Bibliometric Analysis: Patterns of Significance and Correlation in Consumer Satisfaction Research

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Abstract. This study identified patterns of significance and correlation in consumer satisfaction research across countries and became the subject of evaluation for future publications. The method used is bibliometric analysis. An analysis was conducted on 2,500 Dimensions.ai indexed publications, with the search keyword "consumer satisfaction" for 2012-2022. The data was processed and analyzed using VOSviewer to map the number of publications, main keywords, authors, affiliations, countries, and citation references. This research produced 182 items and 3 clusters for keywords, 120 items and 61 clusters for authors, 96 items and 8 clusters for affiliations, 43 items and 6 clusters for countries, and 81 items and 75 clusters for citation references. Consumer satisfaction research from 2012-2022 focuses more on factors influencing consumer satisfaction.

Keywords: *Consumer Satisfaction, Bibliometrics, VOSviewer.*

INTRODUCTION

Today, the business world continues to experience rapid development and intense competition due to globalization's influence, which makes doing business easier in national and international markets (Hartantiet al., 2022). With so many new companies emerging and competing in the market, the products offered are even more numerous and varied. Therefore, companies must try to control market share and win the competition (Imron, 2019). With this phenomenon, many companies do not get consumers because of their inability to face change to look for opportunities to reach consumers (Dewi & Ekawati, 2017). Therefore, it takes a lot of research and in-depth analysis to understand everything in maximizing customer satisfaction and a condition for achieving company goals in the midst of competition (Hendraet al.,2022; Widajanti, 2017).

The goal of a company is to maximize profits and achieve maximum customer satisfaction (Adhari, 2021). A company that strives to maximize consumer satisfaction tends to be superior to its competitors (Sugiyanto & Haryoko, 2020). Therefore, companies must respond quickly to all change forms and focus on customer satisfaction (Pohaet.al., 2022). In addition, companies must understand all types of desires and expectations that consumers link to the products offered (Rohaeni & Marwa, 2018). The current marketing concept is predominantly oriented toward meeting consumer needs and satisfaction (Amilia & Syardiansah, 2021). By creating satisfaction, the expected benefits are building loyalty and forming word-of-mouth recommendations (Sangadji & Sopiah, 2013). In addition, based on the results of research by Muiszudin & Sista (2016) and Chaniaet al. (2022), there is a positive and significant relationship between consumer satisfaction and future purchasing decisions. Furthermore, according to Firatmadi (2017), high levels of customer satisfaction, price sensitivity, marketing failure costs, and operating costs can be

reduced so that consumer turnover can be prevented, advertising effectiveness is created, and business reputation increases.

Consumer satisfaction is vital for business actors in decision-making (Hermawan & Amirullah, 2016). Through satisfaction, consumers will match the results that are felt with the level of expectation (Kotler, 2002). In the context of the experience economy, maximum satisfaction is created from the qualitative effects of individual activity (Firmansyah, 2020). Based on this, consumer satisfaction measures company success positively correlated with key performance indicators (Korenkiewicz & Maennig, 2022), aiming to increase sales (Fadhli & Pratiwi, 2021).

By looking at the complexity and urgency of customer satisfaction for companies that can build loyalty, form recommendations, and increase sales so they excel amid competition, research with the theme of consumer satisfaction is an interesting topic to study and discuss comprehensively. Research on consumer satisfaction has been carried out and published a lot. However, research using bibliometric analysis to see an overview of the development trend of consumer satisfaction, in general, has not been found. Consumer satisfaction is a vital aspect that needs to be studied comprehensively to seize market share amid the competition (Hendrae et al.,2022; Widajanti, 2017). Therefore, this article is a novelty and the first research that explores and presents a more comprehensive mapping of consumer satisfaction trends by adding bibliometric visualization.

