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Improving Transparency and Efficiency of Administrative and Organizational Governance Through Smart Digital Technology and Cloning Systems

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ABSTRACT

Purpose of the study: This study aims to improve the transparency and efficiency of administrative and organizational governance in mosque management through the development of Smart Mosque Digital Technology (SMDT) and a cloning system, enhancing financial administration and operational processes.

Methodology: The study employs a mixed-methods approach, including literature review, interviews, surveys, and observational data collection. The SMDT application was developed using the Waterfall model of the System Development Life Cycle (SDLC). User satisfaction was measured through a questionnaire based on the End-User Computing Satisfaction (EUCS) model and analyzed using descriptive statistics with a sample of direct users from Nurul Jihad Mosque in Jakarta.

Main Findings: The implementation of SMDT significantly improved transparency, accuracy, and efficiency in financial and administrative governance. User satisfaction levels were categorized as "very satisfied" across all measured dimensions, with scores ranging from 50% to 76.5% in the highest satisfaction category. The system enhanced data management, financial reporting, governance transparency, and operational efficiency in mosque operations.

Novelty/Originality of this study: This study presents a novel approach to mosque administration by introducing a fully integrated digital system that streamlines operational processes, improves transparency, and provides a replicable model that can be cloned across other mosques. The integration of digital technology into mosque governance represents a significant advancement in the field of religious organizational management, addressing the gap between traditional administration methods and contemporary digital transformation requirements.

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1. INTRODUCTION

The contemporary landscape of organizational governance has undergone a profound transformation driven by digitalization and technological innovation. Transparent and efficient administrative and organizational governance are fundamental prerequisites for accelerated organizational growth and progress [1]-[3]. The integration of digital technologies into governance structures has emerged as a strategic imperative rather than merely a trend, fundamentally reshaping how organizations operate, make decisions, and engage with stakeholders [4]-[6]. Operational and performance transparency within organizations drives accountability, credibility, and trust, creating relational governance and competitive incentives [7], [8]. Research demonstrates that trust and service quality significantly influence satisfaction levels among stakeholders [9], [10], while transparent leadership exerts substantial impact on administrative reform, leading to more efficient and effective organizational operations [11], [12].

The global movement toward digital transformation has accelerated significantly in the 2023-2025 period, with organizations across various sectors integrating advanced digital technologies such as artificial intelligence (AI), blockchain, cloud computing, and Internet of Things (IoT) into their governance structures [13]-[17]. The digital transformation market is experiencing exponential growth, with the global smart government market valued at USD 33.88 billion in 2023 and projected to reach USD 162.13 billion by 2032, demonstrating a compound annual growth rate (CAGR) of 19.0% [18]. This transformation involves not only technological adoption but also fundamental changes in organizational culture, leadership approaches, and operational paradigms. The shift from siloed governance approaches to integrated digital governance frameworks addresses interconnected risks spanning privacy, AI governance, online safety, and cybersecurity [19]-[21].

Digital technology adoption has been shown to simplify administrative processes, reduce operational costs, and improve service quality [22]. The digitalization of administrative procedures and the transition to paperless administration have simplified processes, reducing the time and resources required while enhancing accessibility and user experience [23], [24]. Financial digital transformation in organizations enhances transparency, governance, financial reporting, and decision-making processes,eeeeee while simultaneously improving trust and regulatory compliance [25]-[27]. Open data platforms and digital systems foster transparency and auditability, strengthening governance outcomes and enabling data-driven decision-making [28], [29]. Governments worldwide are increasingly embracing digital transformation to improve efficiency, enhance citizen services, and increase transparency, with AI predicted to free up nearly one-third of public servants' time for higher-value work [30].

Religious organizations, particularly mosques, represent a significant and unique context for digital transformation. As of January 2025, Indonesia recorded 309,007 mosques [31], constituting one of the world's largest networks of religious institutions. However, the digitalization of mosque administration has lagged significantly behind other organizational sectors. Transparent and efficient mosque administration and organizational governance must develop digital strategies aligned with technological advances to increase accountability and transparency [32]. The capability to collaborate on internal and external integration improves organizational capabilities and service delivery [33]. Despite their importance, mosques face unique challenges in digital transformation, including limited financial resources, resistance to change within mosque organizations, inadequate technological infrastructure, and lack of formal training and technical expertise among mosque administrators [34], [35].

Recent research on digital transformation in religious organizations reveals growing recognition of technology's role in enhancing worship experiences, streamlining operations, and fostering community engagement [36]. Smart masjid systems leverage digital tools and automation to optimize prayer experiences, community interaction, and administrative tasks, ensuring accuracy, efficiency, and greater community involvement [37]. The transformation of mosques into smart buildings involves emerging technologies such as Cyber-Physical Systems (CPS), Radio-Frequency Identification (RFID), Internet of Things (IoT), Virtual Reality (VR), Augmented Reality (AR), and cloud computing, which can improve management systems, safety protocols, and stakeholder experiences [14], [38], [39], [40], [41], [42]. Mobile applications have become central to connecting worshippers with their mosques, offering real-time prayer notifications, announcements, event schedules, donation options, and educational content [43].

However, significant gaps persist in the literature and practice related to digitalization of accountability in mosque organizations [32]. While mosques excel in community engagement, they struggle with maintenance, strategic planning, and operational efficiency due to lack of formal training and technical expertise [35]. Traditional mosque administration faces numerous challenges, including inefficient financial management processes, limited transparency in fund allocation and utilization, manual record-keeping systems prone to errors and data loss, inadequate donor tracking and engagement mechanisms, weak congregation trust due to limited visibility of operations, and inability to generate timely and accurate financial reports [44]. These challenges are compounded by the absence of integrated systems that can comprehensively address the multifaceted administrative requirements of modern mosque management.

The theoretical foundation for improving organizational governance through digital technology draws from multiple research streams. Schnackenberg et al. [45] developed a comprehensive framework for transparency in organizations, identifying three critical dimensions: disclosure (making information available), clarity (making information understandable), and accuracy (making information correct). This framework provides a robust theoretical lens for evaluating digital governance systems. Similarly, research on administrative governance emphasizes the importance of participatory spaces, accountability mechanisms, evaluation capabilities, and technological benefits in driving organizational efficiency [46]. Studies on digital administration highlight how technology drives efficiency, enables data-based decision-making, and enhances competitiveness [47]-[49]. The integration of these theoretical perspectives suggests that effective digital governance systems must simultaneously address transparency, efficiency, accountability, and user satisfaction.

The End-User Computing Satisfaction (EUCS) model, developed by Doll and Torkzadeh, provides a well-validated framework for assessing user satisfaction with information systems [50]. This model identifies five key dimensions that influence user satisfaction: content (relevance, completeness, and usefulness of information), accuracy (correctness and reliability of information), format (presentation, clarity, and organization of information), ease of use (system intuitiveness and simplicity), and timeliness (availability and currency of information) [50], [51]. Recent applications of the EUCS model across various domains, including healthcare information systems, government websites, academic information systems, and mobile applications, have consistently demonstrated its reliability and validity in measuring user satisfaction [52]-[54]. Studies confirm that these five factors significantly influence overall user satisfaction with digital systems, with particularly strong emphasis on ease of use and timeliness in contemporary digital environments [55], [56].

Despite the proliferation of digital solutions in various organizational contexts, mosque administration remains largely characterized by traditional, manual processes. This research gap is particularly significant given the scale and social importance of mosque networks, especially in Muslim-majority countries like Indonesia. The absence of integrated, comprehensive digital systems designed specifically for mosque governance represents both a challenge and an opportunity. While general-purpose management software exists, such solutions typically fail to address the unique requirements of mosque administration, including zakat management, orphan support programs, regular donor tracking, religious activity coordination, and community engagement mechanisms specific to Islamic institutions.

