

## Bibliometric Analysis of Integrated Mathematics and Hadith Studies in Islamic Education

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### Abstract:

This study maps the development of Hadith-integrated mathematics studies in Islamic education through a bibliometric analysis spanning 2015–2024. It emphasizes that integrating Islamic values into mathematics learning has the potential to cultivate learners who are not only cognitively competent but also possess spiritual depth and ethical awareness. The Hadiths of Prophet Muhammad (peace be upon him) are positioned as primary sources for linking mathematical concepts with moral values. Accordingly, the mapping of publication trends, author and institutional productivity, countries of origin, leading source journals, citation patterns, and major research themes constitute the focus of this study. The research questions address publication trends; the most productive authors, institutions, and countries; leading source journals; citation patterns and their impact; dominant themes; and topic relationship mapping through co-occurrence analysis and bibliometric network analysis. This study employs a descriptive quantitative approach using bibliometric analysis with VOSviewer to identify citation trends, keywords, and network visualizations. The results reveal fluctuating publication dynamics, with mathematical modeling emerging as a central node that connects clusters related to epidemiology, disease dynamics, AI-based learning, and cancer prediction. Reputable international journals in applied science and mathematics serve as the primary publication outlets, indicating the interdisciplinary nature of this field. The findings highlight that methodological and applied focuses are more dominant than Hadith as an epistemological foundation, although ethical and normative aspects remain relevant. The study underscores the need for methodological innovation, expanded cross-institutional and cross-country collaboration, and the enrichment of research in pedagogical domains as well as empirical evaluations of the effectiveness of integrative learning models. It also identifies research gaps related to the theoretical framework of Islamic epistemology, empirical evaluation across different educational levels, and increased publication in Islamic studies and computer science journals.

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## INTRODUCTION

The integration of Islamic values into mathematics learning has become an increasingly prominent discourse in contemporary Islamic education. Mathematics is no longer viewed solely as an abstract and neutral exact science; rather, it can be contextualized within Islamic teachings to cultivate students who maintain a balance between cognitive ability, spiritual awareness, and moral

character (Akhyar et al., 2026; Crismono, Faisol, et al., 2025; Crismono, Hudi, et al., 2025; Rahmawati et al., 2025). In this context, the Hadiths of Prophet Muhammad ﷺ serve as one of the primary sources used to connect mathematical concepts with values, ethics, and everyday life practices (Crismono, Hudi, et al., 2025; Hamdanah et al., 2025; Zainudin et al., 2022).

In recent years, research on Hadith-integrated mathematics has grown significantly, particularly in the field of Islamic education. These studies cover a wide range of topics, including the development of teaching materials and learning models, the integration of numeracy concepts with Hadith values, and conceptual studies and systematic literature reviews. These publications are distributed across various national and international journals, with a dominant focus on mathematics education and instruction (Anisaturrizqi et al., 2025; Aziz, 2021; Crismono, Faisol, et al., 2025; Crismono, Hudi, et al., 2025; Marfu'ah et al., 2024; Shamad & Wekke, 2019; Yuniendel & Azhari, 2024).

Despite the growing number of studies, there has been limited research that systematically maps the field's development from a bibliometric perspective. Bibliometric analysis is essential for providing a comprehensive overview of publication trends, author productivity, core journals, citation patterns, and the dominant themes emerging in Hadith-integrated mathematics studies. Without comprehensive mapping, research development tends to remain fragmented, leading to repetitive topics.

Therefore, a bibliometric study is needed to analyze and visualize the knowledge structure within Hadith-integrated mathematics studies in Islamic education. The findings of this research are expected to serve as a foundation for future researchers to identify research gaps, strengthen theoretical frameworks, and develop more innovative and sustainable studies. Based on the background outlined above, the research questions of this study are as follows:

1. How has the number and trend of publications on Hadith-integrated mathematics research in Islamic education developed?
2. Who are the most productive authors, institutions, and countries in Hadith-integrated mathematics research?
3. Which journals serve as the primary sources for publications on Hadith-integrated mathematics research in Islamic education?
4. What are the citation patterns and levels of impact of publications in this field?
5. What themes, keywords, and research focuses are most dominant in Hadith-integrated mathematics studies?
6. How are the relationships and interconnections among research topics mapped based on co-occurrence analysis and bibliometric network analysis?

## METHOD

This study employs a descriptive, quantitative approach, using bibliometric analysis to map and analyze the development of scientific publications on Hadith-integrated mathematics in Islamic education. This approach aims to identify research trends, the productivity of authors, institutions, and countries, journal distribution, citation patterns, and the structure of scholarly networks based on keyword relationships and co-occurrence links (Crismono, 2024; Hashem E et al., 2023).

The research data were obtained from the international, peer-reviewed database Scopus via searches using relevant keywords, including mathematics integration with hadith, Islamic mathematics education, mathematical modeling in Islamic education, and integration of hadith and mathematics, covering the period from 2015 to 2024. The inclusion criteria consisted of indexed

scientific journal articles that substantively discuss the integration of mathematics and Hadith within the context of Islamic education, published in either English or Indonesian. The collected data consisted of publication metadata, including publication year, citation counts, author names, institutional and country affiliations, journal names, and author- and index-based keywords (Crismono, 2023; van Eck & Waltman, 2010).

