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Digital Circular School in Islamic Education: A PRISMA Based Systematic Literature Review (2020-2025) and an Integrative Conceptual Model of Islamic Values, Circularity, and Digital Capacity

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ABSTRACT

Purpose – This study formulates a management framework for pesantren, madrasah, and Islamic schools to respond to the fragmentation of digitalization practices and ecological sustainability through an integrative Digital Circular School model that coherently links Islamic values, circularity, and digital capacity

Design/methods/approach – The study uses a conceptual design based on a systematic literature review with a PRISMA flow. The search was conducted in Scopus, Google Scholar, and DOAJ for publications from 2020 to 2025 using keywords related to circular school, circular economy, eco-pesantren, digital Islamic school management, and Islamic values. Selected articles were analyzed through thematic analysis (theoretical reduction, thematic categorization, and integrative synthesis) to build a conceptual model

Findings – Of 412 initial records, 198 remained after duplicate removal and administrative screening, 74 passed title and abstract screening, and 27 publications met the eligibility criteria. The literature is dominated by literature studies (55 percent) and qualitative case studies (25 percent). The synthesis identifies four themes: integration of Islamic curriculum and pedagogy with technology, digital Islamic leadership and governance, adoption of key technologies along with ethical challenges, and character formation and spirituality in the digital space. These findings produce a cyclical model with three pillars: reinforcement of Islamic values, enhancement of circularity practices, and expansion of digital capacity; this model is conceptual and has not been empirically tested.

Research implications – The model can serve as an initial guide to design digital governance based on amanah and accountability, mainstream paperless practices, 3R, energy efficiency, and resource monitoring through information systems and dashboards; while also strengthening digital literacy, ecological literacy, and Islamic character development within the curriculum and school culture.

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1. Introduction

Global changes marked by the acceleration of digitalization and increasing ecological pressures encourage educational institutions to rearticulate their management orientation to align with sustainability demands and technological developments. In the context of Islamic education, pesantren and madrasah are in a strategic position to develop ecological literacy, digital capacity, and character formation based on spiritual values, although these changes often occur gradually. Various initiatives such as green schools, eco-pesantren, and digitalization of governance have begun to emerge as responses to these dynamics, but their implementation remains fragmented and has not been

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connected within a single comprehensive strategic framework (Kejora et al., 2025; Masturin et al., 2022; Nadifa & Ambarwati, 2024). The complexity of these changes requires a new management model capable of integrating ecological sustainability, digital innovation, and Islamic values as its ethical foundation. The idea of a Digital Circular School emerges as a potentially integrative approach to respond to this need in a more systematic manner.

Digital transformation has changed the management patterns of Islamic schools through increased administrative efficiency, strengthened information transparency, and the provision of more flexible learning services. The use of Learning Management Systems, mobile applications, and information platforms has strengthened data-driven management in pesantren and madrasah, while also improving the quality of educational services (Putra et al., 2025; Ripai et al., 2025; Tantowi et al., 2025). The success of this transformation is strongly influenced by digital leadership, the adaptability of organizational culture, and the readiness of human resources to operate new technologies (Holilah & Hajjaj, 2024; Mutamimah et al., 2025; Thohri, 2022). Nevertheless, the use of technology still focuses on governance and learning, while its integration with the ecological sustainability agenda has received relatively limited attention. This condition indicates the need for a framework that connects digitalization with sustainability strategies both conceptually and operationally.

Circular economy principles offer an alternative paradigm in the management of educational institutions by emphasizing resource efficiency, waste reduction, and the strengthening of sustainability practices. Pesantren and madrasah have implemented a number of circular practices such as waste management, waste banks, energy conservation, and resource reuse as part of community-based educational activities (Azizah & Anhar, 2025; Kejora et al., 2025). This approach creates pedagogical opportunities while also promoting institutional resilience through cost savings and improved quality of the learning environment. However, its implementation is still more often in the form of partial programs rather than as part of structured and sustainable school governance (Mulyadi, 2024; S. Yuana et al., 2024). This limitation highlights the need for a model that can integrate circular economy practices into the school management system more comprehensively, including through the support of digital technology.

Islamic values play a fundamental role in guiding the direction of digital and circular transformation in Islamic educational institutions so that it remains aligned with the ethics and spirituality of the institution. The concepts of maqasid shariah, tauhid, and insan kamil provide an ethical framework to manage resources wisely, foster love for the environment, and ensure responsible use of technology (Bashori et al., 2024; Moslimany et al., 2024). Initiatives such as eco-pesantren and tawhid-based green learning show how Islamic values can be integrated with the ecological sustainability agenda in a holistic manner (Kejora et al., 2025; Masturin et al., 2022). Nevertheless, the penetration of digital technology has the potential to shift institutional attention from the ethical dimension toward a pragmatic orientation that emphasizes speed, efficiency, and automation. This situation requires a model that positions Islamic values as a foundation that unifies digital innovation and circular practices so that transformation proceeds ethically and sustainably.

The literature review indicates that issues of digitalization, ecological sustainability, and Islamic values have been widely discussed, but generally proceed along separate research paths. Studies on the digitalization of Islamic schools emphasize governance improvements and learning innovation, while research on eco-pesantren and the circular economy more strongly highlights environmental aspects and resource management (Abdillah et al., 2025; Novianto et al., 2021; Wadi et al., 2023). On the other hand, studies on Islamic values focus on ethics, spirituality, and the formation of school culture (Izzah et al., 2025; Maharani, 2025). This fragmentation has resulted in the absence of an integrative model that explicitly explains the structural relationship between Islamic values, circular economy principles, and digital capabilities in the management of Islamic schools. The absence of such a

framework makes it difficult for educational institutions to design comprehensive and continuous transformation strategies.

