

A Bibliometric Analysis of Pesantren's Educational Impact: Insights from The Scopus Database (1994–2022)

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ABSTRACT

Purpose – This study endeavored to quantitatively evaluate pesantren's academic output using bibliometric techniques. It aimed to decipher trends in pesantren study themes, collaborative authorship networks, the most prolific contributors, frequently cited papers, and prominent affiliations publishing pesantren-centric works from 1994 to 2022.

Design/methods/approach – Utilizing Scopus as the primary data source with the keyword "pesantren," this study employed a five-stage investigative approach incorporating tools such as Mendeley Desktop, Publish or Perish, and VOSviewer. After rigorous data screening and revision, 154 documents were identified with 'pesantren' as the central theme in their title.

Findings – Pesantren research's trajectory is discernible in three distinct phases: 1994–2008 represents the initiation phase, 2009–2017 marks the development phase, and 2018–2022 signifies the expansion phase. This research broadly classifies the themes into micro and macro topics. The micro dimension delves into the internal dynamics of pesantren, encompassing facets like the education system, prevailing values, traditions, roles of Kyai (pesantren leaders) and Santri (pesantren students), and core subject matters. Conversely, the macro dimension evaluates pesantren's responsiveness and role concerning external dynamics, including ecological shifts, democracy, digital and social media integration, technological advancements, political engagement, and challenges like the COVID-19 pandemic.

Research implications – The findings, derived from evaluative and relational techniques, hold significance for scholars in Islamic education. They offer insights that can guide future research efforts, allowing scholars to minimize subjectivity and causality biases in discerning the current state of pesantren studies. Institutions can also factor these findings into their strategic planning for Islamic educational research, especially those concentrating on pesantren. Notably, a limitation of this study is its exclusive reliance on the Scopus Core Collection. Future research endeavors can achieve a more comprehensive perspective by incorporating additional databases, such as WoS, ProQuest, and PubMed, for comparative analysis.

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1. Introduction

Pesantren (traditional Islamic boarding school) is the oldest educational institution in Indonesia (Mastuhu, 1994), an institution whose growth is based on the bottom-up theory and which originated from the genuinely traditional culture adopted by societies of the Indonesian Archipelago (indigenous) (Madjid, 1997). It has become one of the "grand traditions" in the Indonesian education model. (Sulasman, 2012) Pesantren has established itself as a multipurpose institution that serves as a



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"benteng pertahanan ummat Islam" (fortress for the defense of the Islamic community) and a "pusat penyebaran Islam" (center for the spread of the Islamic faith) (Dhofier, 1980).

Pesantren is a society-based, community-founded, and community-supported Islamic educational institution. Situating pesantren in the heart of Indonesian society has contributed significantly to the country's ability to maintain its educational system (Alam, 2018). Education in pesantren emphasizes teaching religious knowledge and training the student's mental, spiritual and social interaction (Mujab, 2016). to respect spiritual and human values, to teach honest and moral attitudes, and to prepare students to prioritize religious ethics over other ethical principles (Legistia, 2018), so pesantren have become centers of excellence (Mukhtar et al., 2020) for the development of the students as the future leaders.

As of April 2022, the Ministry of Religious Affairs Republic of Indonesia recorded 26,975 pesantren throughout Indonesia. These pesantren educate approximately 2.65 million students (Emis Pendis Kemenag RI, 2022). This is one of Indonesia's most significant assets regarding the best cadre institutions and human resources. Based on the information above, pesantren as an educational ecosystem has attracted scholars and researchers to investigate its vast potential from various perspectives and disciplines, and this occurred well before the independence of the Unitary Republic of Indonesia in 1945.

The first study of pesantren was published in 1857 by a Dutch education expert, Jan Frederik Gerrit Brumund, who wrote about the education system of Javanese society (Brumund, 1857), which utilized 'langar' (small mosques) and 'pesantren' (boarding schools) as educational centers under the control of a Kyai. Several additional studies by Van Der Chijs in 1864 and Van Den Berg in 1886 demonstrated the impact of pesantren and kai on rural communities' social, cultural, and religious life (Van Den Berg, 1886; Van Der Chijs, 1864).

After the independence of the Republic of Indonesia, the study of pesantren is increasingly in demand by many researchers and scholars with various themes and perspectives. These include the scholarly tradition of pesantren (Bruinessen, 1990; Dhofier, 1980; Fauzi, 2012; Putro & Suryono, 2019; Rahardjo, 1973; Steenbrink, 1986; Wahid, 2001) multiculturalism (Raihani, 2012; Zein et al., 2020), democracy (Azizah et al., 2021; Endy Saputro, 2011), teaching and learning, (Rohim & Yulinda, 2013; A. Rohman & Muhtamiroh, 2022; F. Rohman, 2022; Tahir, 2015b, 2017), politics (Abidin & Dong, 2020; Molasy, 2022), society economic (Fauroni & Quraisy, 2020; Muhardi et al., 2021), and environmental conservation (Aulia et al., 2018; Irawan, 2022; Muhardi et al., 2020). These serve as a source of information and a large data set that bolsters the existence of pesantren and their impact on Indonesian society's social, political, cultural, and religious life.