The data analysis was conducted in several stages: first, determining keywords and search criteria; second, collecting and exporting data in CSV or RIS formats; and third, cleaning data to avoid duplication and metadata inconsistencies. The data were then analyzed using VOSviewer. Descriptive bibliometric analysis was used to identify annual publication trends, calculate total citations and publication impact, and determine the most productive authors, institutions, countries, and core journals. Citation analysis was conducted to measure publication impact and identify works with strong academic influence. In addition, keyword co-occurrence analysis was used to map dominant themes and relationships among research topics, which were visualized using network, overlay, and density visualizations.

To ensure validity and reliability, this study used reputable databases, carefully verified metadata, and employed analytical software widely validated in scientific research. This study is limited to publication metadata analysis and does not include an in-depth qualitative review of article content. The data analysis techniques also involved downloading data from Publish or Perish, configuring and importing it into VOSviewer to generate visualizations for analysis.

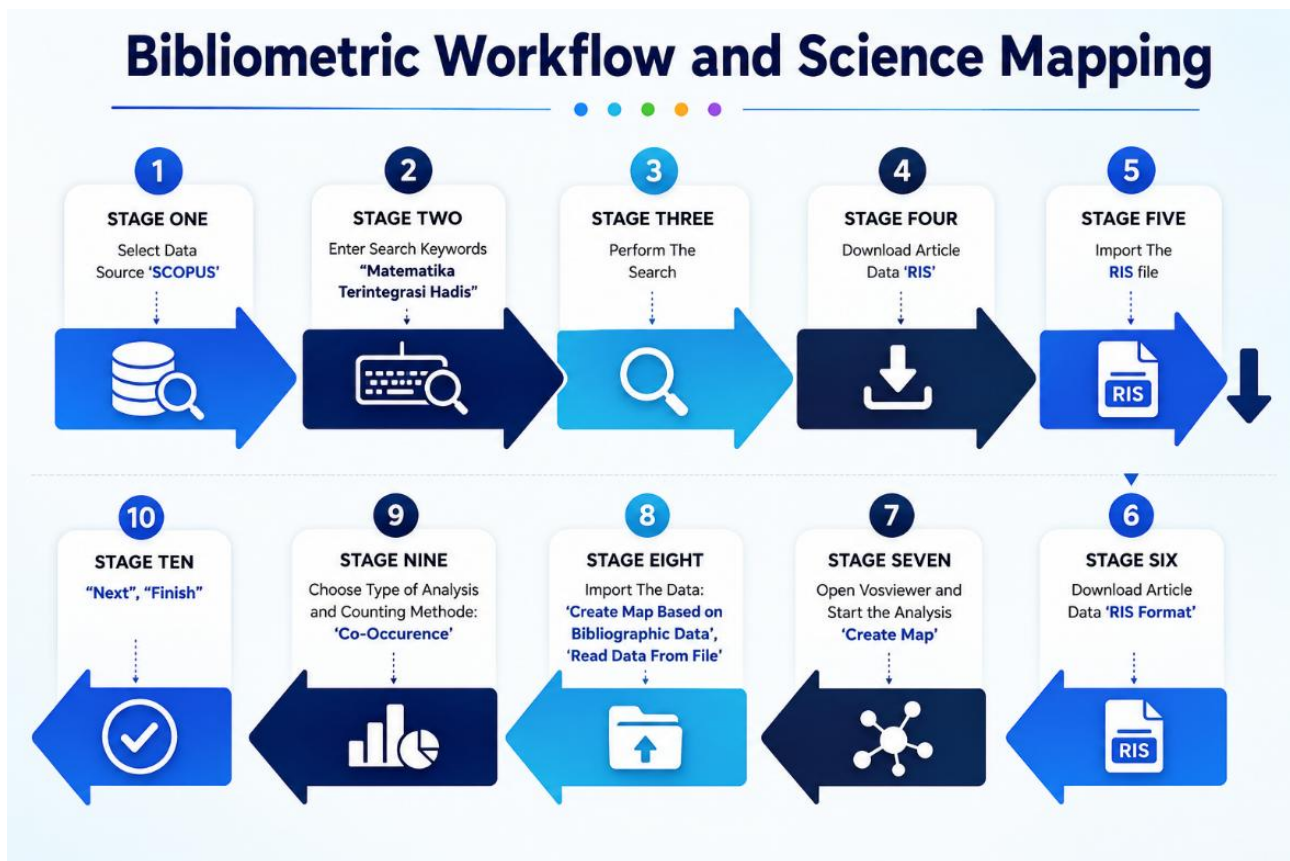


Figure 1. Bibliometric Data Processing Procedure Using VOSviewer

**RESULT**

**Graph of Academic Development and Publications on Hadith-Integrated Mathematics**

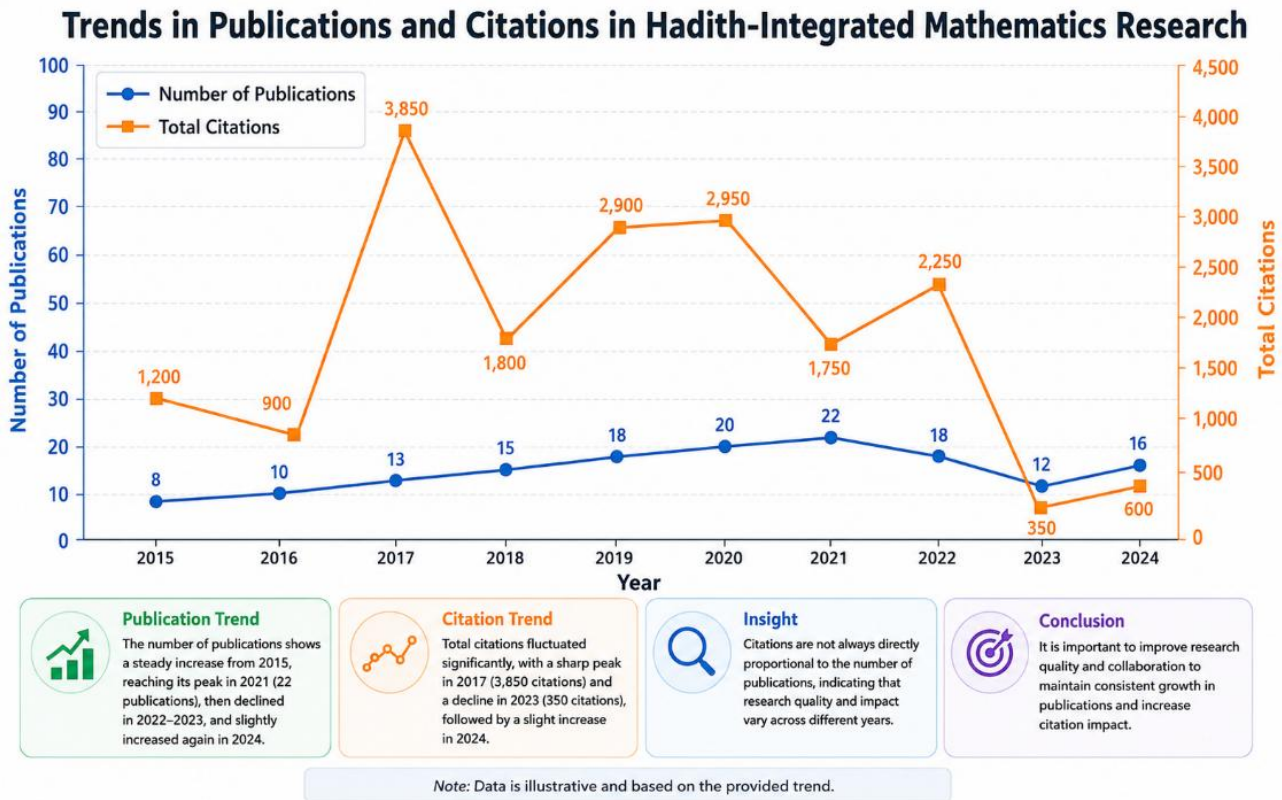


Figure 2. Annual Trends in Scientific Publications

Based on the visualization of publication and citation trends in research on Hadith-integrated mathematics within the context of Islamic education during the 2015–2024 period, the pattern of development appears to be fluctuating but demonstrates significant academic dynamics. During 2015–2016, the number of publications remained relatively limited, and citation levels had not yet shown a strong impact, indicating that this field of study was still in an exploratory and conceptual stage. Entering 2017, there was a very significant surge in total citations, while the number of publications also increased. This phenomenon suggests the emergence of highly influential scholarly works.

During the 2018–2020 period, publication trends remained relatively stable, with an upward trend, and total citations also remained at a relatively high level. This phase can be interpreted as a period of consolidation and implementation strengthening, during which the research focus shifted from integrative discourse to the development of teaching materials, contextual learning models, and the integration of Hadith values into mathematics learning practices in madrasahs or integrated Islamic schools.

However, in the 2021–2023 period, a significant decline became apparent, particularly in citation rates, indicating a weakening of academic impact or a shift in research focus toward other issues, such as post-pandemic digital learning transformation. The sharp decline in 2023 marked the lowest point on the graph, both in terms of productivity and scholarly impact.

Interestingly, 2024 shows signs of recovery, marked by increases in both publications and citations. This may be interpreted as a phase of revitalization in the theme of integrating mathematics and Hadith, possibly through more contemporary approaches such as digital literacy integration, Islamic STEAM education, or the utilization of technology and artificial intelligence in value-based mathematics learning.

Overall, these trends reflect a cycle of academic development that moved from an initial pioneering stage, reached a peak of influence, entered a consolidation phase, experienced a decline, and then demonstrated signs of resurgence. It can therefore be concluded that this field of research remains relevant and has strong potential for further development within the landscape of contemporary Islamic education.

