

# Islamic Educational Management 5.0: A Human-Centered Model for Synchronizing Artificial Intelligence and Digital Culture in Pesantren

Khuliyati<sup>1</sup>, Atmari<sup>2</sup>

<sup>1</sup> Sekolah Tinggi Ilmu Tarbiyah Sunniah Salafiyah Pasuruan, Indonesia

<sup>2</sup> Universitas Islam Al Azhar Gresik, Indonesia

## ARTICLE INFO

### Keywords:

Islamic Educational  
Management 5.0; Artificial  
Intelligence; Digital Culture

### Article history:

Received 2026-06-14

Revised 2026-07-12

Accepted 2026-08-17

## ABSTRACT

The emergence of Society 5.0 and Artificial Intelligence (AI) presents opportunities and challenges for traditional Islamic boarding schools (pesantren), requiring technological transformation without compromising spiritual authority and classical scholarship (turats). This study examines the operationalization of Islamic Educational Management 5.0 at Pesantren Nurul Huda, focusing on the synchronization of AI, digital culture, and Islamic governance. Using a qualitative single-case study, data were collected through semi-structured interviews with kiai, asatidz, IT managers, and santri, six-week observations, and institutional document analysis. Data were analyzed using Miles, Huberman, and Saldana's interactive model, supported by methodological triangulation and member checking. Findings indicate three dimensions of synchronization: AI-supported academic and administrative management, dual-filter cultural adaptation combining technical and Islamic ethical evaluation, and human-centered governance in which AI functions as a decision-support tool (wasilah) under religious leadership. The study proposes a human-centered Islamic Educational Management 5.0 framework that enhances efficiency while preserving sanad al-'ilm, suhbah, and institutional authenticity.

*This is an open-access article under the [CC BY SA](#) license.*



## Corresponding Author:

Khuliyati

Sekolah Tinggi Ilmu Tarbiyah Sunniah Salafiyah Pasuruan, Indonesia, [liazahwa895@gmail.com](mailto:liazahwa895@gmail.com)

## INTRODUCTION

The rapid evolution of Society 5.0 and Artificial Intelligence (AI) has redefined global educational landscapes, demanding a paradigm shift from simple digitization toward human-centered, intelligent, and technology-driven management systems. Society 5.0 emphasizes the integration of advanced technologies with human capabilities to address complex social and educational challenges, positioning AI, big data, and intelligent information systems as strategic components of institutional

transformation. Within Islamic education, particularly in traditional boarding schools (pesantren), this transition introduces a critical imperative: modernizing institutional governance while preserving core spiritual values, akhlaq al-karimah, turats, and the authority of Islamic scholarship. Recent studies indicate that pesantren are increasingly engaging with digital transformation, although technological adoption remains uneven and strongly dependent on institutional readiness, leadership, infrastructure, and cultural adaptation (Supriyono, 2022; Afif et al., 2023; Nugroho & Astutik, 2024). Thus, the transformation toward Islamic Educational Management 5.0 should not be understood merely as technological modernization but as a process of integrating intelligent technologies with the distinctive epistemological, cultural, and ethical foundations of Islamic education.

Within the pesantren context, digital transformation has already expanded beyond conventional information and communication technology toward more systematic digital ecosystems. Studies have documented the use of digital platforms, multimedia, online learning, digital assessment, and information systems to improve learning effectiveness and institutional services. Supriyono (2022) demonstrates that the COVID-19 pandemic accelerated digital transformation in pesantren while simultaneously revealing the importance of maintaining the distinctive educational character of pesantren. Similarly, Haris (2023) emphasizes that digitalization in the Society 5.0 era presents both opportunities and challenges for pesantren, particularly in relation to institutional identity, student character, and technological readiness. Afif et al. (2023) further demonstrate that IT-based collaborative learning can strengthen creative thinking among students in pesantren, indicating that digital transformation can support educational innovation when appropriately integrated with Islamic educational objectives. More recent empirical research also shows that digital technology can improve Qur'anic memorization, learning evaluation, and monitoring systems, while challenges concerning infrastructure, teacher competence, and the balance between traditional and digital approaches remain significant (Nugroho & Astutik, 2024; Masrur et al., 2025).

The emergence of AI represents a qualitatively different stage of this transformation. Unlike conventional digital technologies that primarily facilitate communication, documentation, and access to learning materials, AI enables predictive analytics, automated decision support, adaptive learning, natural language processing, intelligent assessment, and data-driven institutional management. In Islamic education, AI has been identified as having considerable potential to personalize learning, analyze student performance, support teachers, and improve educational administration (Mukminah & Mahmudah, 2023; Zarkani et al., 2025). Recent studies have also begun to examine AI specifically within Islamic educational management, demonstrating its potential to automate administrative processes, improve data accuracy, and support evidence-based decision making (Pohan & Pohan, 2025; Anshori et al., 2025). These developments suggest that AI should no longer be positioned merely as an instructional assistant but increasingly as part of a broader educational management architecture capable of connecting academic, administrative, and institutional decision-making processes.