The need to formulate an integrative model underscores the importance of developing a Digital Circular School conceptual framework that combines Islamic values, circular economy principles, and digital capabilities as the foundation for sustainable Islamic school management. Through conceptual analysis of developments in the latest literature, this model is intended to provide a coherent theoretical basis for designing governance, curriculum, and learning ecosystems that are responsive to the demands of the digital era and the ecological crisis (Bashori et al., 2024; Nasaruddin et al., 2023; S. Yuana et al., 2024). The contribution of this model lies in its ability to unify three main domains of Islamic education into a single conceptual structure that can be operationalized in policy and managerial practice. This orientation opens opportunities for the development of indicators, evaluation frameworks, and further empirical research to assess the effectiveness of Islamic school transformation based on a circular-digital approach grounded in Islamic values.

2. Methods

2.1. *Research Design*

This study uses a conceptual design based on a systematic literature review that is directed to build a theoretical framework regarding the Digital Circular School that integrates Islamic values, circular economy principles, and digital capabilities in the context of 21st-century education. This design was selected because it allows researchers to identify conceptual patterns, theoretical inconsistencies, and cross-domain integration potential that cannot be obtained through traditional empirical approaches (Snyder, 2019). A conceptual approach is relevant for studies focused on developing new models, because it provides space to combine theoretical evidence and prescriptive findings into a coherent logical structure. Thus, this method is used to produce a theoretical construction that can serve as a foundation for the development of policies and educational practices based on a digital circular economy grounded in Islamic values.

2.2. *Research Procedure*

The research procedure was carried out through four main stages that are interrelated and form a systematic flow. The first stage is literature identification through keyword searches that represent the three main research domains, namely Islam–Circular Economy–Digital Capability. The second stage is the literature screening process using the PRISMA flow to ensure that only articles meeting the inclusion criteria are analyzed further, thereby maintaining methodological consistency in source searching. The third stage is the information extraction process that involves collecting core concepts, key findings, and theoretical propositions from each selected article. The fourth stage is thematic synthesis that unifies cross-literature findings into a comprehensive conceptual structure, thereby enabling the formulation of an integrative Digital Circular School model.

2.3. *Tools and Technology*

The entire literature search process was conducted through three global index databases, namely Scopus, Google Scholar, and DOAJ, which represent a range of reputable sources from international and national journals. Reference management was conducted using citation management software to ensure citation consistency and avoid source redundancy. The PRISMA screening and documentation process was conducted using a digital worksheet that enables systematic tracking of the number of articles at each selection stage. The thematic coding process

utilized digital document analysis tools to maintain the orderliness of concept grouping and the consistency of thematic integration.

2.4. *Data Collection and Analysis*

The research data in the form of scientific publication documents were analyzed using thematic analysis techniques adapted to the context of conceptual studies. Each article was coded based on the themes of Islam, circular economy, and digitalization, as well as their derivative subthemes, to identify interconcept relationships and gaps that have not been addressed by previous literature. The analysis process was carried out through three steps: theoretical reduction to filter relevant concepts, thematic categorization to organize cross-domain findings, and reflective integration to construct the structure of the conceptual model. This approach ensures that the analysis is not only descriptive, but also produces a theoretical synthesis that has contributory value for the discipline of Islamic education and the study of the digital circular economy.

2.5. *Reliability and Validity*

Efforts to ensure reliability and conceptual validity were carried out through the application of criteria of transparency, traceability, and theoretical consistency. Transparency was maintained through complete documentation of the search, selection, and synthesis processes based on the PRISMA flow. Traceability was strengthened by storing reference records, thematic codes, and inclusion–exclusion justifications at each analysis stage. Theoretical consistency was obtained through literature triangulation that compares cross-domain findings to minimize interpretive bias and ensure that the resulting conceptual model has internal coherence. This approach strengthens the credibility of the findings and ensures that the developed Digital Circular School model has a valid theoretical basis and can be accounted for in scientific discourse.

3. Results

3.1. *Reviewed Studies and Selection Flow*

The literature identification process in this circular school study was conducted systematically by searching various international and national academic databases such as Scopus, Google Scholar, and DOAJ. The keywords used included circular school, circular economy, green school, eco-pesantren, Islamic school, digital school management, and Islamic education digitalization. The publication time range was limited to 2020–2025 to ensure that the literature obtained reflects the latest developments related to the circular economy, digital transformation, and Islamic education management.

At the initial identification stage, 412 articles were obtained that matched the keywords and year range. These articles were then examined to remove duplicates as well as non-scientific publications, such as opinion papers and policy notes that did not go through a peer-review process. After administrative screening, the number of documents decreased to 198 articles. This stage is important to ensure that only valid and credible academic publications were processed further.

