

DIGITAL TRANSFORMATION IN MADRASAH DECISION MAKING: A SYSTEMATIC LITERATURE REVIEW OF MODELS, ACTORS, AND SUPPORTING TECHNOLOGIES

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ABSTRACT

Digital transformation is fundamentally reshaping how educational institutions govern themselves, yet madrasas face a distinct tension: they must adopt data-driven systems while preserving the normative foundations of Islamic values. Despite growing scholarly attention to this issue, existing literature remains fragmented, studies on educational technology rarely engage with Islamic governance frameworks, while Islamic education scholarship seldom interrogates digital infrastructure. This study addresses that gap through a systematic literature review using the PRISMA approach, drawing on 20 peer-reviewed articles published between 2021 and 2026. Thematic analysis surfaces four distinct decision-making models operating in madrasa contexts: data-driven rational, participatory, Islamic value-based, and adaptive-technological, each interacting in hybrid configurations rather than in isolation. Madrasah principals emerge as the central actors bridging institutional values and technological systems, with platforms such as EMIS serving as key infrastructural supports. The findings also expose a digital paradox: accelerating technology adoption does not automatically improve decision quality, largely because data literacy remains underdeveloped among practitioners. Theoretically, this study advances an integrative conceptual framework, the madrasah digital decision ecosystem, that situates digital governance within an Islamic educational logic. Practically, the findings carry direct implications for capacity-building programs and value-based governance reform in Islamic education management.

Keyword: Transformation, Decision Making, Madrasah, Governance

ABSTRAK

Transformasi digital secara fundamental mengubah cara lembaga pendidikan mengatur diri mereka sendiri, namun madrasah menghadapi ketegangan tersendiri: mereka harus mengadopsi sistem berbasis data sambil tetap melestarikan landasan normatif nilai-nilai Islam. Meskipun perhatian akademis terhadap isu ini semakin meningkat, literatur yang ada masih terfragmentasi, studi tentang teknologi pendidikan jarang melibatkan kerangka kerja tata kelola Islam, sementara kajian pendidikan Islam jarang mengkaji infrastruktur digital. Studi ini mengatasi kesenjangan tersebut melalui tinjauan literatur sistematis menggunakan pendekatan PRISMA, berdasarkan 20 artikel yang telah ditinjau oleh rekan sejawat yang diterbitkan antara tahun 2021 sampai 2026. Analisis tematik mengungkap empat model pengambilan keputusan yang berbeda yang beroperasi dalam konteks madrasah: rasional berbasis data, partisipatif, berbasis nilai Islam, dan adaptif-teknologis, masing-masing berinteraksi dalam konfigurasi hibrida daripada secara terisolasi. Kepala madrasah muncul sebagai aktor sentral yang menjembatani nilai-nilai institusional dan sistem teknologi, dengan platform seperti EMIS berfungsi sebagai pendukung infrastruktur utama. Temuan ini juga mengungkap paradoks digital: percepatan adopsi teknologi tidak secara otomatis meningkatkan kualitas keputusan, sebagian besar karena literasi data masih kurang berkembang di kalangan praktisi. Secara teoritis, studi ini mengembangkan kerangka konseptual integratif, yaitu ekosistem pengambilan keputusan digital madrasah, yang menempatkan tata kelola digital dalam logika pendidikan Islam. Secara praktis, temuan-temuan tersebut memiliki implikasi langsung bagi program peningkatan kapasitas dan reformasi tata kelola berbasis nilai dalam manajemen pendidikan Islam.

Kata kunci: Transformasi, Pengambilan Keputusan, Madrasah, Tata Kelola

INTRODUCTION

Digital transformation has become a global phenomenon that is reshaping governance and decision-making processes in educational institutions. Advances in information and communication technology have encouraged educational organizations to move beyond traditional intuition-based decision-making toward more systematic and data-driven approaches. According to Prasetya (2025), digitalization not only improves operational efficiency but also transforms educational management by enabling the use of information systems and data analytics in decision-making. This shift enhances transparency, accountability, and evidence-based management practices, allowing educational institutions to respond more effectively to contemporary challenges (Wasilah & Mahfud, 2026). As a result, decision-making processes have become more objective, structured, and aligned with the demands of modern educational governance.