Nevertheless, the integration of AI into Islamic educational institutions raises questions that cannot be resolved solely through technological or managerial perspectives. Islamic education places considerable emphasis on adab, moral formation, human interaction, spiritual guidance, and the transmission of authoritative religious knowledge. Consequently, the introduction of algorithmic decision-making into educational environments may create tensions between efficiency and human judgment, automation and teacher authority, data-driven prediction and contextual understanding, and technological innovation and religious ethics. Recent scholarship on AI in Islamic education highlights concerns regarding algorithmic bias, privacy, academic integrity, the potential weakening of critical thinking, and the possibility of reducing the teacher's spiritual and pedagogical role (Hasanah et al., 2024; Larhzizer Hassan et al., 2025; Fathorrozy et al., 2026). From an Islamic ethical perspective, AI adoption therefore requires principles of amanah, justice, transparency, responsibility, privacy

protection, and *maqāṣid al-sharī'ah*. AI should function as an instrument that strengthens human educational responsibility rather than replacing the moral and spiritual agency of educators.

This ethical dimension becomes particularly important in *pesantren* because educational authority is not structured solely through bureaucratic management. The Kiai occupies a central position as religious leader, educator, moral exemplar, and institutional decision maker. The transmission of knowledge is embedded within interpersonal relationships, *adab*, *ta'lim*, *ta'dib*, and the continuity of *sanad al-'ilm*. Consequently, implementing AI-based governance in *pesantren* requires more than technical infrastructure; it requires alignment between technological systems and the existing structure of religious authority. Recent research on digital transformation in *pesantren* demonstrates that successful transformation depends strongly on leadership, organizational culture, human-resource capacity, digital literacy, and the ability to preserve Islamic traditions while adopting technological innovation (Ahmadi et al., 2025; Abidin et al., 2025). Digital transformation therefore becomes sustainable when technology reinforces rather than displaces the leadership, values, and educational traditions embedded within the *pesantren* ecosystem.

Despite these contributions, a significant research gap persists in contemporary literature. Existing studies predominantly examine digitalization in *pesantren* in terms of online learning, multimedia utilization, digital literacy, learning evaluation, or general institutional modernization. Although recent scholarship has begun to discuss AI in Islamic education and educational management, there remains limited empirical research examining AI as an integrated governance framework within traditional *pesantren*. In particular, insufficient attention has been given to the structural mechanisms through which predictive analytics, automated administrative systems, AI-assisted pedagogy, and data-driven decision support can be integrated with the leadership structure of the Kiai, the preservation of *sanad al-'ilm*, and the ethical culture of *akhlaq al-karimah*. This gap is particularly important because recent research continues to emphasize that technological transformation in *pesantren* depends not simply on technological availability but on organizational culture, leadership, human resources, and institutional values.

Accordingly, Islamic Educational Management 5.0 can be conceptualized as an emerging managerial framework that combines intelligent technologies with the humanistic, spiritual, and ethical foundations of Islamic education. Within this framework, AI is not positioned as a replacement for the Kiai, teachers, or traditional learning relationships, but as a supporting infrastructure for evidence-based management, educational personalization, administrative efficiency, institutional monitoring, and strategic decision making. Such an approach is consistent with emerging scholarship that argues for human-centered and ethically regulated AI integration in Islamic education. The central principle is therefore not technological substitution but technological augmentation: AI enhances institutional capabilities while human beings remain responsible for moral judgment, religious interpretation, educational relationships, and strategic leadership (Kurnaesih et al., 2026; Zulfikar et al., 2026).

The primary objective of this research is to critically analyze and conceptualize the strategic operationalization of Islamic Educational Management 5.0 within the *pesantren* ecosystem by examining how AI technologies can be systematically synchronized with the unique digital culture and socio-religious framework of Islamic boarding schools. Specifically, this study investigates the structural mechanisms through which data-driven governance, predictive analytics, automated administration, and AI-assisted pedagogy can enhance administrative efficiency and educational quality without diminishing the central spiritual authority of the Kiai, the preservation of classical scholarly chains (*sanad al-'ilm*), or the ethical foundation (*akhlaq al-karimah*) of institutional culture. The study consequently responds to the emerging need for an Islamic educational management framework capable of balancing technological intelligence with spiritual intelligence and institutional wisdom.

To bridge this literature gap, this article investigates the structural and cultural alignment required to operationalize Islamic Educational Management 5.0 in Pesantren Nurul Huda. By analyzing the intersection of AI integration, digital culture, educational governance, Islamic leadership, and traditional knowledge transmission, this study seeks to formulate a comprehensive managerial model that positions AI as an enabling technology rather than a replacement for human and religious authority. The proposed model is expected to provide actionable insights for Kiai, pesantren leaders, teachers, policymakers, and religious authorities in designing responsible digital transformation strategies. Ultimately, this research argues that the future of Islamic educational management in the Society 5.0 era depends not on choosing between technological advancement and Islamic tradition, but on constructing an integrated governance model in which AI strengthens administrative effectiveness, educational quality, and institutional responsiveness while simultaneously safeguarding *akhlaq al-karimah*, *sanad al-'ilm*, *turats*, and the authentic identity of pesantren. Recent research increasingly supports this direction by emphasizing that sustainable digital transformation requires the simultaneous integration of technology, ethical governance, leadership, digital literacy, and Islamic educational values (Hosna & Nurhidayati, 2026; Kurniawan & Kamalie, 2026).

