, and mission as outlined in an organization's strategic planning. Company performance is a complete display of the company's condition over a certain period, a result or achievement that is influenced by the company's operational activities in utilizing its resources (Galib & Hidayat, 2018)

According to (Whittaker, 1993), performance measurement is a management tool used to improve the quality of decision-making and accountability and assess the achievement of goals and objectives (goal and objectives). Various information is collected so that the work carried out can be controlled and accounted for. This is done to achieve efficiency and effectiveness in all company business processes. The performance measurement results can later be used as consideration for the company in making decisions and determining company policies. (Darmasto et al., 2020)

The Firm value illustrates public trust after the company has gone through a long process, namely from the company's founding until now (Simarmata, 2020). Firm value is also a set of conditions that have been fulfilled by the company over the years of operation, namely from the company's founding to the present. The achievement that satisfies the owner's desires is growing business value because it also increases the owner's welfare (Kurniawan, 2020). Companies must pay attention to various factors that can increase company value. The public's image and trust in the company are built through various efforts, including risk management. The risks faced by the company are managed through risk management so that business processes can run smoothly with the hope of positively affecting firm value.

2. BACKGROUND OF STUDY

Risk management is a systematic and logical method that helps identify, monitor, resolve, and report risks in every activity or process (Idroes, 2006). According to (Darmawi, 2022), Risk management is an effort or activity carried out to avoid, identify, and analyze risk to protect the company against possible losses that may arise. Meanwhile, based on ISO: 31000 2009, risk management is an organizational activity that directs and controls an organization's risk management. From the several definitions of risk management that have been explained, risk management is a systematic and logically organized way to guide, identify, monitor, determine solutions, report risks, and manage to overcome risks in an organization.

In disruption era, the business world is changed and faced economic uncertainty. Thus, innovation is needed to be able to find variables related to risk management. The method that can used is literature reviews in risk management research trends and the other factors that influence it such as company performance and company value. So, in this research, literature review is conducted on scientific journals on risk management, firm performance, and firm value.

According to (Marusic, 2009) a scientific journal is a work that contains reports of research results supported by solid data as proof that the research results can be accounted for. In line with Marusic (Lasa,HS, 1994) , journals are publications by agencies, professional organizations, or scientific institutions in specific fields. Therefore, a scientific journal is the work of a person or group of people that contains research equipped with specific analytical methods that support the results of the research.

This journal trend is especially needed for researchers who want to conduct research on risk management, company performance, and firm value. The existence of journals helps researchers determine the variables related to risk management, company performance, and company size. In addition, it will also facilitate researchers in mapping

previous studies so that future researchers can create more innovative research models related to risk management, company performance, and firm value. Thus, this journal trend analysis will create innovations and *novelty* in future studies.

3. METHODS

The method used in this research is a combination method. The combination research method will be helpful when quantitative or qualitative methods alone are not accurate enough to understand research problems, or by using quantitative and qualitative methods in combination, we will be able to get the best understanding (when compared to one method (Sugiyono, 2019)). The data collection technique in this research is documentation which collecting research on risk management on Google Scolar with the Publish or Perish application. Furthermore The data analysis technique used is bibliometric analysis with the VOS Viewer.

Bibliometric analysis was first introduced in 1969 by Pritchard, Nalimov, and Mulchencko (Aulia, 2018). Bibliometric analysis determines a research trend in a particular science to make it easier to conduct a literature review of a field of science. Analysis of a scientific study that has existed since the 1980s and is included in Library Science, but this science can be applied and studied in all fields over time (Rohanda & Winoto, 2019). The bibliometric map distribution displayed consist of the type of publication, the topic area being studied, the country of origin of researcher, the journal in which publication was published, and language used (Hamidah et al., 2020)

Process data, where data will be calculated with *VOSviewer* software. Bibliometrics is a mathematical method or method that functions and is used to identify academic publications related to citations and scientific matters and is intended for use in libraries or other fields (Daulay, 2018). *VOSviewer* is used to visualize and analyze trends in form of bibliometric maps (Van Eck & Waltman, 2010) . *VOSviewer* software can also be used to data mining, mapping, and grouping articles that were taken from a database source (Xie et al., 2020)

A literature review, in general, is a discussion or reading material related to a topic or findings in research. According to Frankel et al., a literature review is a review of the literature that supports specific problems in the research we are doing. This study is beneficial for researchers, for example, to provide an overview of the problems to be studied, which is helpful for discussion or discussion of research (Prof.Dr. H. Punaji Setyosari, 2010). A literature review is a study that describes reading material by specific themes and fields. A literature review can be done by reviewing various reading sources such as books, scientific articles, scientific journals and newsletters.