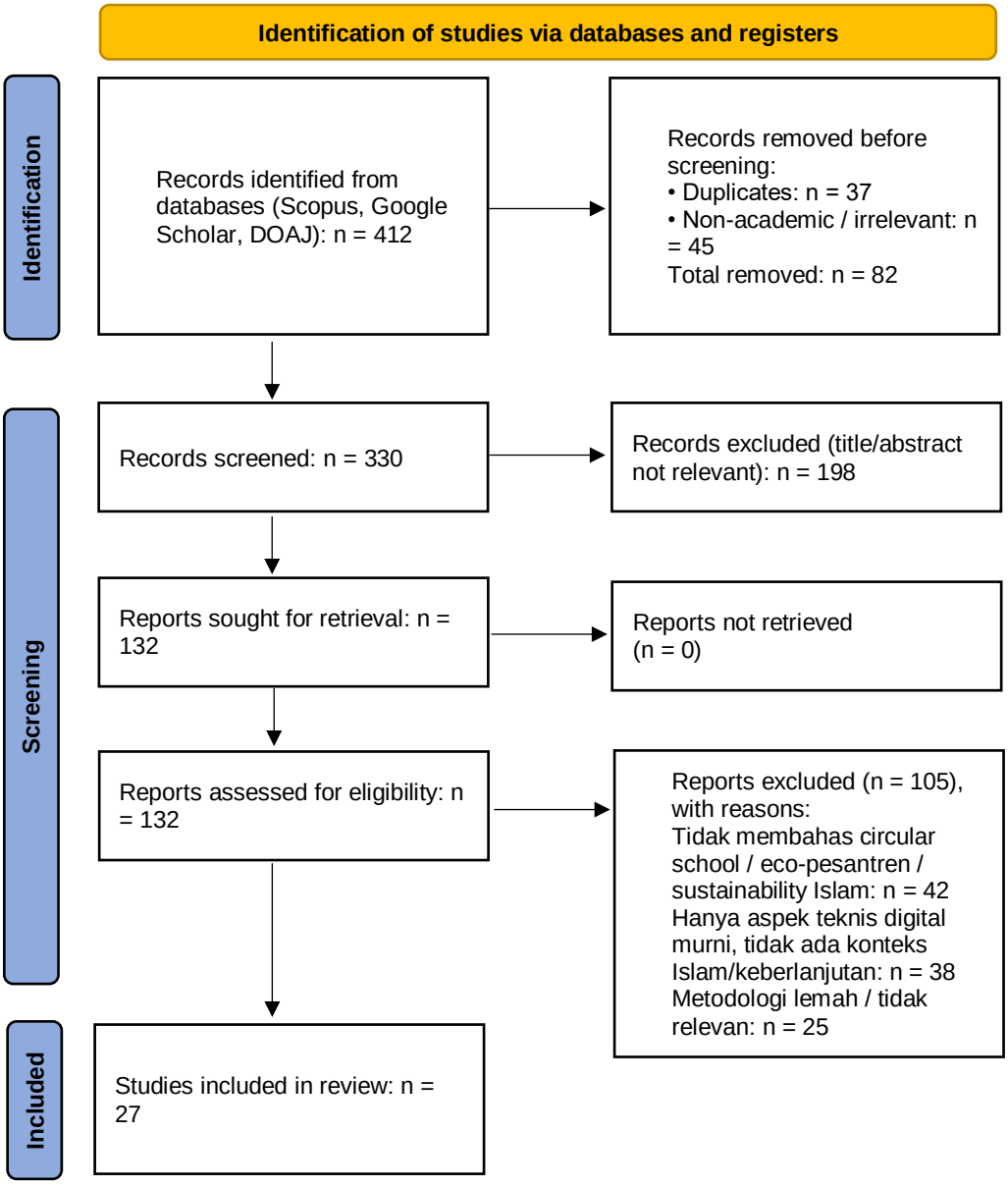
The screening stage was then conducted by reading the titles and abstracts of the 198 articles. At this stage, several initial inclusion criteria were established, namely:

a. The article discusses the circular economy, circular school, green school, or sustainability in educational units.
b. The article explicitly refers to the context of madrasah, pesantren, or Islamic schools.
c. The article mentions the integration of management digitalization or learning.

d. Articles that did not meet one of these criteria were excluded. After this process, the remaining articles shrank to 74 articles that were considered conceptually relevant.

The next stage was eligibility, namely full-text reading of the 74 articles to assess methodological depth, conceptual relevance, and the strength of integration among the three main domains: the circular economy, digital education management, and Islamic values. Some articles were excluded because they only mentioned sustainability in general, did not show integration of the digital dimension, or only discussed Islamic education without relevance to circular school.

Figure 1. PRISMA



Through an in-depth evaluation process at this eligibility stage, the number of articles that passed became 27 publications. These articles have full alignment with the research focus and sufficient analytical quality to serve as the basis for developing the thematic synthesis and the conceptual model. The final stage resulted in 27 articles. These articles represent diverse contexts

of Islamic educational institutions, including modern pesantren, salafiyah pesantren, madrasah, and formal Islamic schools, with conceptual, empirical, and digital implementation study approaches. This number is considered adequate because it provides diversity of perspectives, analytical depth, and sufficient empirical support to build an integrative model regarding circular school management based on digital and Islamic values.

3.2. *Descriptive Mapping of the Literature*

The mapping of the 27 reviewed articles shows fairly diverse methodological characteristics, although the largest tendency remains in conceptual literature reviews and normative analysis. Most studies focus on developing theoretical frameworks, foundational ideas of the circular school model, eco-pesantren, digitalization of Islamic education, and the integration of sustainability values in school or pesantren management. Empirical research that directly tests model implementation is still relatively limited, and usually takes the form of case studies in particular pesantren or schools (for example, studies of smart pesantren, e-administration, or waste management based on the circular economy). These findings indicate that the discourse on circular school and digital Islamic education is still at the stage of conceptual expansion, while its empirical base is growing but not yet dominant.

The distribution of research methods used can be seen in Table 1. Literature studies, whether in the form of conceptual, narrative, or descriptive reviews, dominate about 55% of the total reviewed publications. Qualitative case studies (for example, eco-pesantren, waste management in pesantren, or digitalization of administration) occupy a proportion of about 25%, while the use of mixed methods, systematic literature reviews, and quantitative approaches is very limited. The dominance of literature studies indicates that the theme of digital-based circular school in Islamic education is still relatively new, so many studies function as builders of an initial framework or exploration of ideas, and there are not many studies that systematically test implementation impacts.

