Jurnal Ulunnuha
P-ISSN: 2086-3721 E-ISSN: 2865-6050
Vol. 14 No. 2 / December 2025

https://ejournal.uinib.ac.id/jurnal/index.php/ulunnuha/index
DOI: 10.15548/ju.v13i1.11555

Epistemological Challenges of Hadith Authentication in the Digital Era: A Philosophy of Science Perspective

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Abstract:
This study aims to identify and analyze the forms of hadith dissemination through digital media, particularly websites, and to classify the types of websites that serve as a means of hadith study. This study is motivated by the lack of research that explicitly discusses the role of websites as a medium for the transmission and study of hadith in the digital age, even though previous studies have discussed software such as Lidwa, Maktabah Syamilah, and Gawāmi' al-Kalim. This research uses a descriptive qualitative approach based on literature study, with hermeneutics as a method to understand methodological transformations in hadith studies, as well as triangulation of sources by involving hadith experts and Islamic information technology practitioners to ensure cross-disciplinary validity. The human-in-the-loop principle is applied to integrate Islamic scientific values into the hadith digitization system. The results show that the dissemination of hadith through websites not only expands access to hadith literature but also raises new challenges in terms of the authority and authenticity of information. Websites are classified into several types, including: (1) hadith aggregator websites with search and sanad filter features, (2) hadith-based digital education platforms, and (3) AI-based hadith verification sites that function assistively. Thus, these findings confirm an epistemological renewal in the form of placing AI as a limited tool, not a substitute for human judgment.

Keywords: Digital Hadith Studies, Hadith Websites, Hadith Epistemology, Hermeneutics, AI Verification

INTRODUCTION:

The development of digital technology has had a great influence in various fields of life, including in the realm of education and Islamic studies.[1] Digitalization facilitates access to various sources of knowledge, especially hadith, which previously could only be obtained in printed form. In the context of religion, digitization has greatly helped the process of searching for hadith. Today, the search for hadith is not only limited to printed materials but can be done online through websites and specialized applications. This rapid technological development has also led to the emergence of various applications and websites that present the redaction of hadith in an attractive and accessible manner.

[1] Elis Mila Rosa, "Using of Play Store as a Media for Disseminating Hadith and Other Forms of Hadith Studies on the Play Store," *Al-Bukhari: Jurnal Ilmu Hadis* 5, no. 2 (2022).

While the ease of digitization makes it easier to access hadith, it also affects the way one learns and understands them. Moreover, the ease of access through the internet and apps also raises questions about the validity, authority and quality of knowledge disseminated through digitized hadith platforms. Therefore, it is necessary to conduct an in-depth study to evaluate the impact of digitization on the understanding of hadith, especially in the context of using technology to access and interpret hadith in everyday life.

In line with this theme, a number of previous studies have discussed various hadith software. There are studies that assess the effectiveness of using software such as Lidwa, both on computers and Android devices,[2] as a means of learning hadith.[3] In addition, some studies have also examined the application of al-Maktabah ash-Syamilah to see its role and application in learning and researching hadith,[4] as well as exploring various reference sources of tafsir and hadith books. Although these studies have made important contributions in understanding various hadith software, most of them are still limited to comparing specific applications such as Lidwa, al-Maktabah ash-Syamilah, and Gawāmi' al-Kalīm V.4.5 in the context of learning and searching for hadith.

However, these studies have not examined in depth the website as a medium for disseminating hadith. Therefore, this aspect needs to be explored further.[5] Based on this, this research formulates several main problems, namely: first, what are the forms of hadith dissemination through websites; and second, what are the types of websites that play a role in hadith studies. The purpose of this study is to identify and analyze the forms of hadith transmission through websites, as well as classify and describe the different types of websites that serve as media for hadith studies.