The type of data used in this study is secondary data. Secondary data collected includes research on Risk Management, Company Performance, and Company Value. Data collection techniques are carried out by utilizing the PoP (Publish or Perish) application / Harzing and Mendeley Desktop. The data collection through the PoP (Publish or Perish) / Harzing application is carried out by searching for journals through the keyword menu, namely Risk Management, Company Performance, and Company Value, then determining the number of journals to be analyzed, namely 500 journals, then the year of publication of the journals to be analyzed, namely 2000 to 2023.

After conducting data analysis techniques, data analysis techniques using Mendeley Desktop and *VOSviewer*. Data analysis techniques include (1) mapping RIS data files on Mendeley Desktop based on the order of year, author, and publisher; (2) mapping the results of bibliometric network visualization and scientific publication trends using the *VOSviewer* (Visualization of Similarities) algorithm software based on the number of clusters and items; and (3) mapping research topics based on literature review studies (Budianto, 2022). The researcher tidied up the data from the search results on the PoP (Publish or Perish) application using Mendeley Desktop. Reference

data from Mendeley Desktop is then saved in RIS file format. Then, the reference data obtained using VOSviewer will be analyzed.

4. RESULTS AND DISCUSSION

4.1 Number of Publications

In collecting data through PoP with the keywords Risk Management, Company Performance, and Value, 500 journals were obtained with publication years ranging from 2007 - 2022. The results of data collection through PoP are presented in Figure 1.

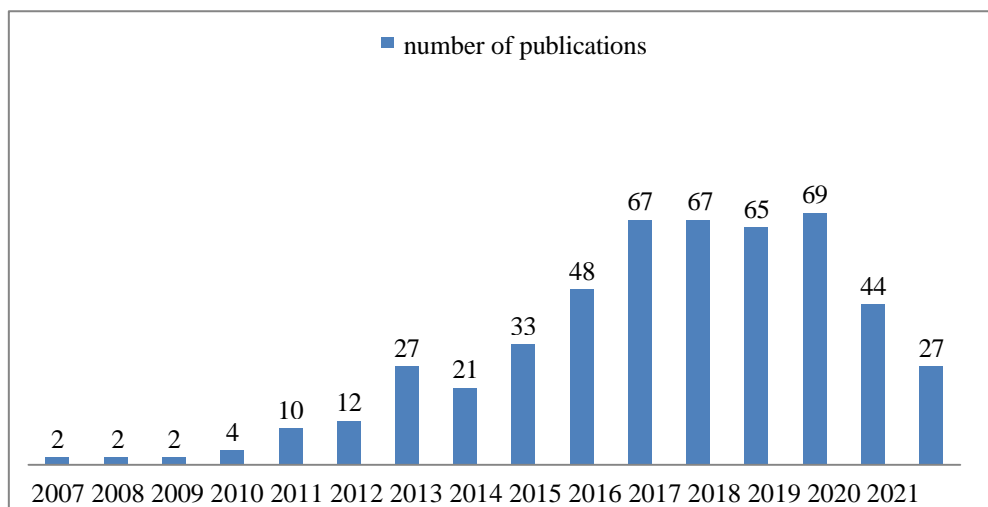


Figure 1. Histogram of the number of publications

Figure 1 shows an average increase in the number of publications each year. In 2007 - 2009, the number of publications on risk management, company performance, and company value remained the same, with two publications each year. Furthermore, it increased by one publication in 2010 to 3 publications, and from 2010 to 2020, it increased significantly. The journals on risk management, company performance, and firm value were published in 2020, with 69 publications. In 2021, there was a decrease in the number of publications by 25 articles, namely 44 publications.

Furthermore, in 2022, there was also a decrease in publications; namely, 17 and 27 articles published. Of course, the increase and decrease in the trend of publications on Risk Management, Company Performance, and company value is influenced by several factors. However, overall, the trend in the number of publications on Risk Management, Company Performance, and company value has increased.