Table 1. Distribution of Research Methods in 27 Reviewed Studies

Research Method	Number of Articles	Percentage (%)
Literature study (conceptual or descriptive)	15	55%
Qualitative case study	7	25%
Mixed methods or digital model or evaluation	2	7%
Systematic literature (SLR)	1	4%
Interviews or field observations	2	7%
Total	27	100%

In addition to methodology, the thematic focus of the literature shows a consistent pattern. Keyword analysis and research foci from the 27 articles show five dominant clusters. First, the integration of technology and digitalization of governance in Islamic educational institutions. Many studies discuss how pesantren and Islamic schools adopt LMS, digital administrative applications, smart management systems, and academic information platforms. Second, a curriculum based on Islamic values and sustainability. Some literature emphasizes the importance of maqasid shariah, tauhid values, and ecological ethics as the basis for developing sustainable education.

Third, teachers' digital literacy and human resource readiness. Most studies emphasize that strengthening teachers' digital capacity is an important factor in the success of digitalization in Islamic education. Fourth, Islamic ethics, management, and leadership. Research emphasizes the need for adaptive leadership that is able to integrate technological innovation with spiritual values. Fifth, the sustainability and circular economy context, especially in pesantren that implement eco-pesantren, waste management, or circular-based education practices.

Table 2. Main Theme Clusters in 27 Reviewed Literatures

Main Theme	Example Keywords	Number of Occurrences
Technology integration and digitalization	digital, LMS, e-administration, smart pesantren	18+
Curriculum and Islamic values	Islamic values, maqasid, tauhid	12+
Digital literacy and teacher competence	literacy, training, human resource capacity	10+
Ethics, management, and leadership	leadership, management, adaptive	8+
Circular economy and sustainability	circular, eco-pesantren, green learning	9+

This mapping indicates that research on circular school in Islamic education does not only emphasize the environmental dimension or resource efficiency, but also positions the integration of Islamic values and digital competence as the main foundation. Thus, an urgent need emerges to formulate a conceptual model that is able to unify these five clusters into one coherent framework. This framework will serve as the basis for the next section that synthesizes the relationships among themes and formulates a digital-based circular school management framework grounded in Islamic values.

3.3. *Thematic Synthesis*

The results of the literature mapping in the previous subsection were synthesized to identify deeper conceptual patterns. Although the 27 reviewed articles use diverse approaches and contexts, these studies can be categorized into four main themes, namely: (1) integration of Islamic curriculum and pedagogy with technology, (2) digital Islamic leadership, management, and governance, (3) adoption of key technologies along with their ethical challenges, and (4) character formation and spirituality in the digital space. A summary of the core findings of each article and their placement within these themes is presented in Table 3. Summary of Main Findings and Themes of the Reviewed Articles.

Table 3. Summary of Main Findings and Themes of the Reviewed Articles

No	Reference	Main Findings	Main Theme
1	(Murdiyanto et al., 2025)	Integration of digital financial systems, e-money, dashboards, waste management, and school business units within a circular school framework in an Islamic school.	Digital-based circular school in Islamic schools
2	(S. Yuana et al., 2024)	Developing a mapping of circular school decisions (canteen, garden, waste, energy) in the context of Indonesian schools.	Circular school policy
3	(Kementerian PPN/Bappenas, 2025)	Establishing schools or madrasah as a locus of education, behavior change, and national circular economy practices.	National circular economy policy
4	(Kementerian PPN/Bappenas, 2022)	Emphasizing the role of schools as agents of change, especially green schools, waste reduction, and circular practices.	Circular economy policy and urgency
5	(Tantowi et al., 2025)	Persis pesantren implements an agribusiness-based circular economy (plants, livestock, waste) integrated with the curriculum.	Circular economy in Islamic educational institutions
6	(Rahmat et al., 2025)	Maggot cultivation, food waste management, and santri environmental literacy as a pesantren circular economy model.	Circular practices in pesantren
7	(Wardhani et al., 2024)	Integration of curriculum, school management, Islamic values, and digital technology.	Digital-based Islamic school management

8	(Yahya, 2024)	Changes in Islamic school governance through digitalization, transparency, and Islamic values.	Digital Islamic school management
9	(Kirana & Zen, 2025)	An information technology based Islamic school management information system (I-SIS) as a governance foundation.	Islamic school management information system
10	(Solahudin et al., 2025)	Improving school administrative efficiency through a digital management system.	Efficiency of digital school management
11	(Farwati & Arifin, 2023)	Digitalization of learning through smart classrooms as part of modern school management.	Digital learning infrastructure
12	(Noviandari & Aminah, 2025)	Strengthening the capacity of teachers and education personnel in using the E-SmartSchool platform.	Digital capacity building in schools
13	(Saryoko et al., 2024)	A web-app based Digital School Management System in an integrated Islamic school (SMPIT).	Digital school management in Islamic schools
14	(Tumiran et al., 2024)	The impact of digitalization on the quality and access of Islamic education through integrated school management.	Digital transformation of Islamic institutions
15	(Kejora et al., 2025)	Developing an eco-pesantren model based on local wisdom that integrates ecological education, environmentally friendly practices, and support for the SDGs in the pesantren environment.	Eco-pesantren and circular economy in Islamic education
16	(Azizah & Anhar, 2025)	Showing the application of the circular economy in waste management at Subulul Huda pesantren through reduction, reuse, and waste processing as a source of economic value.	Circular economy practices in pesantren
17	(Al-Jayyousi et al., 2022)	Synthesizing literature on sustainable development from an Islamic worldview perspective and emphasizing the importance of integrating tauhid, justice, and amanah values in the sustainability agenda.	Islamic worldview and sustainable development
18	(Masturin et al., 2022)	Proposing a tauhid-based green learning model in Islamic higher education to form insan kamil character that cares for the environment and is sustainability oriented.	Tauhid-based green learning and insan kamil character
19	(Bashori et al., 2024)	Formulating a maqasid syariah based digital economy model that emphasizes integration, sustainability, and transformation as a normative framework for economic and technological innovation.	Sustainable digital economy model based on maqasid syariah
20	(Mulyadi, 2024)	Conceptually reviewing the management of Islamic education in the digital era, including managerial transformation challenges, human resource readiness, and the need to integrate technology with Islamic values.	Management of Islamic education in the digital era
21	(Abdillah et al., 2025)	Examining digital transformation in Islamic Religious Education learning, from theoretical aspects to implementation, as well as its impact on students' learning quality.	Digital transformation of PAI learning
22	(Tantowi et al., 2025)	Analyzing the effectiveness of digital technology in pesantren administration and operations and showing that pesantren management becomes more efficient and transparent.	Digital-based pesantren management
23	(Ripai et al., 2025)	Describing how the "Assalafie Babakan Mobile" application transforms the pesantren administrative system from manual to digital and increases service speed.	Digitalization of the pesantren administrative system
24	(Holilah & Hajjaj, 2024)	Reviewing trends and implications of the transformation of Islamic education management in the digital era for learning quality and institutional governance.	Transformation of Islamic education management in the digital era

