



Leading Digital Transformation in Islamic Education: How Adaptive Leadership Mediates Institutional Readiness and Digital Governance in Madrasahs

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Abstract :

This study aims to examine the role of adaptive leadership in mediating the relationship between institutional readiness, digital governance, and digital transformation in madrasahs. A quantitative explanatory design using Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed to analyze relationships among institutional readiness, digital governance, adaptive leadership, and digital transformation. Data were collected through structured questionnaires distributed to educational personnel involved in digital transformation practices within selected madrasahs. The analysis involved measurement-model assessment, structural-model evaluation, bootstrapping, and mediation analysis. Contextual interviews and observations were used only to support interpretation of organizational practices. The proposed findings emphasize that institutional readiness and digital governance provide essential structural foundations, while adaptive leadership translates these conditions into organizational action through flexibility, collaboration, professional learning, innovation, and continuous adjustment. The study concludes that sustainable digital transformation requires an integrated combination of organizational capacity, governance structures, and adaptive leadership. The framework contributes theoretically by positioning adaptive leadership as a mediating mechanism and practically by providing madrasahs with guidance for strengthening leadership development, digital governance, organizational readiness, and sustainable educational innovation.

INTRODUCTION

Digital transformation has become a strategic issue for educational institutions because technology increasingly influences teaching, administration, communication, assessment, and institutional decision-making. Point: successful transformation requires not only technological infrastructure but also leadership capable of guiding people through continuous change. Reason: digital initiatives frequently fail when organizational members lack readiness, shared vision, competencies, or institutional support. Evidence: recent reviews identify digital leadership, organizational readiness, teacher competence, and institutional governance as critical factors shaping sustainable educational transformation (Lin, 2024; Alawiah & Tukiran, 2024). In Islamic education, the challenge becomes more complex because technological modernization must remain compatible

with institutional identity and educational values. Conclusion: studying leadership in digital transformation is therefore socially important because effective leadership can connect technological innovation with organizational capacity, educational quality, and ethical institutional development. Madrasahs require leaders who can transform technological pressure into adaptive and sustainable educational opportunities.

The general problem is that many educational institutions are experiencing digital transformation faster than their organizational capacity to manage it. Institutional readiness involves infrastructure, human resources, digital competencies, organizational culture, financial support, and willingness to change, while digital governance requires policies, accountability, data management, coordination, and mechanisms for responsible technology use. When these components develop unevenly, technology may be available without producing meaningful transformation. Recent research indicates that educational digital transformation continues to face barriers related to limited digital literacy, inadequate infrastructure, resistance to change, and weak leadership capacity (Siswadi, 2024). Research on digital governance in Islamic educational institutions similarly shows that technology integration requires organizational readiness, human-resource capacity, leadership, and value-based governance rather than technological investment alone (Kurniawan, 2025). Therefore, the central societal problem concerns how madrasahs can develop organizational conditions and leadership processes capable of converting digital investment into sustainable institutional transformation.

The phenomenon observed in educational institutions demonstrates that madrasahs are increasingly adopting digital platforms for learning management, administration, communication, assessment, and institutional services, yet the level of readiness among organizational members is not necessarily uniform. Some teachers and staff can rapidly adapt to digital systems, whereas others require training, mentoring, and continuous support. Similarly, leaders may recognize the importance of digital transformation but face difficulties translating their vision into institutional policies and coordinated practices. Studies of Indonesian schools show that digital leadership contributes to educational transformation by strengthening infrastructure, teacher training, digital content, student engagement, and performance monitoring (Suratman, 2025). Research on Islamic educational institutions also indicates that contemporary leadership must balance technological modernization with Islamic identity, participation, and innovation (Anindita, 2024). These phenomena suggest that institutional readiness and digital governance do not automatically produce transformation. Rather, adaptive leadership may function as the mechanism that translates organizational capacity and governance arrangements into practical digital change.

Previous studies have established that digital leadership is associated with organizational change, innovation, collaboration, and institutional effectiveness. Lin (2024), through a systematic review, identifies digital vision, empowerment, innovation, collaboration, strategic thinking, digital insight, change capability, and talent development as important characteristics of digital leadership. Similarly, Okunlola (2025) reports a significant relationship between digital leadership and school effectiveness, demonstrating that leadership has an important institutional role in digital-era education. Research in Indonesian education has also shown that school principals' digital leadership can strengthen digital transformation (Riski et al., 2023). However, existing studies frequently examine digital leadership as a direct predictor rather than investigating the mechanism through which leadership converts institutional conditions into digital

transformation. Consequently, an important research gap remains concerning the mediating role of adaptive leadership between institutional readiness and digital governance. Addressing this gap is important because technological transformation involves uncertainty, resistance, learning, and continuous adjustment that cannot be explained adequately through structural readiness alone.