## METHODS

This study employs a qualitative research design framed as a single case study (Yin, 2018) to investigate the synchronization of Artificial Intelligence (AI) technology and digital culture within Islamic Educational Management 5.0 at Pesantren Nurul Huda. A qualitative case study approach is appropriate for examining complex and context-dependent phenomena within their real-life settings, particularly when the boundaries between technological innovation, institutional governance, religious values, and educational practices are closely interconnected. This approach enables the researcher to obtain an in-depth understanding of how AI-driven technologies are introduced, interpreted, and operationalized within the traditional governance structure of the pesantren while maintaining its spiritual values, *akhlaq al-karimah*, *turats*, and *sanad al-'ilm*. The research was conducted at Pesantren Nurul Huda as a single bounded case, with the institutional environment, leadership structure, educational practices, digital infrastructure, and AI-based management practices constituting the primary units of contextual analysis.

The data consisted of primary and secondary sources. Primary data were obtained directly through in-depth semi-structured interviews and field observations involving key informants who were selected purposively based on their knowledge, authority, and direct involvement in the implementation of educational management and digital technology at Pesantren Nurul Huda. The informants included the Kiai as the central institutional leader, Asatidz or academic administrators responsible for educational implementation, information technology personnel responsible for digital systems and AI-related infrastructure, and selected santri representatives who experienced the implementation of digital and AI-supported educational practices. Secondary data were obtained from relevant institutional documents, including policy documents, organizational guidelines, digital curriculum schedules, administrative records, AI integration guidelines, digital management procedures, server or system usage records where accessible, and official publications produced by the pesantren. The combination of primary and secondary data enabled the researcher to examine both the perceptions and experiences of institutional actors and the formal structures through which AI and digital technologies were incorporated into pesantren management.

Data collection was conducted through interviews, observations, and documentary analysis. Semi-structured interviews were conducted using an interview guide developed around several analytical domains, including institutional decision-making, patterns of AI adoption, digital governance, administrative transformation, educational practices, ethical considerations, the role of the Kiai, the

preservation of sanad al-'ilm, and the relationship between technological innovation and akhlaq al-karimah. The semi-structured format allowed the researcher to maintain consistency across interviews while providing sufficient flexibility to explore emerging issues and informants' experiences in greater depth. Direct field observations were conducted in relevant institutional settings, including administrative offices, computer laboratories, classrooms, and other areas where digital platforms or AI-supported systems were utilized. Observation focused on how technology was incorporated into daily administrative activities, teaching and learning, communication, data management, and institutional decision-making. Documentary analysis was subsequently conducted to examine institutional artifacts, policy documents, curriculum materials, management guidelines, digital records, and relevant system interfaces. These documents were used to corroborate information obtained through interviews and observations and to identify similarities, differences, and patterns across the available sources.

The data were analyzed using the interactive model of Miles, Huberman, and Saldaña (2014), which emphasizes the interconnected processes of data condensation, data display, and drawing and verifying conclusions. Data condensation was conducted by selecting, focusing, simplifying, abstracting, and transforming information obtained from interview transcripts, field notes, and institutional documents. During this stage, irrelevant information was excluded, while meaningful data were coded according to themes related to AI integration, digital culture, educational management, institutional leadership, administrative transformation, ethical governance, and the preservation of Islamic educational values. The coding process was iterative, allowing emerging concepts to be compared and refined throughout the analysis. Following data condensation, the findings were displayed through thematic organization and narrative descriptions to facilitate the identification of relationships, patterns, and structural mechanisms connecting AI technology with the traditional governance system of Pesantren Nurul Huda. The final stage involved drawing and verifying conclusions by identifying overarching themes, relationships, and explanatory patterns emerging from the data. Preliminary interpretations were continuously compared with interview evidence, observation records, and institutional documents to ensure consistency and analytical credibility. The verification process was strengthened through triangulation across data sources and techniques, examination of field notes, and member checking with selected key informants. Through this iterative analytical process, the study sought to ensure that the resulting interpretation accurately represented the processes through which AI integration and digital culture were synchronized with the traditional, ethical, and spiritual foundations of Islamic educational management at Pesantren Nurul Huda.

## FINDINGS AND DISCUSSION

The empirical investigation at Pesantren Nurul Huda indicates that the implementation of Islamic Educational Management 5.0 is characterized not by the replacement of traditional educational authority with Artificial Intelligence (AI), but by a process of structured synchronization between intelligent technologies, institutional governance, and the socio-religious culture of the pesantren. The findings demonstrate that AI is positioned as a supporting instrument for institutional decision-making, academic monitoring, administrative management, and learning activities, while the Kiai and Asatidz remain the primary authorities in determining educational direction and religious interpretation. This finding is important because the transformation toward Society 5.0 requires educational institutions to integrate technological intelligence with human-centered management rather than pursuing automation as an end in itself. Previous studies have similarly demonstrated that AI can improve administrative efficiency, personalized learning, and educational decision-making, but its implementation requires continuous human oversight and contextual adaptation (Bond et al., 2024; Ouyang et al., 2023; Suhardi, 2025).