From a theoretical perspective, decision-making in educational organizations can be explained through various approaches, such as rational theory, behavioral theory, and participatory theory. However, in the context of madrasas, the decision-making process has different characteristics compared to educational institutions in general. In this regard, madrasas face a duality of demands. On the one hand, they are required to adopt rational, data-driven, and digitally supported decision-making practices to meet the demands of modern educational governance. On the other hand, managerial decisions must remain consistent with Islamic normative principles, including *shura* (consultation), *amanah* (trustworthiness), and *maqasid al-shariah* (public benefit). Consequently, digital transformation in madrasas is not merely a process of technological adoption but also a process of harmonizing technological efficiency with religious and ethical considerations. Hafiduddin (2025) and Yahya (2024) explain that decision-making in madrasas is influenced by principles such as deliberation (*shura*), trustworthiness, and the goal of benefit, which aligns with the *maqasid al-shariah*. Therefore, digital transformation in madrasas is not only related to technology adoption but also involves balancing the demands of efficiency and innovation with ethical considerations and Islamic values. This condition makes decision-making in madrasas more complex than in other educational organizations.

Despite offering numerous benefits, implementing digital transformation in madrasas still faces several challenges. Maisaroh (2023) revealed that many madrasas lack adequate digital infrastructure, while low digital literacy among educators and administrators hinders the optimal use of technology. As a result, decision-making processes in many madrasas are still dominated by conventional, experience-based approaches. Rahmadani et al. (2025) also added that adapting to new technologies, including artificial intelligence, still faces various technical and human resource constraints. This situation demonstrates that increasing digital capacity is an urgent need in the management of Islamic education.

On the other hand, various studies show that the use of digital technology has the potential to significantly improve the quality of decision-making. Agustina et al. (2026) found that the use of data in educational information systems can improve the accuracy and quality of managerial decisions. Pitriani et al. (2026) also emphasized that management information

systems play a crucial role in supporting strategic decision-making by madrasah principals. Technology integration enables faster, more accurate, and more comprehensive data processing, thus encouraging more evidence-based decision-making. However, this situation presents a contradiction. On the one hand, technology promises efficiency, accountability, and improved decision quality, but on the other hand, many madrasahs have not been able to optimally utilize this potential due to limited infrastructure and low data literacy. This contradiction demonstrates the complexity of digital transformation in madrasah decision-making and reflects what can be described as a digital paradox. While digital technologies offer substantial opportunities to improve decision quality, transparency, and efficiency, many madrasahs remain unable to fully realize these benefits due to inadequate infrastructure, limited technological readiness, and low levels of data literacy.

Although research on digital transformation in education continues to grow, existing research remains fragmented. Most studies focus on the technical aspects of technology adoption and the implementation of specific applications, such as educational information systems (EMIS), without delving deeply into their impact on decision-making processes. Other studies focus more on leadership, organizational behavior, or the characteristics of individual decision-makers. Consequently, the relationship between decision-making models, the actors involved, and the technology used in madrasah governance remains underdeveloped. As a consequence, existing studies provide only partial explanations of digital transformation, making it difficult for researchers and practitioners to understand how decision-making models are enacted by specific actors through digital technologies within real madrasah governance settings. This fragmentation also hinders the development of comprehensive theoretical frameworks and practical strategies for digital-based decision-making in Islamic educational institutions. Therefore, a synthesis is needed that can map the interrelationships between models, actors, and technology within a unified conceptual framework.

The urgency of this research lies in the need to develop a more comprehensive understanding of digital transformation in madrasah decision-making. Without adequate digital adaptation, educational institutions have the potential to lag behind in the quality of governance and the effectiveness of decision-making (Wasilah & Mahfud, 2026). At the same time, madrasahs are required to maintain a balance between technological innovation and the Islamic values that underpin their institutions. Therefore, developing a decision-making model that integrates both aspects is a strategic necessity for managing Islamic education in the digital era.

The increasing number of studies on digitalization, educational technology, leadership, and decision-making in madrasahs during the 2021–2026 period has yielded diverse findings across various themes and scientific perspectives. Despite making important contributions, these studies have not yet produced a conceptual framework capable of comprehensively explaining the interactions between decision-making models, actors, and technology. Therefore, a Systematic Literature Review (SLR) approach using the PRISMA method was used to synthesize, classify, and integrate existing research findings into a more comprehensive understanding of digital transformation in madrasah decision-making. This approach allows for

the identification of conceptual patterns, relationships between concepts, and directions for future research development.