As explained in the literature review of the thesis entitled "Peran Website dalam Penyebaran Hadis di Era Digital." *El Nubuwwah: Jurnal Studi Hadis* The development of digital technology has brought great changes in various aspects of human life, including in the fields of education and Islamic studies. In this digital era, access to sources of Islamic knowledge, especially hadith, has become much easier and faster. Whereas in the past the search for hadith was limited to printed books that required special expertise in finding the references, now the process can be done quickly through various digital applications and websites. Digitalization has not only changed the way of accessing knowledge but has also affected one's approach in studying and understanding the content of hadith. Various digital platforms present hadith texts with attractive interfaces, instant search features, and integration with scholars' translations and explanations. Some previous studies have highlighted the utilization of digital hadith software and applications in the context of learning and research. For example, the applications Lidwa Pusaka, al-Maktabah ash-Syamilah, and Gawāmi' al-Kalīm V.4.5 have been investigated in terms of their effectiveness in use on both computers and Android devices. These studies generally focus on the comparison of technical features, availability of hadith collections, ease of navigation, and applicability in teaching and learning activities or scholarly research.[6]

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[2] Dliya Ul Fikriyyah, "Telaah Aplikasi Hadis (Lidwa Pusaka)," *Jurnal Studi Ilmu-Ilmu Al-Qur'an Dan Hadis* 17, no. 2 (2016).

[3] Pikri Hafidz Maulid, "Analisis Aplikasi Ensiklopedia Hadis 9 Imam Versi Android Sebagai Sarana Dakwah Di Media Sosial," *Jurnal Penelitian Ilmu Ushuluddin* 2, no. 2 (2022).

[4] Zainora binti Daud and Rabaatul Adawiyah Junus, "Persepsi Pelajar Pengajian Islam Terhadap Maktabah Syamilah Online Dalam Pembelajaran," 2022 (2024).

[5] Luthviyah Romziana et al., "Pelatihan Mencari Sumber Rujukan Kitab Tafsir Hadis Melalui Sofware Maktabah Syamilah Di Universitas Nurul Jadid Paiton Program Studi Ilmu Al-Quran Dan Tafsir," *Jurnal Pengabdian Masyarakat* 4, no. 2 (2022).

[6] Abdul Hamid, "Peran Website Dalam Penyebaran Hadis Di Era Digital," *El Nubuwwah Jurnal Studi Hadis* 2, no. 2 (2024), https://doi.org/10.19105/elnubuwwah.v2i2.15407.

To strengthen the argumentative and problem-oriented dimension of this introduction, it is also necessary to situate digital hadith dissemination within the broader debates of contemporary Hadith Studies, particularly those concerning sanad analysis and Islamic historiography. Scholars such as Harald Motzki, Behnam Sadeghi, and Christopher Melchert have demonstrated that sanad is not merely a technical tool for authentication but also a historical source that reflects patterns of transmission, authority, and scholarly networks in early Islam.[7] heir methodological approaches ranging from Motzki's isnād-cum-matn analysis to Sadeghi's probabilistic and historiographical reading of transmission data highlight the complexity and fragility of hadith authority when detached from rigorous critical frameworks. In the context of digital platforms, where sanad data are often presented in simplified, decontextualized, or automated forms, these insights become highly relevant, as they raise critical questions about whether digital representations of hadith can adequately convey the historiographical depth emphasized by contemporary scholarship.[8] Thus, integrating these perspectives underscores that the problem of digitized hadith dissemination is not merely technological, but epistemological, concerning how authority, authenticity, and historical consciousness are negotiated in the digital age of hadith studies.

METHOD:

This study uses a descriptive-critical qualitative approach with a literature review character. This method was chosen to conceptually and reflectively examine the epistemology of hadith science in the context of digital transformation, without intending to produce empirical generalizations or experimental testing of technical systems. The main focus of the research lies in analyzing the ideas, frameworks, and methodological implications of the shift from classical hadith criticism to a digital approach.

The main sources of data for this research consist of classical hadith literature, such as the works of al-Khaṭīb al-Baghdādī, Ibn Ḥajar al-ʿAsqalānī, and al-Suyūṭī, which are then critically discussed with contemporary academic publications on the digitization of hadith, computer-based hadith verification, and the epistemological discourse of knowledge in the digital age. Data was collected through searching books, scientific journal articles, and conceptual publications relevant to the theme of hadith and information technology.

Data analysis was conducted using a comparative-conceptual analysis method, which compares the epistemological principles of traditional hadith criticism with current digital approaches, particularly in terms of sanad, matan, and the assessment of hadith authenticity. Within this framework, Karl Popper's theory of falsification is used heuristically as a reflective tool to assess the testability and epistemological robustness of hadith verification methods, rather than as a technical or quantitative scientific verification procedure.