### **AI-Driven Administrative and Pedagogical Synchronization**

The first major finding concerns the integration of AI into administrative and pedagogical processes. Pesantren Nurul Huda has developed an increasingly digital management environment in which academic records, student development, administrative information, and learning activities are interconnected through digital systems. AI-supported applications are used primarily to organize and interpret institutional data rather than to independently determine educational policies. This arrangement enables institutional leaders to obtain more comprehensive information regarding student development and administrative conditions before making decisions. Such findings are consistent with the broader development of AI in educational management, where intelligent systems are increasingly used for administrative automation, data processing, prediction, and decision support (Suhardi, 2025). The significance of the Nurul Huda case lies in the way such technologies are incorporated into an institutional structure that continues to place human and religious authority above algorithmic recommendations.

At the academic level, predictive student analytics provide one of the most visible forms of AI-supported management. Student information relating to academic achievement, tahfidz progress, attendance, participation, and behavioral development is processed to identify patterns that may indicate the need for additional academic or pastoral support. The system does not automatically determine the treatment of individual students; instead, the information is interpreted by teachers and institutional leaders. In this sense, predictive analytics function as an early-warning mechanism that helps educators identify students who may require additional mentoring. This finding corresponds with research demonstrating that AI-supported educational systems can facilitate student profiling, prediction, adaptive learning, and personalized educational interventions (Bond et al., 2024). Nevertheless, the Nurul Huda model places a stronger emphasis on human interpretation because student development in pesantren cannot be adequately represented by quantitative indicators alone.

The integration of AI into pedagogy is also reflected in the use of Natural Language Processing (NLP) for supporting the analysis of classical Islamic texts. AI-assisted tools are utilized to facilitate the identification of Arabic grammatical structures, syakl, vocabulary, and nahwu-shorof patterns in kitab kuning. The technology therefore reduces the time required for preliminary textual analysis and enables students and teachers to access supporting linguistic information more efficiently. However, the findings indicate that AI-generated explanations are treated as preliminary references rather than authoritative interpretations. Teachers and Asatidz continue to verify textual meaning, context, and theological implications before information is used in formal learning. This distinction is particularly important in Islamic education because technological accuracy and religious authority are not necessarily equivalent. Recent studies on AI in Islamic education similarly emphasize that AI can support learning personalization and access to knowledge but should not replace teachers in moral, spiritual, and religious formation (Arifudin & Akil, 2026; Hassan et al., 2025).

The administrative dimension demonstrates a similar pattern of technological augmentation. Routine processes such as scheduling, student records, resource allocation, financial monitoring, and institutional reporting have increasingly moved from manual documentation toward integrated digital management. This transformation enables administrators to reduce repetitive work and allows institutional leaders to access information more rapidly. The shift is consistent with the broader movement toward AI-supported educational management, in which intelligent information systems can increase efficiency and facilitate evidence-based decision-making. Research on educational management in Indonesia confirms that AI has potential to optimize administrative processes, support institutional decision-making, and improve organizational efficiency (Suhardi, 2025). At Pesantren

Nurul Huda, however, administrative automation remains subject to institutional supervision, indicating that technological efficiency is subordinated to organizational accountability.

### **Transformation from Digitalization to Islamic Educational Management 5.0**

The findings further reveal a gradual transformation from conventional management toward digital management and subsequently toward an emerging Society 5.0 model. In the conventional system, curriculum management, student records, administrative reporting, and monitoring were predominantly dependent on manual documentation and direct observation. The first phase of digitalization introduced electronic documents, databases, online communication, and basic learning platforms. The current phase goes beyond simple digitization by connecting institutional data, analytical processes, and decision-making mechanisms. This distinction is theoretically important because digitalization merely converts existing processes into digital formats, whereas Education 5.0 involves using intelligent technologies to create more adaptive, responsive, and human-centered educational systems. Studies on Society 5.0 similarly emphasize that AI can support personalized learning, administrative tasks, and educational decision-making while maintaining the central role of teachers (Oktavian et al., 2023; Prasetyo & Rosyid, 2022).

Within the curriculum and pedagogy domain, this transformation is visible in the movement from standardized learning toward more adaptive learning support. Previously, students generally followed similar learning schedules and teachers relied heavily on manual observation to identify differences in student achievement. Digital systems subsequently enabled electronic learning materials and online resources. The integration of AI introduces the possibility of adaptive learning paths based on student performance and learning needs. Such a development is particularly relevant to pesantren because students have diverse abilities in Qur'anic memorization, Arabic language, classical Islamic texts, and general academic subjects. Digital transformation studies in pesantren have already shown that technology can improve learning processes, including Qur'anic memorization and student engagement (Nugroho & Astutik, 2024). The Nurul Huda findings extend this development by demonstrating how AI can potentially transform digital learning resources into more responsive learning-support systems.