Based on this background, this study aims to analyze digital transformation in madrasah decision-making, focusing on the models, actors, and supporting technologies involved. Theoretically, this research contributes to the development of an integrative conceptual framework in Islamic education management. Practically, the research findings are expected to serve as a reference for madrasah administrators in developing digital-based decision-making systems that remain aligned with Islamic values and the needs of modern educational governance.

RESEARCH METHODS

This study employed a Systematic Literature Review (SLR) using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework to examine digital transformation in madrasa decision-making. Literature searches were conducted through Google Scholar using the keywords “digital transformation,” “decision-making,” “madrasah,” and “Islamic education management.” Articles published between 2021 and 2026 were considered. The selection process followed four stages: identification, screening, eligibility, and inclusion. Inclusion criteria consisted of peer-reviewed journal articles written in Indonesian and directly related to digital transformation and decision-making in madrasas. The selection process resulted in 20 articles that were included in the final review.

The research instrument consisted of a data extraction form used to identify and classify key information from each selected study, including research objectives, decision-making models, actors involved, digital technologies utilized, and major findings. The extracted data were analyzed using thematic analysis following the procedures proposed by Braun and Clarke (2006), including familiarization with the data, initial coding, theme development, theme review, and theme definition. This process enabled the synthesis of recurring patterns related to rational, participatory, data-driven, and Islamic value-based decision-making models within the context of madrasa digital transformation.

DISCUSSION

Bibliometric Profile of Included Articles

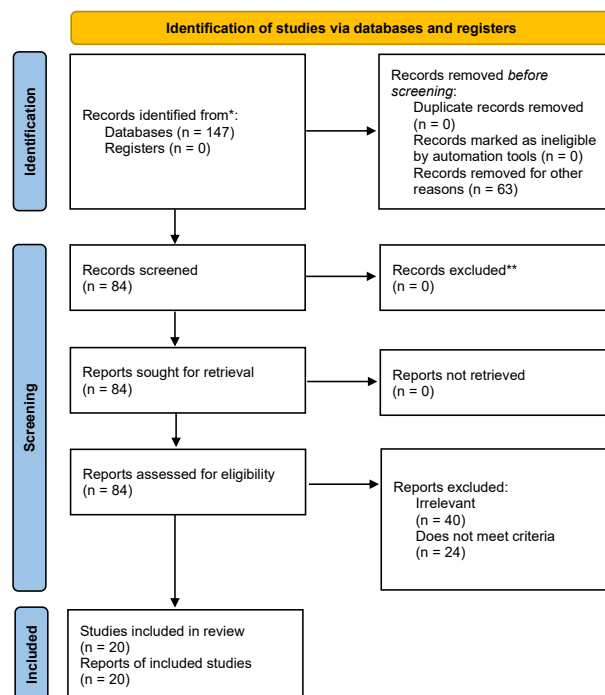


Figure 1. PRISMA 2020 flowchart

The literature selection process in this study resulted in 20 articles meeting the inclusion criteria from a total of 147 articles identified in the initial search stage on Google Scholar with a publication range of 2021–2026. The screening stage was carried out strictly adhering to the PRISMA protocol, which includes four phases: identification, screening, eligibility, and inclusion. Of the 147 identified articles, 63 articles were excluded based on duplication and irrelevant titles. Then, 84 articles entered the abstract screening stage. After reading the full text, 20 articles were designated as the analysis corpus (Page et al., 2021). All included articles were Indonesian-language scientific journals directly related to the research focus, namely digital transformation in madrasah decision-making. The distribution of publication years shows a significant increase, with articles from 2024–2026 dominating at 75%, reflecting the acceleration of academic attention to the issue of digitalization of Islamic education post-pandemic (Agustina et al., 2026; Wasilah & Mahfud, 2026). This finding aligns with global trends showing a surge in publications related to digital transformation in educational management since 2022 (McCarthy et al., 2023; Timotheou et al., 2023). In terms of methodology, 14 articles used a descriptive qualitative approach, 4 articles used a literature review, and 2 articles used a mixed approach, indicating that research in this area is still dominated by phenomenological exploration rather than quantitative empirical testing (Murdiyanto et al., 2025; Snyder, 2019).

