

## DIGITAL TRANSFORMATION OF ISLAMIC BOARDING SCHOOLS IN INDONESIA: MODERNIZATION, INNOVATION, AND VALUE PRESERVATION

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### Abstract

The modernization of Islamic boarding schools (*pesantren*) is fundamentally an effort to transform educational institutions from traditional systems into more adaptive and innovative ones while maintaining the core values of Islamic teachings and the essential functions of *pesantren*. This study aims to examine the forms of modernization and innovation implemented by *pesantren* in the digital era and the challenges associated with these transformations. The study employed a library research approach by analyzing relevant academic literature on *pesantren* modernization, educational innovation, and digital transformation. Data were analyzed using thematic analysis. The findings reveal that *pesantren* modernization is manifested through curriculum innovation, the implementation of digital learning, the development of technology-based management systems, and the utilization of digital media for *da'wah* activities. Several *pesantren* have integrated digital technologies into educational practices through Learning Management Systems (LMS), digital libraries, hybrid learning models, and digital applications for the study of classical Islamic texts. These innovations contribute to broader access to knowledge, improved learning effectiveness, and more efficient institutional management. However, modernization also presents challenges related to digital literacy, infrastructure readiness, and the preservation of fundamental *pesantren* values, including *adab* (Islamic ethics), discipline, Islamic scholarly traditions, and the *kiai-santri* relationship. Therefore, *pesantren* modernization should be understood as a process of adaptation to technological advancement while remaining firmly rooted in the values and traditions of Islamic boarding school education.

**Keywords:** *Pesantren; Modernization; Digital innovation; Transformation*

### A. Introduction

Law No. 20 of 2003 concerning the National Education System states that religious education is not merely one type of education but also encompasses various forms, including *diniyah* education, *pesantren*, and other similar institutions. The provisions regarding religious education stipulated in the National Education System Law are further regulated through Government Regulation No. 55 of 2007 concerning Religious Education and Religious Instruction (Khoiriyah, 2023). Etymologically, the term *pesantren* is derived from the word *santri* with the prefix *pe-* and suffix *-an* (*pesantrian*), meaning a place where *santri* reside. The word *santri* itself is believed to originate from the Sanskrit word *satri*, which means "literate" or "one who can read." According to Nurcholish Madjid, this interpretation is associated with the *santri* community as a literate social class among Javanese Muslims who sought to deepen their religious knowledge through Arabic-language Islamic texts. Another view suggests that the term *santri* originates from the

Javanese word *cantrik*, referring to an individual who faithfully follows a teacher wherever the teacher resides (Rifa et al., 2024). Terminologically, *pesantren* is often referred to as the traditional world of Islam. In this sense, *pesantren* represents an institution that preserves and sustains the continuity of Islamic traditions developed by Muslim scholars (*kiai*) across generations, extending beyond any particular period in Islamic history (Sadali, 2020).

Pesantren is one of the Islamic educational institutions with distinctive characteristics in the history of Indonesian education. Since the sixteenth century, pesantren have served as centers for the transmission of Islamic knowledge, character formation, and the training of Muslim scholars who actively contribute to the social and religious life of society. The educational model, which is based on direct interaction between *kiai* and *santri*, moral development, and the study of *kitab turats* (classical Islamic texts), has shaped a unique identity that distinguishes pesantren from modern educational institutions. This identity has enabled pesantren to endure various phases of social, political, and economic change in Indonesia (Faisal & Taufik, 2020). Within the context of Islamic boarding schools, the modernization of the educational system essentially represents an effort to transform educational institutions from traditional systems into more modern ones while remaining firmly grounded in the fundamental values of Islam and the functions of pesantren as educational, social, and religious institutions. Furthermore, modernization emphasizes the importance of religious morality as a guide for everyday behavior (El 'Ubbad et al., 2024). In addition, the modernization of pesantren education aims to develop a Muslim personality characterized by faith and devotion to God, noble character, social responsibility, commitment to Islamic propagation, and a love of knowledge as part of the broader effort to cultivate well-rounded individuals.

