



DIGITAL TRANSFORMATION OF ISLAMIC BOARDING SCHOOL EDUCATION: A MODEL OF INTEGRATING ISLAMIC TRADITIONS, DIGITAL LITERACY, AND SUSTAINABLE LEARNING ECOSYSTEMS IN BONDOWOSO REGENCY

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Abstract: This research aims to analyze and develop a digital transformation model of pesantren education through the integration of Islamic traditions, digital literacy, and the continuous learning ecosystem in Bondowoso Regency. Digital transformation in Islamic boarding schools is seen as a strategic effort to strengthen the quality of education while maintaining Islamic values as the main identity of the institution. This study uses a qualitative approach with a case study design. The location of the research is in several Islamic boarding schools in Bondowoso Regency that have implemented digital technology in learning and institutional governance. The research informants included kiai, pesantren leaders, teachers, information technology managers, students, and education stakeholders who were selected purposively. Data were collected through participatory observation, in-depth interviews, documentation, and *Focus Group Discussions* (FGDs). Data analysis was carried out interactively using the Miles, Huberman, and Saldaña models which included data condensation, data presentation, and conclusion drawing and verification. The results of the study show that the digital transformation of pesantren education in Bondowoso Regency takes place through the integration of Islamic traditions, transformational leadership of kiai, strengthening digital literacy, and the development of a sustainable learning ecosystem. The success of digital transformation is determined more by the readiness of the organization's culture, human resource capacity, and visionary leadership than by the availability of technology alone. This research produces an Integrative Model of Digital Transformation of Islamic Boarding School Education which consists of five main components, namely Islamic tradition as a normative foundation, transformational leadership as a driver of change, digital literacy based on Islamic ethics as a core capability, a sustainable learning ecosystem as a space for implementation, and collaborative digital governance as a reinforcement of institutional sustainability. The model is expected to be a conceptual and practical reference in the development of an adaptive, innovative, and sustainable digital transformation of Islamic boarding school education.

Keywords: *digital transformation; Islamic boarding school education; Islamic traditions; digital literacy; Continuous Learning*

Abstrak : Penelitian ini bertujuan untuk menganalisis dan mengembangkan model transformasi digital pendidikan pesantren melalui integrasi tradisi keislaman, literasi digital, dan ekosistem pembelajaran berkelanjutan di Kabupaten Bondowoso. Transformasi digital di pesantren dipandang sebagai upaya strategis dalam memperkuat mutu pendidikan dengan tetap mempertahankan nilai-nilai keislaman sebagai identitas utama lembaga. Penelitian ini menggunakan pendekatan kualitatif dengan desain studi kasus. Lokasi penelitian berada pada beberapa pesantren di Kabupaten Bondowoso yang telah mengimplementasikan teknologi digital dalam pembelajaran maupun tata kelola kelembagaan. Informan penelitian meliputi kiai, pimpinan pesantren, guru, pengelola teknologi informasi, santri, serta pemangku kepentingan pendidikan yang dipilih secara purposive. Data dikumpulkan melalui observasi partisipatif, wawancara mendalam, dokumentasi, dan *Focus Group Discussion* (FGD). Analisis data dilakukan secara interaktif menggunakan model Miles, Huberman, dan Saldaña yang meliputi kondensasi data, penyajian data, serta penarikan dan verifikasi kesimpulan. Hasil penelitian menunjukkan bahwa transformasi digital pendidikan pesantren di Kabupaten Bondowoso berlangsung melalui integrasi antara tradisi keislaman, kepemimpinan transformasional kiai, penguatan literasi digital, dan pengembangan ekosistem pembelajaran berkelanjutan. Keberhasilan transformasi digital lebih ditentukan oleh kesiapan budaya organisasi, kapasitas sumber daya manusia, dan kepemimpinan visioner dibandingkan oleh ketersediaan teknologi semata. Penelitian ini menghasilkan Model Integratif Transformasi Digital Pendidikan Pesantren yang terdiri atas lima komponen utama, yaitu tradisi keislaman sebagai fondasi normatif, kepemimpinan transformasional kiai sebagai penggerak perubahan, literasi digital berbasis etika Islam sebagai kapabilitas inti, ekosistem pembelajaran berkelanjutan sebagai ruang implementasi, dan tata kelola digital kolaboratif sebagai penguat keberlanjutan kelembagaan. Model tersebut diharapkan menjadi acuan konseptual dan praktis dalam pengembangan transformasi digital pendidikan pesantren yang adaptif, inovatif, dan berkelanjutan.