**The Most Productive Authors, Institutions, and Countries in Hadith-Integrated Mathematics Research**

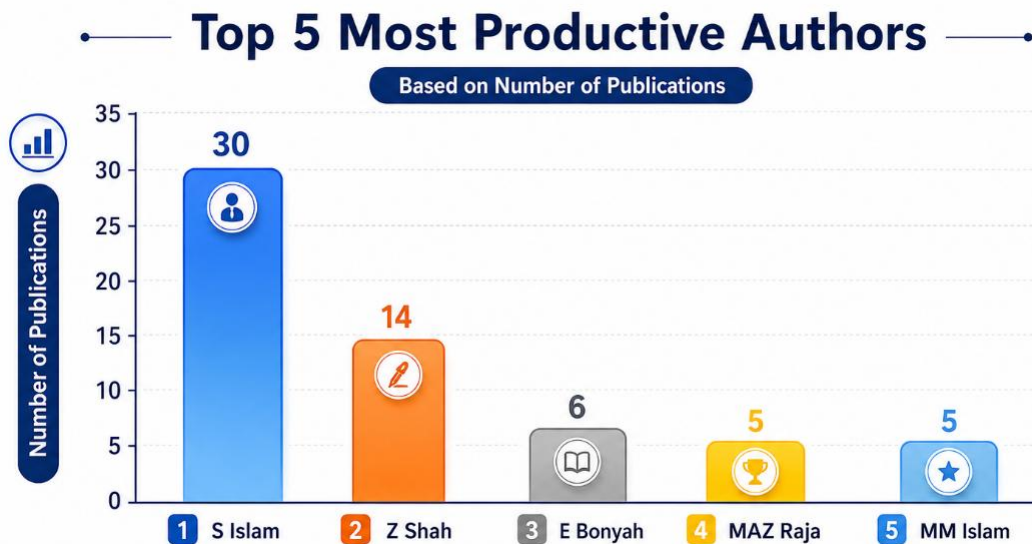


Figure 3. Top 5 Most Productive Authors in Hadith-Integrated Mathematics Research

Based on the visualization of the “Top 5 Most Productive Authors” in Hadith-integrated mathematics research, there appears to be a significant disparity in the number of publications among authors. S Islam ranks first with 30 publications, followed by Z Shah with 14, while E Bonyah, MAZ Raja, and MM Islam each have fewer than 10.

The striking gap between the first- and second-ranked authors indicates that scholarly contributions in this field remain concentrated around one leading researcher. This finding suggests that S Islam plays a dominant role in advancing studies on mathematics integrated with Hadith, both in terms of publication quantity and potential academic influence.

Meanwhile, the productivity of other authors appears relatively balanced but at a lower level, which may reflect that this research field is still evolving and has not yet attracted a large number of contributors with consistently high publication intensity.

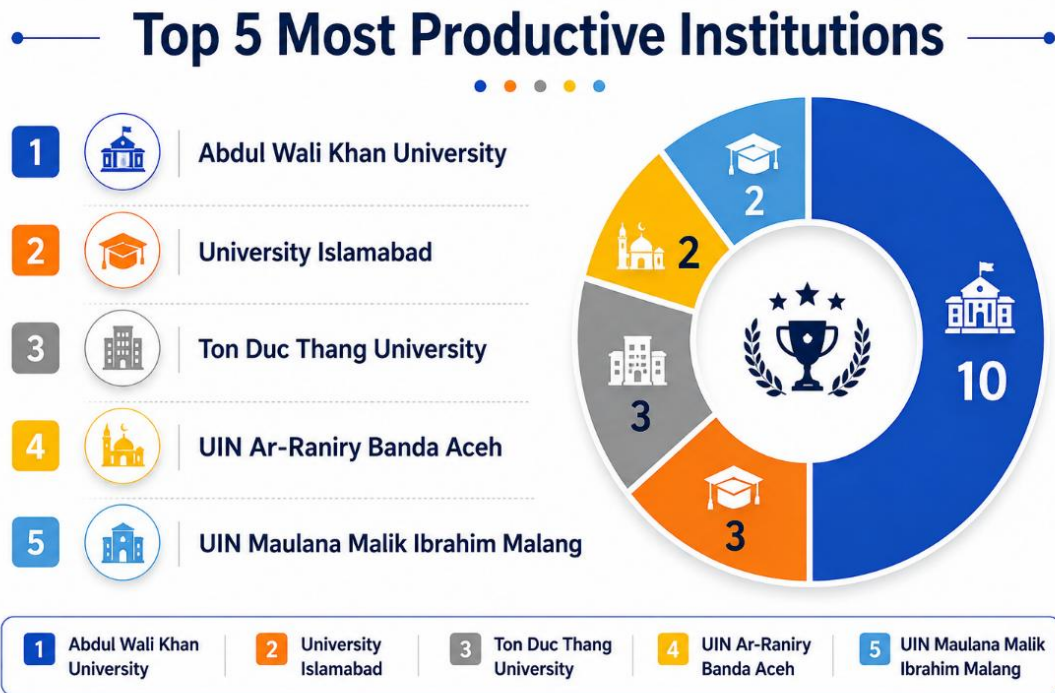


Figure 4. Top 5 Institutions with the Highest Contributions to Hadith-Integrated Mathematics Research

Based on the visualization of the “Top 5 Most Productive Institutions” in Hadith-integrated mathematics research, there is a clear disparity in publication contributions among institutions. Abdul Wali Khan University ranks first with 10 publications. The second and third positions are occupied by University Islamabad and Ton Duc Thang University, each with 3 publications, followed by UIN Ar-Raniry Banda Aceh and UIN Maulana Malik Ibrahim Malang, with 2 publications each.

The dominance of Abdul Wali Khan University indicates that the institution plays a central role in advancing studies on Hadith-integrated mathematics. Its high number of publications may be attributed to several factors, including the presence of research groups focused on the integration of science and Islamic studies, strong institutional support for international publications, active collaboration among researchers, and an academic culture that encourages scholarly productivity. In addition, the presence of key researchers who consistently produce scientific work may also be a major factor contributing to the institution’s high publication output.



Figure 5. Top 5 Most Productive Countries in Hadith-Integrated Mathematics Research

Based on the visualization of the “Top 5 Most Productive Countries” in Hadith-integrated mathematics research, Pakistan is the most dominant country, with 18 publications, as indicated by the darkest color gradient on the map. This color intensity reflects a significant gap compared to other countries in the top five, which average only around 6 publications.