25	(Wadi et al., 2023)	Presenting education management strategies in the digital era to address global changes in Islamic education, including strengthening digital capacity and institutional adaptation.	Islamic education management strategies in the digital era
26	(Novianto et al., 2021)	Developing the concept, framework, and maturity level model of Smart Pondok Pesantren that integrates information systems, digital infrastructure, and pesantren governance.	Smart Pondok Pesantren framework
27	(Mutamimah et al., 2025)	Explaining the integration of prophetic leadership values with digital innovation to form an Islamic elementary school culture that is responsive to the challenges of the digital era.	Prophetic leadership and digital innovation in Islamic school culture

The first theme is the integration of Islamic curriculum and pedagogy with technology. The reviewed articles emphasize the need for a curriculum that is responsive to digital acceleration without losing the foundation of Islamic values, especially in the context of schools and pesantren that develop circular school or eco-pesantren models (Murdiyanto et al., 2025; Rahmat et al., 2025; S. L. Yuana, 2023). Several studies also highlight the importance of teachers' digital literacy as a prerequisite for integrating Islamic values with technology so that learning remains adaptive and humanistic (Farwati & Arifin, 2023; Noviandari & Aminah, 2025; Wardhani et al., 2024). In the curriculum context, several publications emphasize the integration of maqasid shariah values, ecological ethics, and the tauhid approach as the basis for developing a curriculum that is aligned with technology but remains oriented toward the formation of insan kamil character (Bashori et al., 2024; Masturin et al., 2022). This synthesis indicates that technology-based Islamic curriculum is understood not merely as an instrument of knowledge transfer, but as a means of forming individuals who are spiritually excellent and digitally competent.

The second theme is digital Islamic leadership, management, and governance. The literature shows that digitalization in Islamic educational institutions requires visionary leadership that integrates amanah, justice, and ihsan values in the transformation process (Mutamimah et al., 2025; Yahya, 2024). In various pesantren, the successful implementation of digital technology is strongly influenced by leaders' capacity to manage change and ensure that innovation aligns with the institution's spirituality values (Ripai et al., 2025; Tantowi et al., 2025). Other studies emphasize that Islamic value based digital management systems strengthen transparency, the effectiveness of decision making, and educational services (Kirana & Zen, 2025; Solahudin et al., 2025; Tumiran et al., 2024). This synthesis indicates that Islamic leadership oriented toward digitalization becomes an important bridge between technological innovation and the mission of Islamic education.

The third theme is the adoption of key technologies and their ethical challenges. Various studies discuss the use of digital management applications, smart classrooms, web-based information systems, and electronic learning platforms to improve the efficiency of Islamic schools (Farwati & Arifin, 2023; Noviandari & Aminah, 2025; Novianto et al., 2021; Saryoko et al., 2024). In addition to opportunities for efficiency and expanded access, the literature also highlights risks that accompany digitalization, such as the digital divide, dependence on technology, and ethical and human concerns within the digital learning space (Holilah & Hajjaj, 2024; Mulyadi, 2024; Wadi et al., 2023). Some studies warn that without a strong ethical framework based on Islamic values, digitalization can erode the depth of character or give rise to forms of dehumanization in education. This theme emphasizes a dialectic between the potential of technology as a catalyst for innovation and moral risks that must be controlled systemically.

The fourth theme is character formation and spirituality in the digital space. Although digitalization is a major focus, various articles emphasize that character formation, akhlak, and

spiritual values remain at the core of Islamic education. The concepts of eco-pesantren and circular school, for example, position ecological responsibility, akhlak, and spiritual awareness as an integral part of education in the digital era (Azizah & Anhar, 2025; Kejora et al., 2025; Nurkhin & et al., 2024). Several studies show that strengthening worship, teacher role modeling, and technology based management of religious activities can shape a learner profile that is religious while also digitally competent (Bashori et al., 2024; Mutamimah et al., 2025). Research on tauhid-based green learning curricula also affirms that spirituality is the foundation that guides technological innovation so that it remains aligned with the goals of Islamic education (Masturin et al., 2022). This theme indicates that although Society 5.0 emphasizes digitalization, spirituality remains the axis of change orientation.

These four themes form one logical unity that mutually reinforces one another. The integration of a technology-based Islamic curriculum requires Islamic leadership that is able to guide change wisely. The adoption of key technologies requires a solid ethical framework to ensure that digitalization does not sacrifice the human dimension. At the same time, the formation of spirituality and character becomes the foundation to ensure that digital innovation is oriented toward kemaslahatan.

3.4. *Integrative Conceptual Model*

This conceptual model was not built through empirical testing, but through theoretical integration that emphasizes logical coherence among three main pillars: digital capacity, circularity, and Islamic values. These three components are positioned as mutually reinforcing elements in one sustainable cycle, thereby creating a Digital Circular School model that is relevant for Islamic educational institutions. The foundation of this model lies in Islamic values such as amanah, itqan, syura, and khalifah, which function as moral regulators for the entire school management process. Meanwhile, digital capacity and circularity principles serve as drivers of efficient, transparent, and sustainable school operational performance (Azuddin et al., 2025; S. Yuana et al., 2024).