Given the large number of studies conducted on pesantren, scholars and researchers in Islamic education must comprehend the distribution of pesantren-related research to determine the starting point for descriptive, exploratory, and explanatory research. Therefore, reviewing the research map on pesantren education over the past decade is essential. What are the research trends in pesantren education, the global distribution of this topic, contributors, citations, word occurrences, author and co-author networks, and publication sources?

Bibliometric analysis is a statistical analysis strategy that can map the structure and patterns of scientific development through formal productions reported in data repositories. This strategy enables an analysis that spatially represents how themes, specializations, research areas, and individual documents or authors are related (Small, 1999). Bibliometric analysis is used to understand the temporal evolution of a research field from a multidisciplinary perspective (Bhatt et al., 2020) by a quantitative assessment of journal articles, books, or other kinds of written communication (Heersmink et al., 2011). Bibliometric methods or "analyses" are now firmly established as scientific specialties and

are integral to research evaluation methodologies, especially in the scientific and applied fields (Ellegaard & Wallin, 2015).

Cobo, Martínez, Gutiérrez-Salcedo, Fujita, & Herrera-Viedma and Cobo, López-Herrera, Herrera-Viedma, & Herrera consider this method has two primary uses. *They were first* analyzing the performance of authors by evaluating the performance of research and publications of individuals and institutions. *Second*, mapping the state of a topic in science, seeking to reveal the work structure and dynamics of scientific fields, which is particularly useful when a researcher intends to carry out a bibliographic review on a particular subject, introducing greater quantitative rigor in the subjective evaluation of the literature (Cobo et al., 2015).

This approach allows for the identification of growing trends and evolving knowledge in a given topic or area of study; the most prolific and cited authors and institutions; the relationships between countries, research institutions, and individual scientists; and the exchange of scientific information responsible for a given area of knowledge (Noyons et al., 1999). It can also reveal pioneering researchers and research directions in a particular field, thereby analyzing the current state of science and new frontiers of research at hand. This analytical strategy promotes greater autonomy for researchers in interpreting data of interest (Lima & Bonetti, 2020).

According to the experts' opinions above, bibliometric data is increasingly used to evaluate dispersed metadata searches. Bibliometric analysis can be used to summarize and inform field literature, advance statistical approaches or measurements, and enhance the analysis of performance and productivity. For instance, bibliometric literature can disclose scientific trends and discuss scientists' and practitioners' opinions.

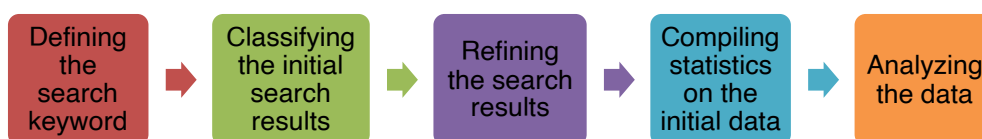
Therefore, this study aims to objectively show the current status of pesantren research by highlighting the global distribution, contributors, citations, word occurrences, author and co-author networks, and publication sources so that research trends that study pesantren will be illustrated. Identifying research trends means looking at how a research topic is used worldwide to find new trends, especially the impact of the pesantren education system on boarding school education issues, popular research areas, and possible knowledge gaps. This allows researchers to get a complete picture of where pesantren education research currently stands, so they can make educated decisions about their work and find out where their contributions can have the most impact.

It is hoped that the results will enable future researchers to reduce the influence of subjectivity and causality when determining the state-of-the-art in studying pesantren and that research institutions will consider them when developing roadmaps for research on Islamic education with a focus on pesantren.

2. Methods

This study used five steps to collect and analyze data: defining the search keyword as "pesantren," initial search results, refinement, statistics on the initial data, and data analysis (Fahimnia et al., 2015; Lima & Bonetti, 2020)

Figure 1 Five Steps of Bibliometric Analysis



2.1. Defining search keywords,

Keywords, or search queries, are words and phrases that users enter into search engines to find information on a specific topic, combine search elements, group terms, or select an index or field to search. This study used Scopus as the literature source for the data search. The first data for this study was collected in January 2023. The Scopus database document search used the query 'pesantren' with the search area on the document title, abstract, and keywords, but no specific provisions for document types or year limits were set; this was done to determine the total number of documents related to pesantren stored in the Scopus database.

2.2. Displaying the initial search results

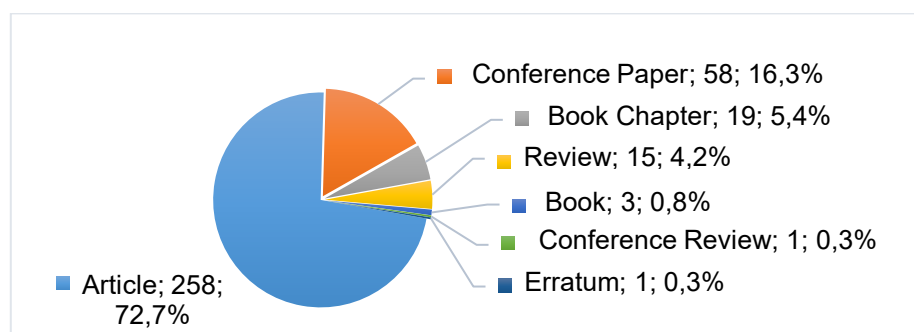
Displaying the initial search results shows the number of documents that met the criteria and type required, precisely the word 'pesantren' in the title, abstract, and keywords. The initial data search from the Scopus indexing database yielded 355 documents, which included articles, conference papers, book chapters, reviews, books, conference reviews, and erratum published between 1994 and 2022.

