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ORIGINAL RESEARCH ARTICLE

Digital Transformation in Madrasah Management: Challenges and Adaptive Strategies

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ABSTRACT

Digital transformation has become a strategic agenda for educational institutions, including madrasahs, in responding to technological advancements and the growing demand for effective, efficient, and sustainable educational management. However, the implementation of digital transformation in madrasahs remains constrained by various organizational, technological, and human resource challenges. This study aims to analyze the challenges of digital transformation in madrasah management and to identify the adaptive strategies employed to support sustainable institutional development. A qualitative approach with a multiple-case study design was employed involving three Madrasah Aliyah in the Special Region of Yogyakarta, Indonesia. Data were collected through semi-structured interviews, non-participant observations, and document analysis, and were analyzed using thematic analysis following Braun and Clarke's framework. The findings reveal four major themes influencing digital transformation: digital transformation challenges, adaptive leadership and digital governance, organizational capacity building, and institutional innovation. The study indicates that successful digital transformation depends not only on technological infrastructure but also on adaptive leadership, collaborative organizational culture, continuous professional development, and integrated digital governance. Based on the cross-case analysis, this study proposes the Adaptive Digital Transformation Framework for Madrasah Management, which positions leadership, governance, organizational capacity, and organizational culture as interconnected capabilities supporting sustainable institutional transformation. The findings reinforce existing theories of digital transformation while extending them by incorporating the distinctive characteristics of Islamic educational institutions.

Keywords: digital transformation; madrasah management; digital leadership; adaptive strategies; Islamic educational management



ABSTRAK

Transformasi digital telah menjadi agenda strategis bagi lembaga pendidikan, termasuk madrasah, dalam merespons perkembangan teknologi serta meningkatnya tuntutan terhadap pengelolaan pendidikan yang efektif, efisien, dan berkelanjutan. Namun, implementasi transformasi digital di madrasah masih menghadapi berbagai tantangan yang berkaitan dengan aspek organisasi, teknologi, dan sumber daya manusia. Penelitian ini bertujuan untuk menganalisis tantangan transformasi digital dalam manajemen madrasah serta mengidentifikasi strategi adaptif yang diterapkan untuk mendukung pengembangan kelembagaan yang berkelanjutan. Penelitian menggunakan pendekatan kualitatif dengan desain studi multikasus yang melibatkan tiga Madrasah Aliyah di Daerah Istimewa Yogyakarta, Indonesia. Data dikumpulkan melalui wawancara semi-terstruktur, observasi nonpartisipan, dan studi dokumentasi, kemudian dianalisis menggunakan analisis tematik berdasarkan tahapan Braun dan Clarke. Hasil penelitian mengidentifikasi empat tema utama yang memengaruhi transformasi digital, yaitu tantangan transformasi digital, kepemimpinan adaptif dan tata kelola digital, pengembangan kapasitas organisasi, serta inovasi kelembagaan. Temuan menunjukkan bahwa keberhasilan transformasi digital tidak hanya ditentukan oleh ketersediaan infrastruktur teknologi, tetapi juga oleh kepemimpinan yang adaptif, budaya organisasi yang kolaboratif, pengembangan kompetensi sumber daya manusia secara berkelanjutan, dan tata kelola digital yang terintegrasi. Berdasarkan analisis lintas kasus, penelitian ini mengusulkan **Adaptive Digital Transformation Framework for Madrasah Management** yang menempatkan kepemimpinan, tata kelola, kapasitas organisasi, dan budaya organisasi sebagai kapabilitas yang saling terintegrasi dalam mendukung transformasi kelembagaan yang berkelanjutan. Penelitian ini memperkuat teori transformasi digital sekaligus memperluas penerapannya pada konteks manajemen pendidikan Islam, serta memberikan implikasi praktis bagi pengambil kebijakan dan pengelola madrasah dalam merancang strategi transformasi digital yang berkelanjutan.