Kata Kunci: *transformasi digital; pendidikan pesantren; tradisi keislaman; literasi digital; pembelajaran berkelanjutan*

INTRODUCTION

Digital transformation has become a strategic agenda in the development of global education, including Islamic education, in line with the increasing need for an adaptive, inclusive, and sustainable learning ecosystem (Sumiati et al., 2024). The development of digital technology is no longer understood simply as a process of digitizing administration or the use of technology-based learning media, but as a comprehensive transformation that includes changes in organizational culture, leadership, curriculum, human resource competencies, and institutional governance. In this context, pesantren as the oldest Islamic educational institution in Indonesia faces the challenge of maintaining Islamic identity based on the yellow book, kiai authority, and halaqah learning traditions, as well as developing the digital literacy of students to be able to actively participate in a knowledge-based society (Sofi et al., 2025). Thus, digital transformation in Islamic boarding schools must be positioned as an integrative process that harmonizes Islamic values, digital technology, and educational sustainability so as to produce relevant learning models without eliminating the distinctive character of the pesantren (List et al., 2020; Zuraida & Setiawan,

2025).

Bondowoso Regency is one of the regions in East Java that has a rapidly growing pesantren ecosystem and plays a strategic role in the educational, social, and religious development of the community. The existence of Islamic boarding schools in this region is not only a center for the transmission of Islamic sciences, but also an agent of community empowerment through formal, non-formal, and community-based economic development. However, the acceleration of digital transformation presents new challenges in the form of digital literacy gaps, limitations of technology infrastructure, digital competence of educators, educational data governance, and integration of technology with the academic culture of Islamic boarding schools which have relied on direct interaction between kiai and students. This condition requires a digital transformation model that not only adopts technology, but is also able to integrate Islamic traditions, digital literacy, and a continuous learning ecosystem that is in accordance with the local characteristics of Islamic boarding schools in Bondowoso.

A number of previous studies have examined the digital transformation of Islamic boarding schools from various perspectives. Research by (Bahri et al., 2024) shows that kyai's leadership plays an important role in the success of digitizing Islamic boarding school education services through strengthening governance and academic services. Research by (Rouf et al., 2024) confirms that digital transformation is an adaptive strategy in building an Islamic boarding school management system that is responsive to the development of the Industrial Revolution 4.0. Meanwhile, (Darwanto et al., 2024) explained that the digitalization of Islamic boarding schools contributes to learning innovation, improving the quality of education management, and the sustainability of Islamic education. The research of (Nwachukwu et al., 2025) then offers the integration of the concept of *learning organization* and *adaptive learning* as the foundation of the digital transformation of students, while (Taufikin et al., 2025) emphasizes the importance of strengthening digital literacy as the main instrument for the transformation of Islamic education in Indonesia.

However, these studies still show some knowledge *gaps*. First, most of the research focuses more on aspects of digitization of Islamic boarding schools' services, leadership, or institutional management, while the integration between Islamic traditions, digital literacy, and continuous learning ecosystems has not been constructed as a single complete conceptual model. Second, previous research generally uses a case study approach on modern Islamic boarding schools or literature studies so that it has not revealed much about the dynamics of digital transformation in Islamic boarding schools that develop in local socio-cultural contexts such as Bondowoso Regency which has religious and cultural characteristics of Pandalungan. Third, there is no empirical model that explains how digital transformation can strengthen the sustainability of pesantren education through synergy between Islamic values, student digital literacy, kiai leadership, institutional governance, and collaboration with the education ecosystem and the community. This gap shows the need for new research that is able to produce integrative models as a conceptual and practical

contribution to the development of pesantren education in the digital era.