This study addresses the critical need for transparent and efficient administrative and organizational governance in mosque management through the development and implementation of Smart Mosque Digital Technology (SMDT). The system is designed as a comprehensive digital platform that integrates all essential administrative functions required for modern mosque governance, including financial management (incoming funds, outgoing funds, and fund distribution), asset management, congregation data management, regular donor management, orphan assistance programs, media and activity management, organizational structure documentation, and zakat recipient (mustahik) management. The novelty of this research lies in creating a holistic, integrated digital ecosystem specifically tailored to mosque governance requirements, with the additional innovation of a cloning system that enables rapid replication and deployment across multiple mosque organizations.

The research objectives are threefold: (1) to develop a comprehensive Smart Mosque Digital Technology (SMDT) system that addresses the multifaceted administrative and organizational governance requirements of mosque management; (2) to implement and evaluate the system's effectiveness in improving transparency and efficiency at Nurul Jihad Mosque in Jakarta; and (3) to validate the system's replicability through a cloning mechanism that can be deployed to other mosques requiring similar governance improvements. This research contributes to both theoretical understanding and practical application of digital transformation in religious organizational contexts, providing a model that bridges traditional religious administration with contemporary digital governance practices.

2. RESEARCH METHOD

This research employs a mixed-methods approach that combines both quantitative and qualitative methodologies to develop, implement, and evaluate the Smart Mosque Digital Technology (SMDT) system. The research was conducted at Nurul Jihad Mosque in Jakarta, Indonesia, during the period from July 2024 to August 2025.

2.1. Research Design

The study uses a convergent parallel mixed-methods design, where both quantitative and qualitative data are collected simultaneously but analyzed separately. This design allows for the collection of numerical data through predefined metrics to assess user satisfaction and qualitative data to explore deeper user experiences and implementation challenges. The two data types provide complementary insights into the effectiveness of the SMDT system. The research is conducted in four stages: (1) data collection, (2) system development, (3)

implementation and measurement, and (4) system cloning validation. Both data types are integrated at each stage to offer a comprehensive understanding of the system's performance. This approach ensures a robust assessment by combining the broad scope of quantitative data with rich qualitative insights, which enhances the study's credibility. The methodology aligns with design science research, ensuring the system's development and evaluation are based on both technical innovation and user needs.

2.2. System Development

The SMDT system was developed following the Waterfall model of the System Development Life Cycle (SDLC), which includes systematic phases: system planning, requirements analysis, system design, implementation and coding, system testing, and deployment. This structured approach ensures that each phase of the system's development is systematically executed and evaluated, aligning with the iterative needs assessment and evaluation phases outlined in the mixed-methods approach of the study.

Requirements analysis defined functional requirements (features and capabilities) and non-functional requirements (performance, security, usability standards). In the quantitative phase, the system's functional requirements were identified based on operational needs derived from survey data, while the non-functional requirements were informed by user feedback gathered through interviews and observational data. Functional requirements included comprehensive modules for financial management (incoming funds, outgoing funds, fund distribution), asset tracking, congregation management, regular donor management, orphan assistance programs, media and activity management, organizational structure documentation, and zakat recipient (mustahik) management. Non-functional requirements emphasized data security, system reliability, responsive user interface, and scalability for future expansion.

System design specifications include: Development platform utilizing PHP (8.0 or later) with CodeIgniter 4 framework, MySQL/MariaDB database management system, Apache/Nginx web server, Bootstrap 5 for responsive UI styling, and JavaScript/CSS for client-side interactivity. Development tools employed include Composer for dependency management, XAMPP/WAMP/LAMP for local development environment, Visual Studio Code as the primary code editor with appropriate extensions, and Chrome browser for testing. These choices were informed by both technical specifications derived from the literature review and feedback from the initial qualitative interviews, which identified preferred development platforms and tools among the system's intended users.

Hardware specifications for the production server include: CPU - 2 Cores minimum for handling concurrent user requests; RAM - 4 GB minimum to ensure optimal MySQL performance and PHP/Web Server caching; Storage - 80 GB SSD for rapid data access and improved system responsiveness; Network - Standard internet connectivity with SSL/TLS encryption for data security. The server operates on Linux distribution (Ubuntu Server) for stability, security, and efficiency. The hardware specifications were validated through a combination of performance testing during system development and feedback from users in the quantitative phase, ensuring that the system met performance expectations as outlined in the user satisfaction surveys.

The system implements ISO-standard data formats where applicable and includes comprehensive security measures: user authentication with encrypted passwords, role-based access control (RBAC) restricting data and function access based on user roles, SSL/TLS encryption for data in transit, database-level encryption for sensitive data at rest, regular automated backups ensuring data recoverability, and comprehensive audit logging of all critical operations. These security protocols were specifically selected in response to concerns raised by interviewees during the qualitative data collection phase regarding the protection of sensitive data, and their effectiveness was later evaluated through user feedback in the satisfaction surveys.

2.3. Data Collection

Data collection was conducted through multiple methods to ensure comprehensive needs assessment and system evaluation:

1. Literature Review: Systematic review of academic and practitioner literature on organizational transparency, administrative efficiency, digital transformation in religious organizations, and information systems success factors. The review identified theoretical frameworks, best practices, and empirical findings relevant to digital governance systems.
2. Interviews: Semi-structured interviews with mosque administrators, financial managers, committee members, and congregation representatives to understand current administrative challenges, workflow processes, information needs, and expectations for digital transformation. Interviews were conducted during the initial needs assessment phase (July-August 2024).
3. Observational Data Collection: Direct observation of mosque administrative processes, financial management procedures, activity coordination workflows, and stakeholder interactions to identify inefficiencies, documentation gaps, and opportunities for digital improvement.
4. Questionnaire Surveys: Structured questionnaires administered to direct system users after implementation to measure satisfaction and assess system impact on transparency, efficiency, and governance quality.

2.4. Measurement Instrument (EUCS)

User satisfaction was measured using the End-User Computing Satisfaction (EUCS) model, a well-validated instrument for assessing information system success. The EUCS model evaluates five core dimensions that are critical for understanding how users perceive the quality and effectiveness of a system. These dimensions are directly linked to the experience and satisfaction of users with the SMDT system. The following table presents the five core dimensions of the EUCS model alongside the corresponding items used to measure each dimension in the questionnaire. Each item is designed to assess various aspects of the system's performance, helping to provide a comprehensive view of its effectiveness.

Table 1. Core Dimensions of EUCS Model and Corresponding Questionnaire Items

EUCS Dimension	Description	Corresponding Questionnaire Items
Content Quality	Measures whether the system provides relevant, complete, and useful information that meets user needs.	1. Does the system provide information that is useful to your work? 2. Is the information provided by the system relevant to your tasks? 3. Is the system comprehensive in the information it provides?
Accuracy	Assesses the correctness, reliability, and trustworthiness of system-generated information.	1. Is the information provided by the system accurate? 2. Can you trust the information provided by the system? 3. Does the system generate reliable data?
Format Quality	Evaluates the presentation, clarity, organization, and attractiveness of information displays.	1. Is the system's display of information organized in a clear and logical manner? 2. Is the information presented in a visually appealing way? 3. Does the system use understandable formats for the information?
Ease of Use	Measures system intuitiveness, user-friendliness, and convenience of interaction.	1. Is the system easy to navigate? 2. How user-friendly is the interface? 3. Does the system respond quickly to your inputs?
Timeliness	Assesses whether information is available when needed, up-to-date, and delivered quickly.	1. Is the information provided by the system delivered in a timely manner? 2. How often is the information updated? 3. Can you access information when required?

Each of these five dimensions was evaluated using the items in the questionnaire, ensuring that various aspects of the user experience were thoroughly captured. In addition to the five core dimensions, the questionnaire included additional items designed to measure the SMDT system's impact on key aspects of governance and administrative efficiency. These items focus on transparency, efficiency, and governance quality, which are essential for the overall success of the system in enhancing mosque administration.