Based on the background of the problem, the research problem can be formulated: How is the pattern of significance and correlation research on the theme of customer satisfaction from the databaseDimensions.ai? Furthermore, what are the recommendations to improve the quality of publications in the future? The research objective to be achieved is to identify the pattern of significance and research correlation with the theme of consumer satisfaction from the databaseDimensions.ai and become evaluation material in improving the quality of publications in the future

RESEARCH METHOD

This research uses the bibliometric analysis method. According to Herawati*et al.*(2022), bibliometric analysis is a broad research method that objectively describes the previous situation. This analysis aims to describe the data through calculation and analysis, understand the interrelationships, and summarize the state of the developing research topic (Muchsinet al.,2013). This method will identify the scientific roots of research, thematic areas, and research development patterns in the field (Skuteet al., 2019). The scope of the analysis is focused on identifying the number of publications, main keywords, authors, affiliations, countries, and references with the most citations through analysis co-occurrence, co-authorship, and citation.
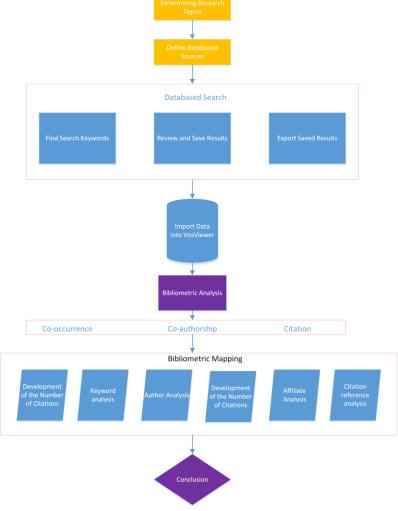
The data used in this research is secondary data with the theme of consumer satisfaction over 11 years. The data comes from the databaseDimensions.ai using the search keywords consumer satisfaction." Dimensions.ai was chosen because it is an indexing alternative with permanent digital object identifier (DOI) criteria (Rusydianaet al., 2020). The search yielded 585,779 publications, 400 datasets, 494 grants, four patents, 518 clinical trials, and 135,213 policy documents. The search results are then simplified into 2,500 publication data and extracted in ".csv" form (Nobaneeet al., 2021).

As a bibliometric analysis tool, VOSviewer is used for network-based mapping, visualization, and exploring bibliometric knowledge maps (Hakim, 2020; Prasetyo, 2021; Shahet al.,2019). The output was then re-analyzed using qualitative descriptive techniques to ensure the breadth of the research and the depth of future research opportunities enriched by additional literature.

Determining the location of items in VOSviewer processed by minimizing (van Eck & Waltman, 2007):

$$V(x_i, \ldots, x_n) = \sum_{i<j} s_{ij} \| x_i - x_j \|^2 \ldots\ldots\ldots\ldots\ldots(1)$$

Become:

$$\frac{2}{n(n-1)} \sum_{i<j} \| x_i - x_j \| = 1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

VectorXi indicates the area where the item is on a two-dimensional map. The Euclidean norm is denoted by ||•||, and n presents the number of items to be mapped. Following are the stages of bibliometric analysis mapping:

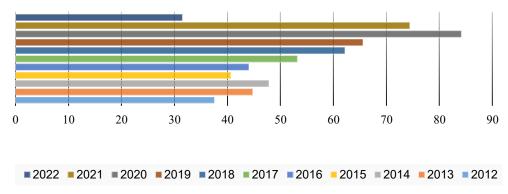Source: Author Data Processing, 2022
Figure 1. Bibliometric Analysis Mapping Stages

RESULTS AND DISCUSSION
Development of Number of Publications

With the development of the number of publications and the extent of the influence of research results, knowledge of the factors and variables of consumer satisfaction will be more complex and comprehensive. Through digital object identifiers during the observation period from

2012-2022, and including journals from Indonesia and other countries globally, the following graph shows the development of the number of consumer satisfaction publications:

Source: Author Data Processing, 2022
Figure 2. Graph of Number of Publications Development Per Year

Based on the graph in Figure 2, the number of publications on the theme of consumer satisfaction varies each year. 2020 was the year with the most publications, with 84,176 publications. The increase in consumer satisfaction publications coincides with the Covid-19 Pandemic, which requires further studies to maintain consumer satisfaction. Apart from 2020, 2021 produced 74,388 publications, and then in 2019, there were 65,582 publications. Therefore, further research can comprehensively discuss strategies to maintain customer satisfaction in various situations. Judging from the fluctuation in the number of publications per year, research on consumer satisfaction will continue to increase and develop. This is in line with consumer satisfaction, which has developed over time.