In addition, this study uses a critical hermeneutic approach to understand the transformation of meaning and function of key concepts in hadith science when recontextualized into a digital system, including the use of Natural Language Processing (NLP) and machine learning. This approach is aimed at examining the epistemological and ethical implications of automation in hadith studies, particularly in relation to scientific authority and the role of humans in the process of hadith assessment.

Thus, this study is positioned as a conceptual-critical study that aims to provide a reflective and methodological framework for the development of digital hadith studies. This study does not empirically assess the technical performance of the application, but rather

[7] Harald Motzki, *The Origins of Islamic Jurisprudence Meccan Fiqh before the Classical Schools* (Leiden: Brill, 2002).

[8] Christopher Melchert, *The Formation of the Sunni Schools of Law, 9th-10th Centuries C.E.* (Leiden: Brill, 1997).

evaluates the assumptions, limitations, and epistemological consequences of using digital technology in hadith verification, while maintaining human scientific authority as a central element in the Islamic scientific tradition.

DISCUSSION:

Ontology of Hadith Studies: Between Riwayah and Dirayah in a New Perspective

Subhi al-Shalih classifies the science of hadith into two main branches, namely the science of riwayah hadith and the science of dirayah hadith.[9] The science of hadith includes all information that comes from the Prophet Muhammad (peace be upon him) in the form of his sayings, actions, decrees, and attributes. In addition, information attributed to the Companions and the Taabi'in is also included in this category. Meanwhile, the science of hadith dirayah is a discipline that focuses on the aspect of analyzing and critically studying the sanad (chain of narrators) and matan (text of the hadith).[10] In this science, hadith are methodologically scrutinized to assess their validity and authenticity. This includes the study of the quality of the narrators, the consistency of the narration, and the conformity of the text with Islamic principles. Thus the science of dirayah becomes an important tool for filtering the authentic traditions from the weak or false ones.[11]

Based on the above explanation, it can be understood that there is a difference in content or approach between the terms sunnah and hadith. Although both have a common point in the aspect of the source, namely the Prophet Muhammad, the term "sunnah" refers more to the Prophet's lifestyle and behavior patterns, which are embodied through his speech and actions in daily life.[12] In contrast, the hadith is more focused on reports or information about everything related to the Prophet, whether in the form of words, deeds, decrees, or other matters related to him. The hadith has a more narrative characteristic since it is basically the result of the narration of individuals who convey what they heard or saw from the Prophet. Thus, although different in terms of approach, sunnah and hadith essentially lead to the same object: The Prophet Muhammad.[13]

In the context of its use, the term "sunnah" tends to be used by scholars of usul fiqh, especially in discussing legal arguments and sources of Islamic teachings other than the Qur'an. While the term "hadith" is more commonly used by hadith scholars in the study of hadith terminology and sanad-matan criticism. Despite the difference in terms, both complement each other and support the understanding of the teachings of the Prophet as a whole.[14]

One of the important figures in the hadith discourse is Ibn Taymiyyah, a reformist scholar whose thoughts have had a major influence on Islamic scholarship. In Indonesia itself, Ibn Taymiyyah's thought has attracted the attention of many academics, especially in the field of hadith.[15] However, studies that specifically discuss the ontology and epistemology of hadith in the perspective of Ibn Taymiyyah are still relatively limited, especially in the form of scientific works such as theses and theses. Therefore, further exploration of Ibn

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[9] Muhammad Dikri Multajam, "Telaah Ontologis Klasifikasi Ilmu Hadis: Dirāyah Dan Riwāyah Sebagai Basis Taksonomi," *Journal of Hadith Studies* 5, no. 1 (2025).

[10] Muhammad Ajja'j al-Khatib, *Ushul al Hadits, Ulumuhu Wa Musthalahuhu* (Beirut: Da'r al-Fikr, 1975).

[11] Subhi al-Shalih, *Membahas Ilmu-Ilmu Hadis* (Jakarta: Tim Pustaka Firdaus, 2000).

[12] Ajja'j al-Khatib, *Ushul al Hadits, Ulumuhu Wa Musthalahuhu*.

[13] al-Shalih, *Membahas Ilmu-Ilmu Hadis*.

[14] Muhammad Mustafa Azami, *Studies in Hadith Methodology and Literature* (Oak Brook: American Trust Publications, 1978).