Kata Kunci: Kompetensi transformasi digital; manajemen madrasah; kepemimpinan digital; strategi adaptif; manajemen pendidikan Islam

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1. INTRODUCTION

Digital transformation has become a strategic agenda in educational systems worldwide in response to rapid advances in information technology, artificial intelligence (AI), big data, cloud computing, and the increasing demand for effective, efficient, and adaptive educational services (Dzulfian Syafrian, 2025). This transformation extends beyond teaching and learning processes, fundamentally reshaping how educational institutions are managed through strategic planning, decision-making, human resource management, academic administration, and quality assurance systems (Sailer & Homner, 2019). Within the context of Islamic education, particularly madrasahs, digital transformation represents both a challenge and an opportunity to enhance institutional competitiveness while preserving Islamic values and educational identity (Aristhya et al., 2022).

In Indonesia, government initiatives promoting educational digitalization have encouraged madrasahs to adopt various digital technologies in institutional management (Hadi et al., 2025). Nevertheless, the implementation of digital transformation remains constrained by inadequate technological infrastructure, limited digital competencies among educators and administrative

staff, organizational resistance to change, financial limitations, and the absence of comprehensive management strategies to sustain digital transformation initiatives. These challenges indicate that digital transformation should not merely be viewed as technological adoption but rather as a comprehensive organizational change involving leadership, governance, organizational culture, strategic planning, and adaptive institutional management (Chaidir et al., 2025).

Previous studies have primarily examined digital technology integration in teaching and learning, Learning Management Systems (LMS), teachers' digital literacy, and e-learning implementation in Islamic schools (Moh. Solikul Hadi, Alifia Azzahra Budi, Ali Kuswadi, 2025). Other studies have investigated digital leadership and institutional readiness for digitalization. However, most of these studies approach digital transformation from a technological perspective and pay limited attention to its implications for institutional management (Auliana & Erra Rismorlita, 2017). Comprehensive investigations into how digital transformation reshapes the entire management system of madrasahs including leadership, governance, organizational culture, strategic decision-making, resource management, and institutional adaptability remain relatively scarce (Roblek et al., 2021).

Accordingly, a significant research gap exists in the limited integration of strategic management perspectives with digital transformation within the context of madrasah management (Moh. Solikul Hadi, Muhammad Nuril Anam, 2021). Furthermore, previous studies have predominantly focused on evaluating technological implementation rather than explaining the adaptive strategies employed by Islamic educational institutions to respond effectively to continuous digital disruption (Haningsih et al., 2026).

This study differs from previous research by examining digital transformation as a holistic organizational change process rather than merely technological implementation. It investigates not only the challenges encountered by madrasahs but also the adaptive strategies developed to strengthen institutional governance, digital leadership, organizational culture, human resource development, innovation management, and data-driven decision-making within Islamic educational institutions.

The novelty of this research lies in proposing a comprehensive conceptual framework of adaptive digital transformation in madrasah management by integrating digital leadership, organizational culture, institutional governance, human resource readiness, and management innovation into a unified strategic management perspective. This framework contributes to both the theoretical development of Islamic educational management and practical guidance for policymakers and madrasah leaders in navigating digital transformation

2. RESEARCH METHODS

This study employed a qualitative approach with a multiple-case study design to obtain an in-depth understanding of digital transformation in madrasah management, particularly regarding the challenges encountered and the adaptive strategies developed by Islamic educational institutions. A qualitative approach was selected because digital transformation is a complex organizational phenomenon that cannot be adequately explained through quantitative indicators alone. Instead, it requires an exploration of participants' experiences, institutional contexts, organizational cultures,

and management practices that shape the digital transformation process within madrasahs (Creswell & Poth, 2018). The multiple-case study design was adopted to enable comparisons across different madrasahs, allowing the identification of recurring patterns as well as institution-specific strategies for managing digital transformation (Yin, 2018).