Keywords Analysis

In line with the development of the number of publications which has increased yearly, the popular keywords in it continue to experience growth. Keywords are dominant codes, words, or phrases describing a document's contents (Siswadi, 2013). A keyword analysis is useful for businesses to study and find solutions to keyword trends for marketing purposes, business ideas, and the next trends. The following is a mapping of keyword analysis in consumer satisfaction research:
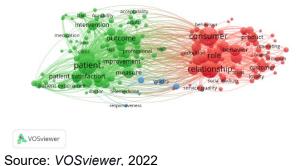

Source: *VOSviewer,* 2022
Figure 3. Keyword Network Visualization

Based on Figure 3, with the extracted fields including title and abstract, binary calculation, and a minimum of 25 specified keyword occurrences, three streams, and 182 keywords are

produced that are most relevant in consumer satisfaction research, namely node-red (cluster 1) as many as 88 keywords that have a flow focus on consumer, relationship, role, Etc. This flow indicates that research examines the factors driving customer satisfaction, one of which is relationships. This research is supported by the research of Tumbuan & Sengkey (2014), which reveals that relationships have positive and significant effects simultaneously or partially on consumer satisfaction, and research by Rataret al. (2021), which reveals that relationship and consumer satisfaction together provide a strong influence on consumer loyalty.

In node green (cluster 2) with 87 keywords, keywords found patient, care, outcome, Etc. Cluster 2 provides an overview of research that examines consumer satisfaction instruments. In addition, other research directions were found on node blue (cluster 3) with keywords as many as 7, correlation, reliability, and validity, which provides an overview of the analytical methods used to identify customer satisfaction. Cluster 3 proves that researchers have played a role in assessing consumer satisfaction. Node and text in each cluster represent the frequency of keywords with one another (Farida & Firmansyah, 2020). From visualizing the keyword network, consumer satisfaction research has a broad scope. The combination of keywords allows an understanding of the scope of consumer satisfaction at a better level. It minimizes the risk of false positive items that do not complement the actual thematic literature (Kovács et al., 2015). To see the density of research, the following is a visualization of keyword density in consumer satisfaction research:

Source: *VOSviewer,* 2022
Figure 4. Keyword Density Visualization

Based on Figure 4, it is known that each keyword point has a color that indicates density. The more keywords around the dot and the greater the weight of the neighboring keywords, the closer the dot is to read. Conversely, the fewer keywords around the dot and the lower the weight of the neighboring keywords, the closer the dot becomes to white (van Eck & Waltman, 2022). In addition, the spacing of keywords and lines shows each keyword's relevance (Tamalaet al., 2022). This density visualization can be used to determine parts of research that are rarely done and have been done a lot, which is useful for further research (Zakiyyahet al., 2022).

From the results of network and density analysis, keywords are grouped into ten main keywords, namely:

Table 1. Top 10 Keywords in Consumer Satisfaction Research

Keywords	Cluster	Links	Total Link Strength	Occurences	Avg. Pub. Year.
Patient	2	173	6189	709	2020.68
Consumer	1	180	4941	683	2020.69
Relationship	1	179	4263	575	2020.79
Care	2	165	4752	548	2020.66
Role	1	180	3408	457	2020.80
Outcome	2	179	3459	410	2020.69

Behavior	1	178	2148	291	2020.88
Measure	2	178	2347	280	2020.72
Influence	1	177	1971	277	2020.78
User	1	173	2066	267	2021.00

Source: Author Data Processing, 2022

Table 1 shows that the main keywords are: patient with occurrences of as many as 709, a consumer with occurrences of as many as 683, relationship with occurrences of as many as 575, and other keywords. Further research developments will provide better insights for researchers into the development of consumer satisfaction because, in research mapping, only three scientific studies make a major contribution. Future research can consider new research as in Table 2 below:
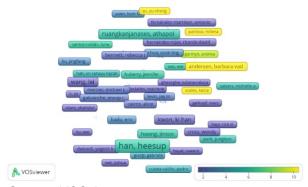
Table 2. Possible Advanced Research Streams

First Stream	Second Stream	Third Stream	Advanced Flow
	Dasar Kasus/Teori		
Consumer	*Patient*	*Correlation*	*Tourism Satisfaction*
Relationship	*Care*	*Reliability*	*Service Quality*
Role	*Outcome*	*Validity*	*Marketing Strategic*
	Dasar Lanjutan		
Service Quality	*Patient Experience*	*Systematic Literature*	*Brand Trust*
Brand	*Acceptabillity*	*Structural Equation Modelling*	*Loyalty*
Social Medium	*Skill*		*E-Wom*

