

# Innovations

## R&D Investment Research From 2015 to 2021 Using VOS Viewer Application: A Bibliometric Analysis

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**Abstract :** *This study aims to provide a bibliometric and science mapping analysis on the research area of R&D Investment published in the Dimension database over the 2017-2021 period. The study used the VOSviewer software and MS Excel spreadsheet for data analysis. The study identified an increasing trend in publication on the topic. The study found that Zahn Bozanic was the most productive author; also Zahn Bozanic, J. Richard Dietrich, Bret A. Johnson, and Frederick L. Bereskin, Po-Hsuan Hsu, Wendy Rotenberg were the highly cited authors. The authors from The USA were the productive publication, while the SSRN Electronic Journal was found to be the most influential journal. The most reoccurring keywords on the topic were R&D Investment, Firm Performance, Research, R&D Expenditure. Finally, the most co-cited sources included Journal of Accounting and Economics, Journal of Financial Economics, The Journal of Finance, The Accounting Review, and Journal of Accounting Research.*

**Keywords :** *1. Journal Impact Factor, 2. R&D Investment, 3. Firm Performance, 4. Design Methodology Approach, 5. Cite Score.*

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## 1. Introduction

Global competition forces companies to compete for customers and employees on an international scale and requires companies to carry out flexible investment policies. Innovation is a positive effect of competition (Dereli, 2015). Human capital and research development are the keys to companies' growth and competitiveness (Dornbusch et al., 2011). The company's innovation can explicitly be seen from the amount of research and development costs allocated by the company (Hill and Snell, 1989:37). A firm's ability to produce a good or service more efficiently than its competitors, which leads to greater profit margins, creates a comparative advantage by utilizing its assets and competencies. Therefore, the company's strategy should lead the innovation by implementing more effective production processes, improving better performance in the market, and instilling a positive reputation in customer perceptions to generate a sustainable competitive advantage (Gunday et al., 2011).

Human capital means all expertise, skills, knowledge, and creativity that can be realized in a work ability that can be used to produce a professional service and economic value. So far, the assessment of the company's performance uses more physical resources (tangible assets). The company's internal business is a series of activities that will later be used to create certain inventions and innovations by internal means. Research and Development (R&D) activities are activities that play a role in product innovation in the company. Simply put, companies cannot create or innovate without significant investments in R&D. There are several factors that affect the company's performance, among others: R & D investment and human capital structure. R & D investment has an important role to develop innovation in company productivity in order to achieve the goals expected by the company. R&D is an important element in improving profitability and creates competitive advantage in various business ventures (Wang et al., 2013). R&D is an essential function for many businesses so that the company can always be ahead of competitors. R&D investment, however, is very important to gain a larger market share through the marketing of the new products produced. The risk of investing in large R&D and uncertain returns makes it difficult for companies to obtain external funding. There is a high risk of uncertainty over the outcome of an R&D project because there is always a high probability of failure giving rise to the general view that R&D activities are difficult to finance in a free market. Jensen (1976) argues in contrast that managers may behave myopically, but capital markets do not.

Manufacturing companies in developed countries in Europe such as the Netherlands, Belgium and Luxembourg have spent a lot of R & D to increase their company profits (Beld, 2014). In Asia, the development of the value of intangible assets also has a positive trend, one example is what happened in Malaysia. Research on the development of the value of intangible assets has been carried out and the results show that the development of the value of intangible assets significantly started from 2004 (Salamudin et al, 2013).

The findings of this study are hoped to enrich the existing literature on the bibliometric mapping of research and development (R&D) spending affects on firm value. The findings of the study also the existing research trends on research and development (R&D) and analyzed using VOS viewer software to contribute to future research and development (R&D) research literature. In the next section considers reviews related to previous studies on research and development (R&D), followed by the research method in Section 3. Most importantly, the following section analyzes the bibliometric analysis result and discussions. In the final section, we provide a conclusion.

## 2. Literature review

Investment in research and development in real terms is an investment in intangible assets the firm's knowledge base, from which profits in future years will be generated (Basgoze and Sayin, 2013:6). However, research and development expenditures do not always lead to superior future performance. The effect of R&D on company profits is still unclear because R&D spending increases the company's sales and costs simultaneously, further explanation on research and development is regulated in PSAK No. 19 concerning Intangible Assets. Several research results found that there was a positive effect of R&D spending on profitability as the results of previous studies found that R&D investments convey a positive signal regarding a firm's future growth (Şişmanoğlu and Akçali, 2016). Grabowski and Mueller (1978) examined the impact of R&D expenditures on a firm's profitability and find that firms that invest more in R&D expenditure and innovation activities have become a factor growth driver. While R&D investments has a negative effect on operating performance (short term), R&D is considered a key to a long-term success of a firm (Qian, Zhong, & Zhong, 2012). Another study found results that contradicted previous research, namely that R & D has a negative relationship with firm performance by Pantagakis et al (2013) and Bouaziz (2016).

The literature notes that research that focuses on R&D spending is mostly carried out in developed countries. Developing countries such as Indonesia as far as the author knows are still very few objects of research even though economic growth in Indonesia is the highest in Southeast Asia (The World Bank, 2018) and is proven by being a member of the G20 and even the rating agency Moody's Investor Service (Moody's) gives a rating of Indonesia's sovereign credit rating at the level of Baa2 or outlook is stable on February 10, 2020. This means that Indonesia is worthy of being an investment grade on the Bank Indonesia website. This economic growth is an important output of R&D spending as explained by the theory of endogenous growth (Romer, 1994) which emphasizes that R&D investment and human capital accumulation are important factors to determine long-term economic growth.

### 3. Materials and Methods

This study applied the bibliometric analysis method comes from the word Bibliometrics, where the word biblio or in English bibliography, biblio means book and metrics is measuring. Bibliometry can be described as a method for analyzing or measuring a book / literacy using a data analysis approach. In addition, the purpose of bibliometry can be used as a process to analyse books, articles and other publications using the Dimensions application, which is used as a forum to search for articles or journals from around the world. This research focuses on the map of article publications in the R&D investment on firm value. This study extracted bibliometric data related to R&D investment literature from Scopus databasewhere the search was carried out in December 2021 with a bibliometric approach. The data used comes from search results in the Dimensions with the keyword R&D with a time period of 2017-2021. VOSviewer itself can serve as an output to visualize and build a bibliometric network, while visualizing data analysis is in the form of country, year, researcher, academic affiliation, type, keywords, growth in the number of works and authors.