[15] Zainal Abidin, "Corak Pemikiran Dan Metode Ijtihad Ibn Taymiyyah," *Millah: Journal of Religious Studies* Edisi Khusus Desember 2010 Studi Islam dalam Multiperspektif (2010).

Taymiyyah's contribution and methodology in the study of hadith becomes very important to enrich the understanding of contemporary Islamic science.[16]

Epistemology of Hadith Studies: Authenticity, Rationality, and Digital Verification

Hadith epistemology is an important branch of Islamic studies that discusses how to establish the validity of hadith through a scientific approach to the sanad and matan. In practice, the methods used include `Ilal al-Hadis to detect hidden defects in transmission, Tarikh al-Ruwah to trace the chronology and biography of narrators, al-Jarh wa al-Ta'dil to assess the moral and intellectual credibility of narrators, and Rijal al-Hadis to compile comprehensive information about narrators. This approach focuses on analyzing the integrity of the narrators, the continuity of the sanad, and the conformity of the matan with Shari'ah principles.[17] Hadith science developed into a complex discipline with its own methodology that distinguishes between sahih, dhaif and maudhu' traditions. Therefore, Hadith epistemology plays a strategic role in maintaining the purity of Islamic teachings through strict validation of the sources of transmission.[18]

The digital age has changed the way people access and disseminate hadith, but this transformation has also brought serious challenges to the validity of religious information.[19]. Hadith are now widely disseminated through social media and search engines without clear sanadic lines or adequate scientific verification processes, making it easy for false or manipulative hadith to circulate. This situation is exacerbated by the low level of digital and religious literacy among the public, which makes it difficult to distinguish between sahih, dhaif or maudhu' traditions. In this context, there is an urgency to build a digital epistemology that is able to combine the traditional methods of hadith science with technology-based verification tools. The aim is to maintain the purity of hadith from distortion of meaning and de-authorization of scholarship amidst the swift flow of digital information.[20]

The development of digital epistemology in hadith science emphasizes the importance of synergy between traditional methods and modern technology as an effort to maintain the validity of texts in the digital era. Concepts such as digital footprints and metadata are viewed as "digital sanads" that enable systematic tracing of the origin and verification of the authenticity of hadith.[21] With the support of databases and AI systems, this approach not only extends the reach of verification but also creates a new data-driven accountability mechanism. Therefore, collaboration between hadith scholars and technologists is crucial in designing a system that upholds scholarly integrity while remaining digitally relevant. This innovation is in line with the spirit of the philosophy of science that continues to evolve to meet the challenges of the times with an inclusive and adaptive approach[22].

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[16] Arief Imanullah, "Hadis Ahad Menurut Ibnu Taimiyah (Tinjauan Implikasi Dan Konsekuensi Pemikiran)" (Skripsi, IAIN Sunan Kalijaga Yogyakarta, 2010).

[17] Mohammad Hashim Kamali, *A Textbook of Hadith Studies: Authenticity, Compilation, Classification and Criticism of Hadith* (Kube Publishing Ltd, 2014).

[18] Muhammad Said and Muh. Tasbih, "Ulumul Hadis (Aspek Ontologi, Epistimologi Dan Aksiologi)," *El-Mizzi: Jurnal Ilmu Hadis* 2, no. 2 (2023).

[19] Paul K Mcclure, "Hashtag Islam: How Cyber-Islamic Environments Are Transforming Religious Authority, by GARY R. BUNT," *Sociology of Religion* 80, no. 4 (October 2019): 542–43, https://doi.org/10.1093/socrel/srz028.

[20] Sabilar Rosyad and Muhammad Alif, "Hadis Di Era Digital: Tantangan Dan Peluang Penggunaan Teknologi Dalam Studi Hadis," *Jurnal Ilmu Agama* 24, no. 2 (2023).

[21] Luciano Floridi, *The Fourth Revolution: How the Infosphere Is Reshaping Human Reality* (OUP Oxford, 2014).

[22] Ai Nurhayati and Samsul Pahmi, "Filsafat Ilmu Dalam Era Digital: Analisis Epistemologis Dan Etis Terhadap Transformasi Pengetahuan Di Dunia Modern," *Indonesian Journal of Science, Technology and Humanities* 2, no. 3 (February 2025).

