



## Trends of Hadith Studies in Artificial Intelligence Research Works on Google Scholar: A Literature Review

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### Abstract:

This literature review explores the research on Artificial Intelligence (AI) in hadith studies worldwide. Data from AI-related research publications on hadith between 2019 and 2023 were analyzed using Google Scholar, a widely used academic search engine. The study emphasizes the significance of using AI technology to enhance Islamic scholarship through hadith studies. The primary objective is to understand the trends in AI publications related to hadith studies and identify the most commonly used AI subfields for analyzing hadith texts. The data analysis includes 29 relevant publications from credible academic sources and journals. The findings reveal fluctuations in AI-related studies on hadith, but the overall trend is declining, indicating a need for further development in this study area. Additionally, the research findings highlight that AI-related publications in Indonesia are still limited, despite being the largest Muslim-populated country. Comprehensive reference books on this topic have also not been found in the past five years. Furthermore, AI research focusing on matan studies in hadith is relatively scarce compared to sanad studies, and other AI subfields beyond Machine Learning and Natural Language Processing require more research to foster development.

**Keywords:** artificial intelligence; AI-related studies; hadith studies; publication trends; AI subfields

## INTRODUCTION

Studying hadith is extremely important for preserving the integrity and continuity of Islam. This is evident from the crucial roles that hadith plays in scholarly pursuits, which cannot be ignored or overlooked. The main point is that the hadith serves as the primary source for understanding the historical life of Prophet Muhammad PBUH, who holds a central position in Islam and is undeniably one of the most influential figures in human history, acknowledged worldwide (Siddiqi, 1993). The hadith is the foundational guidance the Muslim community uses to understand the Quran, uphold Islamic law, perform rituals, and shape their beliefs (Sayeed, 2023). Furthermore, the hadith plays a crucial role in helping Muslims fulfill their religious duties, like praying, performing ablution (*al-wudu*), and carrying out obligatory ablution (*al-ghusl*) (Al-Nawawi, 1987). Moreover, many



Islamic laws Muslims follow today are primarily based on hadith rather than the Quran (Forte, 1978). This emphasizes the importance of studying hadith in maintaining the firm foundation of Islam as a religion.

Islamic scholarship, especially in hadith studies, faces similar challenges as other disciplines – the need to adapt to changing times. The fast-paced digital era presents challenges and exciting opportunities for exploration in Islamic studies, known for its continuous growth (Suryadilaga, 2014). The rapid progress of digitization offers various chances to investigate fascinating phenomena, enabling research, analysis, and future projections (Wahid & Masri, 2019). The study conducted by Ummah aligns with this, stating that current hadith studies are continuously striving to adapt to the changing times. Previously, these studies were done manually, consuming much time, but now they are facilitated by software and the internet, like Maktabah Syamilah, Lidwa Pusaka, and Gawamil Kaleem (Ummah, 2019). Nonetheless, continuous development efforts are essential because the potential for errors, both in numbering and data incompleteness, remains significant, as seen in the case of Lidwa Pusaka (Fikriyyah, 2018). It can be inferred that hadith studies must keep pace with the changing times, characterized by widespread digital technology usage.

The era of digital advancement, where everything relies on digital platforms, has led to the widespread use of Artificial Intelligence (AI) as a technology with human-like intelligence (Panat & Kumar, 2023). This technology holds great potential for developing religious text studies, including the hadith, which is significant in Islam (Andriansyah, 2023). In hadith studies, database applications such as Maktabah Syamilah, which collects and presents data, may be replaced by AI capable of generating and assembling data, leading to new knowledge like interpretations and evolving understandings (Suhartono, 2014). Consequently, machines equipped with generative AI technology, such as Chat-GPT (Generative Pre-training Transformer) or similar models with deep learning capabilities, may take over the analysis of hadith, which was previously the domain of humans (Suyanto, 2021). AI technology is increasingly essential and booming in this era, and hadith studies must keep up with technological advancements (Andriansyah, 2023). Topics related to AI are intriguing subjects for investigation across various fields due to their current trend, including within Hadith studies. Therefore, this research aims to



uncover the trends of artificial intelligence in hadith studies to provide an overview of the research in this area.