Table 2. Additional Items for Measuring SMDT's Impact on Governance and Efficiency

Governance and Efficiency Dimension	Corresponding Questionnaire Items
Transparency	1. Does the system improve transparency in financial operations? 2. Is the governance structure more open with the system in place? 3. Does the system provide accurate data that is easy to understand?
Efficiency	1. Does the system improve the efficiency of administrative processes? 2. Has the system enhanced decision-making speed? 3. How effectively does the system handle multiple tasks simultaneously?
Administrative Governance	1. Does the system support data-driven decision-making? 2. Has the system improved the overall competitiveness of the mosque in managing resources? 3. Does the system increase accountability in decision-making?

Governance and Efficiency Dimension	Corresponding Questionnaire Items
Organizational Governance	1. Has the system enhanced accountability in mosque management? 2. Does the system improve transparency in organizational functions? 3. How fair is the governance process with the system in place?

These additional items were developed based on both qualitative insights gathered through interviews and observational data, as well as feedback from the quantitative survey. They specifically address the broader impact of the system on organizational governance and efficiency. The use of the 5-point Likert scale is a common and effective method for measuring user satisfaction, allowing for clear and quantifiable data on user perceptions of the system's effectiveness across different dimensions. The questionnaire was administered to 18 direct system users, including administrators, financial managers, committee members, and activity coordinators. This sample was selected to ensure that the perspectives of all key users involved in mosque management were represented, providing a comprehensive view of the system's impact.

Table 3. Scoring of Satisfaction Levels of Administrative Variables for the SMDT Application

Main Theme	Subordinate Theme	Score (%)					Satisfaction Level
		1	2	3	4	5	
Administration	Administrative Governance Efficiency	-	-	11.8	23.5	64.7	Very satisfied
	Data-Driven Decision Making	-	-	17.6	17.6	64.7	Very satisfied
	Competitiveness	-	-	12.5	18.8	68.8	Very satisfied

Table 3 shows the satisfaction levels for key administrative variables based on the responses from the 18 system users. The "Very Satisfied" category represents the highest satisfaction rating, indicating that the system has effectively enhanced administrative governance efficiency and decision-making processes.

2.5. Data Analysis

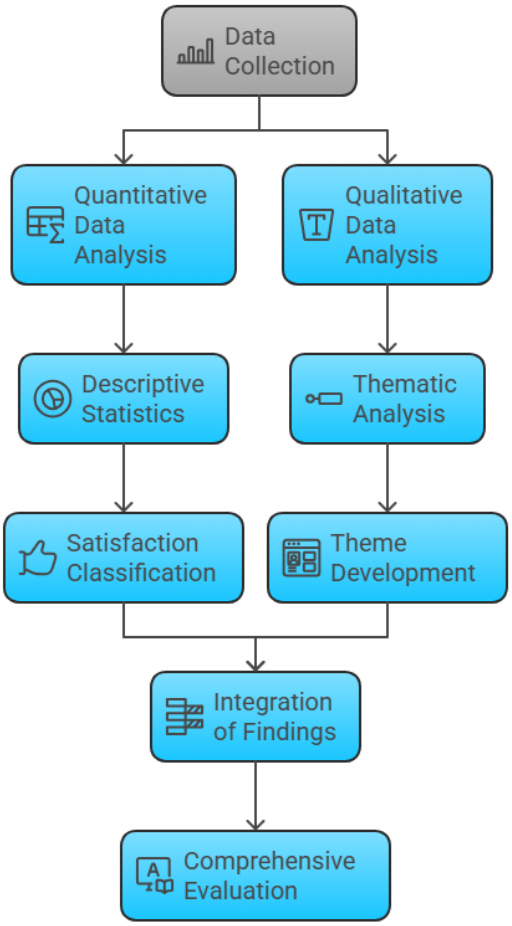

Figure 1. Data Analysis Process for SMDT System

2.5.1. Quantitative Data Analysis

Quantitative data from the EUCS questionnaire were analyzed using descriptive statistics. The instrument used for the quantitative data collection is the EUCS model, which assesses user satisfaction across five key dimensions: content, accuracy, format, ease of use, and timeliness (see Table 1). For each questionnaire item, response frequencies were calculated for each Likert scale point (1 = Very Dissatisfied, 5 = Very Satisfied), and percentages were computed to show the distribution of satisfaction levels across the items. Satisfaction levels were classified based on the proportion of responses in the highest category (score 5). Specifically, items with ≥50% of responses in the highest category were classified as "Very Satisfied," indicating a strong positive user evaluation. This classification method allows for a clear, objective measure of user satisfaction and helps identify the areas where the system performed most effectively.

2.5.2. Qualitative Data Analysis

For the qualitative data, semi-structured interviews and open-ended questionnaire responses were employed to gather in-depth insights into user experiences and challenges faced during the system's implementation. The instruments used for qualitative data collection included structured interview protocols designed for mosque administrators, financial managers, and committee members, as well as open-ended questions incorporated into the EUCS survey. These tools were specifically crafted to capture detailed feedback on system usability, administrative workflows, and perceptions of system impact.

The qualitative data were analyzed using thematic analysis, a widely recognized approach for identifying, analyzing, and reporting patterns (or themes) within qualitative data. The analysis process involved several stages: (1) data familiarization through repeated reading of interview transcripts and open-ended responses, (2) initial coding to organize data into meaningful segments, (3) theme development by identifying recurring patterns and user preferences, and (4) refinement of themes to ensure they accurately represented the collected data. This approach enabled the identification of key insights into user experiences and provided rich, context-specific feedback on system implementation that complemented the quantitative findings. Thematic analysis not only allowed for the identification of patterns and suggestions for system improvements but also ensured that these findings were aligned with the quantitative results, offering a more holistic understanding of how the system impacted users. This integration of qualitative and quantitative data provides a deeper understanding of the system's strengths and areas for enhancement, ensuring that both types of data contribute to a comprehensive evaluation of the Smart Mosque Digital Technology (SMDT) system's effectiveness.

Table 4. Interview Questions for Qualitative Data Collection

Category	Question
System Usability	1. How do you rate the overall ease of use of the SMDT system?
	2. Were there any features of the system that were hard to understand or navigate?
	3. How user-friendly is the interface for new users with limited technological experience?
Administrative Workflows	1. In what ways has the SMDT system improved mosque administration efficiency?
	2. How has the system affected the management of financial records and donor information?
	3. Are there any specific administrative tasks that have become more automated or easier?
Implementation Challenges	1. What challenges did you encounter during the system implementation process?
	2. Were there any issues that were not fully resolved during the implementation phase?
	3. How do you feel about the training and support provided during the implementation phase?
User Satisfaction	1. How satisfied are you with the accuracy and reliability of the information provided by the system?
	2. Does the system meet your expectations for transparency in financial and administrative tasks?
	3. How likely are you to recommend the SMDT system to other mosques or organizations?

2.6. Implementation and System Cloning

Following successful system testing, SMDT was deployed at Nurul Jihad Mosque in Jakarta. A comprehensive training program was conducted for all system users, including administrators, financial managers, and committee members. Training materials included user manuals, video tutorials, and hands-on practice

sessions. The system was implemented progressively, with phased rollout of modules to ensure smooth transition from manual to digital processes.

The final research stage involved developing a systematic cloning process to replicate the SMDT system for other mosques. This process includes: database template preparation with configurable parameters, customization scripts for mosque-specific data (names, addresses, organizational structures), comprehensive documentation including installation guides and user manuals, and technical support protocols for cloned implementations. The cloning system was validated through pilot deployment at two additional mosques in the Jakarta area, demonstrating the system's replicability and adaptability to different organizational contexts.

Ethical considerations were carefully addressed throughout the research. Informed consent was obtained from all participants in needs assessment and user satisfaction evaluation. Data privacy and confidentiality were maintained for all personal and financial information. The research received approval from the mosque management committee, and all data handling procedures complied with relevant data protection regulations.