Source: Author Data Processing, 2022

Author Analysis

By doing the author's analysis, productivity data is obtained writer in consumer satisfaction research. According to Lotka (1926), a writer's productivity is the amount of work written by a person individually in a certain period, which is published in a journal with a linked subject. The following is the author's mapping in consumer satisfaction research:

Source: *VOSviewer,* 2022
Figure 5.Visualization Overlay Author

Based on Figure 5, with the type of co-author analysis, author analysis unit, and full count, the maximum author per document is 25, the minimum author threshold is 3, the minimum author citation is 1, and the calculation of the total strength of the author's relationship with other authors and authors with the greatest total link strength, resulting in 120 authors and 61 clusters. From the analysis results, this has happened collaboration between authors, which is useful for increasing quality and popularity (Handoyo & Putera, 2012). According to Natakusumah (2014),

a writer's productivity is measured by the number of his contributions to produce a masterpiece. The bigger the circle of the author's name, the more consumer satisfaction-themed publications will be in 2012-2022(Thereet al., 2021).

From the results of the analysis, the authors are grouped into ten main authors who do the most research on consumer satisfaction, namely:

Table 3. Top 10 Authors in Consumer Satisfaction Research

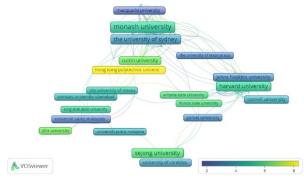| Author	Cluster	Links	Total Link Strength	Doc	Citation	Avg. Citations
Heesup Han	1	9	24	18	102	5.67
Athapol Ruangkanjanases	2	3	9	9	50	5.56
Ki Han Kwon	19	1	5	8	17	2.12
Lei Wang	56	0	0	8	5	0.62
Antonio Ariza-Montes	1	7	19	7	25	3.57
Barbara Vad Andersen	16	1	4	6	73	12.17
Alejandro Vega-Munoz	1	6	12	6	16	2.67
Shih-Chih Chen	2	3	9	6	31	5.17
Rebecca Mitchell	6	3	11	5	16	3.20
Jinkyung Lee	19	1	5	5	16	3.20

Source: Author Data Processing, 2022

Based on Table 3, it is known that the most productive authors are: Heesup Han with 18 documents, Athapol Ruangkanjanases with nine documents, Ki Han Kwon with eight documents, and other authors. Meanwhile, the authors with the most citations are Heesup Han with 102 citations, Barbara Vad Andersen with 73 citations, and Athapol Ruangkanjanases with 50 citations. Therefore, Heesup Han, Barbara Vad Andersen, and Athapol Ruangkanjanases are prolific and influential writers.

In general, every researcher has a different tendency. Some researchers are indexed as single authors, and some authors do co-authoring so that several clusters appear, characterized by different densities, as shown in Figure 5. Authors whose density is large enough indication that the authors have published more research on consumer satisfaction. Compared to lower density. The results of this analysis can be used as a reference for further research in selecting writers who meet the requirements in their field and have conducted the most research on consumer satisfaction.

Affiliate Analysis

Affiliate analysis is useful for the general public to turn publication metadata into visualizations to gain useful knowledge. The following is a mapping of affiliate analysis in consumer satisfaction research:

Source: *VOSviewer,* 2022

Figure 6. Visualization Overlay Affiliate

Based on Figure 6, with the type of co-authoring analysis, affiliate analysis unit, and robust calculation method, the maximum affiliation per document is 25, the minimum document limit for affiliation is 8, the minimum affiliation citation is 1, and by calculating the total strength of the co-author relationship with the affiliation and affiliates with the largest total link strength, resulting in 96 affiliates and 8 clusters. The affiliation analysis results identified the journal's geographic coverage and the mapping of international and institutional collaborations as part of the framework (Liet al., 2016).