Several studies on research trends are available on public platforms such as Google Scholar, Scopus, and Web of Science. Among them, one study published on Scopus by Susetyarini and Fauzi focused on critical thinking abilities in biology journals in Indonesia (Susetyarini & Fauzi, 2020). Another study conducted by Ongaro and Tantardini discussed the influence of religion on society in public administration (Ongaro & Tantardini, 2023), while a study by Mohd Nasir explored trends in hadith studies related to technology (Mohd Nasir et al., 2021). These studies analyzed research trends, identified gaps, and provided further exploration recommendations. Additionally, a literature review conducted by Sulistio explored the use of machine learning, an AI function, in analyzing hadith (Sulistio et al., 2023). The current research stands out as it utilizes Google Scholar as the primary platform and encompasses a broader scope of AI research with specific keywords, making it distinct from the mentioned studies.

This article provides an overview of the trends in artificial intelligence research within hadith studies based on published works. It addresses the following research questions: 1) How does the number of artificial intelligence research works in hadith studies change over the years? 2) How many research works are published in different countries? 3) How many research works are published in various types of publications? 4) How many research works are published for each branch of hadith studies? 5) How many research works are published in each subfield of AI? The study's findings are expected to be a reference for future researchers exploring topics related to Artificial Intelligence and hadith studies.

This study differs from previous research on Hadith studies in several aspects. Firstly, the scope of this study involved analyzing all articles published from 2019 to 2023, including journal articles, undergraduate theses, master's theses, dissertations, conference proceedings, and other scholarly writings. Secondly, the main aim of this study was to comprehensively investigate selected articles that gave priority to hadith studies as their central focus. Thirdly, various parameters were used as the basis for conducting content analysis.



## METHOD

### Research Design

This study utilized a qualitative approach and followed the principle of content analysis (Taherdoost, 2022). Content analysis, as defined by Klaus Klippendorff, is a research technique used to draw reliable and valid conclusions from texts or other meaningful materials in their respective contexts. It provides new insights, enhances researchers' understanding of specific phenomena, or informs practical actions (Klippendorff, 2019). Content analysis has gained prominence in recent years as it can be applied to various sources like texts, stimuli, and audio, enabling a comprehensive understanding (Stemler, 2015). This study employs content analysis to interpret the meaning of the data presented in the research outcomes.

### Data Source

This research uses Google Scholar as the chosen platform, which is widely used along with the Web of Science (WoS) to assist researchers and academics in finding relevant materials for their research (Mikki, 2009). Halevi's study highlights Google Scholar's rapid development, making it a robust and dependable database (Halevi et al., 2017). The published articles considered in this research span the last five years, from 2019 to 2023, following the expected standard for high-quality academic writing (Eko, 2020). Various types of research are included, such as journal articles, theses, dissertations, and undergraduate theses. The selected keywords for source retrieval are specific, covering "Artificial Intelligence" and its derivatives and "Hadith Studies" and synonymous terms. Studies not meeting the established criteria in this research will not be included in the analyzed data.

### Research Instrument

The instrument used for this study was a content analysis guideline containing related aspects observed in **Table 1**. There were five main aspects reviewed for content analysis: (1) the number of publications per year; (2) countries; (3) types of publications; (4) branches of hadith studies; and (5) subfields of AI.