At the institutional governance level, the transformation is even more significant. Conventional management depended largely on hierarchical communication and paper-based reporting, while basic digitalization introduced databases and spreadsheets. Under the emerging Management 5.0 model, institutional leaders can use integrated dashboards and analytical information to monitor academic, administrative, and student-development indicators. This creates a new relationship between data and leadership: data become an informational resource for Kiai and administrators rather than an autonomous decision-making authority. The finding is consistent with the human-centered orientation of Society 5.0, in which technological intelligence is expected to improve human decision-making rather than eliminate human responsibility. This approach also responds to concerns in AI research regarding excessive automation, algorithmic bias, and the reduction of complex human decisions to numerical indicators (Mouta et al., 2024; Collin et al., 2024).

### **Preservation of Kiai Authority and Sanad al-'Ilm**

One of the most important findings concerns the preservation of sanad al-'ilm and the authority of the Kiai. The implementation of AI at Pesantren Nurul Huda does not alter the fundamental hierarchy of religious knowledge. AI is positioned as a *wasilah* or supporting instrument, while the Kiai and qualified *Asatidz* remain the principal authorities in determining the validity, interpretation, and pedagogical application of religious knowledge. This distinction becomes particularly important when AI is used for classical Islamic texts. Although NLP can assist with translation, grammatical identification, and textual comparison, it cannot independently determine the theological or jurisprudential implications of a particular passage. Therefore, AI-supported textual analysis is

subjected to human verification before being incorporated into teaching. This finding reinforces recent arguments that AI should complement rather than replace teachers, particularly in value-based and religious education (Arifudin & Akil, 2026; Hassan et al., 2025).

The preservation of sanad also demonstrates that digital transformation at Pesantren Nurul Huda does not necessarily imply the disappearance of traditional pedagogical relationships. Instead, technology is incorporated into an existing system of talaqqi, suhbah, and tarbiyah. Digital resources can provide additional explanations, textual references, and learning support, but the transmission of religious knowledge continues to depend on direct interaction between teachers and students. This finding is significant because the literature on digital education frequently emphasizes the risk that technological mediation may reduce interpersonal relationships. Within the pesantren context, however, technology is strategically subordinated to direct pedagogical relationships. Digital transformation therefore becomes an extension of traditional education rather than its replacement. Research on digital transformation in pesantren similarly emphasizes that technological adoption needs to preserve the distinctive identity and educational culture of the pesantren (Bahri et al., 2024; Ahmadi et al., 2025).

The role of the Kiai consequently changes from being exclusively a source of direct institutional information toward becoming a strategic regulator of technological transformation. The Kiai does not need to operate every technological system personally, but determines the boundaries within which technology can be utilized. IT personnel and administrators are responsible for technical implementation, while the Kiai and senior Asatidz provide normative and ethical direction. This distribution creates a form of collaborative governance in which technological expertise and religious authority operate within complementary domains. The finding supports research showing that the Kiai continues to play a critical role in directing digital transformation and improving educational services in pesantren (Bahri et al., 2024).

### **Human-Centered Governance and Personalized Tarbiyah**

The second major analytical finding relates to the human-centered character of Islamic Educational Management 5.0. AI-based predictive systems are not primarily implemented to maximize institutional efficiency but to strengthen the capacity of educators to understand and respond to student needs. By automating repetitive administrative processes, teachers and administrators can devote more time to mentoring, counseling, religious guidance, and direct interaction with santri. In this respect, technological efficiency is converted into additional human educational capacity. Such an approach reflects the central principle of Society 5.0, in which technological development is expected to improve human well-being rather than simply increase automation. Previous research has similarly identified personalized learning, administrative assistance, and student ability mapping as important contributions of AI to education (Prasetyo & Rosyid, 2022; Oktavian et al., 2023).

This human-centered orientation is particularly relevant to the concept of tarbiyah in pesantren. Student development involves intellectual, spiritual, moral, emotional, and social dimensions that cannot be fully captured through algorithmic measurements. AI may identify that a student's academic performance has declined, but it cannot automatically determine whether the underlying cause is academic difficulty, emotional distress, family circumstances, interpersonal conflict, spiritual challenges, or adjustment problems within the boarding environment. Therefore, AI-generated indicators become starting points for human inquiry rather than final diagnoses. This finding strengthens the argument that AI should function as a decision-support mechanism rather than an autonomous decision maker. It also responds to international research emphasizing the importance of human oversight, contextual interpretation, and ethical responsibility in AI-supported education (Bond et al., 2024; Mouta et al., 2024).

The pedagogical implications are also visible in the potential personalization of learning. Students with difficulties in Arabic grammar, tahfidz, or particular areas of Islamic studies can receive differentiated learning materials and additional exercises based on identified learning patterns. This creates an opportunity to move from a uniform pedagogical model toward a more responsive educational environment. Recent research on generative AI and education shows that AI can support adaptive learning, personalized materials, feedback, and educational productivity, although ethical and contextual considerations remain necessary (Yusuf et al., 2024). The Nurul Huda case adds an important Islamic educational dimension by demonstrating that personalization must remain connected to the teacher's pedagogical judgment and the pesantren's moral objectives.