4.2 Number of Citations

Based on the results of data collection through the *PoP (Perish or Publish)* application, data related to citations from publications on Risk Management, Company Performance, and company value are obtained. Figure 2 shows the *Citation Matrix (Citation metrics)* on Risk Management, Company Performance, and company value from 2007-2022, namely:

Citation metrics		Help
Publication years:	2007-2022	
Citation years:	16 (2007-2023)	
Papers:	500	
Citations:	39791	
Cites/year:	2486.94	
Cites/paper:	79.58	
Cites/author:	25035.00	
Papers/author:	302.33	
Authors/paper:	1.95	
h-index:	106	
g-index:	179	
hI,norm:	82	
hI,annual:	5.13	
hA-index:	41	
Papers with ACC >= 1,2,5,10,20:	465,447,341,219,89	

Figure 2. Citation metrics
Source: PoP App

Figure 2 shows that the total publication citations on Risk Management, Company Performance, and company value from 2007 to 2022 are 39,791. The average citation per year is 2,486.94, the average author citation is 25,035, and the average citation per journal is 79.58. Furthermore, for more clarity, the citation data per year is presented in Figure 3.

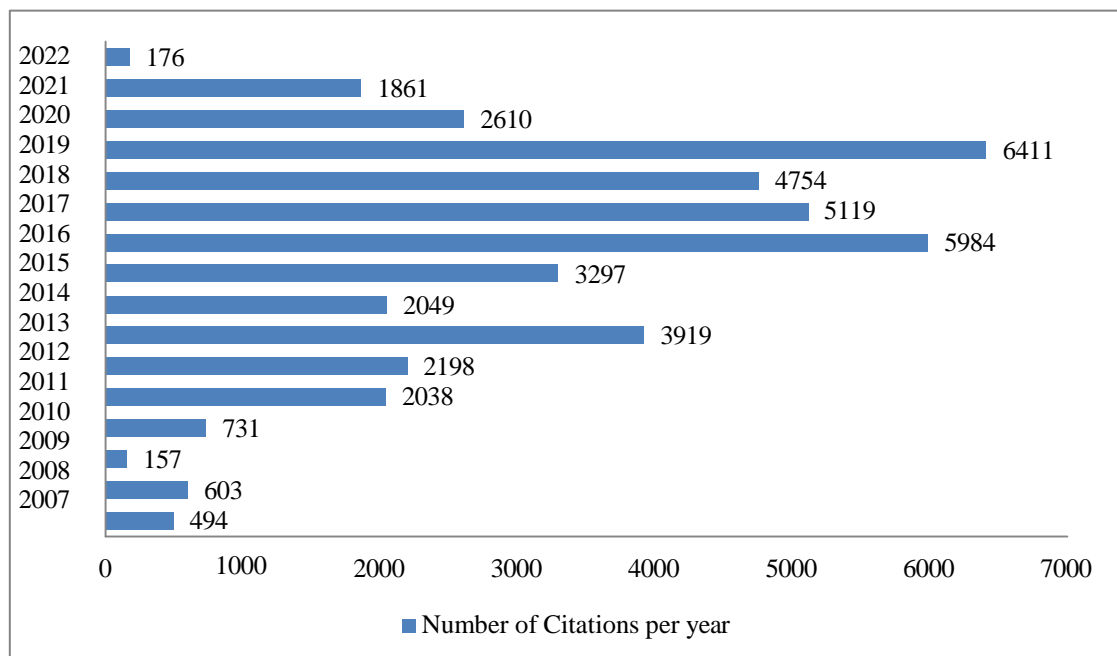


Figure 3. Histogram of the number of citations per year

4.3 Bibliometric Analysis

The data obtained through the PoP (Perish or Publish) application which has been tidied up using Mendeley Desktop is then analyzed using VOSviewer. The analysis

carried out on these data is bibliometric analysis. From the results of bibliometric analysis, the results are obtained in the form of diagrams and graphs that show the variables associated with publications on Risk Management, Company Performance, and company value. The results of data processing using VOSviewer consist of three views of the analysis results, namely Network Visualization, Overlay Visualization, and Density Visualization.

The following are the results of data processing in the form of a *Network Visualization* display.