The distribution of included research types reflects the methodological diversity relevant to the context of Islamic education management. Most studies were conducted using single case studies at a specific madrasah institution, which provides depth of description but limits the generalizability of the findings (Hamdanah, 2025). There is also variation in the units of analysis: 12 articles focused on the madrasah (institutional) level, 5 on the level of the madrasah principal as an individual actor, and 3 on the level of the information system as a supporting

technology. This distribution of focus indicates that research on digital transformation in Indonesian madrasahs has not consistently integrated all three dimensions models, actors, and technology into a coherent analytical framework (Pitriani et al., 2026; Shobri, 2024). This situation emphasizes the urgency of the synthesis conducted in this SLR study, as recommended by Xiao and Watson (2019) and Snyder (2019). Variations in institutional contexts are also evident in the distribution of madrasah levels: 9 articles discuss Madrasah Aliyah (MA), 7 articles on Madrasah Tsanawiyah (MTs), and 4 articles on Madrasah Ibtidaiyah (MI), illustrating that digital transformation is more widely studied at the secondary education level. This distribution finding is consistent with the report of the Indonesian Ministry of Religious Affairs that the implementation of EMIS 4.0 is more intensively carried out in public MA and MTs compared to private madrasah and MI (Murdiyanto et al., 2025; Pitriani et al., 2026).

Table 1. Characteristics of Included Articles (N = 20)

	Author	Article Title	Journal Name	Year	Method	Level
1	Winoto, M., Tri Handoko, B., & Dhesita, S. J.	Transformasi Digital Manajemen Pendidikan melalui Sistem Informasi Madrasah: Studi Kasus MAN 1 Banyumas	Eureka: Jurnal Pemikiran dan Penelitian Manajemen Pendidikan Islam	2026	Qualitative Descriptive	Islamic Senior High School
2	Agustina, M., Annur, S., & Rosad, A.	Transformasi Pengambilan Keputusan Berbasis Data: Peran Strategis Perangkat Lunak dalam SIM Pendidikan Islam	Pendas: Jurnal Ilmiah Pendidikan Dasar	2026	Qualitative Descriptive	Islamic Primary School
3	Pitriani, Annur, S., & Rosad, A.	Peran Sistem Informasi Manajemen dalam Mendukung Pengambilan Keputusan Kepala Madrasah	Pendas: Jurnal Ilmiah Pendidikan Dasar	2026	Qualitative Descriptive	Islamic Senior High School
4	Wasilah, Z., & Mahfud, A.	Transformasi Digital dalam Manajemen Pendidikan Islam: Menavigasi Perubahan Teknologi dan Menjaga Nilai-Nilai Islam	Abdurrauf Journal of Education and Islamic Studies	2026	Literature Review	General
5	Nisa', F. C., Salasa, M. S.,	Peran Kepemimpinan	Jurnal Kepemimpinan	2025	Qualitative Descriptive	Islamic Junior High School

	Nisrina, F., & An-Nabil, A. R.	Kepala Madrasah dan dalam Pengurusan Sekolah Menghadapi Disrupsi Teknologi Pendidikan				
6	As-shodiq, M. J., Sukur, M., Syamsuddin, H., & Huggins, B. A.	Digitalisasi Madrasah: Strategi Kepala Madrasah dalam Mewujudkan Quality of Academic Service Berbasis Digital	JoIEM: Journal of Islamic Education Management	2025	Case Study	Islamic Senior High School
7	Rahmadani, D., Zakir, S., & Putri, R. J.	Persepsi dan Strategi Kepala Madrasah dalam Menghadapi Disrupsi AI untuk Membangun Transformasi Digital Berbasis Nilai-Nilai Islam	Jurnal Pendidikan Tambusai	2025	Qualitative Descriptive	Islamic Junior High School
8	Kurniawan, M. I., & Kamalie, A. S.	Integrasi Kecerdasan Buatan dalam Kepemimpinan Pendidikan Islam: Kerangka Tata Kelola Berbasis Maqashid al-Shariah	Proceeding of International Conference on Islamic Boarding School	2025	SLR Normatif	General
9	Murdiyanto, M., Susetyarini, E., Cholily, Y. M., & Syaifuddin, M.	Digital Circular School in Islamic Education: A PRISMA Based Systematic Literature Review (2020–2025)	Jurnal Pendidikan Islam	2025	SLR-Prisma	General
10	Prasetya, U. A.	Penguatan Manajemen Pendidikan Islam melalui Digitalisasi di Madrasah pada Era Society 5.0	Al-Ilmiya: Jurnal Pendidikan Islam	2025	Literature Review	Islamic Senior High School/Islamic Primary School
11	Shobri, M.	Peran Sistem Informasi Manajemen Pendidikan dalam Meningkatkan Transparansi dan Akuntabilitas di	AKSI: Jurnal Manajemen Pendidikan Islam	2024	Literature Review	Islamic Junior High School/Islamic Senior High School