3. RESULTS AND DISCUSSION

3.1. System Architecture and Design

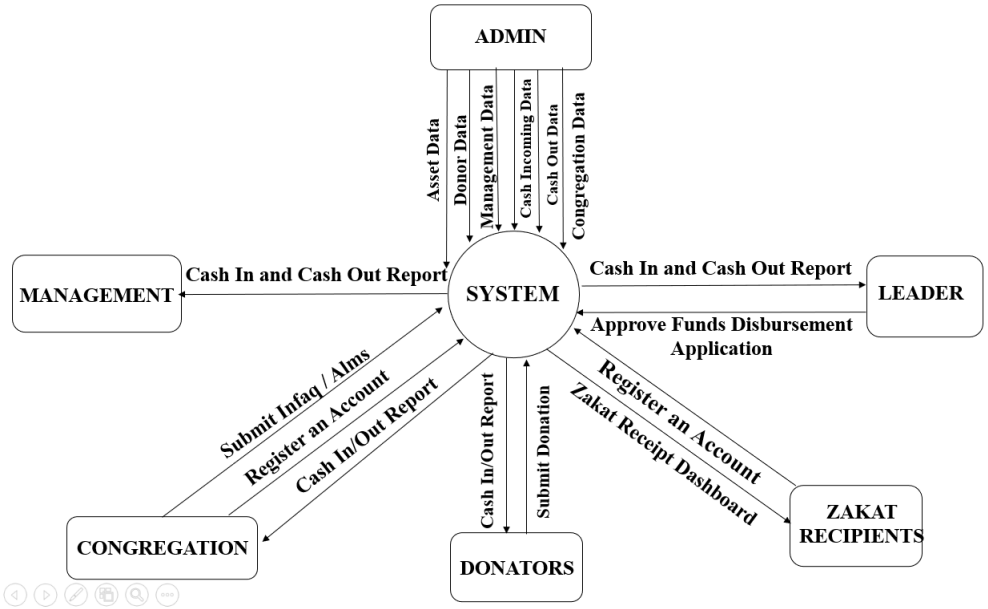

Figure 2. Smart Mosque Digital Technology Data Flow Design

[Note: The figure illustrates the comprehensive data flow diagram showing interactions between users (administrators, financial managers, committee members), system modules (financial management, asset tracking, congregation management, donor management, activity management), and data repositories, with bidirectional data flows and reporting functions.]

The development of the Smart Mosque Digital Technology (SMDT) system represents a comprehensive approach to digitizing mosque governance through an integrated platform that addresses the multifaceted administrative requirements of contemporary mosque management. The system architecture follows a modular design pattern, enabling independent development, testing, and maintenance of individual components while ensuring seamless integration across all modules. This architectural approach offers flexibility and scalability, positioning the system as a modern solution capable of growing with the expanding needs of mosque administration [57], [58].

The integration of digital payment systems represents a significant innovation in mosque financial management, addressing the global trend toward cashless societies [59]. Research indicates that non-cash payment systems significantly influence consumer behavior and organizational financial transparency [60]. The SMDT system's support for multiple digital payment methods ensures accessibility for diverse donor demographics while simultaneously improving financial tracking accuracy. This is a key innovation, as many religious organizations, particularly mosques, still rely on manual or cash-based transactions. The SMDT system's digital payment integration enhances both efficiency and accountability in financial operations [61].

The Asset Management Module provides comprehensive tracking of mosque property and equipment through a centralized digital inventory system. Assets are recorded with detailed information including asset name, category (property, equipment, furniture, electronic devices), date of acquisition, purchase price, current condition,

physical location, and responsible custodian. The module implements depreciation tracking for financial assets and maintains maintenance schedules for equipment requiring regular servicing. This systematic approach to asset management addresses common challenges in religious organizations, where asset tracking is often informal and documentation is incomplete [35], [62], [63]. The system generates automated maintenance reminders based on predefined schedules, ensuring that critical equipment receives timely servicing. Additionally, the module documents asset disposal through a formal workflow that records reasons for disposal, disposal method, authorization approvals, and final disposition, ensuring accountability in asset lifecycle management.

The Regular Donor Management Module recognizes the critical importance of sustaining relationships with committed financial supporters. The module maintains detailed donor profiles including contact information, donation history, commitment schedules (monthly, quarterly, annually), preferred payment methods, and communication preferences. The system generates automated acknowledgment messages upon receipt of donations, provides regular updates on fund utilization, and produces annual giving statements. This module's design highlights the system's unique focus on long-term donor engagement through transparency and communication, which is often lacking in other mosque management systems that may not prioritize systematic donor relations [64]-[66]. The SMDT system operationalizes these principles through systematic donor engagement workflows that strengthen relationships between the mosque and its financial supporters.

The Organizational Structure Documentation Module maintains formal records of mosque governance structures across different management periods. This module documents organizational charts, position descriptions, committee compositions, meeting minutes, policy documents, and strategic plans. Cloud-based storage ensures that organizational knowledge is preserved across leadership transitions, addressing a common challenge in volunteer-managed organizations where institutional knowledge may be lost when key personnel depart. The module implements version control for policy documents, maintains approval workflows for official documents, and provides secure access to historical records for governance continuity [67]-[69].

The system's user interface design prioritizes accessibility and ease of use, recognizing that mosque administrators may have varying levels of technological literacy. The interface employs intuitive navigation patterns, clear visual hierarchies, contextual help messages, and responsive design that adapts to different screen sizes (desktop, tablet, mobile). The Android mobile application provides field access for activity coordinators and committee members who need system access outside the mosque office. Dashboard interfaces provide role-specific views of relevant information, with customizable widgets allowing users to configure their workspace according to their responsibilities [70].

Security architecture implements multiple layers of protection to safeguard sensitive information. User authentication employs secure password policies with encryption, session management with automatic timeout for inactive sessions, and audit logging of all authentication events. Role-based access control (RBAC) ensures that users can only access information and functions appropriate to their organizational roles. Data encryption protects sensitive information both in transit (using SSL/TLS protocols) and at rest (using database-level encryption). Regular automated backups ensure data recoverability in case of system failures or data corruption. These security measures align with contemporary cybersecurity best practices, which emphasize defense-in-depth approaches combining multiple protective layers [71].

3.2. User Satisfaction Assessment Using EUCS Model

The evaluation of user satisfaction with the SMDT system employed the End-User Computing Satisfaction (EUCS) model, providing comprehensive assessment across five validated dimensions: content quality, accuracy, format quality, ease of use, and timeliness. The measurement was conducted with 18 direct system users representing all user roles within the mosque administrative structure. The results demonstrate remarkably high satisfaction levels across all measured dimensions, with the majority of responses falling in the "Very Satisfied" category (score 5 on the Likert scale).