Pakistan’s dominance reflects a strong concentration of academic activity in the integration of mathematics and Hadith studies. This may be supported by several factors, including a well-established tradition of Islamic scholarship, the presence of productive institutions and key researchers, and higher education policies that emphasize scientific publication output.

Meanwhile, other countries in South Asia and Southeast Asia demonstrate more moderate contributions. Overall, it can be concluded that the current center of development for Hadith-integrated mathematics research remains in Pakistan, while other countries offer potential support and significant opportunities for future growth.

### Primary Source Journals for Publications on Hadith-Integrated Mathematics Research in Islamic Education

Table 1. Distribution of the Number of Hadith-Integrated Mathematics Research Articles by Journal

No.	Journal Name	Number of Publications
1	AIP Advances	5
2	Scientific Reports	4
3	Applied Sciences	4
4	PLOS ONE	2
5	Computational and Applied Mathematics	2

Based on the table presented, five major journals serve as the primary publication outlets for research on Hadith-integrated mathematics in the context of Islamic education. In general, these publications are concentrated in reputable international journals focused on applied science, computational mathematics, and multidisciplinary studies, indicating that this field is situated within a broader, more interdisciplinary academic domain.

The journal with the most publications is AIP Advances (5), indicating that Hadith-integrated mathematics research is frequently published in journals oriented toward the physical and applied sciences. This suggests that the mathematical approaches used in integrating Hadith are likely quantitative, computational, or based on scientific modeling.

The second position is occupied by Scientific Reports and Applied Sciences, each with 4 publications. Both journals are recognized as reputable, international, multidisciplinary journals that publish research grounded in scientific approaches and practical applications. This reflects that Hadith-integrated mathematics research possesses strong applied and methodological dimensions.

Furthermore, PLOS ONE and Computational and Applied Mathematics each recorded 2 publications. The presence of PLOS ONE highlights the use of interdisciplinary and data-driven research approaches, while Computational and Applied Mathematics emphasizes mathematical analysis and computational techniques.

Overall, this journal distribution demonstrates that research on Hadith-integrated mathematics in Islamic education is not only published in Islamic studies journals but is more frequently found in international science and mathematics journals. This underscores the field's interdisciplinary nature and strong scientific orientation.

### Citation Patterns and Publication Impact in the Field of Hadith-Integrated Mathematics

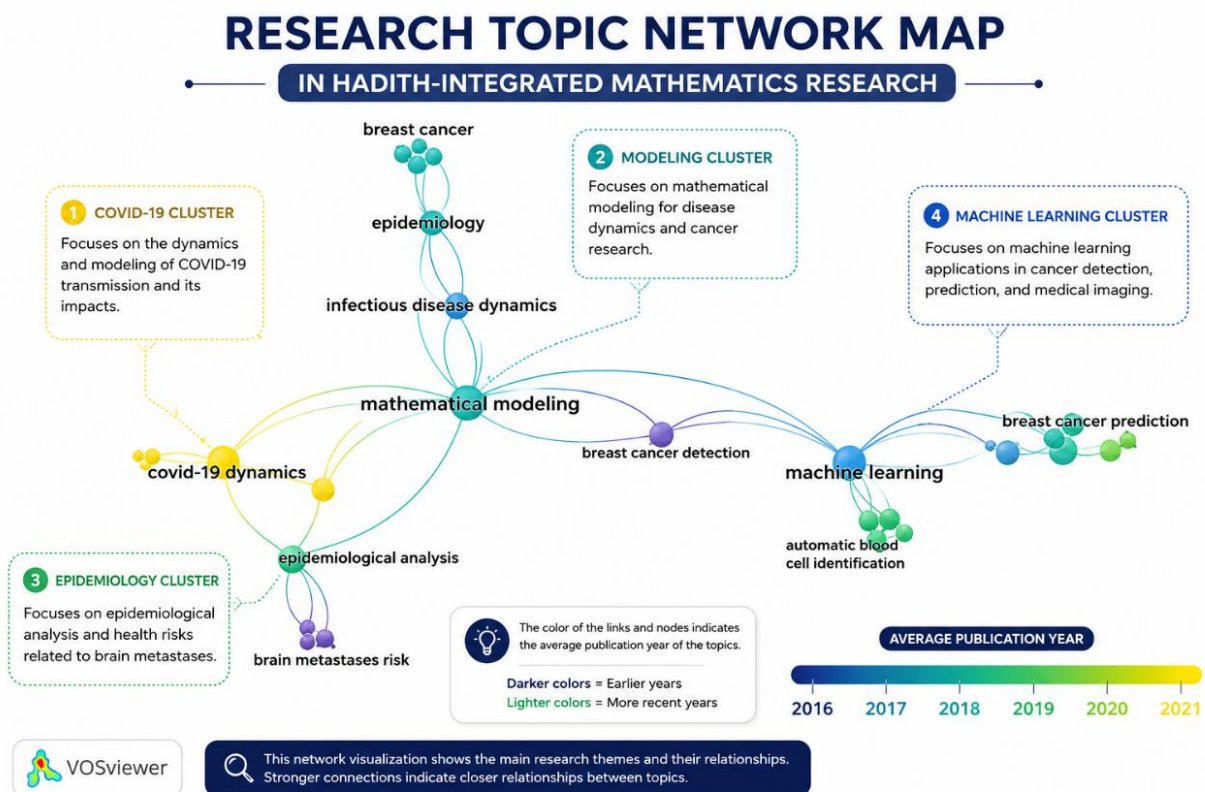


Figure 6. Research Topic Network Map in Hadith-Integrated Mathematics Research

The bibliometric map visualization generated using VOSviewer shows that citation patterns in this field are highly centralized, with “mathematical modeling” as the primary node with the broadest connections across various clusters, including epidemiology, infectious disease dynamics, COVID-19 dynamics, breast cancer detection, and machine learning. The central position of this node, along with its extensive interconnections among topics, indicates that publications based on mathematical modeling exert a strong conceptual influence and serve as key references in the development of derivative research themes. In other words, methodological and interdisciplinary studies tend to receive higher citation counts because they function as both theoretical foundations and analytical frameworks for subsequent research.