**Table 1. The Aspects and Categories Used for Content Analysis in the Study**

Aspects	Categories
<b>Years of Publications</b>	A. 2019 B. 2020 C. 2021 D. 2022 E. 2023
<b>Countries of Publications</b>	A. US B. US & Canada C. UK D. Singapore E. Malaysia F. Switzerland G. Netherlands H. Indonesia I. Korea J. India K. Saudi Arabia L. Turkey M. Uzbekistan
<b>Types of Publications</b> (NMSU Library, 2023)	A. Journal Articles B. Conference Papers C. Theses & Dissertations D. Books & Book Chapters
<b>Hadith Studies Branches</b> (Ismail, 1992; Rohman et al., 2019)	A. Sanad Study B. Matn Study C. Hadith Criticism (Sanad-Matn) Study
<b>AI Subfields</b> (Abioye et al., 2021)	A. Machine Learning B. Computer Vision C. Automated Planning and Scheduling D. Robotics E. Knowledge-Based System F. Natural Language Processing G. Optimization

### Data Analysis

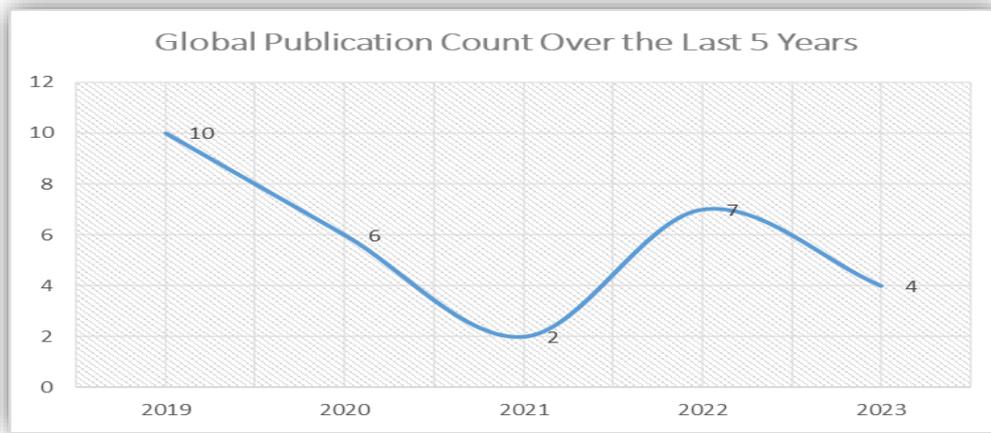
Each article was categorized based on specific aspects that matched the defined categories. The decisions were made using the information found in the abstract, method, and discussion sections provided by the authors. The collected data were presented using bar, line, and pie charts.

## RESULT

### Number of Publications

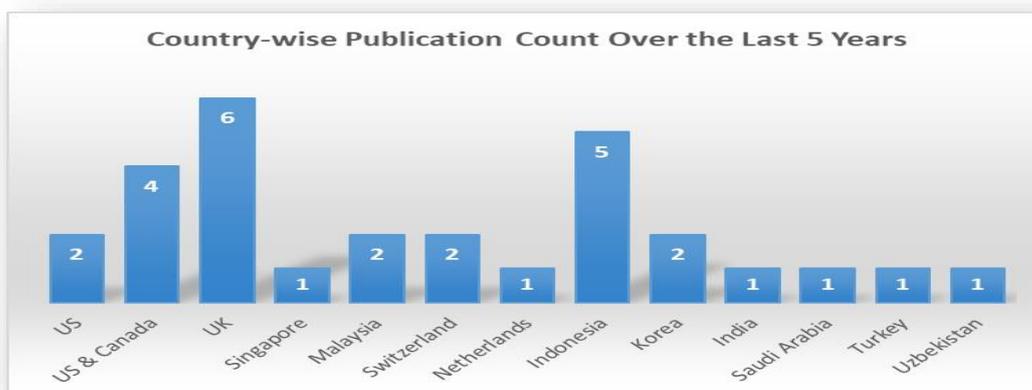
The line chart in **Figure 1** shows information about the global publication count of AI-related studies on hadith from 2019 to 2023. The data indicates a fluctuating trend in research output in this specialized field. Ten publications in 2019 signaled a promising start for the study area. However, in the subsequent years, there was a decline in

publication activity, with six publications in 2020, followed by a significant drop to 2 in 2021. Despite the challenges, there was a partial recovery in 2022, with seven publications suggesting renewed interest and efforts in this domain. Nevertheless, the publication count slightly decreased to 4 in 2023.