Based on this description, this study aims to develop a digital transformation model of pesantren education in Bondowoso Regency through the integration of Islamic traditions, digital literacy, and a sustainable learning ecosystem. The model developed is expected to be able to explain the relationship between pesantren values, religious leadership, digital literacy competencies, learning innovation, digital governance, and institutional collaboration in building an education system that is adaptive to technological developments without eliminating the Islamic identity of the pesantren. The novelty (*state of the art*) of this research lies in the preparation of an integrative model that combines the three main dimensions of Islamic tradition, digital literacy, and continuous learning ecosystem in the local context of Islamic boarding schools in Bondowoso Regency, so as to make a theoretical contribution to the development of a digital transformation model of Islamic education as well as a practical recommendation for policymakers and pesantren managers in designing strategies continuous digitalization.

RESEARCH METHOD

This research uses a qualitative approach with a case study design to gain a deep understanding of the digital transformation of Islamic boarding school education through the integration of Islamic traditions, digital literacy, and the continuous learning ecosystem in Bondowoso Regency. The case study approach was chosen because this study seeks to explore the phenomenon of digital transformation holistically in a real context, so as to be able to describe the dynamics of interaction between pesantren culture, kiai leadership, learning innovation, and the use of digital technology in a specific social environment. Case studies allow researchers to gain a comprehensive understanding of the processes, experiences, and strategies developed by Islamic boarding schools in dealing with technological changes without eliminating the characteristics of Islamic education that become institutional identity (Creswell, 2018; Yin, 2018).

The research was carried out on several Islamic boarding schools in Bondowoso Regency, East Java Province, which were selected purposively based on the following criteria: (1) have applied digital technology in the learning process and institutional governance; (2) maintaining a learning system based on Islamic traditions such as the study of the yellow book, sorogan, and bandongan; and (3) have a digital literacy development program for students or educators. The research location was chosen because Bondowoso Regency is one of the areas that has a fairly rapid development of pesantren with socio-cultural characteristics of Pandalungan, so it is a relevant context for developing a digital transformation model of pesantren education.

In this qualitative research, the presence of researchers is the main instrument (human instrument) that functions to design research, determine informants, collect data, perform interpretation, and draw research conclusions. Researchers are directly involved in the process of field observation, in-depth interviews, documentation, and data verification so that they are able to understand research phenomena based on the perspective of the informants. To

maintain the objectivity and credibility of the research results, the researcher applies reflexivity, conducts systematic field recording, and triangulates during the research process (Guba, 1983; Lincoln, 1985).

The research subjects consist of pesantren stakeholders who are considered to have knowledge and experience regarding the implementation of digital transformation. The research informants were selected using the purposive sampling technique which was then developed through snowball sampling if additional information was needed. The main informants include kiai or pesantren caregivers, leaders of educational institutions, teachers or ustaz, information technology managers, and students who are actively involved in the use of digital technology. In addition, supporting informants came from elements of the Office of the Ministry of Religion of Bondowoso Regency, Islamic education organizations, alumni of Islamic boarding schools, and people who have relationships with the development of pesantren education. The selection of informants is carried out until data saturation is achieved, which is a condition when the information obtained has shown a repeating pattern and no significant new information is found (Guest et al., 2020).

Data collection techniques are carried out through several methods. First, participatory observation, namely directly observing learning activities, the use of digital media, technology-based administrative management, and interaction between kiai, ustaz, and students in the pesantren environment. Second, in-depth interviews use semi-structured interview guidelines to obtain information about the perceptions, experiences, challenges, strategies, and expectations of informants towards the digital transformation of pesantren education. Third, the documentation study includes analysis of institutional documents, curriculum, digitization policies, activity archives, academic reports, social media, pesantren websites, photos of activities, and other supporting documents relevant to the focus of the research. Fourth, the Focus Group Discussion (FGD) was conducted to obtain confirmation and enrich interpretations of the integration model of Islamic tradition, digital literacy, and continuous learning through discussions with stakeholders of pesantren education.

The validity of the data is guaranteed through the application of source triangulation, method triangulation, and time triangulation techniques. In addition, the study applied member checking to informants to ensure the suitability of the interpretation results with their experiences, peer debriefing with fellow researchers or Islamic education experts, and the preparation of trail audits that document the entire research process so as to increase the level of credibility, dependability, confirmability, and transferability of research findings (Guba, 1983; Lincoln, 1985).