Table 5. EUCS Model Satisfaction Level Scoring for SMDT Application

Main Theme	Subordinate Theme	Score (%)					Satisfaction Level
		1	2	3	4	5	
Content	Informative			16.7	22.2	61.1	Very satisfied
Accuracy	Quality			16.7	27.8	55.6	Very satisfied
	Useful			16.7	16.7	66.7	Very satisfied
	According to Needs			16.7	22.2	61.1	Very satisfied
Form, Ease of	Accurate Information			22.2	22.2	55.6	Very satisfied
Use	Correct Information			16.7	27.8	55.6	Very satisfied
	According to Standards			17.6	29.4	52.9	Very satisfied
	Trustworthy			16.7	11.1	72.2	Very satisfied
Timeliness	Attractive Format			22.2	22.2	55.6	Very satisfied
Content	Clear Format			16.7	22.2	61.1	Very satisfied

Main Theme	Subordinate Theme	Score (%)					Satisfaction Level
		1	2	3	4	5	
	Quality Output Format			16.7	22.2	61.1	Very satisfied
	Easy to Use Format			17.6	17.6	64.7	Very satisfied
Accuracy	User-Friendly			22.2	22.2	55.6	Very satisfied
Form	Easy to Use Application			16.7	16.7	66.7	Very satisfied
	Convenient to Use			16.7	16.7	66.7	Very satisfied
	Easy to Interact			16.7	22.2	61.1	Very satisfied
Ease of Use	Timely			16.7	16.7	66.7	Very satisfied
	Up-to-Date			22.2	5.6	72.2	Very satisfied
	Always Ready to Use			27.8	16.7	55.6	Very satisfied
Timeliness	Quick Access			16.7	22.2	61.1	Very satisfied
	Quickly Receive Commands			22.2	27.8	50.0	Very satisfied
	Quickly Search for Information			22.2	11.1	66.7	Very satisfied
	Quickly Upload and Download			16.7	22.2	61.1	Very satisfied
Security	Secure Access			11.8	17.6	70.6	Very satisfied
	Security Settings			27.8	22.2	50.0	Very satisfied
	Secured Data			22.2	27.8	50.0	Very satisfied
End User	Meets Needs			22.2	11.1	66.7	Very satisfied
Satisfaction	Efficient Application			22.2	22.2	55.6	Very satisfied
	Effective in Use			11.8	35.3	52.9	Very satisfied
	How It Works			17.6	11.8	70.6	Very satisfied

These high content quality ratings reflect successful alignment between system capabilities and user requirements, confirming that the needs assessment phase effectively identified and addressed critical information requirements. The finding that information meets users' needs (61.1% highly satisfied, 22.2% satisfied) validates the participatory design approach employed during system development. Research on information systems success emphasizes content quality as a critical determinant of system value and user acceptance [72]. The SMDT system's strong performance in this dimension indicates that users perceive the system as delivering substantial value to their work processes.

The high trustworthiness rating is particularly significant in the context of religious organizations, where trust is fundamental to effective governance and community relationships [73]. The finding that users strongly trust SMDT-generated information suggests that the system has successfully established credibility, likely due to its consistent performance, transparent data handling, and accurate financial calculations. Research on digital financial transformation emphasizes that trust in system accuracy is essential for user adoption and continued engagement [25], [26]. The SMDT results indicate successful trust establishment, which is crucial for long-term system sustainability and user commitment.

Format Quality and Presentation Assessment. The format quality dimension evaluates how information is presented, including visual appeal, clarity, organization, and overall presentation quality. Results show strong positive assessment across format-related items. The attractive format item received 55.6% highly satisfied and 22.2% satisfied ratings (77.8% positive). Format clarity achieved 61.1% highly satisfied and 22.2% satisfied (83.3% positive). Quality of output format similarly reached 61.1% highly satisfied and 22.2% satisfied (83.3% positive). The ease of use of the format dimension showed particularly strong performance with 64.7% highly satisfied and 17.6% satisfied (82.3% positive).

The distinction between content quality and format quality is important: while content addresses what information is provided, format addresses how it is presented. The SMDT system's success in both dimensions indicates that it delivers valuable information in ways that users find clear, attractive, and easy to understand. This dual strength is essential for sustained user engagement, as even valuable information may be underutilized if it is poorly presented [74], [75].

These results are particularly noteworthy given the user population, which includes mosque administrators who may not have extensive prior experience with digital systems. The high ease of use ratings suggest that the system successfully achieves accessibility for users with diverse technological backgrounds. This success can be attributed to several design decisions: intuitive navigation following standard web conventions, contextual help messages guiding users through complex operations, clear labeling of functions and data fields, logical workflow sequences matching users' mental models of their tasks, and comprehensive training materials including user manuals and video tutorials.

Timeliness and Responsiveness Assessment. The timeliness dimension evaluates whether information is available when needed, whether it is current and up-to-date, and whether the system responds quickly to user requests. Results show strong performance across all timeliness items. Timely information provision received 66.7% highly satisfied and 16.7% satisfied ratings (83.4% positive). Up-to-date information showed particularly

strong performance with 72.2% highly satisfied and 5.6% satisfied (77.8% positive). System readiness for use achieved 55.6% highly satisfied and 16.7% satisfied (72.3% positive). Quick access capability reached 61.1% highly satisfied and 22.2% satisfied (83.3% positive). Command response speed showed 50% highly satisfied and 27.8% satisfied (77.8% positive). Information search speed achieved 66.7% highly satisfied and 11.1% satisfied (77.8% positive). Upload and download speed received 61.1% highly satisfied and 22.2% satisfied (83.3% positive).

These security satisfaction ratings are particularly important given increasing concerns about data privacy and cybersecurity [76], [77], [78], [79], [80]. The average cost of data breaches reached $4.88 million in 2024, emphasizing the critical importance of robust security measures [71]. The SMDT system implements multiple security layers including user authentication with encrypted passwords, role-based access controls limiting data visibility, SSL/TLS encryption for data in transit, database-level encryption for sensitive data at rest, automated backup systems ensuring data recoverability, and comprehensive audit logging tracking all system access and modifications.

The high security satisfaction ratings suggest that users feel confident in the system's ability to protect sensitive information. This confidence is essential for mosque governance, where financial information, donor records, and personal data require careful protection. The relatively lower ratings for security settings (50% highly satisfied) compared to secure access (70.6% highly satisfied) may indicate opportunities for enhancing user understanding of security features and controls available to them.

These overall satisfaction ratings validate the SMDT system's success in meeting its intended objectives of improving administrative efficiency and effectiveness. The high ratings across all overall satisfaction items suggest that users perceive substantial value from the system and are satisfied with its performance. This is the ultimate validation of the system development effort, as it indicates that the system successfully addresses real user needs and delivers tangible benefits to their work processes.

Table 3. Scoring of the Satisfaction Level of Transparency Variable towards SMDT Application

Main Theme	Subordinate Theme	Score (%)					Satisfaction Level
		1	2	3	4	5	
Transparency	Governance transparency			18.8	6.3	75.0	Very satisfied
	Governance clarity			17.6	17.6	64.7	Very satisfied
	Governance data accuracy			17.6	29.4	52.9	Very satisfied

Governance transparency, measuring the openness and visibility of administrative operations, achieved remarkable satisfaction levels with 75% of respondents highly satisfied and 6.3% satisfied (81.3% combined positive response). This high transparency rating reflects the system's success in making administrative processes and financial operations visible to authorized stakeholders. The SMDT system operationalizes transparency through multiple mechanisms: real-time financial dashboards displaying current account balances and recent transactions, comprehensive transaction histories accessible to authorized users, automated financial reports generated on-demand or scheduled intervals, activity tracking showing all administrative actions with timestamps and responsible users, and public-facing website displaying appropriate information for general congregation members.

The importance of clarity in transparency cannot be overstated. Organizations may disclose extensive information yet fail to achieve true transparency if that information is incomprehensible to stakeholders [81], [82], [83]. The SMDT system's success in both governance transparency and governance clarity indicates achievement of meaningful transparency rather than merely symbolic disclosure. This distinction is critical for building genuine accountability relationships between mosque management and stakeholders.

The combined transparency assessment demonstrates that SMDT successfully enhances mosque governance transparency across all critical dimensions. This comprehensive transparency improvement addresses a fundamental governance challenge identified in the literature: religious organizations often struggle with accountability and transparency due to informal management practices and limited technological infrastructure [32], [35]. The SMDT system provides the technological foundation for transparent governance, enabling mosques to meet contemporary expectations for organizational accountability.