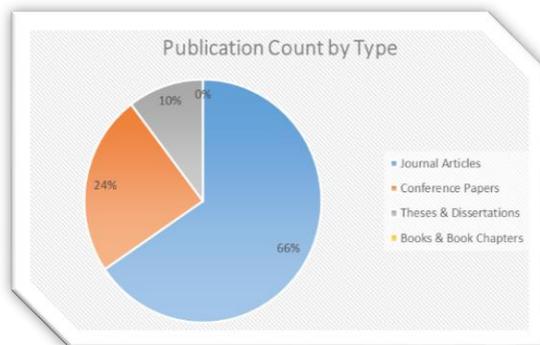
**Figure 1. Worldwide AI-Related Studies on Hadith Publication Count**

The bar chart in **Figure 2** illustrates the global publication count of AI-related studies on hadith from 2019 to 2023, categorized by different countries. The data shows varying levels of research output across these nations. The United Kingdom (UK) leads with six publications, indicating a significant research focus on AI and hadith studies. The United States (US) and Canada closely follow with four publications. Indonesia ranks second with five publications, demonstrating a notable interest in this field. Several countries, including Malaysia, Switzerland, Korea, the US, and the Netherlands, contributed moderately, with two publications each. On the other hand, Singapore, India, Saudi Arabia, Turkey, and Uzbekistan each had one publication, indicating emerging research interest in AI-related hadith studies in these regions.



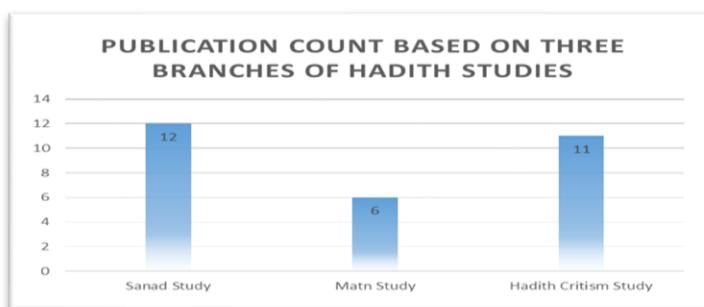
**Figure 2. AI-Related Studies on Hadith Publication Count Based on Countries**

The pie chart in **Figure 3** represents the global publication count of AI-related studies on hadith over the last five years (2019-2023) based on different research types. The data reveals that most publications consist of Journal Articles, accounting for 66% of the total. Conference Papers form the second most significant category, contributing 24% to the overall publications. Theses and Dissertations make up smaller portions, with 10%. Book and Book Chapters occupy the lowest percentage with 0 publications. In total, there were 29 publications within the specified period.



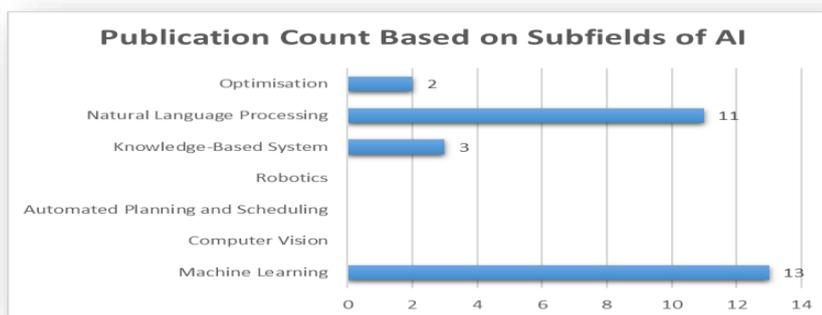
**Figure 3. AI-Related Studies on Hadith Publication Count Categorized by Research Type**

The bar chart in Figure 4 shows the global publication count of AI-related studies on hadith, categorized into three branches of hadith studies from 2019 to 2023. The Sanad Study, with 12 research papers, stands out as the most extensively explored area, indicating a significant focus on examining hadith chains. The Hadith Criticism Study closely follows with 11 publications, reflecting a substantial interest in the critical analysis and authentication of hadith texts. The Matn Study, with six publications, represents the third most prominent branch, highlighting research efforts focused on the content and textual analysis of hadiths. Overall, 29 publications during the specified period indicated the growing importance of AI-based research in advancing the study of hadith.