Karl Popper's concept of falsification emphasizes that a scientific theory must be open to refutation in order to be considered valid, not just verifiable. In the context of hadith, this approach means not only proving the authenticity of a hadith but also actively looking for weaknesses, anomalies or contradictions that could invalidate it. The Islamic scholarly tradition is already familiar with similar principles through the methods of jarh wa ta'dil and illat criticism, which can now be formalized more explicitly through Popperian falsification[23]. The application of falsification in digital hadith verification encourages the development of a system that proactively detects and rejects false hadith rather than merely confirming valid ones. This marks an important paradigm shift from mere justification to active criticism as a form of protection against disinformation in the digital age[24].

The use of technologies such as Natural Language Processing (NLP), data mining, expert systems, and ontologies has brought great innovations in the automatic classification and verification of hadith. NLP enables the analysis of hadith matan and sanad texts through pre-processing and vector representations such as TF-IDF and Word2Vec, while data mining maps the patterns of hadith distribution in cyberspace to detect possible forgeries. Models such as CNN, Naive Bayes, and Decision Tree show high accuracy in classification, while expert systems and ontologies formalize jarh wa ta'dil and isnad knowledge into computer-based inference. Nonetheless, challenges such as algorithmic bias, data limitations, as well as modeling imperfections are still obstacles to full automation. Therefore, a human-in-the-loop approach is still needed so that technology becomes a tool that reinforces, rather than replaces, the role of hadith experts[25].

Epistemologically, artificial intelligence has fundamental limitations because it works based on data, statistical patterns, and probabilistic models, so it does not have normative capacity, scientific intuition, and ethical responsibility as possessed by hadith scholars. AI is only capable of processing what is available in the data corpus and algorithmic schemes, so its assessment of sanad and matn is instrumental, not ijtihādī. Therefore, scientific authority remains with muhaddith and hadith researchers who have competence in usul al-hadith, understanding of historical context, and sensitivity to maqāṣid al-sharīʿah. Within this framework, AI must be positioned as an epistemic tool that accelerates analysis, expands the scope of verification, and supports scientific work, not as the final determinant of hadith authenticity. Affirming this relationship is important so that digital transformation does not shift scholarly authority, but rather strengthens the role of scholars in maintaining the validity and integrity of hadith in the information age.

The Role of Artificial Intelligence in the Reconstruction of Hadith Knowledge

The digitization of hadith scholarship brought about a major transformation in the way people access and understand the teachings of the Prophet, making information more accessible and widespread. These advancements facilitated online learning and preservation of classical literature but also posed a serious challenge of spreading false hadith due to lack of verification mechanisms. The lack of digital and religious literacy among users, especially

[23] Jawad Qureshi, "The Development of Early Sunnite Hadith Criticism: The Taqdima of Ibn Abi Hatim al-Razi (240/854-327/938) by Eerik Dickinson (Leiden, Brill, 2001. 146 Pages.)," *American Journal of Islam and Society* 24, no. 1 (January 2007): 124–26, https://doi.org/10.35632/ajis.v24i1.1577.

[24] Maydi Aula Riski, "Teori Falsifikasi Karl Raimund Popper: Urgensi Pemikirannya Dalam Dunia Akademik," *Jurnal Filsafat Indonesia* 4, no. 3 (2021).

[25] M. Rafi Athallah and Kemas Muslim Lhaksmana, "Hadisth Text Classification Based on Topic Using Convolutional Neural Network (CNN) and TF-IDF," *Journal of Renewable Energy, Electrical, and Computer Engineering* 5, no. 1 (March 2025).

on social media, exacerbates this disinformation[26]. Therefore, a dual strategy is needed, utilizing technology for accessibility while developing verification systems and Islamic literacy. This requires the active involvement of academics and technology developers in integrating scientific validation into digital systems[27].

Each hadith consists of a sanad and a matan, which can now be automatically recognized through a Natural Language Processing (NLP) approach. With the help of machine learning and deep learning, the system can classify traditions based on the quality of the sanad and matan, including sahih, hasan, and dha'if, with a high accuracy of up to 97%. The algorithm also enables the automation of hadith assessment based on quantitative features such as the relationship between narrators, replacing the traditional qualitative and intuitive approach. The integration of AI and digitization expands public access to hadith literature through apps and databases, accelerates takhrij and enables collaborative cross-border study[28]. The Hadith Verification Engine concept is now realized through a combination of NLP, expert systems and automatic classification that work synergistically to create a more holistic hadith authentication framework[29].