From a temporal perspective (2016–2021), the visualization reveals a shift in research focus from epidemiology and cancer-related themes in the earlier period to more applied, technology-driven approaches, such as machine learning and breast cancer prediction, in more recent years. The emergence of the COVID-19 dynamics cluster, represented by newer colors, indicates increased scholarly attention and the potential for rapid citation growth due to its global relevance.

This finding confirms that publication impact in this field is highly dynamic: methodological studies tend to maintain long-term influence, while topics associated with current global issues may experience rapid citation increases driven by timely relevance and global momentum.

### Keyword Relationships Based on Dominant Density in Hadith-Integrated Mathematics Research

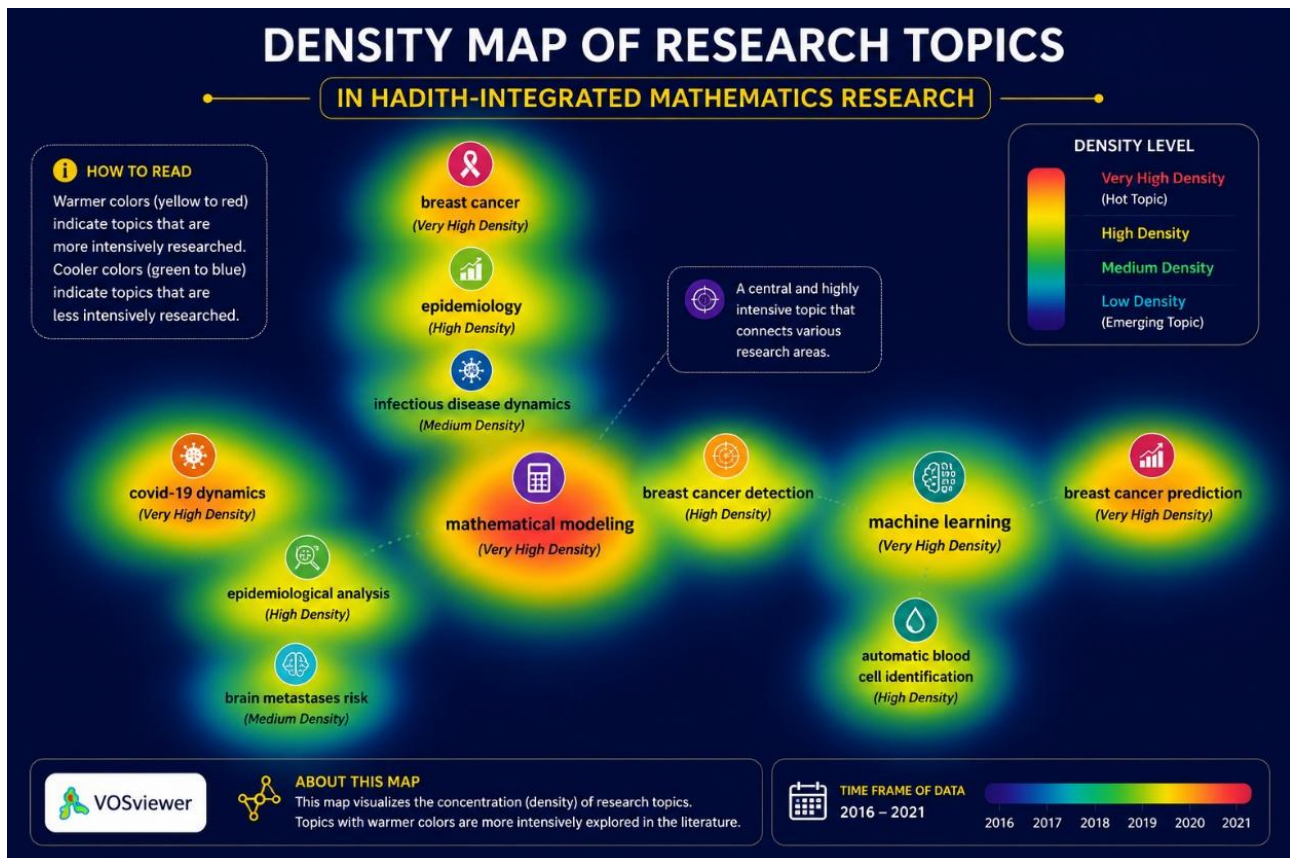


Figure 7. Heat Map of Research Focus in Hadith-Integrated Mathematics and Related Themes

Based on the VOSviewer density map, the most dominant themes and keywords in Hadith-integrated mathematics research appear to be centered on “mathematical modeling,” which serves as the conceptual and methodological core of the research network. The brightest color intensity (yellow) indicates the highest density and frequency of occurrence across several major clusters, particularly those related to breast cancer prediction, machine learning, COVID-19 dynamics, and epidemiology. This suggests that the research focus is not limited to the theoretical aspects of mathematical modeling but also extends to the application of these models in epidemiological and disease-related contexts, including cancer analysis and COVID-19 dynamics. Therefore, the integration of mathematics in this field tends to be highly applied, utilizing quantitative and computational approaches to analyze health and disease phenomena.