**Figure 4. AI Papers Publication Count in Three Hadith Studies Branches**

The bar chart in **Figure 5** provides an overview of the global publication count of AI-related studies on hadith from 2019 to 2023, categorized into various subfields of AI. The data reveals that Machine Learning is the most prominent subfield, with 13 research papers published, indicating widespread adoption and application of Machine Learning (ML) techniques in hadith studies. Conversely, Computer Vision, Automated Planning and Scheduling, and Robotics have no recorded publications during the specified period. Knowledge-Based Systems contributed three publications, showing limited but notable research interest in this area. Natural Language Processing (NLP) follows closely behind Machine Learning with 11 publications, emphasizing the significance of NLP in analyzing hadith texts. Lastly, the subfield of Optimization recorded two publications, suggesting a growing focus on utilizing optimization techniques in the context of hadith studies.



**Figure 5. AI-Related Studies on Hadith Publication Categorized by AI Subfields**

## DISCUSSION

Based on **Figure 1**, the overall trend in AI research focusing on hadith over the past five years indicates a decline. This suggests decreased public interest or researcher engagement in advancing hadith studies through AI research (Blanco & Convertino, 2023; Chàfer et al., 2021). One possible reason for this decline could be the lack of widespread benefits from such research. In contrast, AI research in other fields, like the economy, has shown a much higher perceived impact, with publications reaching 43 and 64 in 2019 and 2020, respectively, steadily increasing in subsequent years (Goodell et al., 2021). While other AI studies demonstrate consistent growth and significant trends, the integration of hadith, a crucial aspect of Islam, must keep up with the advancements of time (Andriansyah, 2023). Therefore, this research recommends increasing AI research in developing hadith studies more extensively. The study highlights the importance of prioritizing the advancement of this area to integrate hadith studies with AI developments

effectively. This would enable a more comprehensive understanding and practical implementation of Islamic teachings in modern contexts.

Based on **Figure 2**, the bar chart shows the international engagement and diversity of research contributions to AI and hadith studies. Compared to other research aspects like healthcare (Secinaro et al., 2021), the USA has a significant number of publications, 215 in recent years, followed by Canada with 32 and the UK with 54, indicating a relatively lower interest in this field. However, a noticeable trend from Figure 2 is that the UK holds the highest position in research publications on this topic, with six publications in the last five years. This could be attributed to the relatively high interest in research publications due to the quality of higher education. According to the QS World University Rankings 2023 (QS World University Rankings, 2023), 6 out of the top 10 universities in the world are from the UK.

On the other hand, Indonesia ranks second in research publications on this topic, with five publications. Although this is already quite commendable for a country with a relatively minimal number of publications (Handini, 2021), given that Indonesia is the world's most populous Muslim country (World Population Review, 2023), it should ideally take the lead in advancing hadith studies as an integral part of Islamic beliefs and practical guidance for daily life (Al-Nawawi, 1987), encompassing various research aspects, including AI. From these facts, it can be concluded that Indonesia needs to increase the number of publications related to the development of hadith through AI research, given the broad potential benefits its population can eventually reap.

Based on **Figure 3**, the pie chart illustrates the distribution of research outputs across various types, highlighting the dominance of Journal Articles and the importance of Conference Papers in disseminating knowledge related to AI and hadith studies. It also indicates the absence of book publications, specifically scholarly books with specific criteria (The University of Texas at San Antonio, 2023), suggesting a lack of comprehensive conceptualization of specific topics. This aligns with the notion that the distinction between books and journal articles, conference papers, and college student publications lies in their nature of understanding. The former three address specific issues or problems, whereas books explore a single topic or concept comprehensively (NMSU Library, 2023). Moreover, according to Alderma, books often serve as essential foundations in conducting in-depth research due to the depth and breadth of concepts they

present (Alderma, 2014). From this, it can be inferred that publications in the form of books or book chapters discussing the themes of AI and hadith are needed to enrich the reference repository with more comprehensive content.