2.3. Refining the search results

Refining the search results is a step that researchers take to get data that gives them more accurate results. The initial keyword search is still broad and has yet to be narrowed down to specific criteria. This leads to many document search results that may or may not be relevant to a topic of discussion, so you have to pick and choose to get data that fits the criteria.

To obtain more accurate search results, the Scopus database metadata was re-searched by limiting the search for the query 'pesantren' to only the document title without the abstract and keywords, excluding review proceedings and erratum documents, and a publication period from 1994 to 2022. The search results were exported in CSV and RIS formats to collect all document citation information (including article title, author, volume, issue, page, number of citations, DOI, source, and document type), bibliographical information, an abstract, and keywords, which were then saved in the Mendeley desktop application. The subsequent step is a thorough recheck for the completeness of document information.

Figure 2 Document type classification on the initial search



As a result, six articles needed the author's name, so rechecking the publisher's website was necessary to get valid information about the author. Then the author's data was added to the Mendeley desktop database. One article did not have the author's name identified, even though it was traced to the publisher's website, so it had to be discarded because the criteria were unmet. Two articles were found to have double titles because the articles were published in different volumes and editions. Therefore only one document was selected. They were further checking

involved correcting the names of the affiliations. Occasionally, the institution's name is given in its native language. For example, "Institut Agama Islam Negeri Ponorogo" (Indonesia) and "State Institute for Islamic Studies of Ponorogo, Indonesia" refer to the same institution; therefore, English names were selected to avoid confusion. The total metadata obtained was 154 documents, consisting of 118 journal articles, 28 conference papers, eight book chapters, three reviews, and one book.

2.4. *Compiling statistics on the initial data*

All completed and accepted metadata is then analyzed based on citation metrics and bibliometrics using three software programs: Publish or Perish (PoP) version 8.8.4275.8412 (Windows GU edition), developed by Tarma Software Research Ltd.; Mendeley Desktop version 1.19.8 by Elsevier; and VOSViewer by Nees Jan Van Eck and Ludo Waltman. PoP was used to analyze document citation metrics, while Mendeley was used to verify document completeness and remove duplicates. In the meantime, VOSViewer version 1.6.18 was used to analyze the bibliometric distribution of authors, keywords, countries, and publication years.

The improved and completed metadata in the Mendeley desktop application was analyzed based on its citation metrics using Harzing's Publish or Parish software version 8.8.4275.8412 (Window GU edition) 2023. The result is a decrease in the number of documents that fit the category, namely 154 Documents from the original number of 355 Documents or only 43.4% remaining.

Table 1 Comparison metrics

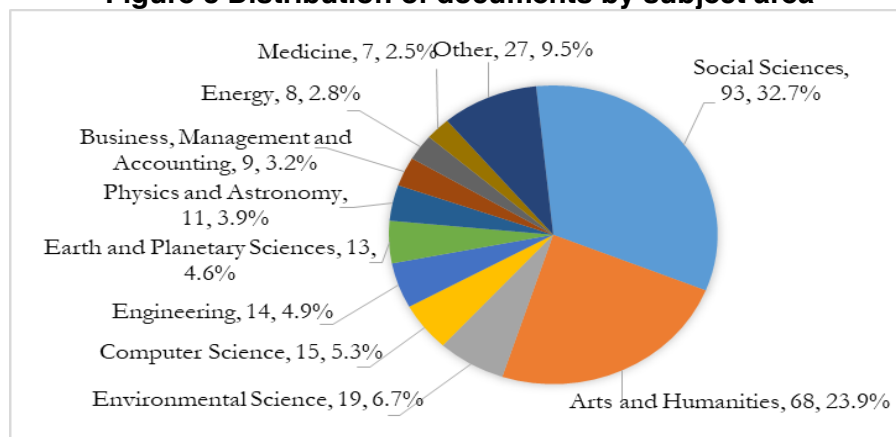
Metrics data	Initial search	Refinement search
Query	Pesantren	
Source	Scopus	
Papers	355	154
Citations	1283	616
Years	29	29
Cites_Year	44.24	21.24
Cites_Paper	3.61	4
Cites_Author	885.36	423.87
Papers_Author	205.45	93.73
Authors_Paper	2.31	2.37
h_index	16	14
g_index	24	19
hc_index	12	10
hI_index	10.67	7
hI_norm	15	12

As indicated in Figure 3, the topics of pesantren studies primarily comprise the ten disciplines and additional domains. More than a quarter of the articles (32,7%) were in the "social

sciences" sector, followed by "art & Humanities" (24,9%). In addition, among the disciplines of study included in the cumulative category "Others," "medical" (2.5%) and "energy" (2.8%) accounted for the fewest number of publications.

Other: Economics, Econometrics and Finance (6), Decision Sciences (4), Mathematics (4), Biochemistry, Genetics and Molecular Biology (3), Chemical Engineering (5), Mathematics (3), Multidisciplinary (4), Agricultural and Biological Sciences (1), Dentistry (1), Nursing (1).