### **Dual-Filter Cultural and Ethical Adaptation**

Another significant finding is the implementation of a dual-filter mechanism before digital or AI-based technologies are incorporated into institutional practices. The first filter concerns technical considerations, including cybersecurity, reliability, accessibility, and data protection. The second filter concerns Islamic ethical and cultural compatibility, including akhlaq al-karimah, amanah, avoidance of harm, privacy, appropriateness of content, and conformity with institutional religious principles. This mechanism demonstrates that technological adoption at Pesantren Nurul Huda is not determined solely by whether a technology is efficient or innovative. Instead, the technology must also be considered appropriate within the institution's moral and religious framework. The dual-filter mechanism provides an important response to the ethical risks associated with AI in education. Contemporary literature identifies privacy, algorithmic bias, transparency, accountability, unequal access, academic integrity, and insufficient human oversight as major challenges in AI-supported education (Mouta et al., 2024; Collin et al., 2024; Bond et al., 2024). Systematic research also indicates that ethical considerations surrounding learning analytics and algorithmic decision-making are frequently underdeveloped in existing AI governance frameworks. At Pesantren Nurul Huda, these risks are addressed by requiring technological systems to pass both technical and normative evaluation. Thus, the dual-filter mechanism can be interpreted as an institutional form of ethical AI governance.

The Islamic dimension of this mechanism is strengthened through the principles of amanah and dharar. Student information is treated as institutional responsibility rather than unrestricted data that can be processed without limitations. Similarly, AI-generated information is not automatically regarded as accurate or authoritative. Teachers and administrators are expected to evaluate its relevance, accuracy, and appropriateness before using it in educational decision-making. This finding is consistent with recent Islamic educational scholarship arguing that AI should be governed by principles such as justice, responsibility, transparency, privacy, and maqasid al-shari'ah (Fathorrozy et al., 2026; Hassan et al., 2025). The dual-filter approach also provides an alternative to two extreme approaches to technology adoption in religious institutions. The first is technological rejection, in which digital technologies are viewed primarily as threats to traditional values. The second is technological determinism, in which every new technology is accepted simply because it promises greater efficiency. Pesantren Nurul Huda instead demonstrates a selective and contextual approach: technologies are accepted when they provide educational or administrative value and when they remain compatible with institutional ethics. This approach is consistent with the emerging discourse on values-based AI adoption in faith-based education, which emphasizes that technological implementation must be aligned with religious values, teacher competencies, institutional regulations, and contextual needs (Arifudin & Akil, 2026; Khoiruddin & Dzulkifli, 2026).

### **Digital Culture and Akhlaq al-Karimah**

The findings further indicate that digital transformation at Pesantren Nurul Huda is not limited to technological infrastructure but extends to the formation of a digital culture. The institution gradually

develops norms concerning how students, teachers, administrators, and leaders should use digital technologies. These norms include responsible information use, appropriate communication, respect for privacy, critical evaluation of AI-generated content, and avoidance of harmful digital behavior. Consequently, digital literacy is understood not simply as the ability to operate technological devices but as the capacity to use technology responsibly within an Islamic ethical framework. This finding is important because the rapid growth of AI has intensified concerns about misinformation, fabricated content, dependency on automated systems, academic dishonesty, and reduced critical thinking. Recent scholarship on AI ethics in Islamic education emphasizes that the use of AI requires digital literacy that integrates technological competence with ethical and religious awareness (Hasanah et al., 2024; Gunagraha et al., 2025). In the Nurul Huda context, *akhlaq al-karimah* therefore functions as an internal governance mechanism for digital behavior. Rather than relying exclusively on technological restrictions, the institution attempts to cultivate responsible users who understand why and how technology should be used.

The development of such digital culture also demonstrates that AI governance is fundamentally a cultural process. Technology can be installed relatively quickly, but institutional norms regarding responsible use require continuous education, leadership, supervision, and habituation. This is consistent with evidence from pesantren digital transformation research showing that institutional readiness, leadership, infrastructure, human resources, and organizational culture influence the sustainability of digital transformation (Ahmadi et al., 2025). The Nurul Huda experience consequently suggests that successful Islamic Educational Management 5.0 requires simultaneous transformation of technological infrastructure and institutional culture.

### **Toward an Islamic Educational Management 5.0 Model**

Taken together, the findings allow the operational structure of Islamic Educational Management 5.0 at Pesantren Nurul Huda to be conceptualized through five interconnected components: intelligent technology, human-centered governance, Islamic ethical filtering, preservation of scholarly authority, and adaptive educational services. The first component provides the technological infrastructure through AI, predictive analytics, NLP, and integrated management information systems. The second ensures that technological systems remain under human supervision. The third establishes ethical boundaries based on *akhlaq al-karimah*, *amanah*, justice, privacy, and avoidance of harm. The fourth protects the continuity of Kiai authority, *sanad al-'ilm*, *talaqqi*, and *suhbah*. The fifth translates technological capacity into personalized educational and pastoral services for santri. These components distinguish Islamic Educational Management 5.0 from a conventional digital management model.

The model also demonstrates that the transformation of pesantren should not be conceptualized as a linear movement from tradition to technology. Rather, it represents a process of selective integration in which traditional knowledge and technological intelligence mutually reinforce one another. AI contributes speed, data processing, prediction, personalization, and administrative efficiency, whereas the pesantren contributes ethical judgment, spiritual orientation, cultural legitimacy, and human mentorship. The resulting model is therefore neither purely technological nor purely traditional. It represents a hybrid management architecture in which technological intelligence operates within the normative boundaries established by Islamic educational values.