The study was conducted in three Madrasah Aliyah located in the Special Region of Yogyakarta, Indonesia. These madrasahs were purposively selected because they have implemented various digital transformation initiatives in institutional management, including digital administration systems, online academic services, learning management systems, and technology-based decision-making processes. The selected research sites represent different organizational capacities, levels of digital readiness, and institutional characteristics, thereby providing a rich context for understanding how madrasahs respond to digital transformation. Rather than focusing solely on technology adoption, this study examined digital transformation as an organizational change process involving leadership, governance, organizational culture, human resource development, and institutional innovation.

The participants were selected using purposive sampling, focusing on individuals who were directly involved in institutional management and digital transformation initiatives within the selected madrasahs. The participants consisted of madrasah principals, vice principals, teachers, administrative staff, information technology coordinators, and school committee representatives. These participants were considered capable of providing comprehensive information regarding the implementation, challenges, and adaptive strategies of digital transformation in their respective institutions.

Data were collected through semi-structured interviews, non-participant observations, and document analysis. Semi-structured interviews explored participants' experiences and perceptions concerning digital transformation initiatives, organizational challenges, leadership practices, and institutional adaptation. Non-participant observations were conducted to examine the implementation of digital management systems, administrative processes, and technology utilization in everyday institutional activities. In addition, document analysis included strategic plans, digital transformation policies, quality assurance reports, meeting minutes, and other institutional documents relevant to the research objectives.

The collected data were analyzed using thematic analysis following Braun and Clarke's (2006) six-stage framework, consisting of data familiarization, initial coding, theme generation, theme review, theme definition, and report writing. After completing the within-case analysis, a cross-case analysis was conducted to compare findings across the three madrasahs and identify common themes as well as distinctive adaptive strategies. To ensure the trustworthiness of the findings, this study employed source triangulation, methodological triangulation, member checking, and peer debriefing. An audit trail documenting all stages of data collection and analysis was also maintained to enhance the credibility, dependability, and confirmability of the research (Lincoln & Guba, 1985).

3. RESULTS AND DISCUSSION

The findings of this study were derived from thematic analysis of interviews, observations, and institutional documents collected from three Madrasah Aliyah implementing digital transformation initiatives. The analysis generated four overarching themes that explain the dynamics of digital transformation in madrasah management, namely (1) digital transformation challenges, (2) adaptive leadership and governance, (3) organizational capacity building, and (4) institutional innovation and sustainability. These themes emerged consistently across the three cases, although each madrasah demonstrated different levels of readiness and adaptation. Figure 1 presents the conceptual structure of the findings.

The first finding indicates that digital transformation in madrasahs extends beyond the introduction of new technologies. Instead, it represents a multidimensional organizational change requiring institutional readiness, strategic leadership, and continuous organizational learning. Four dominant challenges were consistently identified across the three participating madrasahs.

The findings reveal that digital competence remains the primary challenge. Although younger teachers demonstrated greater confidence in utilizing digital platforms, senior teachers tended to rely on conventional administrative procedures. This disparity created inconsistencies in the implementation of digital management systems and limited institutional efficiency. Therefore, digital transformation should be understood not only as technological modernization but also as organizational capacity development.

Another significant issue concerns digital infrastructure. The availability of internet connectivity, integrated management information systems, and institutional databases varied considerably among the participating madrasahs. Such differences affected the effectiveness of academic administration, internal communication, and educational service delivery. Consequently, infrastructure readiness emerged as a prerequisite for sustainable digital transformation.

Furthermore, the study identified organizational resistance as a critical challenge. Resistance was not directed toward technology itself but rather toward changes in established work routines and administrative procedures. This finding suggests that organizational culture significantly shapes the success of digital transformation initiatives.

Despite these challenges, all participating madrasahs demonstrated adaptive strategies to accelerate digital transformation. The findings indicate that successful institutions were characterized by strong digital leadership and systematic governance rather than merely possessing advanced technological resources. Madrasah principals played a central role in articulating a shared digital vision, encouraging innovation, and facilitating collaboration among teachers and administrative staff. Rather than adopting an authoritarian approach, leaders emphasized participatory decision-making and collective responsibility for institutional change. Such leadership practices reduced organizational resistance and strengthened institutional commitment toward digital innovation.