Based on the results of the analysis, affiliates are grouped into ten affiliates with the most consumer satisfaction research, namely:

Table 4. Top 10 Affiliate in Consumer Satisfaction Research

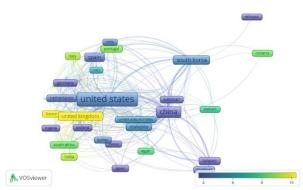| Affiliation	Cluster	Links	Total Link Strength	Doc	Citation	Avg. Citations	Avg. Pub. Year.
Monash University	2	17	52	46	232	5.04	2020.78
University of Melbourne	8	21	48	36	245	6.81	2020.56
Harvard University	1	18	39	32	166	5.19	2020.69
Griffith University	2	19	39	32	117	3.66	2020.72
The University of Sydney	2	18	37	31	106	3.42	2020.68
Sejong University	4	5	13	29	170	5.86	2020.79
University of Pennsylvania	1	14	18	27	183	6.78	2020.56
University of Queensland	2	15	35	25	74	2.96	2021.04
Deakin University	8	14	40	24	176	7.33	2020.75
University of California	1	14	20	21	108	5.14	2020.67

Source: Author Data Processing, 2022

Based on the results of the analysis with the help of visualization overlay and Table 4, affiliations with the most consumer satisfaction research, namely: Monash University with 46 documents, the University of Melbourne with 36 documents, Harvard University with 32 documents, and other affiliations. Affiliates in developed countries dominate affiliates with the most customer satisfaction. Therefore, for further research, affiliates must strive to deepen research on consumer satisfaction to add to the benefits and diversity of different research results as a consideration in the development of science. In addition, co-authoring between different affiliates is recommended.

Country Analysis

The world continues to experience development and consumer satisfaction in the business world. With this complexity, researchers are compelled to research consumer satisfaction. The following is a mapping of countries in consumer satisfaction research:

Source: *VOSviewer,* 2022
Figure 7. Visualization Overlay Country

Based on visualization in Figure 7, with the type of co-authoring analysis, country analysis unit, and robust calculation method, the top country per document is 25, the minimum threshold for a country's documents is 10, the minimum citation of a country is 1, and by calculating the total strength of the author's relationship together with other countries and countries with the largest total link strength, 43 countries and 6 clusters are generated. One of the reasons for the rapid development of consumer satisfaction research throughout this country is that consumer satisfaction is an important matter in the business world. From the results of the analysis, these countries are grouped into ten countries with the most consumer satisfaction research, namely:

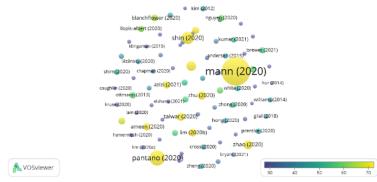**Table 5.** Top 10 Countries in Consumer Satisfaction Research

Country	Cluster	Links	Total Link Strength	Doc	Citation	Avg. Citations	Avg. Pub. Year.
United States	4	35	219	810	3876	4.79	2020.59
China	5	32	243	432	1793	4.15	2021.19
Australia	2	29	117	298	1283	4.31	2020.69
South Korea	6	25	113	173	851	4.92	2020.91
United Kingdom	2	32	125	124	1280	10.32	2020.93
Spain	3	21	64	123	544	4.42	2020.63
Taiwan	5	12	57	76	271	3.57	2020.99
Canada	4	20	45	71	361	5.08	2020.70
Malaysia	1	25	64	68	350	5.15	2021.07
Netherlands	4	18	35	57	253	4.44	2020.46

Source: Author Data Processing, 2022

Table 5 shows the countries with the most consumer satisfaction research: the United States with 810 documents, China with 432 documents, Australia with 298 documents, and others. From the table, it can be observed that high-income countries consistently dominate the rankings because they are more likely to produce and publish more documents with the availability of sufficient funds, tools, equipment, and appropriate structures (Mörschbächera & Granada, 2022). Therefore, this research finds gaps in various countries in producing work. For further research, researchers in cross-country collaboration.

Citation Reference Analysis

Limited references can lead to an incomplete review. In looking for reference sources, a selective attitude needs to be taken. Here is a quote reference mapping:

Source: *VOSviewer,* 2022
Figure 8. Citation Reference Overlay customization

Based on Figure 8, with the type of citation analysis, the unit of analysis is documented, a minimum of 25 document citations, 81 citation references, and 75 clusters in consumer satisfaction research are produced. The color and size of the circle in the visualization show the number of citations (Mokhtariet al., 2019). The analysis results in that the distribution of references is based on year, authorship patterns, reference year updates, and referenced journal rankings (Maha & Tupan, 2019). The reference analysis of the citations makes it easier for businesses to find reference sources with the most citations as material for consideration in formulating policies.