Data analysis was carried out interactively using (Miles, 2020) model which included four stages, namely data collection, data condensation, data display, and conclusion drawing/verification. In the first stage, all data from observations, interviews, FGDs, and documentation was collected systematically. Furthermore, data condensation is carried out through the

process of reduction, *coding*, categorization, and identification of main themes related to Islamic traditions, digital literacy, pesantren leadership, learning innovation, and educational sustainability. The next stage is the presentation of data in the form of matrices, narratives, and conceptual models to make it easier for researchers to identify relationships between categories. The last stage is to draw conclusions and verify continuously through the process of comparison between data, triangulation, and validation to informants so that a conceptual model of digital transformation of Islamic boarding school education that has a high level of credibility is obtained.

The results of the analysis were then used to formulate a Digital Transformation Integration Model for Islamic Boarding School Education that combines three main dimensions, namely Islamic tradition, digital literacy, and a continuous learning ecosystem. The model is expected to be a conceptual contribution to the development of digital transformation theory in Islamic education as well as a practical recommendation for pesantren managers and policy makers in developing a digitalization strategy that is still based on Islamic values and local characteristics of Bondowoso Regency.

FINDINGS AND DISCUSSION

Findings

The results of the study show that the digital transformation of pesantren education in Bondowoso Regency develops through an adaptation process that does not replace Islamic traditions, but strengthens it through the use of digital technology in a contextual manner. Based on the results of observations, in-depth interviews, documentation, and *Focus Group Discussions* (FGD), it was found that most pesantren have utilized information technology in administrative management, learning, institutional communication, and student competency development. However, the implementation of digital transformation is still at various levels, depending on the leadership of the kiai, the readiness of human resources, infrastructure support, and the organizational culture of each Islamic boarding school. These findings show that digital transformation in the pesantren environment does not take place unilaterally, but through a negotiation process between traditional values and the demands of educational modernization.

The first dimension found in the research is the strengthening of Islamic traditions as the foundation of digital transformation. All informants emphasized that the use of digital technology is not intended to replace typical learning methods such as *bandongan*, *sorogan*, *halaqah*, and *book deliberation*, but functions as a supporting media that expands access to learning resources. Digitization is carried out through the provision of the yellow book in digital format, the use of Qur'an and hadith applications, cloud-based storage of study materials, and documentation of religious studies through digital platforms. The kiai maintain scientific authority as the main source of learning, while technology is used to increase the effectiveness of material delivery and expand the reach of da'wah to the community. Thus, digital transformation in Islamic boarding schools takes place within the framework of *value-based digital transformation*, which is a transformation that remains oriented towards the

preservation of Islamic values (*Islamic values preservation*).

The results of the study also show that kiai leadership is the most determining factor for the success of the digital transformation of pesantren education. Kiai not only functions as a spiritual leader, but also as a *change agent* who determines the direction of institutional digitalization policies. In Islamic boarding schools that have a high level of digital transformation, kiai actively provides support for the use of information technology, encourages the improvement of digital competence of teachers and students, builds collaboration with universities and local governments, and opens up spaces for technology-based learning innovation. On the other hand, in Islamic boarding schools that are still in the early stages of digitalization, the transformation tends to take place more slowly because there are still concerns that technology can reduce student discipline and shift the traditional learning culture. These findings indicate that the success of digital transformation is more influenced by visionary leadership than the availability of technology alone.

The second dimension is the digital literacy of students and educators. The research found that digital literacy in Islamic boarding schools is not only understood as the ability to operate technological devices, but also includes the ability to search, evaluate, utilize, and disseminate information responsibly in accordance with Islamic ethics. Various Islamic boarding schools have held training on the use of *Learning Management Systems* (LMS), office applications, digital learning media, simple graphic design, digital da'wah content production, and the ethical use of artificial intelligence to support the learning process. Santri shows high enthusiasm for the use of technology because it is considered to be able to accelerate access to Islamic references and expand scientific insights. However, the study also found that there is a digital competency gap between educators, especially for senior teachers who still need assistance in using digital learning platforms.