Digital governance also emerged as an important adaptive strategy. The participating madrasahs gradually developed integrated administrative systems, electronic documentation, online communication platforms, and digital quality assurance mechanisms. These initiatives enabled faster information exchange, improved transparency, and more efficient organizational coordination. The findings demonstrate that digital governance functions as an organizational mechanism that translates leadership vision into operational practices.

Another important finding concerns the continuous development of organizational capacity. The participating madrasahs recognized that digital transformation could not be sustained without improving the competencies of teachers and administrative personnel. Capacity-building initiatives were implemented through regular digital literacy training, mentoring programs, peer-learning communities, and collaborative workshops. These activities not only enhanced technical competencies but also fostered confidence in utilizing digital technologies for institutional management. Participants consistently emphasized that organizational learning was more influential than technology availability in determining successful digital transformation.

In addition, the findings indicate that collaborative organizational culture supported knowledge sharing among teachers and staff. Informal discussions, peer assistance, and collective problem-solving became important mechanisms for overcoming technical challenges and accelerating institutional adaptation. These practices gradually developed a learning organization capable of responding to technological changes more effectively.

The final theme demonstrates that digital transformation has generated various forms of institutional innovation beyond administrative efficiency. The implementation of paperless administration, cloud-based documentation, digital communication systems, and online academic services significantly improved institutional responsiveness and service quality.

The cross-case analysis indicates that sustainable digital transformation depends on the interaction of four organizational dimensions: leadership, governance, human resource development, and organizational culture. Madrasahs that successfully integrated these dimensions demonstrated higher institutional adaptability than those relying primarily on technological investment.

Based on these findings, this study proposes the Adaptive Digital Transformation Framework for madrasah management. The framework suggests that sustainable digital transformation should be understood as an organizational capability rather than a technological achievement. Leadership provides strategic direction, governance establishes institutional systems, organizational capacity ensures continuous learning, and collaborative culture maintains innovation over time. The interaction among these dimensions enables madrasahs to respond adaptively to technological change while preserving their Islamic educational values and institutional identity.

4. CONCLUSION

This research has demonstrated that performance-based competency development for PAI teachers at MI Mathlul Anwar Srirahayu effectively improves teacher competencies across pedagogical, professional, social, and personality domains. The cyclical model of assessment, planning,

implementation, and evaluation provides a systematic framework for identifying development needs, designing appropriate interventions, and tracking progress over time. The most significant improvements were observed in pedagogical competency, particularly in technology integration and innovative learning design, while personality competency, already relatively strong, showed more modest gains. Supporting factors including teacher motivation and principal support were crucial for success, while constraints such as limited infrastructure and insufficient budget highlighted the need for broader systemic support.

The findings demonstrate that digital transformation in madrasah management should not be interpreted merely as the adoption of digital technologies but rather as a comprehensive process of organizational transformation involving leadership, governance, organizational culture, and institutional capability. This finding suggests that the success of digital transformation depends primarily on organizational readiness rather than technological readiness alone. Although digital infrastructure remains an essential enabling factor, the participating madrasahs consistently emphasized that adaptive leadership, continuous professional development, and collaborative organizational culture played more decisive roles in sustaining digital transformation initiatives.

This finding is consistent with Vial (2019), who conceptualizes digital transformation as a process through which organizations fundamentally improve their operations, structures, and value creation mechanisms by integrating digital technologies into organizational practices. Rather than viewing digital transformation as technological innovation alone, Vial argues that organizational change represents the core element of digital transformation. The present study reinforces this theoretical perspective by demonstrating that madrasahs achieving higher levels of digital transformation were not necessarily those possessing the most advanced technological infrastructure but those capable of aligning leadership, governance, and organizational learning with technological innovation. Therefore, this study strengthens Vial's proposition that digital transformation constitutes an organizational transformation process rather than a technological project.