Alongside modernization, innovation has become an essential aspect of pesantren development. Innovation refers to the implementation of new ideas, methods, programs, or technologies capable of enhancing the quality of educational services and institutional management. The rapid development of the internet, artificial intelligence, big data, and online learning technologies has significantly transformed patterns of interaction, learning processes, and institutional management within pesantren. According to UNESCO (2023), the digitalization of education has become a global agenda aimed at making education more open, inclusive, adaptive, and innovative in response to technological advancement (UNESCO, 2023). Such innovation is not limited to the adoption of advanced instructional technologies but also involves deeper transformations, including the values to be instilled, the content to be taught, and the methods employed in educational processes. Innovation must be implemented comprehensively across these dimensions, as imbalances may undermine the coherence of the educational curriculum and negatively affect students' academic achievement (Badrus et al., 2023). The term innovation originates from the English word "innovation," which refers to something new or a renewal. According to the Indonesian Dictionary (*Kamus Besar Bahasa Indonesia*), innovation is defined as the introduction or application of new elements, as well as discoveries that differ from those previously known, whether in the form of ideas, methods, or tools (KBBI, 2025). In

education, innovation also implies positioning learners as active agents in their own learning processes, encouraging them to think independently and act responsibly.

In the Indonesian context, several studies have highlighted that Islamic educational institutions are currently at a critical juncture between preserving their traditional character and adopting technological innovations in a more systematic manner. Rahmawati (2021) found that digitalization provides opportunities for pesantren to improve management quality, expand access to information, and accelerate administrative services (Rahmawati, 2021). Many pesantren have begun integrating technology into learning activities through the use of Learning Management Systems (LMS), digital libraries, hybrid classrooms, and digital applications for the study of classical Islamic texts. Research by Mahmud and Hasbi (2022) in the *Journal of Islamic Education* demonstrated that digital innovation in pesantren enhances learning effectiveness, particularly in terms of access to scholarly literature and global sources of knowledge (Hasbi, 2022). Likewise, Zuraida (2025) reported that digital technologies play a significant role in expanding access to academic resources, creating more interactive science-learning environments, and improving institutional governance through digital information systems and platforms (Zuraida, 2025). Rohana et al. (2026) argued that the digital transformation of pesantren constitutes a process of negotiation between the tradition of Islamic scholarship (*al-turath*) and the demands of modernization (Rohana et al., 2026). Their findings indicate that digitalization encompasses pedagogical restructuring, the strengthening of digital leadership among *kiai*, and the utilization of Artificial Intelligence (AI) in education and *da'wah* activities. Similarly, Ahmad Qhusyaeri (2024) found that Pondok Pesantren Riyadlus Sholihin introduced the *Dirosah Idlofiyah* (DARS) program as an innovative platform for students to develop talents in calligraphy, Qur'anic recitation (*tilawah*), memorization (*tahfidz*), and public speaking (*khitobah*) (Qhusyaeri, 2024). Nevertheless, these developments also present challenges, including the potential weakening of the authority of *kitab kuning* (classical Islamic texts), shifts in *kiai-santri* relationships, and transformations in pesantren culture. This phenomenon is consistent with Rogers' (2003) Diffusion of Innovation Theory, which suggests that technological adoption is more likely to succeed when innovations are compatible with institutional values, adaptive capacities, and strong leadership support (Rogers, 2003).

On the other hand, digital transformation, which involves integrating digital technologies into all aspects of organizational operations, service delivery, and value creation, is far from a simple process. Nisa (2020) emphasized that many pesantren continue to face infrastructural limitations, low levels of digital literacy among educators, and concerns regarding the erosion of values such as simplicity and obedience to *kiai* due to increasing technological penetration. Although the internet provides broader access to information for *santri*, it also exposes them to content that may be inconsistent with pesantren values (Nisa, 2020). This situation creates tensions between preserving pesantren traditions and responding to the demands of contemporary change. Values such as respect (*adab*) toward teachers, religious discipline, close *kiai-santri* relationships, and

the tradition of direct study of *kitab kuning* remain essential characteristics of pesantren that must be safeguarded.

Beyond the learning process, the modernization of pesantren in the digital era is closely linked to institutional governance. Many pesantren have developed student information systems, digital financial management systems, QR code-based attendance systems, and official communication platforms that facilitate coordination among administrators, parents, and the wider community. Suryadi (2021) found that the digitalization of management not only improves efficiency but also enhances institutional accountability and transparency, thereby strengthening public trust (Suryadi, 2021). In an increasingly competitive educational environment, pesantren that embrace innovation and modern management practices are considered better positioned to survive and thrive. However, technological integration should be directed toward strengthening tradition rather than replacing it.