This model is structured in a cyclical conceptual model format, aligned with the philosophy of circularity. There are three core components in the model: (1) Reinforcement of Islamic Values, (2) Enhancement of Circularity Practices, and (3) Expansion of Digital Capacity. Unlike a hierarchical input-output model, these three components are positioned in one recurring cycle that continuously strengthens one another. Islamic values are positioned at the beginning of the cycle because they serve as the normative reference for school policies and behaviors, including the use of digital technology and the implementation of circularity programs (Al-Māwardī; Al-Ghazali, Ihya'). Next, circularity principles are applied in the management of school resources, energy, and waste to support long-term efficiency (Pratiwi et al., 2025; S. Yuana et al., 2024; Zuhdi & Azizah, 2022). The third zone is the strengthening of digital capacity as an enabler for school governance, data-driven decision making, and the integration of digital administration (Rohita & Rahmadini Hidayat, 2023; Vita et al., 2024; Zulfikar et al., 2022).

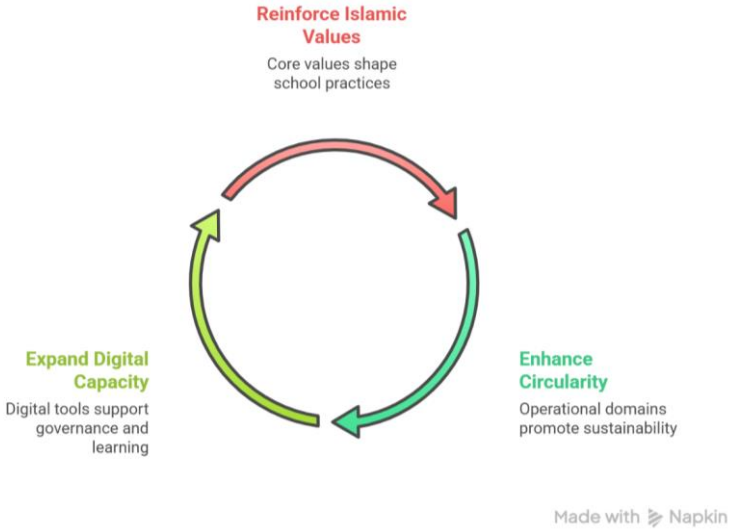
This cycle works through dynamic causal relationships. Islamic values strengthen the ethical foundation and policy direction of digital school governance so that it prevents digitalization practices that are not aligned with kemaslahatan. When Islamic values are applied as operational principles, schools are more prepared to implement circularity because there is spiritual awareness of the prohibition of wastefulness, the importance of balance, and ecological responsibility (QS. Al-A'raf 31; QS. Al-Isra' 26–27). Next, the implementation of circularity requires digital support to monitor energy consumption, manage inventory data, integrate e-money, or optimize school information systems (Azuddin et al., 2025; Murdiyanto et al., 2025). Strong digital capacity, in turn, makes it easier for schools to re-instill Islamic values because technology can be used as a means

of transparency, accountability, and media for value internalization. Thus, all components mutually reinforce each other in a spiral structure that rotates continuously.

This conceptual model implies operational changes in schools. At the policy level, schools need to develop digital governance based on Islamic values through integrated academic information systems, digital financial transparency, and syura-based participation (Karakose et al., 2024). At the operational level, the integration of circularity is carried out through paper reduction (paperless) policies, 3R-based waste management, energy efficiency, and resource management innovation (Pratiwi et al., 2025; S. Yuana et al., 2024). At the level of school culture, technology is utilized to strengthen the itqan work ethos, value-oriented digital leadership, and the creation of a sustainable learning environment (Basyo & Anirwan, 2023; Meliyani et al., 2022). Overall, the combination of the three components in a spiral structure makes Circular School a recurring learning model that is adaptive to change, yet remains rooted in the identity of Islamic values.

This model shows that digital transformation and circularity cannot run effectively without a foundation of Islamic values as the center of behavioral orientation. Conversely, Islamic values require digital tools to be translated into measurable and accountable managerial practices. Circularity provides long-term sustainability direction and ensures that digital transformation does not produce wastefulness or ecological imbalance. Thus, this conceptual model emphasizes that Digital Circular School is not merely the integration of technology in schools, but a process of reconstructing Islamic education governance that is value based, sustainable, and efficient.

Figure 2. Digital Circular School Conceptual Model (Integrative Cycle of Islamic Values, Circularity, and Digital Capacity).



4. Discussion

The discussion on Digital Circular School confirms that the transformation of Islamic education based on values, digitalization, and circularity is a conceptual response to the overlap as well as fragmentation of previous discourse. Various studies on Islamic education management in the digital era show that digitalization is often understood as technical modernization of management and learning, but it has not always been systematically linked with ecological sustainability and the restructuring of resource utilization models (Holilah & Hajjaj, 2024; Mulyadi, 2024). On the other hand, literature on education management strategies in an era of global change emphasizes the need for adaptive institutional design, but it often stops at the level of general managerial prescriptions without formulating

an integrative framework that combines the circular economy, digital governance, and Islamic worldview (Al-Jayyousi et al., 2022; Wadi et al., 2023). The Digital Circular School conceptual model developed in this study positions the integration of these three pillars not as an optional addition, but as one coherent system that redefines the orientation, processes, and indicators of success in Islamic school management. Thus, the main contribution of the model does not lie in adding one new term, but in reorganizing the relationship among values, technology, and circularity as one sustainable Islamic education ecosystem.