Table 4. Scoring of the Satisfaction Level of Efficiency Variables for SMDT Application

Main Theme	Subordinate Theme	Score (%)					Satisfaction Level
		1	2	3	4	5	
Efficiency	Participatory space			11.8	17.6	70.6	Very satisfied
	Transparency for efficiency			11.8	17.6	70.6	Very satisfied
	Includes accountability			11.8	11.8	76.5	Very satisfied
	Evaluation capability			17.6	17.6	64.7	Very satisfied
	Benefits of technology			18.8	6.3	75.0	Very satisfied

Participatory space, measuring the extent to which the system facilitates stakeholder involvement in governance processes, achieved 70.6% highly satisfied and 17.6% satisfied ratings (88.2% positive response). This high rating indicates that SMDT successfully enables participatory governance approaches, allowing stakeholders to engage with mosque administration in ways that were previously difficult or impossible. The system facilitates participation through multiple channels: online donation platforms enabling convenient financial contribution, activity registration systems allowing easy participation in mosque programs, feedback mechanisms providing channels for suggestions and concerns, volunteer coordination systems matching volunteers with opportunities, and communication systems enabling two-way dialogue between administration and congregation.

The high rating for transparency for efficiency indicates that users recognize these instrumental benefits of transparency, not merely valuing transparency as an abstract principle but appreciating its concrete contributions to operational effectiveness. This finding has important implications for promoting digital transformation in religious organizations, suggesting that transparency benefits should be framed not merely as ethical imperatives but also as practical tools for improving organizational performance.

The importance of accountability in religious organizations cannot be overstated. Research indicates that accountability challenges are a significant concern in nonprofit and religious organizations, where governance structures may be informal and oversight mechanisms weak [84]. The high accountability rating suggests that SMDT successfully addresses this challenge, providing technological infrastructure for robust accountability systems. This finding is particularly significant given recent emphasis on accountability in Islamic organizational management [85].

Benefits of technology, assessing overall perceptions of technological value, achieved 75% highly satisfied and 6.3% satisfied ratings (81.3% positive response). This high rating indicates strong user recognition of technology's benefits, suggesting successful change management and technology acceptance. The high technology benefits rating is particularly noteworthy given potential resistance to technology in religious organizations, where tradition and technology might be perceived as conflicting [86]. The positive response suggests that users do not view SMDT as threatening traditional values or practices, but rather as supporting and enhancing the mosque's ability to fulfill its mission effectively.

Comparative Analysis with Efficiency Research. The efficiency improvements observed with SMDT align with broader research on digital transformation and organizational efficiency. Studies of digital transformation in public administration document significant efficiency gains from digitalization, including reduced processing times, lower administrative costs, improved service quality, and enhanced decision-making [87]. The SMDT findings demonstrate that similar efficiency benefits can be realized in religious organizational contexts. Research on digital transformation in organizations emphasizes that efficiency gains often extend beyond simple automation of existing processes to fundamental transformation of how work is organized and performed [88]. The SMDT case illustrates this principle, showing how digital transformation enables not merely faster execution of traditional processes but fundamentally new capabilities such as real-time financial visibility, data-driven decision-making, and automated reporting.

Data-driven decision making, assessing the system's support for evidence-based management, received 64.7% highly satisfied and 17.6% satisfied ratings (82.3% positive response). This dimension reflects growing recognition that organizational effectiveness depends increasingly on the ability to collect, analyze, and act upon data [89]. SMDT facilitates data-driven decision making through multiple features: comprehensive data collection capturing detailed information about all administrative operations, reporting systems presenting data in actionable formats, analytical tools enabling pattern identification and trend analysis, historical data access supporting temporal comparison and trend forecasting, and real-time dashboards providing current visibility of key performance indicators. The data-driven decision making results indicate that SMDT successfully provides mosque administrators with the information infrastructure necessary for evidence-based management. This capability is particularly valuable in resource allocation decisions, program planning, and performance evaluation, where objective data can reduce reliance on subjective judgment and improve decision quality [90].

3.3. Organizational Governance Assessment

The impact of SMDT on organizational governance was evaluated through three dimensions: organizational accountability, organizational governance transparency, and organizational governance fairness. Table 5 presents the satisfaction scores.

Table 5. Scoring of Organisational Satisfaction Levels for SMDT Applications

Main Theme	Subordinate Theme	Score (%)					Satisfaction Level
		1	2	3	4	5	
Organisation	Organizational Accountability			17.6	17.6	64.7	Very satisfied
	Organizational Governance Transparency			17.6	23.5	58.8	Very satisfied
	Organizational Governance Fairness			17.6	23.5	58.8	Very satisfied

The impact of SMDT on organizational governance was evaluated through three dimensions: organizational accountability, organizational governance transparency, and organizational governance fairness. These dimensions reflect key principles of good organizational governance identified in contemporary governance literature [91]. Organizational accountability, measuring responsibility and answerability in organizational operations, achieved 64.7% highly satisfied and 17.6% satisfied ratings (82.3% positive response). This accountability rating complements the earlier accountability assessment in the efficiency dimension, specifically focusing on organizational-level accountability rather than individual operational accountability. SMDT enhances organizational accountability through multiple mechanisms: formal documentation of organizational decisions and actions, clear assignment of responsibilities for different functions, systematic record-keeping enabling verification of organizational claims, transparent financial management demonstrating proper fund stewardship, and regular reporting providing visibility of organizational performance. The importance of accountability in religious organizations is well-documented in the literature, with research emphasizing that accountability is essential for maintaining stakeholder trust, securing ongoing support, and ensuring organizational legitimacy [92].

The combined administrative and organizational governance results demonstrate comprehensive governance improvements across multiple dimensions. The consistently high satisfaction ratings (ranging from 82.3% to 88.2% positive responses) indicate that SMDT delivers substantial governance benefits to mosque administration. These governance improvements address fundamental challenges in religious organizational management, providing technological infrastructure for professional, accountable, and effective governance [93].

3.4. System Cloning and Scalability Validation

The cloning validation involved pilot deployment at two additional mosques in the Jakarta area, providing empirical evidence of the system's replicability and adaptability. The pilot implementations demonstrated several important findings. First, technical replication was successful, with cloned systems functioning correctly in different technical environments (different hosting services, network configurations). Second, organizational adaptation was feasible, with customization processes successfully reflecting each mosque's unique characteristics. Third, training effectiveness transferred across implementations, with training materials developed for the original implementation proving effective for new users at different mosques. Fourth, user satisfaction remained high across implementations, with pilot mosque users reporting satisfaction levels comparable to the original Nurul Jihad Mosque implementation [94].

The scalability assessment indicates that the cloning approach is viable for large-scale deployment. The current system architecture supports multiple independent instances (one per mosque) with central technical support. This distributed model ensures data privacy (each mosque's data remains separate) while enabling economies of scale in technical support and system maintenance. The successful pilot implementations demonstrate proof of concept for broader deployment, suggesting that the SMDT system could be deployed across Indonesia's 309,007 mosques [31], potentially transforming mosque governance on a national scale.

Future research directions include: (1) Long-term impact evaluation tracking organizational outcomes over multiple years; (2) Large-scale deployment research examining barriers and facilitators of system adoption across diverse mosque contexts; (3) Comparative analysis of digital versus traditional mosque governance identifying specific mechanisms through which digitalization improves governance; (4) Integration research expanding system functionality to encompass additional mosque functions; (5) Cross-cultural adaptation research enabling international deployment; (6) Interoperability research enabling data exchange with external systems such as Islamic banking platforms, government zakat agencies, or national mosque networks; (7) Advanced analytics research developing sophisticated analytics capabilities including predictive modeling, donor behavior analysis, and program effectiveness evaluation; (8) Mobile-first redesign research optimizing for mobile devices as primary access method, reflecting global shift toward mobile computing [95], [96], [97], [98].

The development and implementation of the SMDT system represents a significant step toward modernizing mosque administration. While digital tools have transformed many industries, religious organizations, particularly mosques, have often struggled with adopting technology, relying on traditional, inefficient methods that lack transparency [20], [23]. This study addresses a critical gap in the literature by providing a digital solution tailored specifically for mosque administration, bridging the gap between the technological needs of religious institutions and the available tools for governance.