Figure 3 Distribution of documents by subject area



2.5. Analyzing the data

The data analysis phase can begin when all of the required data has been verified and is complete. This research utilizes the metadata of the document titled "pesantren," which was extracted from the primary source, the Scopus database. The software VOSViewer will be used for data analysis. The VOSviewer has several benefits for researchers and experts. It has advanced network visualization features that let users explore and understand bibliometric networks. With its clustering and mapping features, it helps find study topics and intellectual communities. The software works with different networks and has tools for bibliometric analysis like co-occurrence, density visualization, and reference analysis.

The results of the data analysis are displayed in bibliometric mapping using three different visualizations: network visualization, overlay visualization, and density visualization. The three bibliometric mapping visualizations depict data differently and serve distinct functions. Here is a concise explanation of each visualization's distinctions and functions:

2.6. Network Visualization:

In network visualization, the relationships between entities in a network are represented graphically. Entities in bibliometrics can include authors, publications, subjects, and research institutions. A node depicts each entity, and lines or connections between nodes represent relationships between entities. The identification of collaboration patterns, density, or centrality within a bibliometric network is made possible through network visualization. The primary purpose of network visualization is to depict the interactions and relationships between entities in a network so that collaboration dynamics and information flow can be comprehended.

2.7. Overlay Visualization

Overlay visualization integrates bibliometric information with spatial representation to display bibliometric data on a map or geographic space. The primary objective of overlay visualization is to visualize the geographic distribution of authors, research institutions, or

publications within a particular context. For instance, researchers can determine the geographical distribution of authors or collaborations between research institutions in a specific region. Understanding geographic patterns, concentrations, or spatial relationships in bibliometric data is facilitated by overlay visualization.

2.8. Density Visualization

The spatial or temporal distribution of bibliometric entities is represented through density visualization. The primary objective of density visualization is to identify areas with a high density or intensity of particular bibliometric entities, such as publications or citations. Density visualization can utilize color scales or other visual signals to depict density levels on a map or within particular time intervals. The purpose of density visualization is to aid in identifying density patterns or trends that may indicate high research activity in specific regions or periods.

3. Results

The first indicator analysis is the type of document discovered, which indicates the most common study format on the topic. As shown in Table 2, the data included in this study came from a range of publications consisting of 114 journal articles (75%), 28 conference papers (18.2%), eight book chapters (5.2%), one book (0.6%), and three review papers (1.8%).

Table 2 The Distribution by Type

Document Type	Number of documents	Percentage (%)
Article	114	74.0
Conference Paper	28	18.2
Book Chapter	8	5.2
Review	3	1.9
Book	1	0.6
Total	154	100

The beginning of the pesantren retrospective was in 1994. By the start of 2018, though, academics' interest grew. From 1994 through 2008, the annual publishing rate varied between 0 and 2, as seen in Figure 4 below. From 2009 to 2016, the number of publications fluctuated between 2 and 7; from 2017 to 2019, it increased from 5 to 23; from 2020 to 2021, it decreased to a total of 20; in 2022, the number of publications reached its highest level in the previous 28 years with a total of 25 documents.

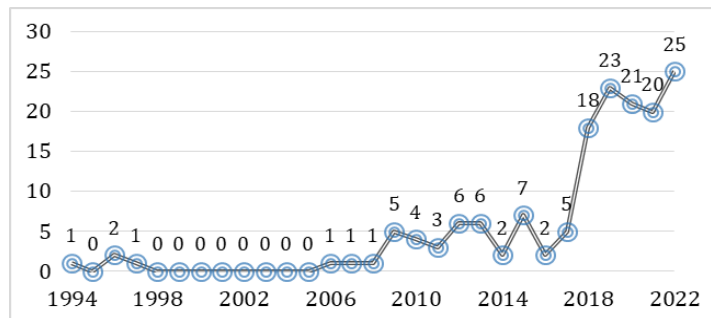


Figure 4 The Distribution of Documents by year

There was a total of 154 documents published by 91 sources, which had been categorized into the following three categories: journals (80 sources), conference proceedings (n=7), books and book chapters (n=4). The following was discovered by examining the most productive sources, or those that have published the most publications in pesantren research (table 3): Jurnal Islam Indonesia (10 articles), IOP Conference Series Earth and Environmental Science (n=8), and Journal of Physics Conference Series (n=8) followed by Jurnal Pendidikan Islam and Studia Islamika (six articles each).

Table 3 The top ten sources contributing to the pesantren theme

No	Source	Country	N- of Article	Citation
1	Journal of Indonesian Islam	Indonesia	10	56
2	IOP Conference Series Earth and Environmental Science	United Kingdom	8	26
3	Journal of Physics Conference Series	United Kingdom	8	23
4	Jurnal Pendidikan Islam	Indonesia	6	2
5	Studia Islamika	Indonesia	6	14
6	E3s Web of Conferences	France	5	9
7	Gender and Power in Indonesian Islam: Leaders, Feminists, Sufis and Pesantren Selves	England	5	14
8	Indonesian Journal of Islam and Muslim Societies	Indonesia	4	21
9	International Journal of Innovation Creativity and Change	United Kingdom	4	12
10	Qudus International Journal of Islamic Studies	Indonesia	4	23

Metadata analysis revealed that 332 writers had published their findings in 154 publications. So, future academics investigating the topic of pesantren must consider the authors who have written the most works and acquired the most citations. The ten writers with the most published and cited works are listed in Tables 4 and 5 below.