This finding contributes theoretically to the emerging discourse on Society 5.0 by extending the human-centered technology paradigm into the specific context of Islamic educational institutions. Previous studies have established the importance of digital transformation and AI for educational innovation, but much of the existing literature focuses on learning efficiency, technological adoption, or general ethical concerns. The Nurul Huda case demonstrates that, in pesantren, the central issue is not simply whether AI can improve efficiency but whether AI can be institutionally synchronized with religious authority, *sanad*, moral formation, and traditional pedagogical relationships. This extends the

concept of human-centered AI by adding a culturally and religiously grounded dimension to technological governance.

Practically, the findings suggest that pesantren leaders should not begin AI transformation by purchasing technological systems alone. Institutional leaders should first establish governance principles, determine areas in which AI can and cannot be used, formulate data-protection procedures, train teachers and administrators, and establish mechanisms for religious and ethical verification. AI applications for administration, student monitoring, learning analytics, and textual assistance can then be introduced incrementally. Such a strategy reduces technological risk while enabling institutional actors to develop the competencies necessary for responsible adoption. Recent research on AI in Islamic education similarly emphasizes the need for teacher competence, ethical regulation, contextualized Islamic content, and continuous institutional oversight (Khoiruddin & Dzulkifli, 2026; Fathorrozy et al., 2026).

Ultimately, the findings indicate that the distinctive contribution of Islamic Educational Management 5.0 lies in its ability to position AI as a *wasilah* for strengthening *tarbiyah*, rather than as a substitute for human and religious authority. The effectiveness of AI at Pesantren Nurul Huda is therefore measured not merely by the speed of administrative processing or the sophistication of algorithms, but by its ability to improve educational quality while preserving *akhlaq al-karimah*, *sanad al-'ilm*, *suhbah*, *talaqqi*, and the leadership role of the *Kiai*. This orientation is compatible with contemporary AI ethics scholarship, which emphasizes human oversight, transparency, accountability, and contextual sensitivity in educational AI systems (Mouta et al., 2024; Bond et al., 2024). Thus, Islamic Educational Management 5.0 can be understood as a culturally embedded model of digital transformation in which technological advancement is deliberately directed toward strengthening, rather than disrupting, the authentic identity and pedagogical mission of pesantren.

## CONCLUSION

This study concludes that the implementation of Islamic Educational Management 5.0 at Pesantren Nurul Huda demonstrates a form of digital transformation in which Artificial Intelligence (AI) is integrated with, rather than substituted for, traditional Islamic educational governance. AI-supported technologies contribute to administrative efficiency, student monitoring, learning support, and the processing of classical Islamic texts, while strategic and religious decisions remain under the authority of the *Kiai* and qualified *Asatidz*. The findings therefore indicate that the transition toward Society 5.0 in pesantren is not simply a technological transformation but a process of institutional adaptation that combines technological intelligence with human judgment, spiritual values, and traditional educational practices. The study further concludes that the sustainability of AI integration depends on the alignment between technology, Islamic ethical principles, and the cultural structure of pesantren. The preservation of *sanad al-'ilm*, *talaqqi*, *suhbah*, *tarbiyah*, and *akhlaq al-karimah* provides an important normative foundation for determining how AI should be used. The dual-filter approach identified in this study—technical evaluation and Islamic ethical evaluation—provides a mechanism for ensuring that technological adoption remains consistent with principles of *amanah*, responsibility, privacy, justice, and avoidance of harm. Consequently, AI functions primarily as a *wasilah* that strengthens educational and managerial capacity rather than as an autonomous source of religious or institutional authority.

Theoretically, this study contributes to the development of the Islamic Educational Management 5.0 concept by proposing a human-centered and culturally embedded model consisting of five interconnected dimensions: intelligent technology, human-centered governance, ethical digital culture, preservation of scholarly authority, and adaptive educational services. Practically, the model provides guidance for pesantren leaders in developing responsible AI governance through gradual

implementation, teacher and administrator capacity building, ethical data management, and continuous human oversight. Nevertheless, because this study focuses on a single pesantren, its findings cannot automatically be generalized to all Islamic boarding schools. Future research should examine multiple pesantren with different institutional characteristics and employ comparative or longitudinal designs to evaluate how AI integration develops over time and how the proposed Islamic Educational Management 5.0 model can be validated across diverse pesantren contexts.