The novelty of this study lies in the creation of an integrated, modular, and scalable system designed to meet the unique needs of mosque governance. Unlike many generic software solutions that adopt a one-size-fits-all approach, the SMDT system is customizable to accommodate the varying needs of different mosques [44], [45]. The inclusion of a cloning system that allows for easy replication across multiple mosques is a key innovation, reducing the cost and complexity of deploying advanced technology in resource-constrained settings. This innovation is especially significant for mosques with limited resources, as it provides an affordable pathway to implementing modern technology in their operations [79].

Transparency in financial and administrative processes is another important innovation. Many mosques have faced challenges with opaque financial management, leading to trust issues within the community. The SMDT system addresses this by providing real-time financial dashboards and automated reporting, making it easier for mosque administrators and stakeholders to track funds and resources with greater accuracy and transparency [48]. This enhances trust and improves the overall governance of mosque operations, addressing a major issue identified in the literature on digital governance in religious institutions [49].

Additionally, SMDT is uniquely designed to address the specific needs of mosque administration, incorporating modules for managing zakat (charitable giving), donor relations, and orphan programs services essential to Islamic institutions that are often overlooked by traditional software [50], [51]. This focus on strengthening long-term donor relationships through features like automated acknowledgment messages and annual giving statements marks a significant improvement over existing systems, which do not prioritize sustained engagement with donors.

In terms of security, the system employs up-to-date measures such as encryption, role-based access control, and regular backups to protect sensitive financial and personal data. These features are crucial for mosques handling donations and congregation member information, ensuring the integrity of the system and aligning with best practices in data protection [56], [61]. The high levels of user satisfaction, especially regarding content quality, system accuracy, ease of use, and timeliness, demonstrate the system's effectiveness and accessibility, even for mosque administrators with limited technological experience [57], [59], [60].

The implications of this study are twofold: it contributes to the growing field of digital governance in religious organizations, providing a practical model for integrating technology into mosque administration, and it offers insights into how technology can enhance transparency, efficiency, and accountability in non-profit religious institutions. The successful deployment of SMDT at Nurul Jihad Mosque, along with its potential for replication at other mosques, suggests that this system can have a wide-reaching impact, providing a template for similar organizations to modernize their governance practices.

However, this study does have limitations. The research was conducted in a single mosque in Jakarta, which limits the generalizability of the findings to other regions or mosque contexts. Furthermore, the evaluation period was relatively short, and long-term impacts on governance, transparency, and efficiency are yet to be fully assessed. Future research should address these limitations by expanding the study to include multiple mosques in different regions and conducting a longitudinal analysis to measure the sustainability of the system's benefits. Additionally, further research could explore the adaptability of the SMDT system in other religious or non-profit organizations, broadening its potential applications.

4. CONCLUSION

This study successfully developed and implemented the Smart Mosque Digital Technology (SMDT) as an integrated, effective, and scalable solution for mosque governance transformation, encompassing financial management, asset management, membership, donor relations, activities, and organizational documentation through web- and mobile-based platforms. Implementation at Nurul Jihad Mosque in Jakarta demonstrated significant improvements in user satisfaction, transparency, efficiency, and governance quality, with high satisfaction levels based on the End-User Computing Satisfaction (EUCS) model. Theoretically, this study extends the application of digital governance concepts from public and corporate sectors to religious organizations, while practically offering a proven and replicable digital transformation model, as evidenced by successful implementation in multiple mosques. Despite limitations related to site scope and evaluation duration, the findings highlight opportunities for future research through longitudinal studies, cross-context comparisons, and integration of advanced technologies such as AI and blockchain. Overall, this research confirms that digital transformation can enhance transparency, efficiency, and accountability in mosque governance without compromising religious values, and holds strong potential for broader adoption across Indonesia and beyond.

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USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY

The authors used ChatGPT during the preparation of this work to design graphics and images. After utilizing the tool, the authors thoroughly reviewed and edited the content as necessary and assumed full responsibility for the publication's content.

REFERENCES

[1] C. Aspizain, "Analysis of organizational structure and integrated coordination on organizational growth," *Asian J. Manag. Entrep. Soc. Sci.*, vol. 4, no. 3, pp. 1387–1400, 2024.

[2] A. M. Abrianto, I. Amaefuna, and A. F. Onyemowo, "Biology learning innovation using booklet media," *J. Acad. Biol. Biol. Educ.*, vol. 1, no. 2, pp. 75–81, 2024, doi: 10.37251/jouabe.v1i2.1158.

[3] M. C. Nguyễn and T. N. Le, "The impact of health education through animated videos on mothers' attitudes in providing complementary foods to breast milk," *J. Heal. Innov. Environ. Educ.*, vol. 2, no. 1, pp. 113–120, 2025, doi: 10.37251/jhiee.v2i1.2325.

[4] TrustCloud, *Digital Transformation in Governance: Strategies for Success in 2025*, 2025.

[5] H. Habiburrohman, E. Supartini, and P. O. Onchera, "The effect of peer assessment through Twitter on students' writing analytical exposition text ability," *J. Lang. Lit. Educ. Res.*, vol. 1, no. 1, pp. 18–24, Jun. 2024, doi: 10.37251/jolle.v1i1.997.

[6] T. T. T. Linh, T. T. M. Huong, and N. Thammachot, "Sustainable nutrient management for NFT hydroponic lettuce: Integrating kipahit (*Tithonia diversifolia*) liquid organic fertilizer with AB-mix," *Integr. Sci. Educ. J.*, vol. 6, no. 3, pp. 240–248, Sep. 2025, doi: 10.37251/isej.v6i3.2118.

[7] M. Fahn and G. Zanarone, "Transparency in relational contracts," *Strateg. Manag. J.*, vol. 43, no. 5, pp. 1046–1071, 2022.

[8] V. D. Anggraini and W. Widodo, "Increasing student awareness of the school environment through the Adiwiyata program," *J. Heal. Innov. Environ. Educ.*, vol. 2, no. 1, pp. 130–141, Jun. 2025, doi: 10.37251/jhiee.v2i1.2358.

[9] A. Caniago, "Analysis of trust and service quality on customer satisfaction," *J. Lentera Bisnis*, vol. 11, no. 3, pp. 219–230, 2022.

[10] D. N. Junita and R. D. Prasad, "The effect of using animation video on students' writing skills," *J. Lang. Lit. Educ. Res.*, vol. 1, no. 2, pp. 39–44, 2024, doi: 10.37251/jolle.v1i2.1063.

[11] R. H. Obyes, R. A. Abood, H. H. Shyaa, and A. A. Amanah, "The impact of determining human resources governance requirements to achieve administrative reform using an honest management approach," *J. Mod. Proj. Manag.*, vol. 12, no. 1, pp. 41–51, 2024.

[12] T. T. T. Linh, T. T. M. Huong, and N. Thammachot, "Sustainable nutrient management for NFT hydroponic lettuce: Integrating kipahit (*Tithonia diversifolia*) liquid organic fertilizer with AB-mix," *Integr. Sci. Educ. J.*, vol. 6, no. 3, pp. 240–248, Sep. 2025, doi: 10.37251/isej.v6i3.2118.

[13] International Association of Privacy Professionals, *Organizational Digital Governance Report 2025*, 2025.

[14] S. Pahmi, A. P. Junfithrana, E. Supriyadi, A. Hendriyanto, and L. H. Muhaimin, "Exploring virtual reality's impact on math anxiety: Transforming the learning experience," *J. Posthumanism*, vol. 5, no. 1, pp. 1391–1412, 2025, doi: 10.63332/joph.v5i1.683.

[15] S. T. Rahimi et al., "Spatiotemporal changes in future precipitation of Afghanistan for shared socioeconomic pathways," *Heliyon*, vol. 10, no. 7, p. e28433, 2024, doi: 10.1016/j.heliyon.2024.e28433.