		Lembaga Pendidikan Islam					
12	Yahya, S.	Transformasi Manajemen Pendidikan Islam dalam Era Digital	Jurnal Insan Cendekia	2024	Literature Review	General	
13	Buana, I.	Proses Pengambilan Keputusan dalam Pengembangan Mutu Madrasah (Studi Kasus MAN Insan Cendekia Paser)	Jurnal Tarbiyah dan Ilmu Keguruan Borneo	2023	Case Study	Islamic Senior High School	
14	Prastiwi, M. A., & Widodo, A.	Peran Kepemimpinan Kepala Madrasah di Era 5.0, Pendidikan dan Teknologi, pada Kompetensi 21st Century	PRIMER: Jurnal Ilmiah Multidisiplin	2023	Qualitative Descriptive	Islamic Junior High School	
15	Maisaroh, I.	Transformasi Manajemen Pendidikan di Madrasah Ibtidaiyah dalam Menghadapi Era Digital	Jurnal Ilmu Tarbiyah	2023	Qualitative Descriptive	Islamic Primary School	
16	Hafiduddin, M.	Transformasi Model Pengambilan Keputusan Konsumen Pendidikan Islam di Era Digital: Dampak Teknologi, Kontroversi Perubahan Sistem Pendidikan, dan Studi Kasus di SMA Darul Mukhlashin	JDP: Jurnal Dinamika Pendidikan	2025	Case Study	Islamic Senior High School	
17	Sirojuddin, A., Aprilianto, A., & Kartiko, A.	Peran Sistem Informasi Manajemen dalam Pengambilan Keputusan di Madrasah Ibtidaiyah Darussalam Pacet Mojokerto	ZAHRA: Research and Thought Elementary School of Islam Journal	2022	Qualitative Descriptive	Islamic Primary School	

18	Yusuf, M.	Penggunaan Artificial Intelligence (AI) dalam Meningkatkan Literasi Digital pada Lembaga Pendidikan Islam	AKSI: Jurnal Manajemen Pendidikan Islam	2024	Literature Review	General
19	Winoto, M. (Tim Redaksi)	Transformasi Digital Pendidikan Madrasah: Peran Strategis EMIS dalam Tata Kelola Berbasis Data	Jurnal Manajemen Pendidikan	2025	Qualitative Exploratory	Islamic Senior High School/Islamic Junior High School
20	Saugi, W., Komariyah, L., Subagiyo, L., Warman, W., & Mansouri, M. C.	Madrasah Management Transformation: Systematic-Bibliometric Review of Indonesia's Religious Ministry Policy 2019–2024	Jurnal Asy-Syukriyyah	2025	SLR-Bibliometrik	General

Decision-Making Model in the Context of Madrasah Digital Transformation

The results of a thematic analysis of the 20 included articles revealed four dominant decision-making models emerging in the context of madrasah digital transformation: the data-driven rational model, the participatory model, the Islamic value-based model, and the adaptive-technological model. The data-driven rational model was the most frequently encountered in 12 of the 20 articles, characterized by an increasing reliance on information generated by management information systems such as EMIS 4.0, e-RKAM, and SIMANTU in the institutional policy formulation process (Winoto et al., 2026). This model operates on the assumption that good decisions are supported by valid, structured, and real-time accessible data, in line with the concept of data-driven decision making (DDDM) established in the global education management literature (Gaftandzhieva et al., 2023; Rose, 2025). The implementation of the rational model in madrasahs, however, is not perfectly linear it often interacts with normative considerations derived from Islamic values, resulting in a unique hybridization of the model (Hafiduddin, 2025; Yahya, 2024). This finding strengthens the argument that the context of Islamic education demands a reinterpretation of decision-making models developed in the Western management tradition (Kurniawan & Kamalie, 2025).

The participatory model emerged consistently in eight articles, particularly in studies on the role of deliberation as a collective decision-making mechanism integrated with digital technology support. Buana's (2023) findings at MAN Insan Cendekia Paser showed that effective madrasah principals tended to combine a deliberative approach based on stakeholder consultation with data provided by management information systems, forming what can be conceptualized as “data-informed deliberation”. This pattern is not found in general educational

management literature, emphasizing the uniqueness of madrasah managerial epistemology, which places the value of shura as a governance principle that cannot be substituted by digital algorithms alone (Hafiduddin, 2025; Saugi et al., 2025). Meanwhile, the Islamic values-based model appears strong, especially in research examining the strategic level of decision-making, where consideration of maqashid al-shariah becomes a normative filter for every adoption of new technologies, including artificial intelligence (Kurniawan & Kamalie, 2025; Rahmadani et al., 2025). The adaptive-technological model, most widely discussed in recent articles (2024–2026), describes how madrasas respond to technological disruption by developing institutional adaptive capacity that combines the speed of technology adoption with the preservation of Islamic institutional identity (As-shodiq et al., 2025; Nisa’ et al., 2025).