Furthermore, the findings support the Dynamic Capability Theory proposed by Teece (2018), which emphasizes that organizational sustainability depends on an institution's capability to sense environmental changes, seize emerging opportunities, and continuously reconfigure organizational resources. The adaptive strategies implemented by the participating madrasahs—including digital capacity building, collaborative governance, and continuous organizational learning—reflect these dynamic capabilities. Rather than reacting passively to technological disruption, the madrasahs actively reconfigured managerial practices and institutional processes to maintain organizational effectiveness. However, this study extends Teece's theory by highlighting that, within Islamic educational institutions, dynamic capabilities are strongly influenced by Islamic organizational values such as collaboration (*shūrā*), trust (*amānah*), and collective responsibility. Consequently, organizational adaptation in madrasahs is driven not only by strategic considerations but also by religious and ethical values that shape institutional behavior.

The findings also correspond with Senge's (1990) concept of the learning organization, which argues that sustainable organizational change depends on continuous learning, knowledge sharing, and collective problem-solving. The participating madrasahs consistently implemented digital

literacy programs, mentoring systems, peer learning communities, and collaborative discussions to strengthen teachers' and administrative staff's digital competencies. These initiatives created an organizational environment in which learning became a continuous institutional process rather than an individual responsibility. Nevertheless, the present study broadens Senge's framework by demonstrating that organizational learning within madrasahs integrates professional development with Islamic educational values, thereby reinforcing both technological competence and institutional identity simultaneously.

Another significant finding concerns the role of leadership during digital transformation. The results indicate that adaptive digital leadership functions as the primary catalyst for organizational change by reducing resistance, strengthening collaboration, and encouraging institutional innovation. These findings are consistent with the transformational leadership theory proposed by Bass and Avolio (1994), which emphasizes leaders' abilities to inspire organizational members, promote innovation, and facilitate change. Similarly, Northouse (2022) argues that effective leadership in contemporary organizations requires adaptability, strategic vision, and collaborative communication. The present study confirms these theoretical propositions while providing additional evidence that leadership effectiveness in madrasahs is closely associated with leaders' capacity to integrate digital innovation with Islamic educational values. This suggests that digital leadership within Islamic educational institutions possesses distinctive characteristics that differ from leadership models commonly discussed in corporate organizational settings.

The findings are also comparable with several previous empirical studies. Recent research on digital transformation in education has generally concluded that technological infrastructure and digital competence significantly influence institutional digitalization. However, most previous studies have primarily focused on technology adoption, digital literacy, or e-learning implementation. Comparatively, the present study demonstrates that these dimensions represent only a part of the broader digital transformation process. The cross-case analysis indicates that organizational culture, governance mechanisms, strategic leadership, and adaptive institutional capacity exert equally important influences on successful digital transformation. Accordingly, this study extends previous research by proposing a more holistic perspective that integrates technological, organizational, managerial, and cultural dimensions into a unified framework of digital transformation in madrasah management.

A particularly important contribution of this study lies in the development of the Adaptive Digital Transformation Framework for Madrasah Management. Unlike previous studies that conceptualize digital transformation primarily from technological or managerial perspectives, the proposed framework positions adaptive leadership, digital governance, organizational capacity, and collaborative organizational culture as interconnected organizational capabilities that collectively determine institutional sustainability. This framework also incorporates Islamic educational values as the ethical foundation guiding organizational transformation, thereby offering a context-specific model for Islamic educational institutions. Consequently, the findings contribute not only to the development of digital transformation theory in educational management but also provide practical guidance for policymakers and madrasah leaders seeking to implement sustainable digital transformation initiatives.

Overall, this study supports and extends existing theories rather than contradicting them. The findings reinforce the propositions of Digital Transformation Theory, Dynamic Capability Theory, Organizational Learning Theory, and Transformational Leadership Theory by demonstrating their applicability within the context of Islamic educational institutions. At the same time, the study extends these theoretical perspectives by showing that successful digital transformation in madrasahs is inseparable from the integration of Islamic organizational values, collaborative governance, and adaptive institutional culture. Therefore, the proposed framework contributes a contextualized understanding of digital transformation that reflects the unique characteristics of madrasah management while enriching the broader discourse on educational leadership and organizational change.

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