This perspective is consistent with Abdullah's (2022) view that the modernization of Islamic education should be integrative in nature, combining traditional values with technological advancement within the framework of Islam as *rahmatan lil 'alamin* (a mercy to all creation) (Abdullah, 2022). Considering these dynamics, the study of modernization and innovation in pesantren within the digital era has become increasingly important. Such inquiry is necessary to understand how pesantren can develop educational innovation, institutional management, and digitalization strategies while preserving their identity as traditional Islamic educational institutions.

## **B. Method**

This study employed a qualitative approach using the library research method. According to Zed (2018), library research focuses on the analysis of concepts, theories, and empirical findings that have been published in scholarly journals, books, and research reports related to the modernization and innovation of pesantren in the digital era (Zed, 2018). The data collection process was conducted through a systematic literature search in academic databases, including Google Scholar, Garuda, and relevant national and international journals. The search was carried out using the keywords "pesantren modernization," "pesantren innovation," "digital transformation of pesantren," "digitalization of Islamic education," and "pesantren in the digital era." The literature reviewed was limited to publications published between 1964 and 2025.

Data were analyzed using thematic analysis as proposed by Braun and Clarke (2006). The research procedure was conducted in several stages. First, the researcher identified key issues concerning the modernization of pesantren, digital transformation in Islamic education, and the challenges of technological development within tradition-based educational institutions. Second, relevant references were collected from national and international journals, academic books, and recent research reports addressing educational digitalization and innovation in pesantren. The selection of sources was carried out selectively by considering their relevance, recency, and credibility. The third stage involved descriptive qualitative data analysis. The researcher systematically reviewed, recorded, compared, and synthesized ideas from various sources to identify patterns,

similarities, and differences in scholarly perspectives. The findings of the analysis were used to develop a more comprehensive understanding of the concept of modernization, forms of digital innovation, as well as the challenges and adaptation strategies of pesantren in the digital era. The final stage consisted of drawing conclusions based on the researcher's interpretation of the findings obtained from the literature. The conclusions were organized systematically to provide a comprehensive and academically accountable overview of the phenomenon under study (Braun et al., 2006).

### **C. Finding and Discussion**

#### **The concept of Pesantren modernization in the perspective of Islamic education Kontemporer**

The modernization of pesantren in the digital era is a phenomenon that cannot be separated from social dynamics, the development of communication technology, and the increasing demands for the quality of Islamic education in Indonesia. In the context of contemporary Islamic education, modernization is understood as the process of adjusting pesantren institutions to remain relevant to the needs of the times without eliminating the character of the scientific tradition that became its identity. Nurcholish Madjid (1997) calls modernization as an effort to rationalize or reform that places pesantren in a strategic position in the midst of changes in modern society (Madjid, 1997), while Abdurrahman Wahid (1999) emphasizes that pesantren as a subculture has a high adaptation potential to change, as long as it remains grounded in Islamic moral values (Wahid, 1999).

In the perspective of the theory of social change, Giddens (2001) affirms that traditional educational institutions are under pressure of change due to the emergence of a new social order characterized by the acceleration of technology (Giddens, 2001). Boarding schools are at a point where they have to determine a position: either maintain the old pattern completely, or adapt technology to strengthen its role. Failure to adapt has the potential to cause cultural lag, as explained by Ogburn (1964), which is a situation when cultural values lag behind technological developments (Ogburn, 1964).

The modernization of boarding schools is basically not only understood as the adoption of technology, but also the reconstruction of an educational system that is more adaptive to the Times. According to Amin (2019), modernization should be directed at improving the quality of Educational Management, curriculum renewal, as well as increasing the capacity of pesantren human resources. In the perspective of Islamic education management, modernization cannot be separated from the principles of effectiveness, efficiency, and quality of learning that emphasize the integration between religious values and technological progress.

Some experts also assert that the modernization of boarding schools should run through a gradual approach. Fathurrahman (2020) stated that digital transformation in Islamic Educational Institutions requires a change in learning culture and the readiness of educational actors, such as kiai, ustaz, and santri (Fathurrahman, 2020). Without cultural change, technology is just an instrument with no meaning of renewal. This is in line with the theory of institutional change proposed by Scott (2014), that successful change requires conformity between the structure, norms, and culture of institutions (Scott, 2014).