Thus, the bibliographic information about R&D was obtained from this database only. The articles were searched using the Dimensions database in on January 4<sup>th</sup>, 2022. The search criteria were topic Research and Development Investment , refined by timespan: 2017 to 2021 (December) with keywords/terms Research and Development. One hundred eighty five (185) documents related to research and development has appeared. The articles then analyzed using VOSViewer that can be used to generate, visualize and analyze bibliometric networks developed by van Eck & Waltman (2010) and MS Excel.

### 4. Result and discussion

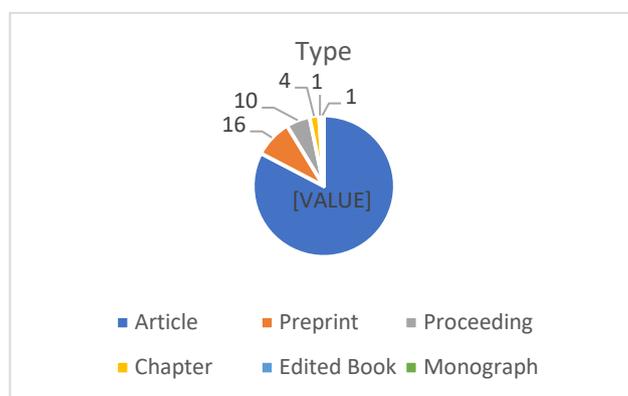
In this discussion, the results and discussion are obtained from a research method where this method is used to seek data analysis from journals or articles published around the world. In searching for the data, an application is needed to search for articles and journals, namely the Dimensions, this application is very helpful in finding a journal or article. In this study, the method used is the bibliometric method, where this method can be interpreted as a method of analysis where the data used will be measured in various aspects of data analysis visualization in the form of country, year, researcher, academic affiliation, type, keywords, growth in the number of works and author.

The results of the search on the the Dimensions application found 185 journal documents or articles with the theme of Research and Development originating from various countries, besides that it can be seen by various universities from around the world and it can also be seen by writers who often make scientific works. In addition, it can also be seen the types of scientific works, types of articles, types of books and others. Apart from that, you can also see publications from various universities. In addition, it can also be seen the years of articles that are often made. In addition, it can also be seen that writers have made scientific works from various countries. Main research fields in the figure 1 is development of the number of R&D papers from 2017-2021.



**Figure1. Development of the number of R&D papers from 2017-2021**

It can be seen in the chart for the year figure 1 above, here the search for articles about R&D was carried out in the period 2017 to 2021. Where it is clear that articles that are often made or that are often published in 2017 with a total of 44 documents, for the lowest being in the year 2018 with a total of 30 documents. So the total articles or scientific papers that appeared in the period 2017 to 2021 were 185 scientific paper documents. The kind of scientific work being made in the figure 2 as follows.



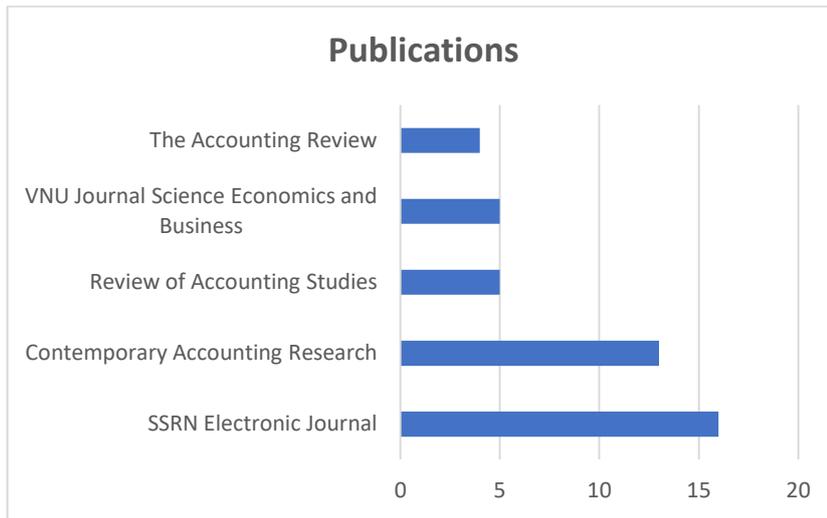
**Figure 2. The kind of scientific work being made**

It can be seen in the graph of the types of scientific papers figure 2 above, in a search on Dimensions there are various types of scientific papers, ranging from Articles, Preprint, Proceeding, Chapter, Edited book and Monograph. It can be seen that the type of scientific paper that is mostly written is Article (dark blue) where as many as 153 article documents. For the lowest one made is Edited Book (orange) and Monograph where as many as 1 document book. So the total articles or scientific papers that appeared in the period 2017 to 2021 were 185 scientific papers with a variety of different scientific works. In the Most Citations Authors can be seen in table 1 as follows.

No	Year	Authors	Document	Citation
1	2017	Zahn Bozanic, J. Richard Dietrich, Bret A. Johnson	2	63
2	2018	Frederick L. Bereskin, Po-Hsuan Hsu, Wendy Rotenberg	1	34
3	2017	Sophia J. W. Hamm, Boochun Jung, Woo-Jong Lee	1	27
4	2019	Stacie K. Laplante, Hollis A. Skaife, Laura A. Swenson, Daniel D. Wangerin	1	19
5	2019	Shenggang Ren, DuoJun He, Tao Zhang, Xiaohong Chen	1	19

**Table 1. Most Citations Authors of R&D Publication**

It can be seen in the table 1 above, there are five authors who has most citations on scientific papers, namely Zahn Bozanic with 63 Article citation, besides Frederick L with 34 Article citation, then Sophia J with 27 Article citation, then Stacie K and Shenggang Ren with 19 Article citation. The article by Zahn Bozanic is entitled “SEC comment letters and firm disclosure”. In addition, articles by Frederick L entitled "The Real Effects of Real Earnings Management: Evidence from Innovation". The article by Sophia J is entitled “Labor Unions and Income Smoothing”. In addition, articles by Shenggang Ren entitled "Limits of tax regulation: Evidence from strategic R&D classification and the R&D tax credit". The Most Published Journal on R&D can be seen in figure 3 as follows.