The next finding is related to the development of a continuous learning ecosystem. Digital transformation not only affects the learning process in the classroom, but also drives institutional governance changes towards a more collaborative and data-driven system. Pesantren began to develop a digital administration system, application-based academic management, digital libraries, student information systems, electronic payment services, and online communication media between pesantren, parents, and alumni. In addition, several Islamic boarding schools have built a network of partnerships with universities, local governments, community organizations, and the industrial sector to support the development of students' digital competencies. The ecosystem creates a *lifelong learning ecosystem* through the integration of formal, non-formal, and community-based learning.

However, this study also identifies a number of challenges of digital transformation in the pesantren environment. The main challenges include the limitations of internet infrastructure in several rural areas, limited budgets for information technology development, uneven digital competence of educators, low availability of quality digital-based Islamic learning content, and the absence of integrated Islamic boarding school digitalization operational

standards. In addition, some pesantren managers still face a dilemma in controlling the use of gadgets by students so as not to cause negative impacts such as social media addiction, the dissemination of unvalidated information, and the decrease in the intensity of face-to-face learning interactions. Therefore, digital transformation requires a supervisory mechanism, internal regulation, and digital *citizenship* education that is in line with Islamic values.

Based on the results of thematic analysis, this study succeeded in constructing the Digital Transformation Integration Model of Islamic Boarding School Education in Bondowoso Regency which consists of five main components. The first component is the values of Islamic tradition as the foundation of organizational culture which includes sincerity, adab, ukhuwah, kiai example, and learning the yellow book. The second component is transformational leadership of kiai which functions as a driver of innovation, policy makers, and a link between the tradition of pesantren and the development of digital technology. The third component is digital literacy, which includes technology competence, information literacy, media literacy, digital security, digital ethics, and the ability to use artificial intelligence responsibly. The fourth component is the continuous learning ecosystem, namely learning integration, digital governance, institutional partnerships, teacher professional development, and collaboration with the community. The fifth component is institutional sustainability, which is realized through improving the quality of education, strengthening the competitiveness of graduates, learning innovation, and strengthening the role of pesantren as a center for community empowerment based on technology and Islamic values.

The analysis of the relationship between components shows that Islamic tradition functions as a normative foundation, kiai leadership as a strategic driver, digital literacy as the main capability, and the learning ecosystem as an implementation space that jointly produces the sustainability of digital transformation of pesantren education. In other words, the success of digital transformation is not determined by the level of technological sophistication possessed by Islamic boarding schools, but by the ability of institutions to integrate Islamic values, adaptive leadership, digital competence, and institutional collaboration in one sustainable learning system. This model shows that digital transformation in the Bondowoso Regency pesantren is an adaptive process that maintains the continuity of Islamic traditions while improving the quality of education in accordance with the demands of the digital era.

Overall, the results of this study show that the digital transformation of pesantren education in Bondowoso Regency has evolved towards a new paradigm that no longer positions tradition and technology as two polar opposites. Instead, the two form a mutually reinforcing relationship through the integration of Islamic values, digital literacy, visionary leadership, and a continuous learning ecosystem. These findings produce a conceptual model that enriches the study of digital transformation in Islamic education and provides an empirical basis for the formulation of pesantren development policies that are adaptive to technological developments without losing their

Islamic identity, character, and tradition.

Discussion

The results of the study show that the digital transformation of pesantren education in Bondowoso Regency is not a digitalization process that is oriented towards technology adoption alone, but a socio-technical transformation that involves changes in organizational culture, leadership, learning practices, and institutional governance while maintaining the Islamic identity of the pesantren. These findings strengthen the theory of the Digital Transformation Framework put forward by (Hanelt et al., 2021), that digital transformation is a strategic organizational change that integrates technology, business processes, and cultural changes to create *new value*). In the context of Islamic boarding schools, the new value is not only in the form of administrative efficiency or modernization of learning, but also in improving the quality of Islamic science transmission through the use of digital technology without eliminating the scientific authority of kiai as the epistemological center of Islamic boarding schools. Thus, this study emphasizes that the success of digital transformation in Islamic educational institutions cannot be measured only by the level of technology adoption, but also by the ability of institutions to integrate digital innovation with value systems (*value integration*).