In addition to NLP, AI technology also utilizes deep learning to automatically classify hadith based on scholarly parameters determined by classical scholars. AI can "learn" from thousands of hadith entries that have been labeled by experts, thus generating an adaptive classification system[30]. This enables the creation of structured hadith databases complete with metadata on the sanad, narrators, and reports. By doing so, AI is able to provide an interactive platform for learners and researchers. This expands access to hadith literature that was previously scattered, unintegrated, and difficult to analyze manually[31].

AI is not only used to detect plagiarism, but is also able to identify anomalies in the sanad and matan that indicate forgery or theological inconsistencies. The system analyzes digital footprints and builds a graph of the transmitter network to find suspicious transmission patterns on a large scale. This approach enables the application of the principle of ittisal al-sanad in the form of digital visualization to help scholars detect complex fabricated traditions. In this context, Karl Popper's principle of falsification can also be applied, encouraging AI to not only seek the truth but also actively test and disprove the authenticity of hadith. Therefore, the design of an AI system for hadith verification should include anomaly-finding algorithms and early warning systems in order to maintain the integrity of Islamic knowledge in the digital age[32].

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[26] Heidi A. Campbell and Ruth Tsuria, *Digital Religion: Understanding Religious Practice in Digital Media* (Routledge, 2021).

[27] Harie Fachrurrosi and Tajul Arifin, "Penggunaan Teknologi Modern Dalam Penelitian Hadits," *Cakrawala: Journal of Religious Studies and Global Society* 1, no. 2 (Desember 2024).

[28] Abdul Hakim and Pauli Anggraini, "Artificial Intelligence in Teaching Islamic Studies: Challenges and Opportunities," *Molang: Journal Islamic Education* 1, no. 2 (July 2023): 19–30, https://doi.org/10.32806/jm.v1i2.619.

[29] Hammam M. ABDELAAL and Hassan A. YOUNESS, "Hadith Classification Using Machine Learning Techniques According to Its Reliability," *ROMANIAN JOURNAL OF INFORMATION SCIENCE AND TECHNOLOGY* 22, nos. 3–4 (n.d.): 2019.

[30] Fouzi Harrag, Aboubekeur Hamdi-Cherif, and Eyas El-Qawasmeh, "Vector Space Model for Arabic Information Retrieval — Application to 'Hadith' Indexing," *2008 First International Conference on the Applications of Digital Information and Web Technologies (ICADIWT)*, August 2008, 107–12, https://doi.org/10.1109/ICADIWT.2008.4664328.

[31] Moath Mustafa Ahmad Najeeb, "Towards a Deep Leaning-Based Approach for Hadith Classification," *EJERS, European Journal of Engineering and Technology Research* 6, no. 3 (March 2021).

[32] Taghreed Tarmom, Eric Atwell, and Mohammad Alsalka, "Deep Learning vs Compression-Based vs Traditional Machine Learning Classifiers to Detect Hadith Authenticity," *White Rose Research*, December 2021.

Although AI offers tremendous potential in hadith studies, its use must remain grounded in traditional epistemological and critical approaches in order to maintain valid scientific authority. AI is merely a tool that needs to be controlled and evaluated by hadith scholars since technology cannot replace the human aspects of spirituality, empathy, and normative validation. The integration of AI with hadith science demands close collaboration between computer scientists and scholars to transform classical principles such as 'is, dabt, and ittisal al-sanad into a representative digital system. Harmonization between classical methods and modern technology should be viewed as a synthesis rather than an antagonism, so that AI serves to strengthen rather than displace traditional foundations.[33] Therefore, the development of a new paradigm based on interdisciplinary work is imperative, in order to give birth to a more adaptive, accurate, and effective Islamic scientific methodology in the digital era[34].