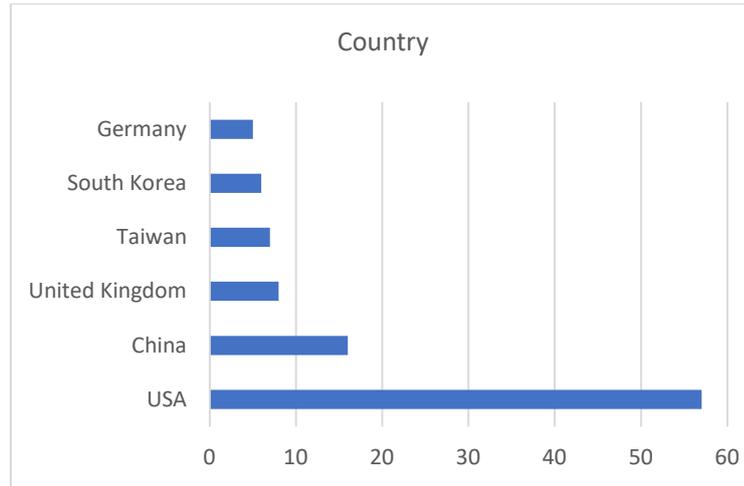
**Figure 3. The journal with the most published papers**

Based on the Publications chart figure 3 above, it can be seen that the highest publications or the ones that often publish many scientific papers are SSRN Electronic Journal with 16 publications. The lowest or those that rarely publish scientific papers are namely Review of Accounting Studies and VNU Journal Science Economics and Business, Contemporary Accounting Research, Review of Accounting Studies and The Accounting Review, the total number of publications is 27 publications. Main Affiliations in R&D Research in the table 2 as follows.

No	Institution Affiliation	Number of Papers	Regions
1	Boston University	3	USA
2	University of South Carolina	2	USA
3	West Virginia University	2	USA
4	Capital University of Economics and Business	2	China
5	University of Auckland	2	New Zealand

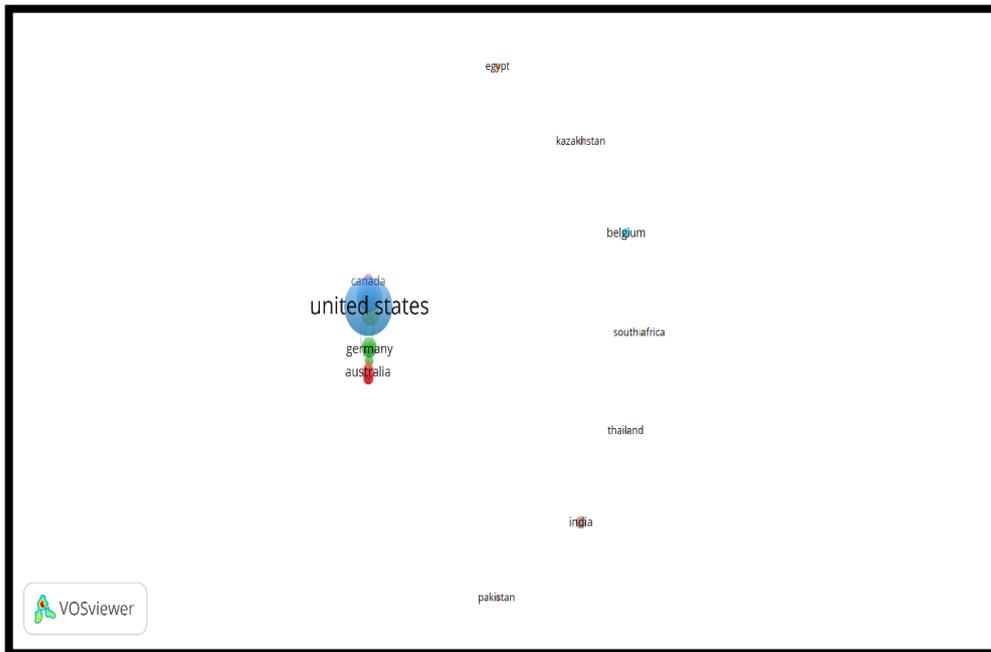
**Table 2. Main affiliations in R&D research**

Based on the table 2 above which contains universities that often publish or make scientific papers such as articles or journals, it can be explained that Boston University has a total of 3 scientific papers. Furthermore, University of South Carolina has a total of 2 scientific papers. West Virginia University has a total of 2 scientific papers. Capital University of Economics and Business has a total of 2 scientific papers. Then University of Auckland has a total of 2 scientific papers. So, it can be concluded that the highest in making or publishing a scientific work are 5 universities. Most Frequent Country Affiliation of ISO R&D Publication in the figure 4 as follows.