Based on **Figure 4**, the results presented by the bar chart above indicate a significant gap between two branches of hadith studies, namely hadith criticism study and *sanad* study, and *matn* study. *Sanad* study, which involves examining the names of narrators and the connecting symbols they used (Ismail, 1992), occupies the highest popularity, indicating a considerable research interest in this area and in AI research within hadith criticism study, which ranks second. Unfortunately, the research interest in AI within the *matn* study only reaches half of the percentage observed in the *sanad* study. This trend aligns with Suryadilaga's statement that research on *matn* has been challenging to develop among scholars. At the same time, the *sanad* study, on the contrary, has seen numerous hadith literature focusing on the chain of narrators (Suryadilaga, 2009).

However, *matn* study holds a crucial position in hadith studies due to the prevalence of hadith fabrications and the presence of *al-wahm*, which refers to various errors in the narration of hadith (Tangngareng, 2016). Moreover, if *matn* studies were integrated with various other disciplines such as social sciences, natural sciences, anthropology, history, and geography, it would lead to a more contextual, innovative understanding of hadith *matn* while also keeping up with the developments of the time (Firdaus & Suryadilaga, 2020). Apart from what has been mentioned by Firdaus and Suryadilaga, Darmalaksana also emphasizes the urgency of aligning interdisciplinary hadith studies with science and technology (Darmalaksana, 2021), which includes AI as a subfield of computer science (Kandlhofer et al., 2016). In essence, based on the low trend in *matn* hadith studies, this research recommends further investigation and AI research to expand the knowledge of hadith into broader and more innovative realms.

Based on **Figure 5**, the AI subfields in hadith studies highlight Machine Learning and Natural Language Processing (NLP) as the leading areas with significant attention and output. Focusing on these dominant subfields is essential, but there is untapped potential in Computer Vision, Automated Planning and Scheduling, and Robotics that needs further exploration. This trend is intriguing when compared to research by Abioye, which showed that the highest position in AI research from 2010 to 2020 was in optimization, unlike other subfields (Abioye et al., 2021).



This difference is understandable since the primary purposes of hadith studies are to verify historical information from the Prophet Muhammad PBUH (Idri, 2010) and to accurately interpret and understand the meanings of hadith texts (matn), which can continuously evolve in interpretations (Zakiyah & Ghifari, 2022). However, in the future, there could be a valuable integration of these emerging AI trends with hadith studies, such as using robotics to assist in religious practices (Suhartono, 2014) or developing a knowledge-based system for hadith consultation based on expert thinking and knowledge (Suyanto, 2021). Scholars should keep innovating in established subfields like Knowledge-Based Systems and Optimization to improve AI applications in hadith studies. Balancing new trends and nurturing existing ones will maximize AI's potential for comprehensive and innovative research, benefiting Muslims worldwide in hadith and Islamic studies.

## CONCLUSION

Hadith studies are essential to be developed with various other disciplines and must always keep up with the advancements of the time, including the rapidly growing field of AI. Through trend analysis of 29 scholarly research works on Google Scholar, this research reveals five key findings that can serve as a foundation for further researchers to develop hadith studies through AI research.

The first finding is related to the decrease in AI research interest in hadith studies, recommending increased research given the urgency of hadith studies. The second finding concerns the lack of AI-based hadith studies in Indonesia, which needs improvement, considering it is the world's largest Muslim population. The third finding highlights the need for works such as books or book chapters discussing the comprehensive integration of AI and hadith. The fourth finding emphasizes the lack of AI research in matn studies, calling for attention to this crucial area. The last finding pertains to the low representation of AI subfields other than Machine Learning and Natural Language Processing, suggesting the need to maximize all subfields to foster innovation and the broader development of hadith studies.

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