Table 2. Decision-making model in digital transformation of madrasas

Decision-Making Model	Description / Main Focus	Frequency of Occurrence
Rational Model	Data-Driven Decision Making (DDDM)	12 of 20 articles
Participatory Model	Data-Driven Deliberation	8 of 20 articles
Islamic Value-Based Model	Based on Maqasid Sharia	7 of 20 articles
Adaptive-Technological Model	Adjusting to technological developments	6 of 20 articles

Note. The cumulative frequency reported in Table 2 (12 + 8 + 7 + 6 = 33) intentionally exceeds the total number of included articles (N = 20). This is because each article was coded based on the dominant decision-making pattern(s) it exhibited, and several articles displayed more than one model simultaneously—for instance, a data-driven rational model operating alongside Islamic value-based considerations. The frequencies therefore reflect overlapping or hybrid themes rather than a mutually exclusive, single-category classification of the 20 articles.

Key Actors in Madrasah Digital Decision Making

A cross-article synthesis identified five groups of actors that repeatedly emerged as decision-making agents in the madrasah digital transformation ecosystem. These five actors are: (1) the madrasah principal as the primary decision-maker; (2) EMIS/information system operators; (3) Teachers and education personnel; (4) Madrasah committees and parents; (5) Policymakers from the Ministry of Religious Affairs. The madrasah principal was consistently identified as a central figure in 18 of the 20 articles analyzed, serving a dual role as both a transformational leader and a technology adoption policymaker (Nisa’ et al., 2025; Prastiwi & Widodo, 2023). This crucial position of the madrasah principal aligns with Hamdanah’s (2025) findings that the success of digital transformation in madrasahs depends heavily on the madrasah principal’s capacity to navigate the tension between technological modernization and maintaining the institution’s Islamic identity. This finding is further supported by Anwar and Saraih (2024), who demonstrated that digital leadership positively impacts knowledge sharing and emotional intelligence, indirectly strengthening an organization’s capacity for data-driven decision-making. Therefore, madrasah principals are not merely technology users but also

digital strategy architects who determine the direction and pace of transformation (As-shodiq et al., 2025; Rahmadani et al., 2025).

EMIS and information system operators are technical actors whose role is often underestimated, yet they prove crucial in ensuring the quality of data that underpins decision-making. Sirojuddin et al. (2022) and Pitriani et al. (2026) found that limited field operator competency is a major bottleneck in the flow of information from raw data to strategic knowledge usable by madrasah principals. This condition reflects a more systemic data literacy problem, where investment in technological infrastructure is not accompanied by a commensurate increase in human resource capacity (Gaftandzhieva et al., 2023; Iwogbe et al., 2025). Teachers and education personnel, meanwhile, play a role as both data producers and users of information output in decision-making at the classroom and program levels (Murdiyanto et al., 2025; Prasetya, 2025). Madrasah committees and parents act as participatory actors who legitimize decisions through deliberation, while the Ministry of Religious Affairs serves as a regulator and technology platform provider that establishes data interoperability standards across the Indonesian madrasah ecosystem (Agustina et al., 2026; Wasilah & Mahfud, 2026). These hierarchies and interactions between actors form what can be conceptualized as the “digital madrasah decision ecology” a complex, layered system unique to the Indonesian Islamic education context.