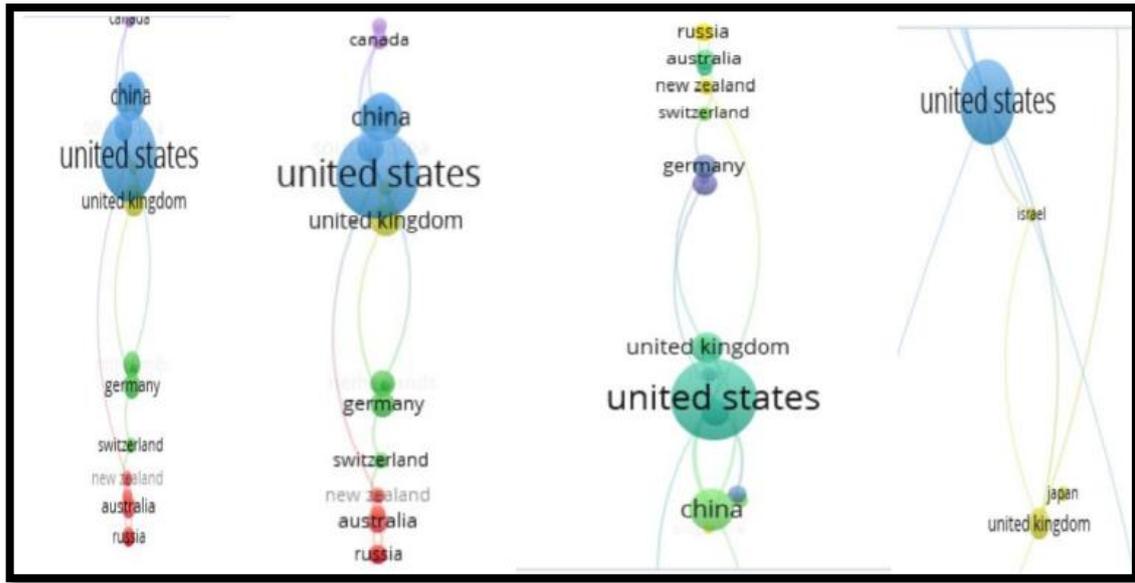


**Figure 4. Development of the number of SBM papers by country**

From the results of data analysis on Dimensions, it can be seen in the graph figure 4 above, which contains countries that often make or publish journals or articles in the period 2017 to 2021. Where the highest country is the USA which has 57 scientific papers. Furthermore, there are five countries that have the same number of scientific papers as many as 2 scientific papers, namely Israel, New Zealand, Italy, Switzerland, Japan, Tunisia, Belgium and Indonesia. In addition, the lowest were 12 countries that published 1 scientific papers, namely Malaysia, United Arab Emirate, Vietnam, Kuwait, Singapore, Brazil, Croatia, Egypt, Kazakhstan, Pakistan, South Africa and Thailand. So in total, all the countries that published scientific papers on the theme of R&D, in which the period 2017 to 2021 amounted to 32 countries. The Network Visualization can be seen in the figure 5 as follows.



**Figure 5 . Network visualization map of high frequency keywords**



Based on the Network Visualization output from VOSviewer in the Figure 6 below, it shows that the R&D bibliometric analysis process is divided into 3 clusters (Red, blue and green). The picture also visualizes the relationship between keywords so that it can help to understand and reflect on the R&D journal for five years. The division of the clusters is as follows and only the most keywords appear in the image. 1. R&D Investment (red). In this cluster, we can find themes from Research. This cluster is related to the following accounting, company and relationship. 2. This cluster is dominated by the keywords firm, manager, earning and relation (blue). This cluster is dominated by the keywords Research, development, R&D Expenditure and design methodology approach. The Overlay Visualization map of high frequency keywords can be seen in the figure 6 as follows.

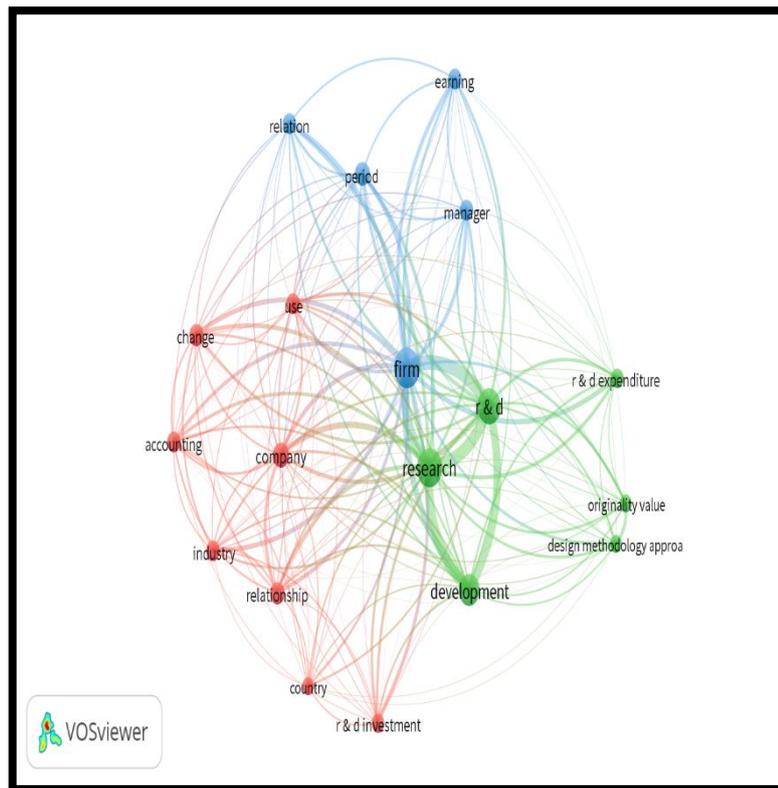
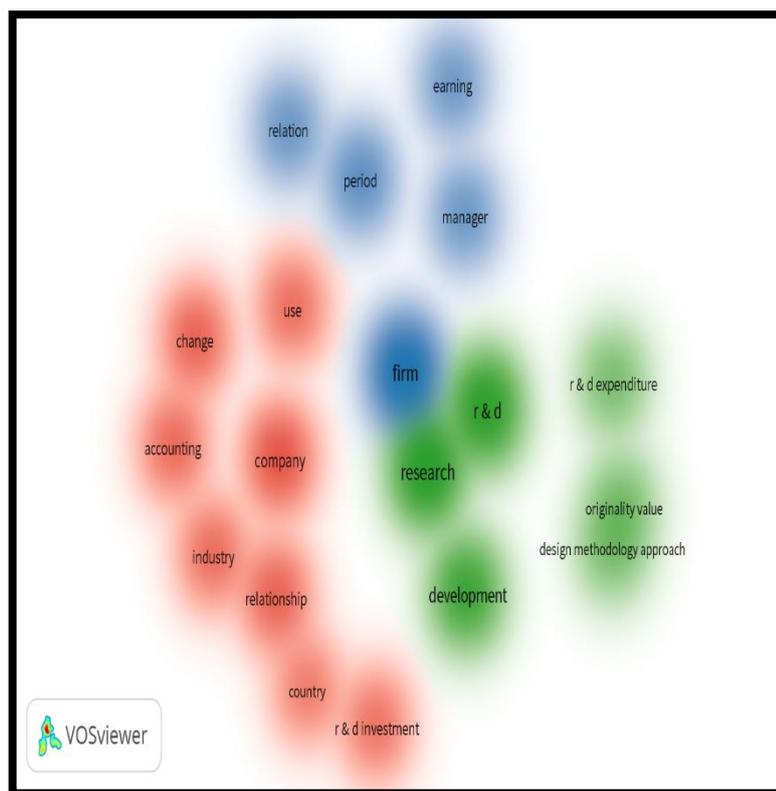


Figure 6 . Network visualization map of high frequency keywords



**Figure 7. Density visualization map of high frequency keywords**

Based on the Density Visualization output from VOSviewer, the figure 7 above shows the depth of the research. This is indicated by the darker the color that appears, so it can be said that there is still a lot of research on this keyword. For example, from the image above, it can be seen that the ISO keyword has a thick color, which indicates that there have been many studies using that keyword.