Ethical and Hermeneutical Consequences in the Digitalization of Hadith

Hadith as the second source of Islamic teachings after the Qur'an plays an important role in shaping the value system and legal order in Muslim society. However, in the process of understanding, hadiths are not only understood textually or normatively, but must also be analyzed ethically and hermeneutically. The ethical consequence refers to the moral values contained in the hadith, while the hermeneutical consequence relates to the method of interpretation that takes into account the historical, cultural context and purpose of the Prophet Muhammad's words. This approach is important so that the hadith is not only used as a legal basis, but also becomes an actual and contextual guide to life. The ethical consequences of the hadith are manifested in the form of the formation of noble morals and behavior for Muslims. Many traditions emphasize the values of honesty, compassion, justice and social responsibility as part of the character of a true Muslim. For example, the Prophet's tradition that "the best of human beings are those who are most beneficial to others" (HR Ahmad) provides the foundation for social ethics and concern for others. These hadiths are not mere exhortations, but rather form a moral framework that must be realized in daily life.[35]

On the other hand, the hermeneutical approach to understanding hadith emphasizes the importance of interpreting hadith texts in depth and not rushing to take the literal meaning. This is because many traditions were delivered by the Prophet in certain social and cultural contexts that are different from today's conditions. Therefore, an understanding of asbab al-wurud (the causes of the emergence of the hadith), historical context, and maqashid sharia (the purpose of Islamic law) becomes very important. Contextual interpretation will produce an understanding that is relevant and can be applied wisely in contemporary life.[36] An example of the hermeneutical approach can be seen in the hadith that recommends beating a child who does not pray at the age of 10. If understood literally, this hadith can be interpreted as legitimizing violence against children. However, hermeneutically, this hadith is more accurately understood as a recommendation to instill discipline and responsibility for worship from an early age, not physical violence. With this approach, the value of education

[33] Jonathan A. C. Brown, *Misquoting Muhammad: The Challenge and Choices of Interpreting the Prophet's Legacy* (Simon and Schuster, 2014).

[34] Bambang Sulistio et al., "The Utilization of Machine Learning on Studying Hadith in Islam: A Systematic Literature Review," *Education and Information Technologies*, July 17, 2023.

[35] Luthfi Maulana, "Periodesasi Perkembangan Studi Hadits (Dari Tradisi Lisan/Tulisan Hingga Berbasis Digital)," *ESENSIA: Jurnal Ilmu-Ilmu Ushuluddin* 17, no. 2 (2016).

[36] Karima Nurul Huda, "Perkembangan Kajian Hadis Dalam Ranah Digital," *Andung: Gunung Dajati Conference*, n.d.

and compassion in Islam is maintained, and the misuse of religious texts to justify unethical actions is avoided.[37]

The ethical and hermeneutical consequences are closely related. Ethical understanding encourages Muslims to explore the wisdom and virtues of the hadith, while a hermeneutical approach ensures that these values are applied appropriately in the context of the times. hermeneutical approach ensures that these values are applied appropriately according to the context of the times. Without an ethical understanding, the hadith can be used to justify intolerant behavior. Conversely, without a hermeneutical approach, the hadith can be misinterpreted and imposed literally without considering the social context that was different from the Prophet's time. In a complex and dynamic modern society, both approaches are essential to keep the teachings of Islam relevant. Social changes, scientific developments, and cultural diversity demand a more inclusive and contextual interpretation of hadith. This does not mean changing the teachings of Islam, but understanding the moral message and purpose of the Shari'ah in a way that suits the needs of the times. Thus, Muslims can take maximum advantage of the hadith as a source of goodness and wisdom.

An ethical and hermeneutical approach can also prevent the rise of religious extremism that often stems from a narrow and textualist understanding of hadith. For example, some groups may use the hadith about jihad narrowly to justify violence when hermeneutically jihad encompasses a broad struggle for justice, education and the welfare of the people. By understanding the context, purpose and moral values of the hadith, Muslims can avoid harmful interpretations and instead promote Islam as a religion that is rahmatan lil 'alamin. Thus, the ethical and hermeneutical consequences of the hadith determine the direction and quality of Islamic understanding in society. Hadith should not only be understood as commands or prohibitions, but also as a source of values and wisdom that guides people in facing the challenges of the times. Through this approach, the hadith can continue to be a light for Muslims, guiding them to live morally, justly and compassionately, without losing the spirit of the example of the Prophet Muhammad.[38]

Data collection in this study was carried out through various sources, both primary and secondary. The primary source used is the book *Kontribusi Digitalisasi Hadis Bagi Perkembangan Studi Hadis di Era Revolusi Industri 4.0* by Istianah and Sri Wahyuningsih. The secondary sources include various types of scientific publications such as journal articles, proceedings, theses, dissertations, as well as several websites that contain information about the development of hadith digitization. Some of them are Dorar.net, Waqfeya, CariHadis.com, nabualhadith.com, and Hadith Digital Online All in One.