From the results of the analysis, the cited references are grouped into the ten most cited references in consumer satisfaction research, namely:

Table 6. The 10 Most Cite References in Consumer Satisfaction Research

Total Citations	First Author	Cluster	Title	Source	Year
691	Devin M. Mann	35	*Covid-19 transform health care through telemedicine: evidence from the field*	*Journal of the american medical informatics association*	2020
246	Eleonora Pantano	15	*Competing during a pandemic? Retailers' ups and downs during the covid-19 outbreak*	*Journal of business research*	2020
176	Hakseung Shin	1	*Reducing perceived health risk to attract hotel consumer in the covid-19 pandemic era: focused on technology innovation for social distancing and cleanliness*	*International journal of hospitality management*	2020
103	Yuyang Zhao	17	*What factors determining customer continuingly using food delivery apps during 2019 novel coronavirus pandemic period?*	*International journal of hospitality management*	2020
92	Hui Zhu	47	*How to influence rural tourism intention by risk knowledge during covid-19 containment in china: mediating role of risk perception and attitude*	*International journal of environmental research and public health*	2020
89	Manish Talwar	51	*Has financial attitude impacted the trading activity of retail investors during the covid-19 pandemic?*	*Journal of retailing and consumer services*	2020
79	Weng Marc Lim	58	*Home sharing in marketing and tourism at a tipping point: what do we know, how do we know, and where should we be heading?*	*Journal of business research*	2020

72	Suzan B. Hassan	44	*Covid-19 and repeat visitation: assessing the role of destination social responsibility, destination reputation, holidaymakers' trust and fear arousal*	*Journal of destination marketing & management*	2020
71	Nisreen Ameen	44	*Costumer experiences in the age of artificial intelligence*	*Computers in human behavior*	2020
67	Eleanor Layfield	38	*Telemedicine for head and neck ambulatory visits during covid-19: evaluating usability and patient satisfaction*	*Head & neck*	2020

Source: Author Data Processing, 2022

Based on Table 6, it is known that the references with the most quotations were written by Mannet al. in 2020 under the title "Covid-19 Transform Health Care Through Telemedicine: Evidence from the Field", with 691 citations, followed by references written by Pantanoet al., in 2020 under the title "Competing during a Pandemic? Retailers' Ups and Downs during the Covid-19 Outbreak", with 246 citations, a reference written by Shin & Kang in 2020 under the title "Reducing Perceived Health Risk to Attract Hotel Consumer in the Covid-19 Pandemic Era: Focused on Technology Innovation for Social Distancing and Cleanliness", with 176 citations, and references written by other authors of 81 citation references and 75 clusters. The analysis results show that much research on consumer satisfaction was carried out in 2020 and is associated with the Covid-19 Pandemic, where many studies provide new insights for business actors to adjust and consider strategies during a pandemic. This is in line with the economic sector, one of the worst-hit sectors during the Pandemic compared to other sectors (Tasrif, 2020). The economy is a vital aspect of life, where each individual is in direct contact with economic needs in carrying out life (Hanoatubun, 2020).

CONCLUSION

Based on the analysis results, the distribution of publications on consumer satisfaction varies annually. 2020 was the year with the most publications, with 84,176 publications. The main keywords in consumer satisfaction research are patient with occurrences 709 and other keywords totaling 182 and 3 clusters. The most prolific writer is Heesup Han, who produced 18 documents, and other authors, as many as 120 authors and 61 clusters. The affiliate with the most research was Monash University, with 46 documents, and other affiliates with 96 affiliates and 8 clusters. The country with the most research was the United States, with 844 documents, and other countries, with 43 countries and 6 clusters. The references with the most quotes are written by Mannet al. in 2020 under the title "Covid-19 Transform Health Care Through Telemedicine: Evidence from the Field" Journal of the American Medical Informatics Association, as many as 691 citations, and references written by other authors as many as 81 citation references and 75 clusters.

Based on the explanation above, the results of this study can be developed and used to test future trends and become evaluation material for improving the quality of publications in the future. Based on the analysis results, more cross-topic research collaboration is needed in keywords, authors, affiliations, countries, and enriching citation references. Therefore, for further research, researchers using similar analyses must find and use coherent data and analyze the strengths, weaknesses, and limitations of the research database used. In addition, comparing the results of similar analyzes using different bibliometric software is also recommended.

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