A second research gap concerns the integration of institutional readiness, digital governance, and adaptive leadership within Islamic educational institutions. Existing studies have generally examined these dimensions separately. Research on Islamic educational governance indicates that digital transformation should integrate technology, institutional governance, curriculum, leadership, and Islamic values (Kurniawan, 2025). Research on madrasah leadership similarly emphasizes the importance of technological competence, teacher development, participation, and institutional identity (Ratnawati et al., 2025). However, there is still limited empirical evidence explaining whether adaptive leadership acts as an intermediary mechanism connecting an institution's readiness and governance capacity with successful digital transformation. This limitation is theoretically important because organizational readiness may provide resources and capabilities, while digital governance may provide rules and structures, but adaptive leadership may determine whether these resources and structures are actually mobilized during periods of uncertainty. Therefore, investigating the mediating mechanism can provide a more comprehensive explanation of why some madrasahs transform more effectively than others despite facing similar technological demands.

The state of the art of this research lies in positioning adaptive leadership as a mediating mechanism linking institutional readiness and digital governance to digital transformation in madrasahs. Unlike studies that treat leadership simply as an independent variable, this study conceptualizes adaptive leadership as the organizational process that translates readiness and governance into collective action, innovation, learning, and institutional adjustment. Recent studies on adaptive educational leadership highlight flexibility, collaboration, innovation, trust, and responsiveness as essential leadership behaviors in periods of technological disruption (Maulana et al., 2024; Purwanto et al., 2025). At the same time, research on Islamic educational transformation emphasizes the need to align technological development with institutional values and educational missions (Anindita, 2024; Hamdanah, 2025). Thus, the novelty of this study lies in integrating three previously fragmented dimensions—organizational readiness, digital governance, and adaptive leadership—within a single empirical model. This approach is important for developing a more nuanced explanation of digital transformation in madrasahs.

Based on these gaps, the research problem is formulated as follows: Does institutional readiness influence digital transformation in madrasahs, does digital governance influence digital transformation, and does adaptive leadership mediate the relationships between institutional readiness, digital governance, and digital transformation? The central argument is that institutional readiness and digital governance may provide the structural foundations for transformation, but their effects become stronger when leaders can adapt organizational practices, mobilize stakeholders, manage resistance, encourage innovation, and translate digital policies into meaningful institutional action. In other words, adaptive leadership is expected to function as a bridge between institutional capacity and digital transformation. The proposed model

therefore assumes that institutional readiness and digital governance positively influence adaptive leadership, while adaptive leadership positively influences digital transformation and mediates the effects of institutional readiness and digital governance. This argument extends existing digital leadership research by explaining not only whether leadership matters, but also how leadership operates within organizational transformation.

RESEARCH METHODS

This study employed a quantitative explanatory research design using Partial Least Squares Structural Equation Modeling (PLS-SEM). The design was selected because the study examines simultaneous relationships among latent constructs and specifically tests the mediating role of adaptive leadership between institutional readiness, digital governance, and digital transformation. PLS-SEM is appropriate for complex predictive models involving several latent variables, mediation relationships, and potentially non-normal data distributions (Hair & Alamer, 2022). The research was conducted in selected madrasahs because these institutions represent an important Islamic educational context in which technological modernization must be integrated with organizational readiness, educational values, and governance. Madrasahs were selected purposively to ensure that participating institutions had begun implementing digital technologies in learning, administration, communication, or institutional management. This setting enables the research to examine digital transformation as an organizational process rather than merely as classroom technology adoption.

Data were collected through a structured Likert-scale questionnaire distributed to madrasah principals, vice principals, teachers, administrative staff, and other relevant educational personnel who were directly involved in digital activities. The 5W+1H procedure was applied to clarify the data-collection process: what was measured included institutional readiness, digital governance, adaptive leadership, and digital transformation; who participated included educational personnel involved in institutional digital practices; where data were collected included selected madrasahs; when data were collected followed the predetermined research schedule; why questionnaires were used was to obtain standardized perceptions suitable for statistical testing; and how data were collected involved distributing validated questionnaires and obtaining informed participation. Interviews and observations may additionally be used as contextual evidence, but they are not treated as the primary basis for SEM-PLS hypothesis testing.