The data collection process was conducted in stages. The first stage began with a reference search using various academic databases such as Google Scholar, ResearchGate, and university repositories to find articles and scientific papers relevant to the research topic. Once the references were collected, each source was evaluated based on the authority of the author, the credibility of the publisher, and the actuality or newness of the information presented. The sources that had passed the selection process were then organized and classified based on their type, whether they were books, journal articles, or websites.

CONCLUSION :

This study confirms that the ontology of hadith studies is fundamentally divided into two main domains, namely the science of riwayah and the science of dirayah. Ilmu riwayah

[37] Raegil Albert Setiawan, "Resepsi Hadis Pada Platform Media Sosial: Studi Kritis Tentang Penyebaran Dan Interpretasi Hadis Di Era Digital," *Musnad : Jurnal Ilmu Hadis* 2, no. 1 (2024).

[38] Wahyuningsih dan Istianah, *Kontribusi Digitalisasi Hadis Bagi Perkembangan Studi Hadis Di Era Revolusi Industri*, n.d.

focuses on the preservation and transmission of authentic hadith originating from the Prophet Muhammad SAW through his companions and tabi'in, while ilmu dirayah functions as an analytical tool to test the validity of sanad and matan through the evaluation of the credibility of narrators and the conformity of the substance of the hadith with the principles of Islamic teachings. Within this framework, the conceptual difference between hadith and sunnah is also significant; hadith is understood as a narrative report of the Prophet's words, deeds, and decisions, while sunnah represents the normative patterns of the Prophet's life. Although they have different focuses, both still refer to the Prophet Muhammad SAW as the main source of Islamic teachings.

From an epistemological perspective, this study shows that the mechanism of hadith verification developed through classical disciplines such as 'Ilal al-Hadith, Tarikh al-Ruwah, Jarh wa Ta'dil, and Rijal al-Hadith plays a central role in maintaining the authenticity and integrity of Islamic teachings. However, the development of digital technology presents new challenges, particularly in the form of the massive spread of hadith without clear sanad in the digital space, which is exacerbated by low digital and religious literacy among the public. This condition necessitates the creation of a digital epistemological framework in hadith studies, namely the integration of classical methodology with modern verification technology based on artificial intelligence, including the use of metadata and digital footprints as a form of "digital sanad" to support the validity of hadith information in the contemporary era.

Furthermore, this study finds that the application of Karl Popper's principle of falsification in the study of hadith has strong methodological relevance, as it encourages a critical and evaluative attitude in detecting weaknesses, anomalies, and potential flaws in the transmission and substance of hadith. This approach is conceptually in line with the tradition of hadith criticism in Islam, particularly through the mechanisms of jarh wa ta'dil and 'illat analysis. AI-based technological innovations, such as Natural Language Processing, data mining, and automatic classification systems using Convolutional Neural Network (CNN) and Naive Bayes models, show significant potential in assisting the process of categorization and analysis of hadith. However, challenges such as algorithmic bias, dataset limitations, and the risk of epistemic reductionism emphasize that technology cannot stand autonomously without scientific supervision. Therefore, a hybrid human-in-the-loop approach is the main recommendation so that the role of technology is complementary and remains under the scientific authority of hadith scholars.

Ultimately, reconstructing hadith knowledge through the use of artificial intelligence not only has implications for expanding access and strengthening cross-disciplinary and geographical collaboration, but also requires ethical and hermeneutical caution. Understanding hadith must remain contextual, taking into account asbab al-wurud, maqashid syariah, and universal moral values such as justice and compassion. Thus, the study of hadith in the digital age is not trapped in a narrow textual reading, but is able to contribute to preventing extremism and reinforcing Islam as rahmatan lil 'alamin. Continuous collaboration between scholars, academics, and technologists is a key prerequisite in formulating an adaptive, credible, and relevant methodology for the study of hadith amid the dynamics of the Industrial Revolution 4.0.

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