## 5. Conclusion

This paper or journal discusses the development of R&D Investment papers published from 2017-2021 and analyzes the bibliometric results of 185 papers or journals that have been processed in the VOSviewer application. The highest growth of R&D Investment papers indexed by Dimensions in 2017-2021 occurred in 2017 with 44 articles. Most of the international publications on R&D Investment Published by SSRN Electronic Journal with 16 publications. Meanwhile, the country that publishes the most scientific papers is The USA with 57 scientific papers and universities that often issue scientific papers, namely Boston University which is in The USA has 3 scientific papers. Furthermore, University of South Carolina in The USA has a total of 2 scientific papers. Then, West Virginia University in The USA has 2 scientific papers. And Capital University of Economics and Business in China has a total of 2 scientific papers. And finally University of Auckland, which is in New Zealand, also has 2 scientific papers published. So, it can be denied that the highest production or publication of a scientific work is 5 universities. Writers who has most citations on scientific papers, namely Zahn Bozanic with 63 Article citation, besides Frederick L with 34 Article citation, then Sophia J with 27 Article citation, then Stacie K and Shenggang Ren with 19 Article citation. The article by Zahn Bozanic is entitled "SEC comment letters and firm disclosure". In addition, articles by Frederick L entitled "The Real Effects of Real Earnings Management: Evidence from Innovation". The article by Sophia J is entitled "Labor Unions and Income Smoothing". In addition, articles by Shenggang Ren entitled "Limits of tax regulation: Evidence from strategic R&D classification and the R&D tax credit.

## References

- [1] *Abood, David., Levi, Shai., & Weiss, Dan. (2017). Managerial Incentives, Options, and Cost Structure Choices. Review of Accounting Studies, 23(2), 422-451.*
- [2] *Adhiutama, Akbar., & Firmialy, Sita Deliyana. (2019). Investigation on Leveraging Effect of Women Directors on The Board on R&D Investment and Firms Financial Performance In The Context of Developing Countries: Evidence From Indonesia. Afro-Asian J of Finance and Accounting, 1(1), 1.*
- [3] *Agrawal, Anup., & Nasser, Tareque. (2018). Corporate Financial and Investment Policies in the Presence of a Blockholder on the Board. Quarterly Journal of Finance, 08(03), 1850012.*
- [4] *Ahmad-Zaluki, Nurwati A., & Badru, Bazeet Olayemi. (2020). Intended Use of IPO Proceeds and Initial Returns. Journal of Financial Reporting and Accounting, 19(2), 184-210.*
- [5] *AlHares, Aws., King, David., & Ntim, Collins. (2018). Block Ownership and Companies' R&D Intensity: The Moderating Effect of Culture. Corporate Ownership and Control, 15(2), 19-32.*
- [6] *Amoah, Nana Y., Anderson, Anthony., Bonaparte, Isaac., & Muzorewa, Susan. (2017). Managerial Opportunism and Real Activities Manipulation: Evidence from Option Backdating Firms. Review of Accounting and Finance, 16(3), 282-302.*
- [7] *Banker, Rajiv D., Fang, Shunlan., & Mehta, Mihir N. (2019). Anomalous Operating Performance During Economic Slowdowns. Journal of Management Accounting Research, 32(2), 57-83.*
- [8] *Basgoze, Pinar., & H Cem Sayin. (2013). The Effect of R&D Expenditure (Investment) on Firm Value: Case of Istanbul Stock Exchange Turkey, Ankara: Department of Business Administration, Volume 2 ISSN: 2146-7943. Journal of Business Economic and Finance.*
- [9] *Bereskin, Frederick L., Hsu, Po-Hsuan., & Rotenberg, Wendy. (2018). The Real Effects of Real Earnings Management: Evidence from Innovation. Contemporary Accounting Research, 35(1), 525-557.*
- [10] *Billings, Bruce K., Moon, James R., Morton, Richard M., & Wallace, Dana M. (2020). Can Employee Stock Options Contribute to Less Risk-Taking? Contemporary Accounting Research, 37(3), 1658-1686.*
- [11] *Bitat, Abdelfeteh. (2017). Environmental Regulation and Eco Innovation: The Porter Hypothesis Refined. Eurasian Business Review, 8(3), 299-321.*
- [12] *Bouaziz, Z. (2016). The Impact of R&D Expenses on Firm Performance: Empirical Witness from the Bist Technology Index, 51-60. Journal of Business Theory and Practice.*
- [13] *Bouwens, Jan., Hofmann, Christian., & Van Lent, Laurence. (2017). Performance Measures and Intra-Firm Spillovers: Theory and Evidence. Journal of Management Accounting Research, 30(3), 117-144.*
- [14] *Canace, Thomas G. Jackson, Scott B., & Ma, Tao. (2017). R&D Investments, Capital Expenditures, and Earnings Thresholds. Review of Accounting Studies, 23(1), 265-295.*
- [15] *Chaney, Paul K., Gunn, Rita Nevada., & Coleman Jeter, Debra. (2020). Implications of Changes in GAAP for Business Combinations (and Goodwill) on Accounting and Finance Research. The International Journal of Accounting, 55(02), 2050006.*
- [16] *Chen, Ming-Chin., & Li, Huan-Yi. (2018). The Effects and Economic Consequences of Cutting R&D Tax Incentives. China Journal of Accounting Research, 11(4), 367-384.*
- [17] *Chen, Zhao., Liu, Zhikuo., Suárez Serrato, Juan Carlos., & Xu, Daniel Yi. (2021). Notching R&D Investment with Corporate Income Tax Cuts in China. American Economic Review, 111(7), 2065-2100.*
- [18] *Cheng, C. S. Agnes., Guo, Peng., Weng, Chia-Hsiang., & Wu, Qiang. (2020). Innovation and Corporate Tax Planning: The Distinct Effects of Patents and R&D\*. Contemporary Accounting Research, 38(1), 621-653.*
- [19] *Che-Yahya, Norliza., & Abdul-Rahman, Siti Suhaila. (2020). The Influence of Growth Opportunities on IPO Initial Aftermarket Performance. International Journal of Financial Research, 12(1), 40.*
- [20] *Chircop, Justin., Collins, Daniel W., Hass, Lars Helge., & Nguyen, Nhat (Nate) Q. (2019). Accounting Comparability and Corporate Innovative Efficiency. The Accounting Review, 95(4), 127-151.*
- [21] *Chung, Hyeesoo H., Hillegeist, Stephen A., Park, You-Il., & Wynn, Jinyoung P. (2019). Capitalization*

of In Process Research and Development under SFAS 141R and Information Asymmetry. *Contemporary Accounting Research*, 36(4), 2379-2407.