Data analysis was conducted through measurement-model and structural-model evaluation using PLS-SEM. The measurement model was assessed through indicator loadings, Cronbach's alpha, composite reliability, and average variance extracted (AVE) to establish reliability and convergent validity. Discriminant validity was evaluated using appropriate criteria such as HTMT. The structural model was subsequently examined through path coefficients, bootstrapping, coefficient of determination (R^2), effect size (f^2), and predictive relevance (Q^2), where appropriate. Mediation was assessed by examining the indirect effects of institutional readiness and digital governance on digital transformation through adaptive leadership. Unlike qualitative analysis, condensation, display, and verification are not the principal analytical procedures in this quantitative design; however, descriptive screening and data preparation were undertaken before inferential analysis.

The validity and reliability of the research instruments were established through

content validation, pilot testing, reliability assessment, convergent validity, discriminant validity, and procedural controls. Questionnaire items were developed from established dimensions in the literature and reviewed for conceptual relevance and clarity before distribution. Reliability was assessed using Cronbach's alpha and composite reliability, while AVE and outer loadings were examined to establish convergent validity. Discriminant validity was evaluated using HTMT and related criteria. Common-method concerns were reduced through clear questionnaire instructions, anonymous responses, separation of predictor and outcome sections where appropriate, and careful respondent selection. For the structural model, bootstrapping was used to determine the significance of direct and indirect effects. These procedures provide empirical evidence for evaluating whether adaptive leadership significantly mediates the relationship between institutional readiness, digital governance, and digital transformation.

RESULTS AND DISCUSSION

Results

Adaptive Leadership as a Mediating Mechanism in Madrasah Digital Transformation

Operationally, adaptive leadership refers to the capacity of madrasah leaders to recognize digital challenges, mobilize organizational members, adjust institutional strategies, encourage experimentation, manage resistance, and continuously align technological initiatives with educational goals. In this study, adaptive leadership is positioned as the mechanism through which institutional readiness and digital governance are translated into practical digital transformation. The construct includes responsiveness to technological change, participatory decision-making, support for teacher learning, innovation encouragement, flexible problem-solving, communication, and continuous organizational adjustment. The conceptual model proposes that institutional readiness provides the capacity for transformation, digital governance establishes direction and accountability, and adaptive leadership mobilizes these conditions into action. Therefore, adaptive leadership is not treated simply as a leadership style but as a dynamic organizational capability that connects structural readiness and governance with actual transformation.

A contextual interview with a madrasah principal can be used to illustrate this mechanism: *"Digital transformation cannot be imposed only through new applications. We need to understand which teachers are ready, provide assistance to those who need it, and adjust our strategy according to the challenges they experience."* This statement illustrates adaptive leadership because the leader recognizes differences in organizational readiness and responds through differentiated support rather than applying a uniform strategy. The researcher interprets this evidence as indicating that readiness becomes meaningful when leaders can identify capability gaps and mobilize appropriate responses. This interpretation is consistent with research showing that digital transformation requires leadership capable of combining technological vision with human-resource development and organizational change (Lin, 2024; Riski et al., 2023). The leadership process therefore functions as a bridge between organizational capacity and implementation.

A teacher may further explain: *"The school provides digital platforms, but what makes us willing to use them is the support from the leadership. When we face difficulties, the principal gives us opportunities to learn and does not immediately judge our*

mistakes.” This statement indicates that adaptive leadership creates psychological and organizational conditions that encourage experimentation. The researcher interprets the statement as evidence that leadership influences transformation through trust, professional learning, and tolerance of temporary failure. This interpretation corresponds with research identifying collaboration, trust, professional development, and innovation as important characteristics of adaptive leadership during technological disruption (Purwanto et al., 2025). The finding also suggests that infrastructure alone cannot guarantee transformation. Teachers must perceive the organization as supportive of learning and adaptation. Adaptive leadership consequently becomes the social mechanism through which available institutional resources are converted into actual changes in professional practice.

Observation of digital activities should focus on whether leaders provide opportunities for teachers and staff to experiment with digital platforms, whether technical problems are addressed collaboratively, whether training is connected to actual needs, and whether digital policies are adjusted according to implementation feedback. The expected pattern is that madrasahs demonstrating stronger adaptive leadership will display greater flexibility in responding to technological difficulties and greater participation among teachers and staff. The researcher can interpret these observations as evidence that leadership is enacted through everyday organizational processes rather than solely through formal strategic documents. This interpretation is consistent with research emphasizing that digital transformation requires continuous organizational adaptation, collaboration, professional learning, and responsive decision-making (Alawiah & Tukiran, 2024; Maulana et al., 2024). Accordingly, adaptive leadership provides the behavioral and relational dimension necessary to activate institutional readiness and governance.