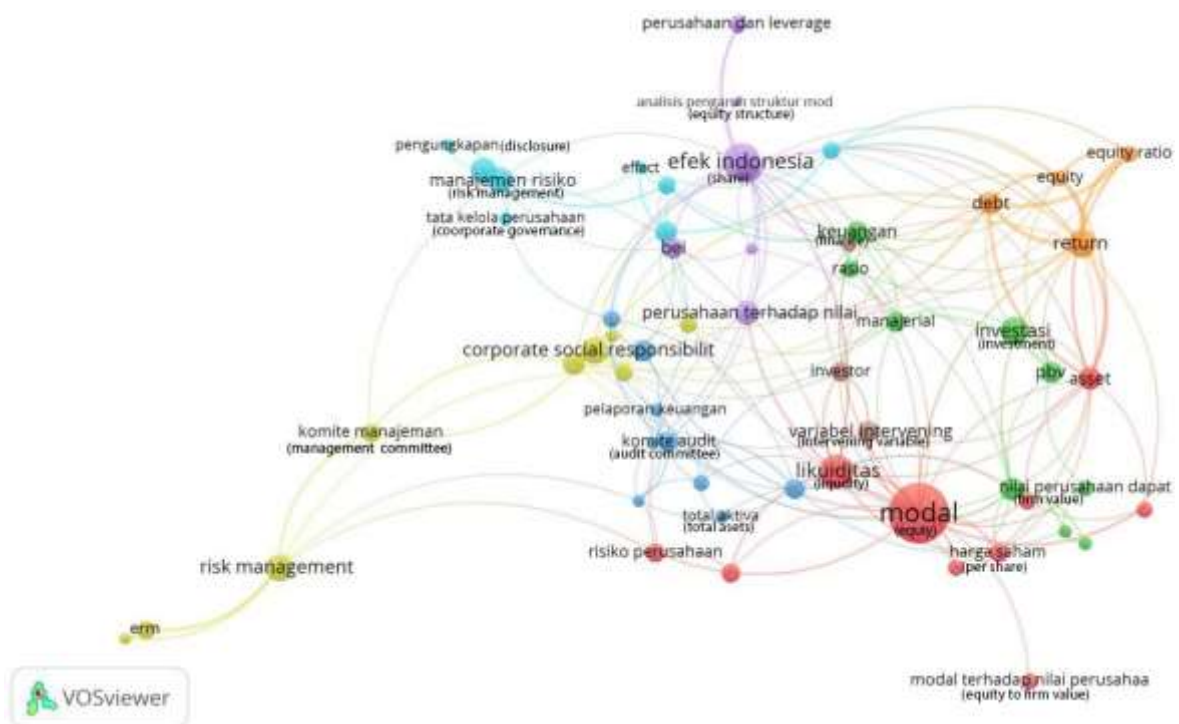


Figure 4. *Network Visualization* view
(Source: data processed)