In addition, the modernization of Islamic boarding schools must also pay attention to the epistemological aspects of Islamic Science. Fazlur Rahman (2000) argues that modern Islamic education should blend modern rationality with Islamic normative values (Rahman, 2000). Thus, pesantren can update the Learning Methodology without losing the orientation of spirituality and moral development that characterizes it.

### **Forms of Pesantren innovation in the Digital Era**

Various studies show that pesantren began to innovate, especially in the field of learning. Digitization of materials, the use of platforms such as Google Classroom, Moodle, or internal Learning Management System (LMS), as well as the use of digital book study applications are becoming an increasingly common form of adaptation. Mahmud and Hasbi's (2022) research confirms that digital learning in modern pesantren increases santri's access to broader scientific references, especially classic books that have been converted to digital format (Mahmud et al., 2022). In fact, some boarding schools have developed hybrid learning models that combine face-to-face and online materials to create independent learning.

Modernization in pesantren is not only seen in the aspect of learning, but also in administrative governance. Digitization of pesantren management is seen as important to improve efficiency, transparency, and accountability. Suryadi (2021) pointed out that the use of the pesantren information system (SIP) helps administrators manage santri data, activity reports, and institution documentation more effectively (Suryadi, 2021). Digital financial systems, cloud-based archiving, and QR-based attendance are common practices in boarding schools that are undergoing managerial transformations.

On the missionary side, the digital era opens up a much wider space. The use of social media such as YouTube, Instagram, TikTok, and podcasts makes Islamic boarding school da'wah able to reach a larger and diverse audience, not only among students or local communities. Shafii (2020) referred to this phenomenon as "virtual da'wah", where pesantren play a new role in shaping public religious discourse through digital media (Shafii, 2020).

Pesantren innovation in the digital era not only includes the use of learning technology, but also the restructuring of the educational ecosystem. Santoso's research (2021) confirms that the use of Information Technology in pesantren increases the effectiveness of monitoring santri learning, especially through digital-based evaluation applications (Santoso, 2021). Digitization of libraries is also a significant innovation. Al-Lily's (2019) research shows that access to digital literature increases learners' Reading intensity as well as expanding their reading resources globally (Lily, 2019). Pesantren that has developed a digital library is able to provide access to classic books, international journals, and interactive modules that were previously difficult to reach. Pedagogical innovation is also seen in the development of learning methods such as flipped classroom and blended learning.

According to Muttaqin & Mondry (2020), this learning model improves students' independence, active involvement, and critical thinking skills (Muttaqin et al., 2020). In modern pesantren, combining traditional sorogan and bandongan methods with LMS

creates a more adaptive learning pattern. At the institutional level, the use of Pesantren Management Information System (SIM-Pesantren) strengthens management professionalism. Suryadi (2021) mentioned that SIM-Pesantren can reduce the administrative error rate by up to 40% and increase the speed of administrative services to santri Guardians (Suryadi, 2021).

### **The Challenge Of Modernization**

However, the modernization of boarding schools is inseparable from the challenges. Some pesantren caregivers' concerns about the negative impacts of the internet—such as access to non—educational content or a decline in santri discipline—are still an important discourse. Nisa (2020) notes the tension between technology and the habitus of pesantren, where a disciplined and supervised pesantren environment must adapt to a digital culture that tends to be free (Nisa, 2020). Another challenge that arises is the uneven digital literacy, both among santri and ustaz. Zainuddin (2021) found that many pesantren educators are not familiar with digital-based learning applications or evaluation methods (Zainuddin, 2021). In addition, limited infrastructure such as internet networks, computer devices, and multimedia facilities are obstacles, especially for small pesantren or salaf pesantren.

To give a more concrete picture, a number of case studies show how certain pesantren managed to modernize proportionally. Pondok Modern Darussalam Gontor, for example, integrates technology in the education system without eliminating the tradition of discipline that became its identity. Gontor utilizes academic information systems, digital libraries, and modern da'wah media to strengthen its educational ecosystem. Meanwhile, Sidogiri Pesantren shows that even salaf pesantren can make significant innovations. Through the digitalization of the economy such as BMT, modern minimarkets, and e-commerce of santri products, Sidogiri is an example of a boarding school that is able to harmoniously combine tradition and modernity.