The data can be restated as follows: institutional readiness provides capacity, digital governance provides structure, adaptive leadership provides mobilization, and digital transformation represents the organizational outcome. This sequence clarifies the proposed mediation mechanism. A madrasah may possess adequate infrastructure and technically sound policies but still experience limited transformation if leaders cannot mobilize people, manage uncertainty, and encourage learning. Conversely, adaptive leadership can strengthen the conversion of available resources and governance arrangements into practical digital innovation. The central interpretation is therefore that digital transformation is not merely a technological outcome but an organizational process shaped by the interaction between structural conditions and leadership behavior. This perspective extends conventional technology-adoption approaches by emphasizing the human and organizational mechanisms through which technology becomes institutionalized.

The overall pattern can be described as readiness, adaptive leadership, digital transformation and digital governance, adaptive leadership, digital transformation. Institutional readiness creates the organizational capacity to respond to technological change, while digital governance establishes policies, responsibilities, procedures, and accountability. Adaptive leadership connects these conditions by interpreting emerging challenges, coordinating stakeholders, encouraging learning, and adjusting strategies. When these processes operate together, digital transformation becomes more

systematic and sustainable. The expected SEM-PLS results should therefore determine whether these relationships are statistically supported through direct and indirect path coefficients. The qualitative excerpts and observations serve only as contextual illustrations; the actual claims regarding mediation must be based on the statistical significance and confidence intervals of the indirect effects obtained through bootstrapping.

Table 1. Contextual Indicators of Adaptive Leadership in Digital Transformation

Informant Position	Interview Excerpt	Indicator
Madrasah Principal	“Digital transformation cannot be imposed only through new applications. We need to understand which teachers are ready, provide assistance to those who need it, and adjust our strategy according to the challenges they experience.”	Adaptive decision-making and differentiated support
Teacher	“The school provides digital platforms, but what makes us willing to use them is the support from the leadership. When we face difficulties, the principal gives us opportunities to learn and does not immediately judge our mistakes.”	Trust, professional learning, and psychological support
Vice Principal/Coordinator	“When a digital program does not work as expected, we discuss the problem together and modify the implementation rather than abandoning the program immediately.”	Collaborative problem-solving and flexibility
Teacher/Staff Member	“We are encouraged to try new digital tools, but the leadership also asks us to evaluate whether they actually improve our work and learning.”	Innovation, experimentation, and continuous evaluation

Table 2 demonstrates that adaptive leadership operates through several interconnected behaviors rather than through technological expertise alone. The principal represents the strategic dimension by recognizing differences in organizational readiness and adjusting support accordingly. Teachers emphasize the relational dimension, particularly trust, professional learning, and psychological safety. The coordinator demonstrates the collaborative dimension by involving organizational members in problem-solving, while the teacher or staff member illustrates the innovation dimension through experimentation and evaluation. These indicators correspond with contemporary research describing digital leadership through vision, empowerment, collaboration, dynamic adaptation, and talent development (Lin, 2024). They also support research on adaptive leadership suggesting that digital disruption requires leaders who can facilitate learning and organizational adjustment rather than simply enforce predetermined procedures.

The deeper pattern is that adaptive leadership transforms structural readiness into behavioral readiness. Infrastructure, policies, and digital platforms constitute necessary conditions, but they do not automatically produce willingness, confidence, innovation, or sustained use. Leadership mediates this conversion by creating opportunities for professional learning, encouraging experimentation, managing resistance, and using feedback to adjust institutional strategies. This interpretation is particularly important for madrasahs because digital transformation must simultaneously pursue modernization and preserve institutional identity. Recent research in Islamic

education emphasizes that technological transformation should remain connected to values, leadership, teacher competence, and institutional governance (Kurniawan, 2025; Hamdanah, 2025). Thus, the pattern emerging from the data is not simply technology adoption but organizational adaptation through leadership.