- [22] Curtis, Asher., McVay, Sarah., & Toynbee, Sara. (2020). *The Changing Implications of Research and Development Expenditures for Future Profitability*. *Review of Accounting Studies*, 25(2), 405-437.
- [23] Datta, Sudip., Jha, Anand., & Kulchania, Manoj. (2019). *On Accounting's Twenty-First Century Challenge: Evidence on The Relation Between Intangible Assets and Audit Fees*. *Review of Quantitative Finance and Accounting*, 55(1), 123-162.
- [24] Dereli, 2015, *Innovation Management in Global Competition and Competitive Advantage*, *Procedia – Social and Behavioral Sciences*, 195, pp. 1365 – 1370.
- [25] De Simone, Lisa., Huang, Jingjing (Jing)., & Krull, Linda K. (2019). *R&D and the Rising Foreign Profitability of U.S. Multinational Corporations*. *The Accounting Review*, 95(3), 177-204.
- [26] De Waegenaere, Anja., Sansing, Richard C., & Wielhouwer, Jacco L. (2017). *Development Cost Capitalization During R&D Races*. *Contemporary Accounting Research*, 34(3), 1522-1546.
- [27] De Waegenaere, Anja., Sansing, Richard., & Wielhouwer, Jacco L. (2020). *Tax Loss Carryovers in a Competitive Environment\**. *Contemporary Accounting Research*, 38(1), 180-207.
- [28] Demeré, Paul., Donohoe, Michael P., & Lisowsky, Petro. (2020). *The Economic Effects of Special Purpose Entities on Corporate Tax Avoidance*. *Contemporary Accounting Research*, 37(3), 1562-1597.
- [29] Dinh, Tami., Schultze, Wolfgang., List, Thomas., & Zbiegły, Nadine. (2020). *R&D Disclosures and Capitalization Under IAS 38—Evidence on The Interplay Between National Institutional Regulations and IFRS Adoption*. *Journal of International Accounting Research*, 19(1), 29-55.
- [30] Dinh, Tami; Sidhu, Baljit K., & Yu, Chuan. (2019). *Accounting for Intangibles: Can Capitalization of R&D Improve Investment Efficiency?* *Abacus*, 55(1), 92-127.
- [31] Dong, Qi (Flora)., & Zhao, Xin. (2017). *Do Firms Do What They Say? The Effect of the American Jobs Creation Act of 2004 on R&D Spending*. *Journal of the American Taxation Association*, 40(1), 87-107.
- [32] Fung, Michael K(2017). *Fraudulent Financial Reporting and Technological Capability in the Information Technology Sector: A Resource-Based Perspective*. *Journal of Business Ethics*, 156(2), 577-589.
- [33] Geyer-Klingenberg, Jerome., Hang, Markus., Rathgeber, Andreas W., Stöckl, Stefan., & Walter, Matthias. (2017). *What Do We Really Know About Corporate Hedging? A Meta-Analytical Study*. *Business Research*, 11(1), 1-31.
- [34] GurhanGunday, et al. (2011). *Effects of Innovation Types on Firm Performance*. *The International Journal of Production Economics*. Istanbul, Turkey.
- [35] Gupta, Isha., Raman, T. V., & Tripathy, Naliniprava. (2021). *Creating Value Through Related and Unrelated Merger and Acquisition: Empirical Evidence*. *Corporate Ownership and Control*, 18(4), 67.
- [36] Hafeez, Abida., Shah Syed, Karim Bux., & Qureshi, Fiza. (2019). *Exploring the Relationship between Government R & D Expenditures and Economic Growth in a Global Perspective: A PMG Estimation Approach*. *International Business Research*, 12(4), 163.
- [37] Hamm, Sophia J. W., Jung, Boochun., & Lee, Woo-Jong. (2017). *Labor Unions and Income Smoothing*. *Contemporary Accounting Research*, 35(3), 1201-1228.
- [38] Harymawan, Iman., Nasih, Mohammad., Agustia, Dian., Ratri, Melinda., & Nowland, John. (2020). *CEO & CFO Education and R&D Investment in Indonesia*. *Australasian Accounting Business and Finance Journal*, 14(2), 16-34.
- [39] Hill, Mary S., Ruch, George W., & Taylor, Gary K. (2018). *Research and Development Expense and Analyst Forecast Errors: An Underestimation of Sales or Overestimation of Expenses?* *Journal of Accounting Auditing & Finance*, 34(4), 667-684.
- [40] Hsiao, Hsiao-Fen., Liao, Szu-Lang., Su, Chi-Wei., & Sung, Hao-Chang. (2017). *Product Market Competition, R&D Investment Choice, and Real Earnings Management*. *International Journal of Accounting and Information Management*, 25(3), 296-312.
- [41] Huang, Jing; Krull, Linda., & Ziedonis, Rosemarie. (2020). *R&D Investments and Tax Incentives: The Role of Intra-Firm Cross-Border Collaboration\**. *Contemporary Accounting Research*, 37(4), 2523-2557.