Research findings that show that Islamic tradition remains the foundation of digital transformation show that there is a process of recontextualization of tradition in the face of changing times. This perspective is in line with the Social Construction of Technology (SCOT) theory developed by Wiebe E. Bijker, Trevor J. Pinch, and Thomas P. Hughes, which explains that technology is never neutral, but rather shaped by social, cultural, and community values of users (Klein & Kleinman, 2002). The results of the study show that digital technology in Islamic boarding schools does not change the value structure of Islamic education, but undergoes a domestication process so that it functions as an instrument to strengthen the tradition of learning the yellow book, digital da'wah, scientific documentation, and the development of Islamic intellectual networks. In other words, pesantren culture is actually a variable that determines the form of digital transformation, not the other way around. This finding enriches the SCOT theory by showing that faith-based educational institutions have a *cultural filtering mechanism* for technological innovation so that digitalization takes place selectively based on sharia principles and pesantren values.

Kiai leadership, which emerged as the main determinant of digital transformation, shows that organizational changes in Islamic boarding schools are more influenced by value-based transformational leadership than by technological factors. This condition can be explained through the theory of Transformational Leadership developed by Bernard M. Bass and Bruce J. Avolio, which emphasizes four main dimensions, namely *idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration* (Bass & Riggio, 2006). The results of the study show that kiai carry out these four functions through moral example, providing a digital vision that

remains based on Islamic values, encouraging learning innovation, and fostering teachers and students to be ready to face technological changes. However, this study finds a new dimension that has not been widely discussed in Bass and Avolio's theory, namely spiritual legitimacy, which is the legitimacy of leadership born from religious authority and spiritual charisma. This dimension is a differentiating factor between digital transformation in Islamic boarding schools and educational organizations in general. Therefore, this research offers conceptual development in the form of Islamic Transformational Digital Leadership, which is a transformational leadership model that integrates spiritual leadership, digital vision, and the preservation of Islamic values.

The dimension of digital literacy found in the study shows that students' digital competencies are not sufficiently understood as technical abilities to operate digital devices, but must include critical thinking skills, digital ethics, information security, and moral responsibility in utilizing technology. These findings support the Digital Competence Framework (Van Audenhove et al., 2024) developed by the European Commission, which divides digital competence into five main domains, namely *information and data literacy, communication and collaboration, digital content creation, safety, and problem solving*. However, the results of the study show that in the context of pesantren there is an additional dimension in the form of ethical digital literacy. This dimension integrates the principles of *tabayyun*, trust, honesty, media manners, and social responsibility in the use of technology. Thus, this study proposes to expand the DigComp framework through the addition of Islamic ethical digital competence aspects, which are typical characteristics of Islamic education in facing the challenges of disinformation, hate speech, and abuse of digital media.

The findings regarding the formation of a sustainable learning ecosystem show that digital transformation in Islamic boarding schools has moved towards a learning ecosystem paradigm that places learning as a collaborative process across actors and across spaces. This perspective is in line with the theory of Learning Organization from Peter M. Senge who explains that learning organizations are built through five main disciplines, namely *systems thinking, personal mastery, mental models, shared vision, and team learning* (Husaini Zuhri & Huda, 2024). In this study, the five disciplines are seen through collaboration between Islamic boarding schools, universities, local governments, alumni, and the community in building a digital-based learning system. However, this study found that the continuous learning process in Islamic boarding schools is not only driven by the need to increase organizational capacity, but also by worship orientation (*ta'abbudi*) and community service. Thus, the concept of *learning organization* in pesantren has developed into an Islamic Learning Ecosystem, which is a learning system that integrates spiritual, social, academic, and technological dimensions in a sustainable unit.