Pesantren Tebuireng Jombang shows another form of modernization through the development of an integrated curriculum between religion, science, and technology, as well as the use of digital learning platforms since the pandemic. The Pesantren Al-Muqoddasah Tasikmalaya applies the concept of smart pesantren, by utilizing digital devices such as RFID attendance, internal LMS, to integrated CCTV-based security systems. These four case studies show that modernization is not uniform; each pesantren innovates according to their respective conditions, visions, and resource capabilities.

The challenges of modernizing boarding schools are not only technical, but also cultural and ideological. Rahman (2018) emphasizes that resistance to digitalization often arises from fears of the loss of traditional values that are the identity of pesantren (Rahman, 2018). The concern is rooted in the assumption that technology can give birth to an instant, individualistic and consumerist culture. In addition, another challenge is the digital divide—the difference in the ability to access technology between large and small boarding schools. Data from the Ministry of Religious Affairs (2020) shows that more than 45% of pesantren still experience limited internet networks, computer devices, and

technical personnel. This makes the digitization process uneven (Data Kementerian Agama, 2020).

The next challenge is the low digital literacy of students and educators. Santoso (2021) found that only 35% of ustaz in some pesantren are able to manage application-based learning or LMS (Santoso, 2021). Without intensive training, the use of technology is often only ceremonial. From the ethical aspect, technological adaptation also requires strict supervision. Syafii (2020) explained that the free access of santri to the internet has the potential to open exposure to negative content that is contrary to the value of pesantren. Therefore, strengthening internal regulation and content filtering is an urgent need (Syafii, 2020).

### **Strategy of strengthening Pesantren modernization and innovation**

The strategy of strengthening the modernization and innovation of pesantren basically emphasizes the importance of integrating technology with the value of pesantrenan. Abdullah (2022) emphasizes that the renewal of Islamic education must remain based on ethics and spiritual values, so that technology serves as a tool, not a substitute for the identity of pesantren (Abdullah, 2022). Digital literacy training for administrators and students, collaboration with universities or government agencies, and strengthening data-based governance are relevant steps to ensure modernization can run effectively. In addition, pesantren need to formulate internal regulations related to the use of technology to stay in line with Islamic education ethics.

Overall, the modernization of boarding schools in the digital age is a complex process, involving the interaction between tradition, technology, religious values, and social dynamics. The main key lies in the ability of pesantren to place technology as a means of strengthening the role of Da'wah and education, not as a threat to its traditional values. With a proportional approach, modernization can strengthen pesantren as an Islamic educational institution that not only maintains tradition, but is also able to answer the challenges of the Times.

To ensure effective modernization, pesantren must implement a comprehensive strategy. Abdullah (2022) emphasizes that renewal must be done through an integrative approach, which combines technology with spiritual values, morals, and Customs (Abdullah, 2022). Some key strategies include:

- a. Strengthening Digital Literacy. Mandatory training programs for ustaz, santri, and pesantren administrators are needed so that technology really improves the quality of learning. Training may include:
  - 1) The Use Of LMS
  - 2) Making Digital Learning Media
  - 3) Data Management And Digital Archives
  - 4) Cyber Security Policy
  - 5) Cooperation With Universities & government. Yunus & Arifin's study (2021) shows that pesantren collaboration with universities can improve the quality of curriculum, human resources, and technology infrastructure (Yunus et al., 2021). Cooperation with the government, such as the Ministry of religion and the Ministry of Education and culture, can also accelerate digitization through the help of devices and training.

- 1) Formulation Of Internal Regulations On The Use Of Technology. Pesantren need to establish sops related to the use of the internet, social media, and digital devices. This is to maintain the discipline of students while preventing misuse of technology.
- 2) Data-Driven Management Transformation. According to Osborne & Gaebler (1992), modern institutions should prioritize data as the basis for decision-making. Pesantren can develop:
  - a. The Santri Database
  - b. Digital Learning Evaluation System
  - c. Curriculum Needs Analysis
  - d. Digital Budgeting. (Osborne Et Al., 1992)

### **Case Study of Pesantren modernization and innovation in the Digital Era**

To strengthen the previous theoretical discussion, this section presents several case studies from pesantren in Indonesia that have successfully modernized and innovated in the digital era. These examples show the variety of approaches and strategies used by pesantren in responding to technological developments.