- [42] *Ikatan Akuntansi Indonesia. (2010). PSAK No. 19 Tentang Aset Tidak Berwujud – Edisi Revisi. Dewan Standar Akuntansi Keuangan: PT. Raja Grafindo.*
- [43] *Iyer, Subramanian R., Sankaran, Harikumar., & Zhang, Yan. (2020). Do Well-Connected Boards Invest Optimally in R&D Activities? The Journal of Financial Research, 43(4), 895-932.*
- [44] *Jasrial, Jasrial., Puspitasari, Susy., & Muktiyanto, Ali. (2018). Earnings Management, Effective Tax Rate (ETR) and Book-Tax Gap (BTG). GATR Accounting and Finance Review, 3(1), 33-43.*
- [45] *Jensen, M.C. dan Meckling W.H. (1976). Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure, 3 (4), 305-360. Journal of Financial Economics.*
- [46] *Jeong, Seong-ho., Lee, Youngjae., & Kang, Sung Hoon. (2019). Government Spending and Sustainable Economic Growth: Based on First- and Second Level COFOG Data. Public Money & Management, 40(2), 1-9.*
- [47] *Jin Park, Kyung., Mo, Kyoungwon. (2018). Impact of CEO pensions on value relevance of R&D expenditures. Problems and Perspectives in Management, 16(4), 224-234.*
- [48] *Kadir, Baharudin., & Shamsudin, Mohd Farid. (2019). A Case Study Analysis of Typhidot: An Example of Market-Oriented R&D Commercialization in Malaysia. International Journal of Financial Research, 10(5), 75.*
- [49] *Kao, Wei-Chuan. (2017). Innovation Quality of Firms with The Research and Development Tax Credit. Review of Quantitative Finance and Accounting, 51(1), 43-78.*
- [50] *Kim, Jeong Ho., & Im, Chae Chang. (2017). The Study on The Effect and Determinants Of Small – And Medium-Sized Entities Conducting Tax Avoidance. Journal of Applied Business Research (JABR), 33(2), 375-390.*
- [51] *Kim, KapSoon., & Yoon, SungMan. (2017). Evaluation and Improvement of R&D Tax Credit for New Growth Engine and Basic Science Technology-Focusing on Bio and Health Field-. Journal of Taxation and Accounting, 18(5), 203-236.*
- [52] *Kim, MinChung., Xiong, Guiyang., & Kim, Kwang-Ho. (2017). Where Does Pride Lead? Corporate Managerial Hubris and Strategic Emphasis. Journal of the Academy of Marketing Science, 46(3), 537-556.*
- [53] *Kreß, Andreas., Eierle, Brigitte., & Tsalavoutas, Ioannis. (2019). Development Costs Capitalization and Debt Financing. Journal of Business Finance Accounting, 46(5-6), 636-685.*
- [54] *Kumari, Pooja., & Mishra, Chandra Sekhar. (2019). Value Relevance of R&D Reporting in India: Significance of Intangible Intensity. Journal of Financial Reporting and Accounting, 17(3), 432-448.*
- [55] *Kwon, Sewon., Choi, Sera., Kim, BumJoon., & Lee, Moonyoung. (2018). Asymmetry in R&D Investments of Chaebol Firms. Journal of Taxation and Accounting, 19(2), 209-230.*
- [56] *Lakhal, Nadia., & Dedaj, But. (2019). R&D Disclosures and Earnings Management. Journal of Financial Reporting and Accounting, 18(1), 111-130.*
- [57] *Laplante, Stacie K., Skaife, Hollis A., Swenson, Laura A., & Wangerin, Daniel D. (2019). Limits of Tax Regulation: Evidence from Strategic R&D Classification and the R&D Tax Credit. Journal of Accounting and Public Policy, 38(2), 89-105.*
- [58] *Lee, Junyoup., Lee, Eunsuh., Kim, Kevin H., & Paik, Daniel Gyung H. (2017). Acquired In-process Research Development and Earnings Management. Australian Accounting Review, 28(4), 577-588.*
- [59] *Lim, Si Jie., White, Gregory., Lee, Alina., & Yuningsih, Yuni. (2017). A Longitudinal Study of Voluntary Disclosure Quality in The Annual Reports of Innovative Firms. Accounting Research Journal, 30(01), 89-106.*
- [60] *Liu, Bo., & Zhang, Dana. (2020). The Use of Non-GAAP Measures in Initial Public Offerings. Journal of Corporate Accounting & Finance, 31(4), 60-72.*
- [61] *Liu, Shiyuan., Du, Jiang., Zhang, Weike., & Tian, Xiaoli. (2021). Opening The Box of Subsidies: Which Is More Effective For Innovation? Eurasian Business Review, 11(3), 421-449.*
- [62] *Lobo, Gerald J., Xie, Yuan., & Zhang, Joseph H. (2017). Innovation, Financial Reporting Quality, and Audit Quality. Review of Quantitative Finance and Accounting, 51(3), 719-749.*
- [63] *Ma, Zhiming., Ruan, Lufei., Wang, Danye., & Zhang, Haiyan. (2021). Generalist CEOs and Credit Ratings\*. Contemporary Accounting Research, 38(2), 1009-1036.*