The methodological mapping of the 27 articles shows that the discourse on circular school and digital Islamic education is still in an early conceptualization phase, with a dominance of literature studies and strong normative analysis. Studies on the transformation of Islamic education management more often elaborate general trends and implications of digitalization, but rarely include long-term evaluation designs on the impacts of that transformation on governance quality and learning outcomes (Holilah & Hajjaj, 2024; Wadi et al., 2023). At the same time, circular economy policy at the national level places schools and madrasah as a strategic locus for behavior change and sustainability practices, but this has not been followed by measurable operational frameworks at the level of Islamic education units (Kementerian PPN/Bappenas, 2025). This limitation is reinforced by findings that digitalization is often positioned as a technical agenda in religious learning, without always being integrated with the restructuring of resource management and the design of a circular school ecosystem (Abdillah et al., 2025; Sudirman et al., 2025). In this context, the Digital Circular School conceptual model fills the gap by offering a conceptual architecture that connects the policy level, governance, and daily practices in one value-digital-circularity cycle that can be further tested empirically.

The integration of Islamic curriculum and pedagogy with technology in this model emphasizes that digitalization should not be reduced to merely a new medium for transferring religious content. A maqasid syariah based digital economy framework shows that the design of technological innovation ideally departs from sharia objectives such as hifz al-din, hifz al-nafs, and hifz al-bi'ah, so that the circular economy and digital transformation are both directed toward kemaslahatan across generations (Bashori et al., 2024; Masturin et al., 2022). The tauhid-based green learning model and insan kamil character indicates that a sustainable curriculum needs to combine the strengthening of ecological awareness with the formation of spirituality that views nature as amanah, not merely an economic resource, which in the Digital Circular School context is translated into learning practices and school projects that are data-based and circularity based (Masturin et al., 2022; Moslimany et al., 2024). The synthesis of findings also shows that a digital-based religious learning model in secondary schools can improve access and the quality of the learning process, but it only reaches part of the transformative potential if it is not linked to curriculum engineering that combines digital literacy, ecological literacy, and the internalization of Islamic values in one pedagogical package (Nasaruddin et al., 2023). Thus, the curriculum pillar in Digital Circular School functions as an integration space between digital tools, Islamic content, and circular economy practices presented in the form of learning experiences, not merely content material.

The leadership and digital governance dimension in this model positions leaders of Islamic educational institutions as key actors who stitch together prophetic values with technological innovation. Prophetic leadership literacy that emphasizes amanah, shiddiq, fathanah, and tabligh values provides a normative framework for transforming school culture when linked with digital initiatives such as data transparency, real-time feedback, and participation of school members (Mutamimah et al., 2025; Thohri, 2022). The development of Islamic school management information systems shows that digitalization can strengthen the integration of academic functions, finance, and student services, but its effectiveness is strongly determined by the extent to which the system design internalizes principles of justice, accountability, and public service that constitute the spirit of Islamic management (Kirana & Zen, 2025).

Within the Digital Circular School framework, leadership is not only interpreted as the ability to adopt new applications, but as the capacity to orchestrate structural, cultural, and technological change so that the entire decision making cycle aligns with Islamic values and sustainability goals. This perspective is consistent with educational leadership studies that place school leaders as the main drivers of humanistic and value based digital transformation, not merely technology project managers (Karakose et al., 2024).

Key technology adoption practices identified in the reviewed studies show that pesantren and Islamic schools have utilized various digital systems, but often in the form of partial initiatives that are not yet bound within a circular school framework. The Smart Pondok Pesantren maturity model, for example, shows how the integration of information systems, digital infrastructure, and governance can be increased gradually, but it does not always include the circularity dimension as an indicator of institutional performance (Novianto et al., 2021). Studies on the effectiveness of digital technology in pesantren administration and operations reinforce the finding that digitalization can reduce manual workloads and increase efficiency, but issues such as waste management, energy efficiency, and resource consumption have not yet become explicit focuses (Ripai et al., 2025; Tantowi et al., 2025). The Digital Circular School model responds to this condition by positioning digital systems not only as administrative tools, but as instruments for monitoring flows of materials, energy, and school finances, so that the resulting data can be used to optimize circular economy practices. Thus, digital transformation shifts from the level of “procedure automation” toward “circular intelligence” that enables schools to conduct continuous improvement based on data.

The digital learning transformation identified in the literature also provides an important foundation for the digital capacity component in the proposed model. The development of Learning Management System and web profiles for pesantren branding shows that the integration of digital applications can expand the reach of learning and strengthen the institutional image, while opening opportunities for more systematic management of educational content (Harormainy et al., 2025). Studies on digital learning transformation in madrasah aliyah confirm that the success of using digital platforms depends on teacher readiness and school management, but they have not widely integrated sustainability indicators such as digital carbon footprints or infrastructure utilization efficiency (Putra et al., 2025). On the other side, studies on Islamic school digital governance indicate that properly designed information systems can strengthen transparency, internal control, and accountability, which in the Digital Circular School model become prerequisites for monitoring and directing circularity practices at the micro level (Zulfikar et al., 2022). By tying together the dimensions of learning, governance, and resource monitoring within one digital capacity framework, this model encourages a reorientation of the function of technology from merely a learning medium to strategic infrastructure for sustainability.

Circular economy and eco-pesantren practices provide initial evidence that Islamic educational institutions have strong social and religious capital to develop circular schools, although the empirical base is still limited. A number of studies on the circular economy in pesantren show that the integration of agribusiness, waste management, and santri environmental literacy can form an educational ecosystem that internalizes ecological responsibility values while generating economic benefits for the institution (Rahmat et al., 2025). An eco-pesantren model based on local wisdom shows that integrating environmentally friendly practices into pesantren culture can strengthen the contribution of Islamic education to the SDGs agenda, but it has not fully utilized digital technology as a tool for the design, monitoring, and evaluation of circularity (Kejora et al., 2025). Circular economy policy that positions schools and madrasah as agents of change emphasizes the importance of the educational locus as an arena for implementing concrete circular practices, but without adequate digital frameworks, it is difficult to measure and optimize the contributions of these institutions to national sustainability targets (S.