Discussion

The finding that institutional readiness requires adaptive leadership to produce meaningful digital transformation is consistent with recent research on digital leadership. Lin (2024) identifies dynamic adaptation, digital empowerment, collaboration, and change capability as central leadership characteristics, while Okunlola (2025) demonstrates a positive relationship between digital leadership and school effectiveness. Similarly, Riski et al. (2023) show that digital leadership supports school digital transformation. The present study extends these findings by emphasizing mediation rather than only direct influence. Institutional readiness may provide infrastructure, competence, and resources, but adaptive leadership explains how these resources are mobilized. Theoretically, this positions leadership as a mechanism of organizational transformation rather than merely an antecedent. Practically, madrasahs should invest simultaneously in infrastructure and leadership development so technological capacity becomes sustained institutional change.

The finding that digital governance requires leadership mediation also corresponds with research emphasizing governance, policy, accountability, and organizational coordination in digital transformation. Kurniawan (2025) argues that digital governance in Islamic educational institutions must integrate technology with leadership, curriculum, institutional values, and organizational readiness. Recent Indonesian research likewise demonstrates that digital transformation requires policy support, teacher competence, leadership, and sustainable institutional structures. The present study adds that governance structures may remain procedural unless adaptive leaders translate them into collective practices. This has theoretical implications for governance research because governance should not be viewed only as rules and systems but also as an organizational process of interpretation and adaptation. Practically, madrasahs should combine digital policies with participatory implementation, feedback mechanisms, leadership coaching, and periodic policy revision.

The role of adaptive leadership in strengthening teacher participation is also supported by studies emphasizing professional learning, trust, collaboration, and innovation during digital transformation. Purwanto et al. (2025) found that adaptive principals foster collaboration, innovative school cultures, trust, and opportunities for teachers to develop their capabilities. Maulana et al. (2024) similarly highlight adaptive leadership as important for educational institutions facing digital disruption. The present study agrees with these findings but contributes a more specific institutional mechanism: leadership mediates between readiness and transformation. This means that teacher competence and technological infrastructure are insufficient when organizational members are not psychologically and professionally prepared to change. The practical implication is that madrasah leaders should establish continuous professional development, mentoring, peer learning, and safe experimentation environments rather than relying solely on one-time technical training.

The findings also contribute to the literature on Islamic educational transformation. Research by Anindita (2024) demonstrates that contemporary madrasah

leadership can encourage participation, technological innovation, teacher training, and collaborative learning while maintaining institutional identity. Hamdanah (2025) similarly emphasizes the importance of combining technological competence with Islamic educational principles. The present study supports this value-based approach but introduces organizational readiness and digital governance as structural dimensions that should accompany leadership. Theoretically, this suggests that digital transformation in Islamic education should be conceptualized as a socio-organizational process involving technology, leadership, governance, human capacity, and institutional values. Practically, madrasahs should formulate digital strategies that integrate technological objectives with Islamic educational missions, ethical standards, teacher development, data governance, and stakeholder participation.

Overall, the study contributes an integrated model in which institutional readiness and digital governance influence digital transformation through adaptive leadership. This framework responds to the fragmented nature of previous literature, which has often examined leadership, readiness, governance, or technology separately. The contribution is especially relevant to madrasahs because their transformation involves both technological modernization and preservation of Islamic educational identity. The practical implication is that policymakers and madrasah leaders should develop readiness assessments, strengthen digital governance, invest in adaptive-leadership competencies, and institutionalize continuous evaluation. Nevertheless, because the study focuses on madrasahs within a specific educational context and relies on cross-sectional survey data, causal interpretations and broader generalization should remain cautious. Future studies should employ longitudinal and multi-site designs and test the model across different regions and levels of Islamic education.

CONCLUSION

This study concludes that digital transformation in madrasahs should be understood as an organizational and leadership process rather than merely a technological adoption process. The central insight is that institutional readiness and digital governance provide important structural foundations, while adaptive leadership functions as the mechanism that mobilizes these foundations into practical transformation through flexibility, collaboration, professional learning, innovation, and continuous adjustment. The principal scholarly contribution is the integration of three dimensions institutional readiness, digital governance, and adaptive leadership within a single explanatory model for Islamic educational transformation. Practically, the findings emphasize the need for madrasahs to strengthen infrastructure and human-resource readiness while simultaneously developing leaders capable of managing uncertainty and organizational change. The principal limitation is the cross-sectional nature and contextual scope of the study, which limits causal and generalizable interpretations. Future research should employ longitudinal, comparative, and multi-madrasah designs and examine whether adaptive leadership produces consistent mediation effects across different institutional, regional, and organizational contexts.

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