Decision-Making Support Technology in Madrasas

Thematic analysis identified four technology clusters that served as the infrastructure supporting decision-making in madrasas in the 2021–2026 period. The first cluster is platform-based management information systems, encompassing EMIS 4.0, SIMANTU, e-RKAM, and EDM, which serve as the backbone for integrated institutional data management (Pitriani et al., 2026; Winoto et al., 2026). EMIS 4.0, launched by the Ministry of Religious Affairs as a replacement for SIMPATIKA, was the most frequently mentioned technology in 11 of the 20 articles, indicating its dominance as a national madrasah data ecosystem (Agustina et al., 2026; Murdiyanto et al., 2025). The second cluster is artificial intelligence-based technology, which is beginning to enter the discourse of madrasah management, although it is still in the exploratory stage—particularly in the context of automated grade recapitulation, predictive analysis of student performance, and machine learning-based decision support systems (Kurniawan & Kamalie, 2025; Rahmadani et al., 2025). This finding aligns with the global trend identified by Bai (2024) that the integration of big data analytics in educational management opens up opportunities for fundamental transformation in the way educational leaders make strategic decisions. However, madrasah readiness to adopt AI is still severely limited by inadequate infrastructure and human resource capacity (Rahmadani et al., 2025; Yusuf, 2024).

The third cluster is digital communication and collaboration platforms, including messaging applications, videoconferencing, and learning management systems (LMS) used to support online collective decision-making processes (Maisaroh, 2023; Prasetya, 2025). The use of these platforms has accelerated significantly following the COVID-19 pandemic, shifting conventional meeting and deliberation patterns to hybrid formats that require rapid adaptation

from all madrasah stakeholders (McCarthy et al., 2023; Nisa' et al., 2025). The fourth cluster is web-based reporting and evaluation systems, such as e-RKAM and the Madrasah Education Report, which generate information dashboards for decision-making based on standardized performance indicators (Buana, 2023; Shobri, 2024). The availability of digital dashboards has been shown to improve the accuracy and speed of madrasah principals' managerial decisions, but it also creates new vulnerabilities in the form of a reliance on valid data and an inability to interpret data contextually (Gaftandzhieva et al., 2023; Iwogbe et al., 2025). Overall, these findings suggest that digital transformation in madrasahs is more layered moving from basic administrative digitization to increasingly intelligent analytical integration, but with uneven adoption rates between public and private madrasahs, and between urban and rural areas (Murdiyanto et al., 2025; Wasilah & Mahfud, 2026).

Unexpected Patterns: The Digital Paradox in Madrasah Governance

One of the most unexpected findings of this SLR was the identification of what the researchers conceptualized as the “digital madrasah paradox”, a condition where increased adoption of information technology does not automatically translate into improved decision-making. This paradox is evident in the fact that even madrasahs that have implemented EMIS 4.0 and e-RKAM still demonstrate decision-making patterns that are intuitive and based on the principal's personal experience, rather than based on systematic data analysis (Pitriani et al., 2026; Sirojuddin et al., 2022). This phenomenon can be explained through the data literacy theoretical framework developed by Gaftandzhieva et al. (2023), which emphasizes that the presence of data-generating technology does not automatically produce a culture of evidence-based decision-making it requires the interpretive capacity (sense-making capacity) of educational leaders who bridge data with policy. In madrasahs, the gap between data availability and interpretative capacity is exacerbated by the low digital literacy of senior madrasah principals, the instability of EMIS operators due to high turnover, and limited internet connectivity in rural areas (Maisaroh, 2023; Murdiyanto et al., 2025; Wasilah & Mahfud, 2026). This paradox raises further questions that go beyond the boundaries of the existing literature: is a madrasah management model rooted in the values of personal trust and charismatic legitimacy of the kiai or madrasah principal more resistant to the penetration of data-centric logic than is one found in general educational institutions (Hafiduddin, 2025; Yahya, 2024).

The second paradoxical finding concerns the position of Islamic values in digital decision-making architecture. The articles analyzed consistently assert that digital transformation in madrasahs must be grounded in Islamic values, yet almost none provide concrete operationalizations of how principles such as amanah (trust), musyawarah (deliberation), and adal (obedience) are translated into information system design or data-driven decision-making protocols (Kurniawan & Kamalie, 2025; Hafiduddin, 2025). This gap between value rhetoric and operational implementation forms what can be called the “Islamic digital governance gap”, a conceptual lacuna that presents the most significant opportunity for new theoretical contributions in the field of Islamic education management (Murdiyanto et al., 2025; Wasilah & Mahfud, 2026). These findings also indicate that research in this area is still

dominated by descriptive approaches that have not yet been able to produce normative models that can serve as guidelines for practitioners (Snyder, 2019; Xiao & Watson, 2019). The implication of these interpretive findings is the urgent need for longitudinal empirical research that follows the digital transformation process in madrasas more comprehensively, as well as design research that develops digital governance models that are genuinely rooted in Islamic epistemology (McCarthy et al., 2023; Timotheou et al., 2023).