The results of the study also show that the success of digital transformation is influenced by the ability of pesantren to build relationships between people, technology, and organizations. This perspective can be explained through the Socio-Technical Systems Theory developed by the

Tavistock Institute, which emphasizes that organizational effectiveness can only be achieved if social systems and technological systems develop in a balanced manner (Mumford, 2006). This research shows that pesantren that only invest in digital infrastructure without increasing teacher capacity and organizational culture do not undergo a significant transformation. On the other hand, Islamic boarding schools that develop human resource competencies, adaptive leadership, innovation culture, and digital governance are able to build a more sustainable transformation. These findings confirm that the digital transformation of Islamic education must be understood as a process of organizational capability building, not just the digitization of learning tools.

Interestingly, the research found that the biggest challenge to digital transformation does not come from resistance to technology, but from the need to maintain a balance between modernization and the preservation of Islamic boarding school identity. These conditions can be analyzed using the Institutional Theory developed by (DiMaggio & Powell, 1983) regarding *institutional isomorphism*. The theory explains that organizations tend to be pressured to resemble other organizations due to regulative, normative, and mimetic pressures. However, the results of the study show that pesantren in Bondowoso Regency do not fully follow the flow of digital isomorphism like modern educational institutions, but rather carry out selective institutional adaptation, which is adopting technology that is in accordance with Islamic values while rejecting digital practices that have the potential to damage the pesantren culture. Thus, this study expands (DiMaggio & Powell, 1983) theory through the concept of selective digital adaptation, which is the ability of Islamic educational organizations to select digital innovations based on normative and religious legitimacy.

From the perspective of Islamic education theory, the results of the study confirm that digital transformation is still based on the goals of Islamic education as formulated by (Al-Attas, 1991), namely the formation of civilized human beings (*insan adabi*) through the *process of ta'dib*. Digital technology in this study is not positioned as the final goal of education, but as a *wasilah* (means) to strengthen the process of character formation, scientific development, and improvement of the quality of worship. Therefore, the success of digital transformation is not only measured through indicators of learning efficiency, but also through improving the quality of morals, digital ethics, social responsibility, and religious integrity of students. This perspective also distinguishes the digital transformation of pesantren from the digital transformation paradigm in general education which is more oriented towards improving technological competence and academic productivity.

Based on the overall results of the analysis, this study produced a conceptual synthesis in the form of an Integrative Model of Digital Transformation of Value-Based Islamic Boarding School Education. The model explains that the success of digital transformation is the result of the interaction of five main components, namely (1) Islamic tradition as a normative foundation, (2) transformational leadership as a driver of change, (3) digital literacy based on Islamic ethics as a core capability, (4) a continuous learning

ecosystem as a space for implementation, and (5) collaborative digital governance as an institutional mechanism. These five components form a system that strengthens each other so as to produce a digital transformation that is adaptive, sustainable, and still maintains the identity of the Islamic boarding school. This is the main novelty (*state of the art*) of this research, because it is different from previous research that tends to view digitalization as a technology or management issue alone. This research shows that the digital transformation of pesantren education is a process of integration between technology, culture, leadership, ethics, and spirituality, resulting in a new paradigm that can be called the Islamic Digital Education Ecosystem, which is a digital education ecosystem that is rooted in Islamic values while being responsive to the development of a global digital society.

CONCLUSION

This study concludes that the digital transformation of pesantren education in Bondowoso Regency is an integrative process that combines Islamic traditions, digital literacy, and a continuous learning ecosystem without eliminating the distinctive identity of pesantren students. The success of digital transformation is not solely determined by the availability of technology, but is more influenced by transformational leadership of kiai, strengthening digital literacy based on Islamic values, and collaboration between stakeholders in building adaptive education governance. The results of the research resulted in an Integrative Model of Digital Transformation of Islamic Boarding School Education which consists of five main components, namely: (1) Islamic tradition as a normative foundation, (2) transformational leadership as a driver of change, (3) digital literacy based on Islamic ethics as a core capability, (4) a continuous learning ecosystem as a space for implementation, and (5) collaborative digital governance as a strengthening of institutional sustainability. This model is a conceptual contribution in the development of the theory of digital transformation of Islamic education as well as providing practical recommendations for pesantren managers and policymakers in designing digitalization strategies that are innovative, sustainable, and remain oriented to Islamic values.

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