Yuana et al., 2024). The Digital Circular School model articulates the need to stitch these practices into one integrated cycle, so that the success of eco-pesantren does not stand alone, but becomes part of a data-based circular school management strategy.

Theoretically, the developed conceptual model confirms that Islamic values function as moral regulators that guide the use of technology and the design of circularity in school management. Waste and resource management practices in pesantren, for example, show that the circular economy is not sufficient to be understood as a technical mechanism of efficiency, but as a form of implementing the prohibition of israf and the command to maintain balance in the Islamic perspective, which in the case of Subulul Huda pesantren is manifested through reduction, reuse, and waste processing into a source of economic value (Azizah & Anhar, 2025). The integration of amanah, itqan, and khalifah values in Islamic education management provides a normative foundation for implementing digital governance that emphasizes transparency, accountability, and kemaslahatan, while preventing risks of technological instrumentality that neglect the human dimension (Sovrano et al., 2022). Thus, the three pillars of the model, Islamic values, circularity, and digital capacity, are understood not as neutral domains, but as arenas in which technological choices, policies, and daily practices must be tested through ethical standards and the long-term goals of Islamic education. This perspective strengthens the argument that Digital Circular School is an epistemic reconstruction of how Islamic educational institutions interpret modernity and sustainability, not merely a procedural adjustment.

The practical and policy implications of the Digital Circular School model open space for a more directed agenda of research and institutional development. Studies on readiness and stakeholder engagement in pesantren show that the success of educational service innovation is strongly influenced by multi-actor involvement and change management design that considers local socio-economic dynamics, which in the context of this model can be expanded by incorporating circularity indicators and fair digital practices (Lutfiyah et al., 2025; Sudirman et al., 2025). The transformation of pesantren culture in the digital era that combines local values and global competencies suggests that policies to strengthen religious moderation, digital literacy, and ecological literacy can be combined in one school-based intervention package if facilitated by leadership that is sensitive to the opportunities and risks of technology (Maharani, 2025). At the governance level, studies on change management and Islamic school leadership show the importance of designing participatory and transparent decision making structures, which in this model can be operationalized through digital dashboards that contain integrated indicators of spiritual, circular, and digital performance (Karakose et al., 2024; Zarkasi et al., 2025). Thus, the Digital Circular School model not only offers a conceptual understanding framework, but also provides an initial roadmap for policies and development programs that can be tested in various contexts of pesantren, madrasah, and Islamic schools in the future.

5. Conclusion

This study aims to build an Islamic school management framework that integrates Islamic values, circular economy principles, and digital capabilities within one coherent architecture. Through a systematic literature review with a PRISMA based selection flow and thematic synthesis of 27 publications from the 2020–2025 period, this study identifies four main patterns in the literature, namely the integration of Islamic curriculum and pedagogy with technology, Islamic leadership and digital based governance, adoption of key technologies along with their ethical challenges, and the strengthening of character and spirituality in the digital space. This synthesis confirms that digitalization in Islamic educational institutions tends to proceed as technical modernization, while the circularity agenda often appears as partial programs, so both require normative and operational binders so that they do not proceed separately.

In response to this need, this study formulates a Digital Circular School conceptual model in the form of an integrative cycle consisting of three pillars, namely reinforcement of Islamic values, enhancement of circularity practices, and expansion of digital capacity. This model answers the study's conceptual question at the theoretical level by showing mutually reinforcing relationships: Islamic values serve as moral regulators for policy choices and the use of technology, circularity directs resource efficiency and long-term sustainability, and digital capabilities function as enablers for data-driven governance, transparency, and monitoring of circular practices. Thus, the main contribution of this study lies in reorganizing the relationship among values, technology, and circularity as one managerial ecosystem that can serve as a reference for policy design and indicator development.

Practically, the Digital Circular School model can be applied as a guide for developing school and pesantren governance through strengthening the principles of amanah, itqan, syura, and khalifah in digital policies, while mainstreaming circularity into school operations such as reducing paper use, 3R based waste management, energy efficiency, and optimizing information systems for accountability and decision making. The main policy implication is the need for a transformation package that unifies digital literacy, ecological literacy, and Islamic character development within the curriculum, school culture, and measurable evaluation mechanisms.

The limitation of this study is its conceptual, literature based nature, so it has not yet tested the model's effectiveness in field contexts, as well as the publication coverage limited to the 2020–2025 period. Therefore, further research needs to develop operational indicators and evaluation instruments to measure the performance of values, digital, and circularity in an integrated manner, and to test the model empirically across various types of pesantren and madrasah through comparative study designs, mixed methods, and implementation evaluation. This research agenda is important so that Digital Circular School can develop from a conceptual framework into an implementative model that is valid, cross-context adaptive, and relevant for sustainable Islamic education transformation.

Declarations

Author contribution statement

Murdiyanto initiated the research topic, formulated the core research questions, and coordinated the overall manuscript preparation. Eko Susetyarini contributed to the development of the theoretical framework and provided guidance on the research methodology. Yus Mochamad Cholily supported the data collection process and assisted in managing research implementation and logistics. Mohammad Syaifuddin contributed to the data analysis, interpretation, and synthesis of the research findings. All authors contributed to refining the discussion, strengthening the conceptual coherence, and reviewing and approving the final version of the manuscript.

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Data availability statement

The datasets generated during and analyzed during the current study are available from the corresponding author upon reasonable request.

Declaration of Interest's statement

The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this paper.

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