Table 4 Top seven ranking authors with the highest number of publications

Rank	Author	Affiliation	Publication	N-of Citation
1	Bianca J Smith	Centre for Indonesian Law, Islam and Society, Melbourne, Australia	4	27
2	Amirul Mukminin	Universitas Jambi, Indonesia	4	26
3	Kasinyo Harto	UIN Raden Fatah Palembang, indonesia	3	26
3	Lenny Marzulina	State Islamic University (UIN) Raden Fatah Palembang, indonesia	3	26
4	Akhmad Habibi	Universitas Jambi, Indonesia	3	25
5	Ismail Suardi Wekke	Institut Agama Islam Negeri Sorong, Indonesia	3	13

6	Sofyan Sauri	Indonesia University of Education	3	7
7	Hasbi Indra	University Ibnu Khaldun Bogor, Indonesia	3	0
7	Muhammad Abdullah	Diponegoro University, Semarang, Indonesia	3	0

Table 4 displays the top ten authors with the most published papers. Bianca J. Smith and Amirul Mukminin, with a total of 4 papers apiece, are the authors with the most publications, followed by Kasinyo Harto, Lenny Marzulina, Akhmad Habibi, Ismail SW, Sofyan Sauri, Hasbi Indra, Muhammad Abdullah each with three articles.

Table 5 Top Nine ranking authors with the highest number of publications

Rank	Authors, Year	Title	Per Year	N of Cites	Source	Source type
1	Azra, Afrianty, and Hefner (2010)	Pesantren and madrasa: Muslim schools and national ideals in Indonesia	4.08	53	Schooling Islam: The Culture and Politics of Modern Muslim Education (chapter 8), 172-198	Book Chapter
2	Pohl (2006)	Islamic education and civil society: Reflections on the pesantren tradition in contemporary Indonesia	2.00	34	Comparative Education Review, 50(3) 389-409	Review
3	Ma'arif (2018)	Education as a foundation of humanity: Learning from the pedagogy of pesantren in Indonesia	4.80	24	Journal of Social Studies Education Research, 9(2) 104-123	Journal
4	Tahir (2015)	Multilingual behavior of pesantren IMMIM students in Makassar	3.00	24	Asian EFL Journal, 2015 (86) 45-64	Journal
5	Izfanna and Hisyam (2012)	A comprehensive approach in developing akhlaq: A case study on the implementation of character education at Pondok Pesantren Darunnajah	1.91	21	Multicultural Education and Technology Journal, 6(2) 77-86	Journal

The ten most prolific academic institutions (Table 6) are Diponegoro University and State Malang University, which published eight articles each, followed by Sunan Kalijaga State Islamic University (n = 7), Walisongo State Islamic University (n = 6), University of Malaya, State Institute of Islamic Studies (IAIN) Kediri, State University of Jakarta, State University of Semarang, and Syarif Hidayatullah State Islamic University, which each published five articles.

Affiliation	Country	N- of Documents
Diponegoro University, Semarang	Indonesia	8
State University of Malang	Indonesia	8
Sunan Kalijaga State Islamic University (UIN), Yogyakarta	Indonesia	7
Walisongo State Islamic University (UIN) Semarang	Indonesia	6
Gadjah Mada University	Indonesia	5
University of Malaya	Malaysia	5

State Institute for Islamic Studies (IAIN) Kediri	Indonesia	5
State University of Jakarta	Indonesia	5
State University of Semarang	Indonesia	5
Syarif Hidayatullah State Islamic University (UIN), Jakarta	Indonesia	5

3.1. Keyword Co-Occurrence Network

Keywords in a paper are a concise representation of the core concept or theme being covered and the quickest approach to convey to readers the issues and scientific fields being explored. According to Cobo et al. (2011), author keywords are recognized as one of the essential types of bibliographic metadata in bibliometrics and scientometrics, as well as a significant conduit of scientific concepts, ideas, and knowledge.

It is a content analysis technique that employs author keywords to create semantic visual maps that reflect the cognitive structure of the examined subject (Khan & Wood, 2015). The VOSviewer software was used to prepare the bibliometric map using co-occurrence data and its association strength (Waltman et al., 2010), representing and analyzing the data as an alternative to traditional techniques of multidimensional representation and network visualization by combining visualization and clustering techniques that favor analysis (Baier-Fuentes et al., 2019). Of 606 keywords selected by the author with a maximum of two occurrences per keyword, 74 met this requirement; the keywords were grouped into 10 clusters with various categories of discussion themes (Table 7).

Table 6 keywords with a minimum of twice occurrences.

Cluster	Number of Keywords	Selected Keyword
1	14	Curricula; e-learning; Indonesian pesantren; Indonesian pesantren; information and communication; information technology; information use; junior high schools; learning activity; learning outcome; literature studies; student; teaching; teaching and learning
2	11	Education computing, empowerment; engagement; environmental awareness; environmental education; environmental management; Islamic education; motivation; pesantren education; pesantren in Indonesia; religion
3	10	Adolescent; cross-sectional study; female; food management; human; human experiment; internet; male; santri
4	8	Character education; eco-pesantren; environmental conservation; Indonesia; Islam, Islamic boarding school, Islamic teaching; teaching English
5	7	Democracy; Integration; kiai; Madura; pesantren; radicalism; system
6	7	Al-Quran, boarding school, character; education; Islamism; social media; women.
7	6	Covid-19; economic and social effects; educational institutions; local wisdom; planning; sustainable development
8	2	madrasah; multicultural education;

Each cluster is comprised of essential words that are gathered and centered on a common theme; hence, each cluster will constitute a unique discussion subject: the distribution of keywords mapped into three visualizations (table 7): network visualization (figure 5), overlay visualization (figure 6), and density visualization (figure 7).