- 1) Pondok Modern Darussalam Gontor: integration of technology as a support for the education system. Pondok Modern Darussalam Gontor (PMDG) is an example of a boarding school that has a strong tradition but is adaptive to modernization. Gontor not only builds an integrated education system, but also gradually utilizes digital technology to support management and learning. Some of the innovations made include:
  - 2) Academic and administrative information systems. Gontor implements a digital-based administration system for managing santri, assessment, and financial data. According to Sari research (2021), the application of Information Technology in Gontor helps improve efficiency and reduce data inequality between education units (Sari, 2021).
  - 3) Library Automation System. Gontor Central Library uses a digital catalog (OPAC) so that students can access book information quickly through a local computer.
  - 4) Digital Da'wah Media. Gontor developed a YouTube channel, streaming radio, and an online study platform that expanded da'wah access to the diaspora of alumni in various countries. This strengthens Gontor's status as a center for the spread of modern da'wah.

The study by Karim (2022) shows that the modernization of Gontor still adheres to the values of simplicity, discipline, and independence – the three main pillars that characterize the PMDG (Karim, 2022).

- a. Pondok Pesantren Sidogiri: Economic Innovation and strengthening Digital Independence. Pesantren Sidogiri in East Java is known as one of the salaf boarding schools that make significant innovations in the field of Economics and governance. Although carrying the concept of Salafism, Sidogiri successfully combines classical traditions with modern management. Some digital innovations developed:
  - 1) BMT and Minimarket SIDOGIRI. Pesantren Sidogiri manages Sharia cooperatives and modern minimarkets that are connected to an internal digital system for recording transactions, stock, and distribution. Research by Fakhruddin (2020) shows that the digitalization of Sidogiri retail management plays a major role in strengthening the economic independence of pesantren (Fakhruddin, 2020).
  - 2) Information System Santri (SIM SANTRENG). This system makes it easier for Guardians to monitor child development, payments, and official communication between pesantren and guardians.

- 3) E-Commerce Boarding School Products. Sidogiri develops online marketing through national websites and marketplaces. Products such as Santri Drinking Water (AMS) and Sidogiri bread have been widely marketed and supported by digital promotions. This study shows that even a salaf boarding school can be a modern institution without losing its scientific identity.
- b. Pesantren Tebuireng Jombang: curriculum modernization and digital transformation of learning. Tebuireng, one of the oldest boarding schools in Indonesia, made significant modernizations to the curriculum, education management, and technology utilization.
  - 1) Curriculum Development Based On Science Integration. The Tebuireng curriculum combines religious, science, and technology lessons. Research by Hidayat (2021) calls curriculum integration in Tebuireng a hybrid Islamic education model that is relevant to the modern world (Hidayat, 2021).
  - 2) Digital Learning System (DLS). During the pandemic, Tebuireng developed a digital learning platform based on Moodle and Google Workspace. After the pandemic, this platform was retained as a complement to the layout.
  - 3) Digitization of Archives and museums. Hasyim Ash'ari Museum under pesantren Tebuireng has developed a digital catalog of pesantren history, so that visitors can access data interactively. This shows that modernization is not limited to learning, but also to knowledge management.

Finding section is provided prior to the discussion section. Each section stands alone as a subtitle. The finding and discussion should be written in not less than 60% of the entire body of the manuscript.

#### **D. Conclusion**

The modernization of pesantren in the digital era represents a process of adaptation to the advancement of knowledge, technology, and the evolving needs of society, rather than a form of Westernization or an attempt to eliminate the traditional values of pesantren. This modernization is reflected in the digitalization of learning processes, the strengthening of technology-based management systems, and the utilization of digital media for da'wah activities and institutional development. Its success depends on the ability of pesantren to integrate technological advancements with their core values, including *adab* (ethical conduct), discipline, spirituality, and the tradition of Islamic scholarship. In this regard, technology should be positioned as a means to strengthen the educational, religious, and managerial functions of pesantren rather than as an end in itself.

The findings of this study imply the need for the development of pesantren-based digital policies that regulate the use of technology in accordance with Islamic values and the distinctive characteristics of pesantren. Enhancing digital competencies through training programs for *kiai*, *ustaz*, and educational staff is essential to support this transformation. Furthermore, strengthening technological infrastructure, including internet access, digital learning facilities, and integrated information systems, constitutes a critical requirement for ensuring equitable digital transformation across pesantren. Collaboration among pesantren, government agencies, higher education institutions, and technology providers should also be reinforced to support human resource development,

the provision of digital facilities, and the promotion of sustainable educational innovation.

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