Below is the display result in the form of *Overlay Visualization*

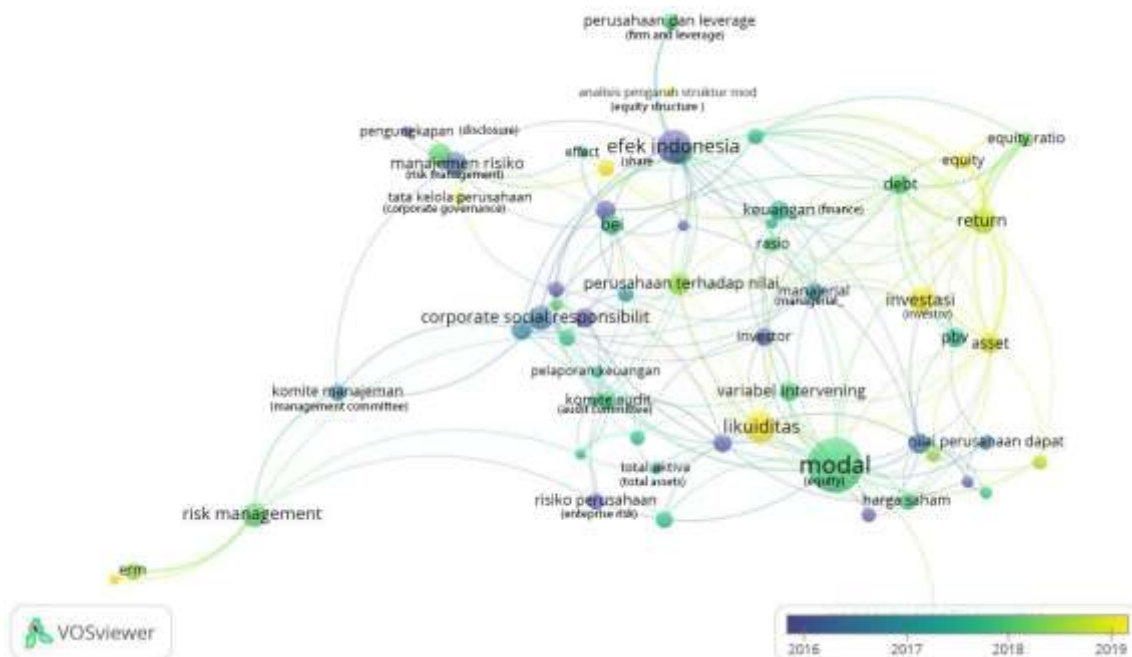
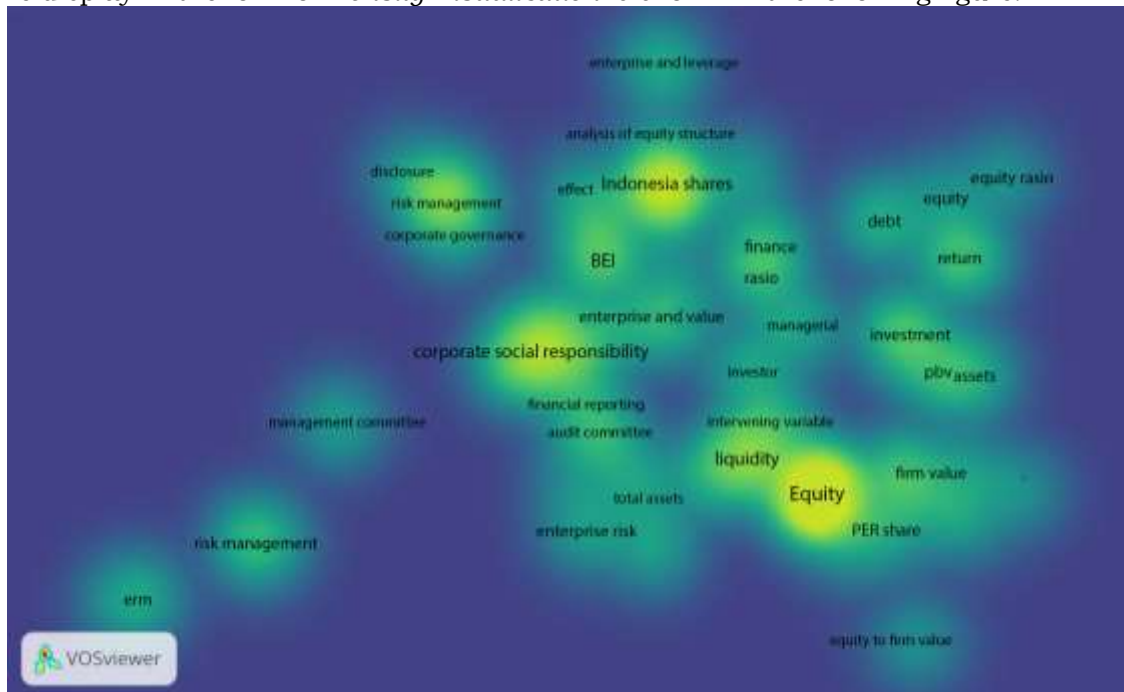


Figure 5. *Overlay Visualization Display*
(Source: data processed)

The display in the form of *Density Visualization* is shown in the following figure:



(Source: data processed)

Figure 6. *Density Visualization Display*

Based on the display of *Network Visualization*, *Overlay Visualization*, and *Density Visualization*, publications on Risk Management, Company Performance, and Company Value show a display with colourful lines interconnected to form a particular network.

These colourful lines show the relationship between publication citations and the themes of Risk Management, Company Performance, and company value, not only. These lines show how publications with the themes of Risk Management, Company Performance, and company value can be connected. In addition to the lines on the *Network Visualization*, *Overlay Visualization*, and *Density Visualization* displays, there are nodes with varying colours and sizes. The node's size indicates the number of publications cited with risk management, company performance, and company value. The larger the node size, the greater the publication's citation and vice versa.