The keyword network in each cluster and the relationship pattern between keywords are visualized in Figure 6. The trend of pesantren research is also depicted. The overlay visualization map depicts the ways that have evolved and are still in use. A spectrum of colors represents the years. The

themes explored between 2016 and 2022 are represented in blue, green, and yellow. Darker hues denote the earlier publications, whereas lighter hues indicate the newest ones.

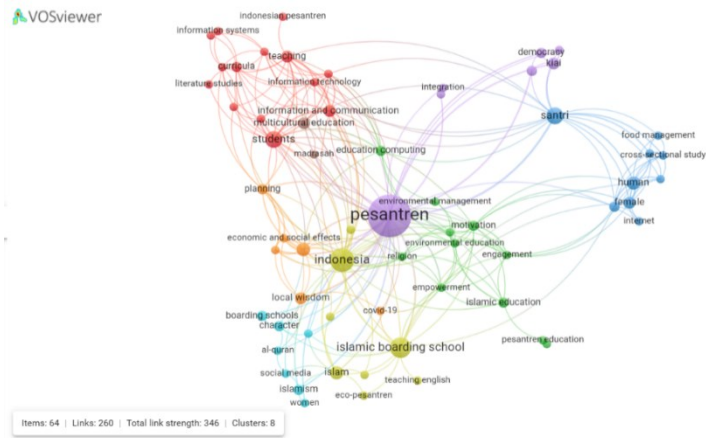


Figure 5 Network visualization of keywords

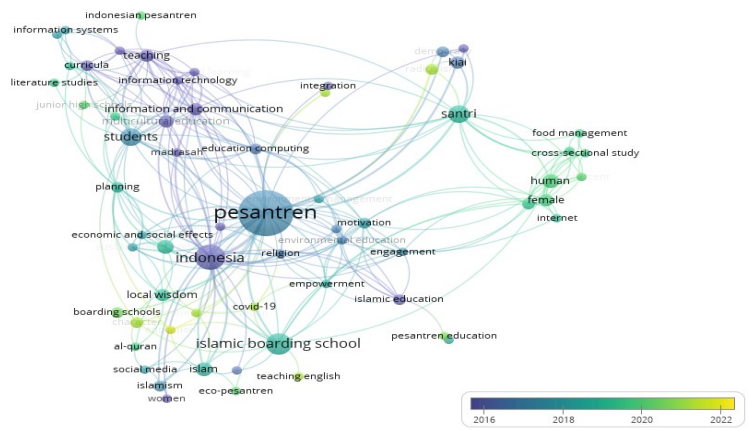


Figure 6 Overlay visualization of keywords

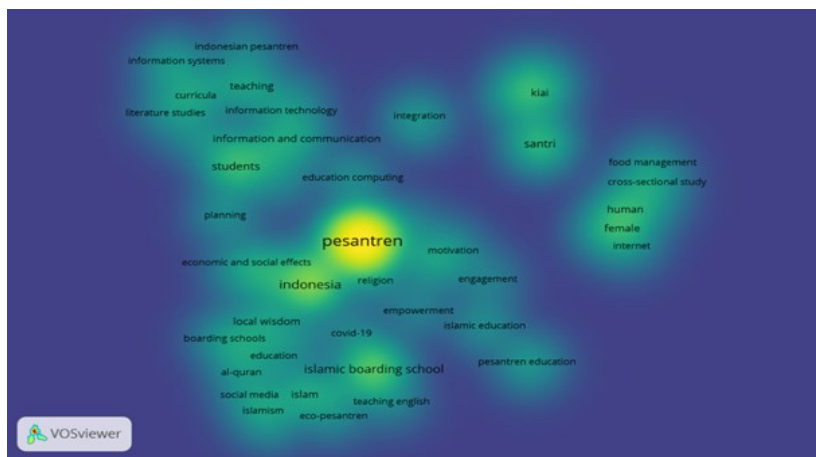


Figure 7 Density Visualization of keywords

Figure 7 depicts the density visualization's shape. In this keyword density visualization, we can see how frequently or infrequently terms be used. The color of the term is the indicator that determines

how often the keyword is researched. When the color is darker or more transparent, the term is examined more frequently; when the color is dimmer, the term is studied less frequently.

3.2. Co-authorship network analysis

Co-authorship network analysis is an analytical tool that describes the pattern of authorship between researchers in the academic field. Co-authorship analysis aims to see the level of productivity in authors both as single authors and collaborative authors when conducting research and writing activities. Also, co-authorship analysis can find which institutions, departments, and countries often contribute to research and publish scientific work.