From a thematic perspective, the dominance of keywords such as machine learning, breast cancer detection, and breast cancer prediction suggests that research trends are evolving toward the integration of mathematical modeling and artificial intelligence in healthcare. Meanwhile, keywords such as epidemiological analysis, infectious disease dynamics, and COVID-19 dynamics highlight a strong emphasis on disease transmission modeling and risk analysis.

The highest density observed in these clusters demonstrates that research in this field primarily focuses on developing mathematical models for prediction, analysis, and data-driven decision-making. Thus, the dominant theme is the integration of mathematical modeling and computational technology in epidemiological and disease studies.

**Mapping the Relationships and Interconnections Among Research Topics Based on Co-Occurrence Analysis and Bibliometric Networks**

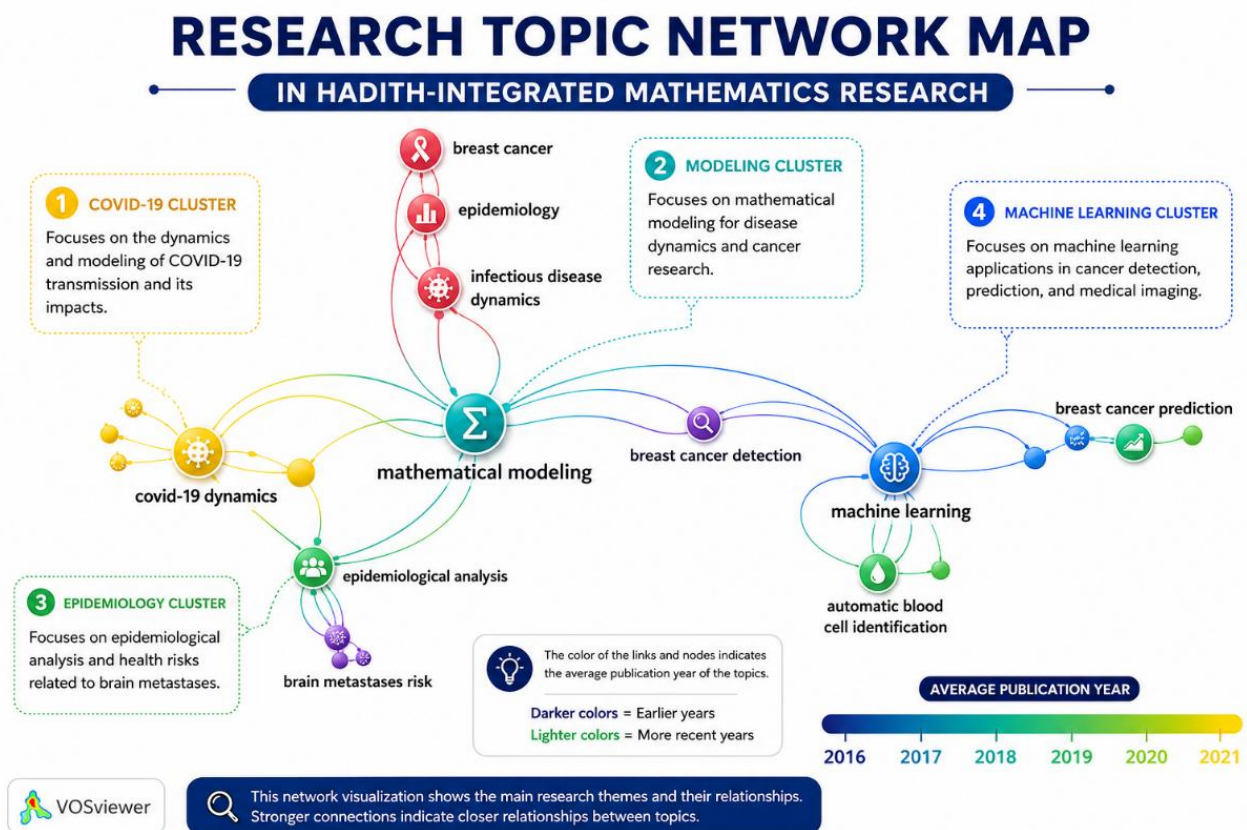


Figure 8. Network Visualization of Hadith-Integrated Mathematics Research Topics Using VOSviewer

Based on the VOSviewer co-occurrence network visualization, the map of relationships among research topics reveals a clustered, interconnected network structure, linked by major conceptual nodes. “Mathematical modeling” appears as the central node, connecting nearly all clusters, indicating that it serves as the primary methodological foundation across various research topics. From this central node, the network branches into several major thematic groups that form distinct clusters based on their proximity and co-occurrence frequency.

The red cluster focuses on epidemiology, infectious disease dynamics, and breast cancer, highlighting the strong relationship between disease studies and epidemiological approaches grounded in mathematical models. The green cluster includes epidemiological analysis and brain metastases risk, which remain within the healthcare domain but are more specifically oriented toward risk analysis.

The purple cluster centers on COVID-19 dynamics, which is connected to both epidemiological analysis and mathematical modeling, indicating the integration of pandemic-related topics within a broader modeling framework. Meanwhile, the yellow–blue cluster illustrates the relationship between machine learning, automatic blood cell identification, and breast cancer prediction, demonstrating a shift toward computational approaches and artificial intelligence.