According to (Budianto, 2022), The varying colours of the diagram represent categories or topics and help in understanding how publications are related to different topics or fields of science. Thus, from the results of the analysis of publications on Risk Management, Company Performance, and firm value, there are several other topics outside of these variables that are connected. The topic most related to risk management, firm performance, and firm value is capital, with lines connected to many other topics such as liquidity, stock price, corporate risk, managerial, etc. In addition, data processing resulted in a publication cluster analysis that shows the relationship between one publication and another. Table 1 is a *cluster* analysis of publications on Risk Management, Company Performance, and firm value.

Table 1 shows that other topics are interrelated with risk management, company performance, and company value. Where these topics are certain variables that must be considered in assessing the risks that the company will face, the company must be able to manage the risks that it may face, which can come from the variables in the topic cluster.

Table 1. *Cluster Analysis*

<i>Cluster</i>	Number of items	Item
<i>Cluster 1</i>	10	Asset, stock price, liquidity, capital, capital to firm value, business risk, firm risk, structure, asset structure, asset structure
<i>Cluster 2</i>	9	Investing, financial, managerial, firm value, PBV, Effect of dividend policy, sales growth, ratio
<i>Cluster 3</i>	9	Independent commissioner, audit committee, financial reporting, influence of good corporate governance, influence of managerial ownership, company to management, ownership structure, total assets
<i>Cluster 4</i>	9	Corporate Social Responsibility, CSR, ERM, Financial performance, management committee, influence of enterprise risk management, risk management, ROA, Moderating Variables
<i>Cluster 5</i>	8	Analysis of the effect of profitability, analysis of the effect of capital structure, IDX, Indonesia Stock Exchange, Management influence, Company and Leverage, Size
<i>Cluster 6</i>	8	Corporate Governance, effect, firm size, risk management, disclosure, management disclosure, risk management disclosure, corporate governance
<i>Cluster 7</i>	4	Debt, equity, equity ratio, return
<i>Cluster 8</i>	3	Investor, company stock market, intervening variable

(Source: data processed)

5. CONCLUSION

Publications obtained from searching with the keywords Risk Management, Company Performance, and Company Value are 500 publications from 2007 to 2022. In 2007 - 2009, the number of publications stayed the same, namely two publications. In 2010, it became three publications, and from 2010 to 2020, it increased significantly. In 2020, there were 69 publications. However, in 2021 and 2022, there was a decrease in the number of publications to 44 and 27.

The results of the bibliometric analysis are obtained in the form of diagrams and graphs showing the variables associated with publications on risk management, company performance, and company value. The data processing results using *VOSviewer* consist of three views of the analysis results: *Network Visualization*, *Overlay Visualization*, and *Density Visualization*. The display forms a network showing the relationship of publication citations between one another with the theme of Risk Management, Company Performance, and company value. In addition, nodes with varying colours and sizes show the number of citations of publications with the themes of risk management, company performance, and company value. The larger the size of the node, the greater the citation of the publication and vice versa and the colour of the node indicates the linkage of publications related to different topics or fields of science, such as liquidity, stock prices, corporate risk, managerial, and others.

From the results of bibliometric analysis, we obtained results in the form of grouping topics interconnected with publications. The topics are grouped into 8 clusters with different topics in each cluster, where risk management, firm size, and firm value are related to other variables such as capital, liquidity, assets, and others. The topics are grouped into 8 clusters with different topics in each cluster, where risk management, firm size, and firm value are related to other variables such as capital, liquidity, assets, and others. The results of this research provide mapping various variables which related to risk management for future research. Not only for researchers, but also for industries that directly apply risk management to their business processes. Practitioners implement strategic using mapping of risk management to manage the enterprise risk. Bibliometric analysis contributes to the mapping of variables that companies can use to manage the risk. Through research on bibliometric analysis of risk management, firm performance, and firm value can create collaboration between researchers and practitioners.

6. LIMITATIONS AND FUTURE WORKS

Limitations, The data is collected only from Google Scholar. Results can be more varied by adding other database sources. Future works, Future research is expected to increase the sample size to find out more broadly about the relationship between risk management variables, company performance, and firm value. In addition, future research is expected to conduct a more in-depth literature review with more up-to-date methods.

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