Based on the synthesis of research findings, the relationship between digital technology, actors, decision-making models, Islamic governance values, and madrasa governance outputs can be formulated in a conceptual framework called the Madrasah Digital Decision Ecosystem.

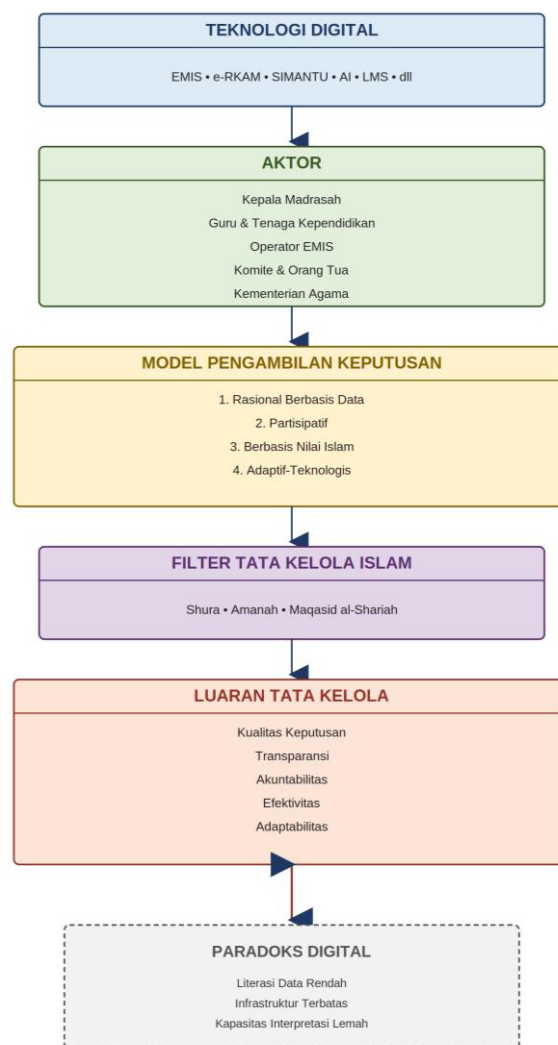


Chart 1. Madrasah Digital Decision Ecosystem

CONCLUSION

The digital transformation of madrasah decision-making, as revealed through a systematic literature review, demonstrates that technology integration is not merely instrumental but reshapes the epistemology of decision-making itself. This research's findings confirm the existence of four dominant models data-driven, participatory, Islamic values-based, and adaptive-technological that do not exist in isolation but interact in contextual, hybrid configurations. Within these configurations, the madrasah principal plays a central role,

navigating the complex relationships between data, values, and institutional interests. However, the emergence of the digital paradox demonstrates that the availability of technology does not automatically improve decision quality, primarily due to limited data literacy and interpretive capacity. Therefore, digital transformation in madrasahs must be understood as a socio-technical process that requires the integration of technological infrastructure, human resource competencies, and the operational internalization of Islamic values.

Theoretically, this research contributes to the development of an integrative conceptual framework that connects the dimensions of models, actors, and technology within a single madrasah digital decision-making ecosystem. Practically, these findings imply the need to strengthen the digital leadership capacity of madrasah principals, improve data literacy across all stakeholders, and develop information systems that are not only technically accurate but also aligned with the principles of maqasid al-shariah. The resulting implementation roadmap encompasses three main phases: administrative digitization, data-driven system integration, and transformation toward a values-based intelligent decision support system. Within this framework, this research's contribution matrix places conceptual innovation on the integration of analytical and normative dimensions, and practical innovation on the design of Islamic value-based digital governance. Future research should focus on longitudinal empirical studies and the development of operational models capable of bridging the gap between value rhetoric and digital practices in madrasah governance.

RECOMMENDATION

Based on the research findings, madrasahs and the Ministry of Religious Affairs need to improve digital literacy and data-driven leadership capacity for madrasah principals, teachers, and EMIS operators through regular training, so that decision-making relies not only on intuition but also on accurate data analysis. On the other hand, a digital governance system that incorporates Islamic values such as amanah (trust), musyawarah (deliberation), and maqasid al-shariah (the obligation to adhere to Islamic principles) into technology-based practices remains an unfinished business. Digital infrastructure in private madrasahs and rural areas also lags far behind and needs to be a real priority, not just a recommendation on paper. Further research using empirical and longitudinal approaches and a wider sample size is needed so that the resulting madrasah digital governance model is not only theoretical but can be used in the field.

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