Data clustering can be used to classify a set of provided articles. Clustering enables the topological analysis of networks by identifying topics, interrelationships, and collaboration patterns. Modularity has garnered increasing scholarly interest, making it a crucial research field in social network analysis. Co-authorship analysis of 332 authors has classified the authors into 128 clusters based on authorship networks, consisting of 81 collaborative author clusters and 47 single author clusters that do not have authorship networks.

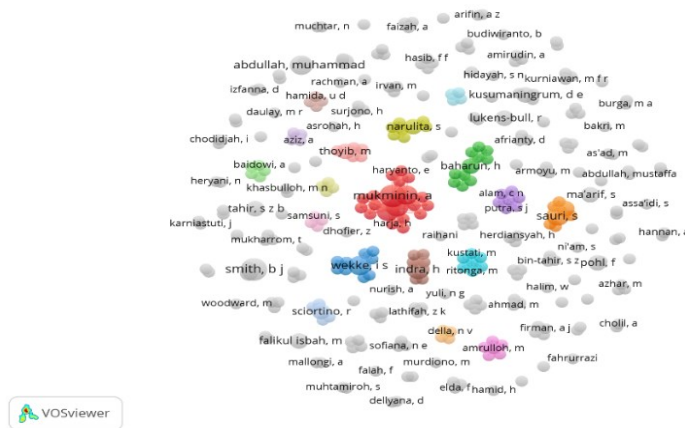


Table 7 The top eight co-authorship clusters

Based on Figure 8, clusters are represented as a collection of tightly interconnected nodes. Every network node is designated to a cluster. The resolution parameter determines the number of clusters. The greater this parameter's value, the greater the number of clusters. Each cluster in which nodes are located has colored differently. The following is a list of 10 clusters with the highest authorship networks.

Figure 8 Network visualization of co-authors

Cluster	N-of author	N-of Article	Authors
1	20	4	R Anggraini, A Mukminin, E Haryanto, M Hidayat, U Sulistiyo, A Habibi, L Marzulina, K Harto, D Erlina, M Holandyah, D Desvitasari, A Arnilawati, F Fridiyanto, E S Rozanna, H Harja, D Iqroni, J Najwan, M Sofwan, S Haswindy, M Sirozi
2	11	2	A Fauzi, H Hefniy, H Baharun, A Mundiari, U Manshur, M Musolli, A Syakroni, M Z Sunarto, B Musthofa, M Wijaya, C Muali
3	10	3	M A Lubis, M A Embi, M.Md. Yunus, I S Wekke, N M Nordin, J L Fua, R U Nurlila, F Gunawan, M Yusuf, W Naro

4	8	2	R N Aulia, I Mardhiah, A Gunawan, D E N Isnaini, M Firdaus, S Narulita, S Nur Aulia, A I Setianingsih
5	7	1	C N Alam, Y Suryana, K Manaf, B Subaeki, F M Kaffah, S J Putra, S Muhammad Indra Nurardy
6	7	1	S Samsu, M Kustati, D D Perrodin, M Ritonga, M Kosim, R Rusmini, S Suwendi
7	7	2	S Sauri, S Gunara, F Cipta, N Nursyamsiah, Y Nurbayan, A S Rahmat, L L Nursaidah
7	7	2	H Indra, H Tanjung, Y H Setiawati, A Primarni, E Norman, I Rusydi, I K Rahman
8	6	1	A Humaidi, N Fadhliyah, M Amrulloh, A Saregar, D N Zahra, Y Mihmidaty
8	6	1	M Syafiq Humaisi, M Thoyib, I Arifin, A Imron, A Sonhadji

4. Discussion

Fluctuations and dynamic phases characterize the pesantren research graph. In 1994, Zamakhsyari published "The Importance of Pesantren in the Development of Primary Education in Indonesia" (1994). A paper written around this period that provides an overview of pesantren as one of Indonesia's institutions of Islamic education might be regarded as a trailblazer. There was a significant increase in publications from 2018 to 2022, with 107 publications (figure 4). 2022 was a very prolific year, as the number of papers generated in a single year reached 25, surpassing the number of annual publications since 1994.

Based on how research on pesantren has been spread out, the evolution of pesantren research was divided into three phases: 1994–2008 was the beginning, 2009–2017 was the development, and 2018–present was the burst. This suggests that research about "pesantren" is advancing from year to year and that there is potential to continue research and investigate novelty.

Smith, B.J. and Mukminin, A. emerged as the most prolific authors with four articles each, followed by Habibi, A., Harto, K. Indra, H., Marzulina, L., Wekke, IS., Sauri, S., and Abdullah, M, with three articles each. Azra et al. (2010) received the most significant number of citations with 53, followed by Pohl (2006) with 34 citations and Ma'arif (2018) and Tahir (2015) with 24 citations each. The paper with the most citations was entitled "Pesantren and Madrasa: Muslim Institutions and National Ideals in Indonesia" and was published in 2010 by Azra, Afrianty, and Hefner. It received 53 citations. Meanwhile, the most productive affiliates were Diponegoro University and the State University of Malang, each producing eight documents.

The study of the treasures of pesantren comprised two categories of research topics: micro and macro. Micro pertained to pesantren's phenomena and internal dynamics, including the education system and values applied, the traditions practiced, *Kyai*, *Santri*, subject matter, and the scientific chain. At the same time, the purpose of the macro was to examine the role or response of pesantren to external dynamics such as ecology, democracy, social media, information, technology, political participation, and the COVID-19 pandemic. This shows that the approach and scope of study in exploring phenomena in pesantren are interdisciplinary.