Overall, this network map illustrates that the relationships among research topics are interdisciplinary and integrated through a shared methodological approach—namely, mathematical modeling. Health and epidemiological topics form the initial foundation of the network, which then evolves toward predictive applications based on machine learning. Thus, this co-occurrence structure shows that research has developed thematically from model-based disease analysis toward prediction systems and AI-based automation, with mathematical modeling serving as the primary link between clusters.

## DISCUSSION

The bibliometric findings indicate that studies on Hadith-integrated mathematics in Islamic education are developing within an epistemological framework aligned with the paradigm of knowledge integration, which rejects the dichotomy between religious and secular sciences. This paradigm has long been emphasized in Islamic education literature as a response to the fragmentation of modern knowledge, which separates the rational, spiritual, and moral dimensions (Rakhmat, 2022). In this context, mathematics is not understood as a value-free discipline but rather as an epistemological instrument that can be guided by normative values derived from Hadith.

The dominance of the mathematical modeling approach identified in scientific publications reflects a shift in integration from philosophical discourse toward methodological and applied approaches. This pattern is consistent with previous studies showing that the integration of religion and science at the global level is more readily accepted when framed within quantitative and computational approaches (Hamdanah et al., 2025). However, several critical studies warn that such an approach risks reducing the Islamic dimension to an instrumental role, where Hadith functions merely as normative legitimacy rather than as an epistemological foundation that shapes mathematical ways of thinking (Petrescu-Mag et al., 2025).

The concentration of productivity among specific individuals and institutions indicates that this field remains in an early stage of consolidation. This finding aligns with previous bibliometric studies showing that emerging interdisciplinary fields generally develop in a centralized manner before diffusing into broader academic communities (Chen et al., 2014). Although such concentration may accelerate methodological standardization, the literature also emphasizes that dependence on

specific academic centers may limit diversity in approaches and theoretical innovation (Giraldo et al., 2022). Therefore, strengthening collaboration across institutions and countries becomes a strategic necessity, particularly between Islamic higher education institutions and science-based universities.

Publications in international journals specializing in science and mathematics indicate that this field has met global methodological standards. However, this finding also confirms criticisms in Islamic education studies that methodological acceptance does not always correlate with the depth of value integration (Barbour, 1998). In other words, although Hadith-integrated mathematics has successfully entered international publication platforms, critical evaluation is still needed regarding the extent to which Hadith serves as a substantive integrative element rather than merely an additional contextual reference.

The centrality of methodological works within citation networks demonstrates that mathematical and interdisciplinary research tends to have broader academic impact. This finding is consistent with the literature, which emphasizes that modeling- and prediction-based research is highly relevant to contemporary issues such as epidemiology, public health, and artificial intelligence (Jordan & Mitchell, 2015). In this context, Hadith has the potential to provide an ethical framework for the use of predictive models and data-driven technologies, as emphasized in Islamic ethical studies on science and technology (Saifuddeen et al., 2013).

The keyword co-occurrence structure, which demonstrates interconnections among research topics, also confirms a shift in research orientation from deterministic models toward machine learning-based approaches. This shift aligns with global trends in mathematics and science education (Bishop, 1988) and opens opportunities for Islamic education to develop mathematics learning that is adaptive to technological advancements. In this context, the integration of Hadith functions not only as a source of values but also as an ethical foundation for instilling scientific responsibility, academic integrity, and moral awareness in data management and artificial intelligence.

Overall, the bibliometric results confirm that studies on Hadith-integrated mathematics have reached methodological maturity but still face conceptual and pedagogical challenges. The remaining research gaps include: (1) the development of theoretical integration frameworks based on Islamic epistemology, (2) empirical testing of the effectiveness of Hadith-integrated mathematics learning models at various educational levels, and (3) the expansion of international collaboration to ensure that knowledge development is not concentrated in specific regions and academic actors. The future challenge lies not merely in increasing publication quantity but in deepening the quality of integration so that Hadith values are genuinely internalized within a holistic and transformative mathematics learning paradigm in Islamic education.

## CONCLUSION

The main findings of the bibliometric analysis of Hadith-integrated mathematics studies in Islamic education reveal fluctuating publication trends, with mathematical modeling emerging as the central conceptual node that connects various thematic clusters, including epidemiology, infectious disease dynamics, artificial intelligence-based learning, and cancer prediction. This study also identifies that reputable international journals in applied science and mathematics play a significant role as publication outlets, highlighting the field's interdisciplinary nature. Conceptually, the findings emphasize that the integration of mathematics and Hadith increasingly focuses on methodological and applied dimensions through mathematical modeling, marking a shift from normative

philosophical debates toward quantitative frameworks that enable the use of technologies such as machine learning, while still providing opportunities to strengthen ethical and epistemological dimensions grounded in Hadith.

Future research should expand collaboration across institutions and countries to reduce the concentration of research centers and to strengthen theoretical foundations grounded in Islamic epistemology that integrate Hadith values more substantively into mathematics learning design. The identified research gaps include developing theoretical integration frameworks, empirically evaluating the effectiveness of integrative learning models across educational levels, and increasing publications in Islamic studies and computer science journals to enrich methodological diversity. Overall, this study represents a transitional phase toward increasingly interdisciplinary and technology-driven approaches, with a stronger focus on broader pedagogical and social impacts in contemporary Islamic education.

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