- [64] Makhaiel, Nargis Kaisar Boles. (2019). *The Influence of Egyptian Context on The Trade-Off Between Earnings Management Approaches*. *Journal of Financial Reporting and Accounting*, 17(1), 133-168.
- [65] Makni, YosraFourati., Maaloul, Anis., & Dabbebi, Rabeb. (2020). *The Determinants of Tax-Haven Use: Evidence from Canada*. *Journal of Applied Accounting Research*, 21(1), 142-162.
- [66] Makryvelios, Evangelos., & Mavrotas, George. (2021). *Analysis of the Research & Development Funding in Greece under EU Programmes*. *Journal of Public Administration and Governance*, 11(1), 223.
- [67] Malmendier, U., & G. Tate. (2008). "Who makes acquisitions? CEO overconfidence and the market's reaction.", 89, 20-43. *Journal of Financial Economics*.
- [68] Malmendier, U., & G. Tate. (2005). "CEO overconfidence and Corporate Investment.", 60(Dec), 2661-2700. *Journal of Finance*.
- [69] Malmendier, U., G. Tate., & J. Yan. (2011). "Overconfidence and Early Life Experiences: The effect of Managerial Traits on Corporate Financial Policies.", 66, 1687-1733. *Journal of Finance*.
- [70] Martínez-Fierro, Salustiano., Biedma-Ferrer, José María., & Ruiz-Navarro, José. (2019). *Impact of High-Growth Start-Ups on Entrepreneurial Environment Based on The Level of National Economic Development*. *Business Strategy and the Environment*, 29(3), 1007-1020.
- [71] Mathur, Neeti., Tiwari, Satish Chandra., Sita Ramaiah, T., & Mathur, Himanshu. (2021). *Capital Structure, Competitive Intensity and Firm Performance: An Analysis of Indian Pharmaceutical Companies*. *Managerial Finance*, 47(9), 1357-1382.
- [72] Mukarram, Syed Shafqat., Ajmal, Tahira., & Saeed, Abubakr. (2018). *Women Directors' Propensity towards Risk in Technology Firms*. *Corporate Governance*, 18(2), 353-367.
- [73] Na, Hyung Jong., Park, Sung Ook., & Kim, Seong Tae. (2018). *The Effect of Real-Activity Earning Management on Relationship between R&D Intensity and Firm Value*. *Journal of Taxation and Accounting*, 19(4), 155-170.
- [74] O'Connell, Vincent., AbuGhazaleh, Naser., & Kintou, Abdelmounaim. (2017). *The Impact of R&D Programme Success on The Decision to Capitalise Development Expenditures in European Firms*. *Technology Analysis and Strategic Management*, 30(1), 1-16.
- [75] Oh, Myoungjin., Shin, Jungwoo., Park, Pil-Ju., & Kim, Sunmee. (2020). *Does Eco-Innovation Drive Sales and Technology Investment? Focusing on Eco-Label in Korea*. *Business Strategy and the Environment*, 29(8), 3174-3186.
- [76] Ossorio, Mario. (2018). *Does R&D Investment Affect Export Intensity? The Moderating Effect of Ownership*. *International Journal of Managerial and Financial Accounting*, 10(1), 65.
- [77] Qian H., Zhong K., & Zhong Z.K. (2012). *Seasoned Equity Issuers R&D Investment: Signaling or Overoptimism*, 35, 553-580. *The Journal of Financial Research*.
- [78] Pham, Dung., Nguyen, Thanh., Pham, Trang Minh., & Adhikari, Hari. (2020). *Corporate Divestiture Decisions and Long-Run Performance*. *Journal of Behavioral Finance*, 22(2), 1-15.
- [79] Ren, Shenggang., He, DuoJun; Zhang, Tao., & Chen, Xiaohong. (2019). *Symbolic Reactions or Substantive Pro-Environmental Behaviour? An Empirical Study of Corporate Environmental Performance Under the Government's Environmental Subsidy Scheme*. *Business Strategy and the Environment*, 28(6), 1148-1165.
- [80] Riedl, Edward J., Sun, Estelle Y., & Wang, Guannan. (2020). *Sentiment, Loss Firms, and Investor Expectations of Future Earnings\**. *Contemporary Accounting Research*, 38(1), 518-544.
- [81] Sadek, Md. Abu Zafar., & Anwar, Syed Ferhat. (2018). *Contemporary Transformations in the Global Pharmaceuticals Industry and Strategic Imperatives for Bangladesh Enterprises*. *Journal of Business and Economics*, 9(9), 799-814.
- [82] Salamudin, N., Bakar, R., Ibrahim, M. K., & Hassan, F. H. (2013). *Intangible Assets Valuation in The Malaysian Capital Market*, 11 (3), 391-405. *Journal of Intellectual Capital*.
- [83] Sangster, Alan., & Gibb, Forbes. (2017). *Earnings Management, Ultra Vires Borrowing, and Auditing of a Scottish Brewery 1884–1927*. *Accounting Historians Journal*, 44(2), 1-15.
- [84] Scott, Ricky William. (2017). *Do Institutional Investors Aleviate Agency Costs in R&D Investment Decisions?* *Accounting and Finance Research*, 6(3), 24.
- [85] Song, Young Min., & Koo, Ja Eun. (2017). *The Effects of Smoothing of R&D on Firm Value*. *Journal*

of *Taxation and Accounting*, 18(5), 55-86.

- [86] Stern, Joel M., & Willett, Joseph T. (2019). *A Look Back at the Beginnings of EVA and Value-Based Management*. *Journal of Applied Corporate Finance*, 31(3), 95-102.
- [87] Suman, Samridhi., & Singh, Shveta. (2021). *Corporate Governance Mechanisms and Corporate Investments: Evidence from India*. *International Journal of Productivity and Performance Management*, 70(3), 635-656.
- [88] Sun, Estelle Y. (2021). *The Differential Role of R&D and SG&A for Earnings Management and Stock Price Manipulation\**. *Contemporary Accounting Research*, 38(1), 242-275.
- [89] Tian, Lin., & Han, Liang. (2020). *Nurturing Regional Innovation: The Effects of Bank Competition in the USA*. *International Journal of Banking Accounting and Finance*, 12(1), 75-96.
- [90] Ting, Irene Wei Kiong., Lo, Huai-Chun., & Kweh, Qian Long. (2018). *How Do Ownership Concentration and Family Control Affect R&D Investments? New Evidence from Taiwan*. *International Review of Finance*, 20(1), 275-291.
- [91] TrikiDamak, Sana. (2017). *Research And Development Accounting Treatment: Effects of CEO Characteristics and Corporate Governance Mechanisms*. *International Journal of Accounting and Economics Studies*, 5(2), 124.
- [92] Turlington, Jean., Fafatas, Stephan., & Oliver, Elizabeth Goad. (2019). *Is it U.S. GAAP or IFRS? Understanding how R&D costs affect ratio analysis*. *Business Horizons*, 62(4), 427-436.
- [93] Van Eck, N.J., Waltman, L., Dekker, R., & Van den Berg, J. (2010). *A Comparison of Two Techniques for Bibliometric Mapping: Multidimensional Scaling And VOS*, 61(12), 2405-2416. *Journal of the American Society for Information Science and Technology*.
- [94] Wang, C. H., Lu, Y. H., Huang, C. W., & Lee, J. Y. (2013). *R&D, productivity, and market value: An empirical study from high-technology firms*, 41(1), 143-155. *Omega*.
- [95] Wonglimpiyarat, Jarunee. (2017). *Technology Auditing and Risk Management of Technology Incubators Science Parks*. *World Journal of Entrepreneurship Management and Sustainable Development*, 13(1), 44-56.
- [96] Yoon, Sang Pil., Chung, Yang Hon., & Ko, Hye Soo. (2021). *The Impact of Government R&D Support on R&D Efficiency of Enterprise: Based on the WorldClass300 Enterprises*. *Korean Journal of Management Accounting Research*, 21(1), 91-113.
- [97] Zheng, Mengyao. (2019). *The Relationship between Income Tax Burden and R & D Investment of High-Tech Enterprises*. *Modern Economy*, 10(03), 720-729.
- [98] Ziyadin, Sayabek., Omarova, Aizhan., Doszhan, Raigul., Saparova, Gulnara., & Zharaskyzy, Gulim. (2018). *Diversification of R&D results commercialization*. *Problems and Perspectives in Management*, 16(4), 331-343.