Most pesantren-related research focused on education and its derivatives, including teaching and learning, curriculum, and technology-based learning (table 7). The existence of pesantren influences this as an Islamic educational institution that has its distinctiveness and characteristics based on religious and moral values (Anam et al., 2019; Fauzi et al., 2018; Putro & Suryono, 2019) and is even considered a miniature of a moderate Islamic society (Ni'am, 2015) which teaches to be able to

create respect and tolerance in diversity (Lubis et al., 2009; Ma'arif, 2019; Raihani, 2012). This attracted researchers to explore pesantren as a system (Faizah et al., 2018; Zein et al., 2020) and as an entity (Ritchey & Muchtar, 2014).

Figure 6 depicted the apparent shift in study topics from 2016 to 2022: from studies on an integrative and multicultural Islamic education curriculum in pesantren, technology-assisted learning, and the role of *Kyai* (purple and dark blue) to studies on local wisdom, technology, and social media systems related to pesantren technology diffusion, pesantren ecology, and management and empowerment of pesantren resources in the economy (green and light green). New issues published in the 2020s were radicalism, local wisdom-based environmental conservation, English language learning and character education.

The total number of authors was 332. All authors were distributed into two groups: single and collaborative authors. Co-authorship had formed 81 clusters consisting of 285 authors. This co-authorship cluster produced 107 articles, or 69.5% of the total 152 documents, with a ratio of three to one (3:1), meaning that three authors wrote one article. Meanwhile, single authorship formed 47 clusters with 47 authors and documents each, or a percentage level of 30.5%, with a ratio of one author producing one article.

In recent years, there has been a notable increase in interdisciplinary and international collaborations in collaborative research. Many contemporary research problems necessitate the expertise of multiple disciplines, and collaborative efforts enable researchers from various fields to work together and combine their knowledge and abilities. However, this has yet to be observed in pesantren studies. Most collaborative research in this field focuses on quantity, i.e., many researchers, but all of them still need to be in monodisciplinary instead of interdisciplinary fields. So the collaborations built by researchers between universities or countries are in mono-disciplines.

Both collaborative and individual research have their benefits, and the nature of the research question frequently influences the decision between them, the availability of resources, and the preferences and circumstances of the researchers. Collaborative research frequently integrates diverse perspectives, expertise, and resources, which can lead to more prosperous and more exhaustive research outcomes. Collaboration can increase productivity, efficiency, and the capacity to tackle more complex problems requiring multidisciplinary strategies. In addition, collaborative research can facilitate the exchange of knowledge, skills, and resources, resulting in a more robust and rigorous research process.

Individual research, on the other hand, provides researchers with complete independence and control over their tasks. It can facilitate individual creativity, exploring novel research avenues, and acquiring specialized knowledge. Individual researchers may have more freedom in decision-making and research direction, resulting in more targeted and specialized outcomes.

5. Conclusion

Using bibliometric analysis, this study traced the evolutionary trajectory, key constituents, collaborative patterns, and trends in pesantren research, as reflected in the Scopus database. The results partition the evolution of pesantren research into three distinct phases: 1994–2008 (initiation), 2009–2017 (development), and 2018–present (burst). Throughout this period, the trajectory of pesantren research demonstrated fluctuations, marking dynamic epochs. Significantly, Zamaksyari Dhofier's work solidified pesantren studies as a distinct academic discipline. In 2022 alone, there were 25 publications on this topic, the highest in nearly three decades. In total, 154 documents were crafted by 332 authors, where 285 authors collaborated in 81 clusters to produce 107 co-authored documents. The balance of the documents, 47 in number, were produced individually.

Pesantren studies were seen to tackle both local and global concerns. The micro dimension illuminated aspects of the pesantren education system, its traditions, values, leaders (kyai), students (santri), curriculum, and academic lineage. The macro perspective elucidated the intersections of pesantren with broader themes such as ecology, democracy, technology diffusion, social media, political participation, and even global challenges like the COVID-19 pandemic. Moreover, the 2020-centric topics included radicalism, environmental conservation rooted in local knowledge, English language acquisition, and character education.

Scholarly work on the "pesantren" model in Islamic education underscores a rapidly expanding domain. However, international research collaborations appear scant. The potential of pesantren in natural resource empowerment, technology integration (including artificial intelligence), and its dual role in preserving local wisdom while adapting to global developments present fertile grounds for interdisciplinary inquiry.

Nonetheless, this study has limitations. Its sole reliance on the Scopus Core Collection, encompassing only titles with the term "pesantren," may inadvertently omit pertinent works. Future research might achieve a richer understanding by incorporating other databases such as WoS, ProQuest, and PubMed. Additionally, using specific software tools, including PoP software, VOSviewer, Mendeley, and Microsoft Excel, introduces the possibility of subjective biases and errors in interpretation.

Declarations

Author contribution statement

Erfan Gazali devised the proposed concept and collected the data. Agnes Arum Budiana performs data analysis. All writers discussed the findings and contributed to the final draft.

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Data availability statement

The datasets generated during and analyzed during the current study are available from the corresponding author upon reasonable request.

Declaration of Interest's statement


The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this paper.

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