## REFERENCES

- Afif, N., Aziz, A., & Mubin, F. (2023). The construction learning model of Islamic education in Society 5.0 and its relevance at Islamic boarding schools on Java Island. *TARBIYA: Journal of Education in Muslim Society*, 10(1), 69–84.
- Ahmadi, A., Al-faini, A. F., Mun'im, M. A., & Jannah, S. (2025). Membangun ekosistem pendidikan digital di pesantren: Bukti empiris dari TMI Al-Amien Prenduan. *Dirosat: Journal of Islamic Studies*, 10(1).
- Bahri, S., Wahid, A. H., & Najiburrahman. (2024). Digital transformation in pesantren: The Kyai's role in improving educational services. *Indonesian Journal of Education and Social Studies*, 3(2).
- Bond, M., Khosravi, H., De Laat, M., Bergdahl, N., Negrea, V., Oxley, E., Pham, P., Chong, S. W., & Siemens, G. (2024). A meta systematic review of artificial intelligence in higher education: A call for increased ethics, collaboration, and rigour. *International Journal of Educational Technology in Higher Education*, 21, Article 4.
- Collin, S., Lepage, A., & Nebel, L. (2024). Ethical and critical issues of artificial intelligence in education: A systematic review of the literature. *Canadian Journal of Learning and Technology*.
- Fathorrozy, F., Syarifah, N., Anam, K., & Qomariyah, N. (2026). Kerangka etis artificial intelligence dalam pendidikan Islam: Mengintegrasikan maqasid syariah di era pembelajaran digital. *re-JIEM: Research Journal of Islamic Education Management*.
- Gunagraha, S., Chayati, S., & Baidi, B. (2025). Ethics of using artificial intelligence in the world of Islamic education. *JENTRE: Journal of Education and Religious Thought*, 6(1).
- Hasanah, U., Khairunnisa, R., Della, D. A., & Attamimi, T. A. (2024). Opportunities, challenges and ethics of artificial intelligence implementation in teaching Islamic Religious Education in public universities: A case study in South Kalimantan. *JMPI: Jurnal Manajemen, Pendidikan dan Pemikiran Islam*, 2(2), 144–154.
- Hassan, F. L., Irawan, D., Usman, A., Aprizon, A., Hammad, I., Supratama, R., Khayati, S. Q., Rokhma, E. M., Rochmawan, A. E., & Susanto, E. (2025). Artificial intelligence in Islamic education: Ethics and its implications for Islamic education. *Amorti: Jurnal Studi Islam Interdisipliner*, 4(4).
- Hosna, R., & Nurhidayati, T. (2026). Artificial intelligence as a challenge and solution for Islamic education in the digital era. *Journal of Islamic Education and Pesantren*, 6(1).
- Khoiruddin, M. A., & Dzulkifli, I. (2026). Integrating artificial intelligence in Islamic education: Ethical, pedagogical, and sustainability perspectives. *INTIHA: Islamic Education Journal*, 3(2).
- Kurnaesih, U., Faizudin, F., Sayuti, S., Munji, A., & Romadan, A. I. (2026). Ethical of using artificial intelligence in learning: Perception of college students in the Islamic education study program. *Ta'dibuna: Jurnal Pendidikan Islam*, 14(6).
- Kurniawan, M. I., & Kamalie, A. S. (2026). Integrasi kecerdasan buatan dalam kepemimpinan pendidikan Islam: Kerangka tata kelola berbasis Maqashid al-Shariah. *Proceeding of International Conference on Islamic Boarding School*, 2(1).

- Masrur, M., Muhtarom, M., Salamun, S., Kusuma, N., Wahyudi, A., & Khotimah, S. H. (2025). Evaluation of digital-based Al-Qur'an Tahfizh learning in boarding school. *TARBIYA: Journal of Education in Muslim Society*, 12(1).
- Mouta, A., Pinto-Llorente, A. M., & Torrecilla-Sánchez, E. M. (2024). Uncovering blind spots in education ethics: Insights from a systematic literature review on artificial intelligence in education. *International Journal of Artificial Intelligence in Education*, 34, 1166–1205.
- Mukminah, N., & Mahmudah, U. (2023). The utilization of artificial intelligence (AI) technology in Islamic primary education in the era of Society 5.0. *Proceeding of Annual International Conference on Islamic Education and Language (AICIEL)*, 482–488.
- Nugroho, A., & Astutik, A. P. (2024). Digital transformation of Islamic boarding school education. *Indonesian Journal of Islamic Studies*, 12(2).
- Oktavian, R., Aldya, R. F., & Arifendi, R. F. (2023). Artificial intelligence dan pendidikan era Society 5.0. *Inteligensi: Jurnal Ilmu Pendidikan*.
- Pohan, R., & Pohan, N. (2025). Integration of artificial intelligence in Islamic education management system to improve administrative efficiency. *Sistem Pendukung Keputusan dengan Aplikasi*, 4(2).
- Prasetyo, A. A., & Rosyid, H. A. (2022). Tinjauan pengaruh kecerdasan buatan terhadap pembelajaran untuk menghadapi masa Society 5.0. *Jurnal Inovasi Teknologi dan Edukasi Teknik*, 2(6), 267–271.
- Supriyono, S. (2022). Pesantren, the COVID-19 pandemic and digital transformation: A global development perspective. *Muslim Education Review*, 1(1), 37–58.
- Suhardi, M. (2025). Optimizing educational management with artificial intelligence in Indonesian higher education: A qualitative exploration. *Journal of Educational Management and Instruction*, 5(2).
- Yusuf, A., Noor, N. M., et al. (2024). Generative AI in education and research: A systematic mapping review. *Review of Education*.
- Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). SAGE Publications.