[16] M. A. Haque et al., "Regression supervised model techniques THz MIMO antenna for 6G wireless communication and IoT application with isolation prediction," *Results Eng.*, vol. 24, p. 103507, 2024, doi: 10.1016/j.rineng.2024.103507.

[17] R. Nagarajan, M. Batumalay, and Z. Xu, "IoT-based intrusion detection for edge devices using augmented system," *J. Appl. Data Sci.*, vol. 5, no. 3, pp. 1412–1423, 2024, doi: 10.47738/jads.v5i3.358.

[18] Prutech, *The Future of Governance: How Smart Governance Is Transforming Public Administration*, 2025.

[19] International Association of Privacy Professionals, *AI Governance Profession Report 2025*, 2025.

[20] M. M. Jackson, A. Abdallah, and O. Alfaki, "Advancing sustainable development goal 6: Innovations, challenges, and pathways for clean water and sanitation," *Integr. Sci. Educ. J.*, vol. 6, no. 3, pp. 224–231, 2025, doi: 10.37251/isej.v6i3.2114.

[21] A. Ghalby and L. A. Malaluan, "Safety first? Exploring occupational health and safety knowledge levels of chemistry education students in laboratory settings," *J. Chem. Learn. Innov.*, vol. 2, no. 1, pp. 12–22, Jun. 2025, doi: 10.37251/jocli.v2i1.1562.

[22] K. Prachumrasee et al., "From traditional to digital: Transforming local administrative organization workflows in Thailand through social listening tools," *Soc. Sci.*, vol. 13, no. 12, p. 666, 2024.

[23] P. D. Mihai, T. Liviu, and N. Maria, "E-government and the general population's digital skills in the European Union and OECD member states," in *Digital Transformation*, 2022, pp. 41–53.

[24] A. Nisah, Q.-U. Jatoi, and G. Tleumuratov, "Procedure text writing skills using silent film media in grade VII students of state junior high school 10 South Tangerang," *J. Lang. Lit. Educ. Res.*, vol. 2, no. 1, pp. 1–9, Jun. 2025, doi: 10.37251/jolle.v2i1.1574.

[25] A. Alassuli, N. S. Thuneibat, A. Eltweri, K. Al-Hajaya, and K. Alghraibeh, "The impact of accounting digital transformation on financial transparency: Mediating role of good governance," *J. Risk Financ. Manag.*, vol. 18, no. 5, p. 272, 2025.

[26] T. Akimova, "The impact of innovations in enterprise accounting and control systems on optimizing the analysis of financial reporting in the transition to IFRS," *Econ. Aff.*, vol. 69, no. 1s, 2024.

[27] S. Sharman, U. Axunov, and M. Al Balushi, "A study of reflective practice within a multidisciplinary team in an elite football academy," *Multidiscip. J. Tour. Hosp. Sport Phys. Educ.*, vol. 2, no. 1, pp. 48–55, 2025, doi: 10.37251/jthpe.v2i1.1856.

[28] United Nations Development Programme, *A Shared Vision for Digital Technology and Governance*, 2024.

[29] Y. Kurniawan, "Motivation of class XI students towards learning physical education, sports, and health," *Multidiscip. J. Tour. Hosp. Sport Phys. Educ.*, vol. 1, no. 1, pp. 16–20, Jun. 2024, doi: 10.37251/jthpe.v1i1.1038.

[30] Organisation for Economic Co-operation and Development, *Governing with Artificial Intelligence: How AI Is Accelerating the Digital Government Journey*, OECD Publishing, 2025.
[31] R. M. R. Permana, "Distribution data on the number of mosques by province in Indonesia in January 2025," Indonesian Ministry of Religious Affairs, 2025.
[32] M. Izzati, R. Mulyany, and H. Fahlevi, "Digitalization of accountability in philanthropy: The missing attention on Islamic-based organizations," 2024.
[33] A. Hidayat, J. Nugroho, A. Caniago, D. H. Ismail, A. Solihin, and P. Halim, "The influence of supply chain integration on organizational performance: From the point of view of organizational capability in Indonesia," *Int. J. Supply Chain Manag.*, vol. 9, no. 2, pp. 486–494, 2020.
[34] A. Moaz and M. M. Awny, "Digital transformation of non-governmental organizations in Egypt," in *Digital Transformation in Developing Countries*, 2024, pp. 157–190.
[35] A. S. Mohammed, C. Amoah, J. Abbas, and S. Naayif, "Facilities managers vs. mosque management committees: Evaluating the need for professional facilities management in mosque operations," *Facilities*, vol. 43, no. 5–6, pp. 363–396, 2025.
[36] MadinaApps, "How mosques are going digital for a seamless worship experience," 2024.
[37] MadinaApps, "Digital masjid systems: Transforming mosque operations," 2024.
[38] RSIS International, "Emerging technologies for transforming mosques into smart buildings: A systematic literature review," *Int. J. Res. Sci. Innov.*, 2024.
[39] L. H. Muhaimin, D. Dasari, A. Hendriyanto, R. Andriatna, and S. Sahara, "Can augmented reality enhance students' mathematical literacy? A study on technological development for learning practice," *Int. J. Math. Educ. Sci. Technol.*, pp. 1–34, 2025, doi: 10.1080/0020739X.2025.2502398.
[40] L. H. Muhaimin, Y. S. Kusumah, D. Juandi, A. Hendriyanto, and S. Sahara, "The role of augmented reality-based media for enhancing students' mathematical ability: A systematic literature review," *AIP Conf. Proc.*, vol. 2909, no. 1, pp. 1–9, 2023, doi: 10.1063/5.0182121.
[41] M. Ramaiah, V. Chandrasekaran, P. Adla, A. Vasudevan, F. A. M. Hunitie, and S. I. S. Mohammad, "Optimal feature selection based on OCS for improved malware detection in IoT networks using an ensemble classifier," *Int. J. Data Netw. Sci.*, vol. 8, pp. 2129–2140, 2024, doi: 10.5267/j.ijdns.2024.6.018.
[42] J. Jeyaboopathiraja, P. Mariajohn, S. S. Maidin, and J. Sun, "An adaptive cuckoo search algorithm with deep learning for addressing cyber security problems," *J. Appl. Data Sci.*, vol. 5, no. 4, pp. 1977–1988, 2024, doi: 10.47738/jads.v5i4.366.
[43] MOHID, *The Future of Mosque Management*, 2024.
[44] A. S. Abdullah Salim, N. Md Yatim, N. Mohamed Isa, S. Z. Ibrahim, and M. A. A. Hanafi, "Impacts of the COVID-19 pandemic on mosque institutions in Malaysia: Assessment on activism, financial, and digital dimensions," in *Digital Transformation in Religious Organizations*, 2025, pp. 533–543.
[45] A. K. Schnackenberg, E. Tomlinson, and C. Coen, "The dimensional structure of transparency: A construct validation of transparency as disclosure, clarity, and accuracy in organizations," *Hum. Relat.*, vol. 74, no. 10, pp. 1628–1660, 2021.
[46] I. Abouddaka, M. Bassiri, A. Atibi, M. Tridane, and S. Belaaouad, "The engineering of e-governance and technology in the management of secondary schools: Case of the Nouaceur delegation," *J. Inf. Technol. Manag.*, vol. 13, pp. 229–237, 2021.
[47] L. M. M. Paucar, J. C. P. Larico, C. A. Hancco, and J. F. Apaza, "Impact of digital transformation on administrative management: Perspectives from cloud computing and big data in Industry 4.0," *J. Ecohumanism*, vol. 4, no. 2, 2025.
[48] R. Yusup, "Analyzing the role of information technology in enhancing teachers' attitudes toward e-learning: A case study in Indonesian higher education," *Lit. Int. J. Soc. Sci. Humanit.*, vol. 2, no. 1, pp. 41–51, 2023, doi: 10.52005/rrkq1797.
[49] Y. Helsa and S. Yulianti, "Technology liberating or controlling? A critical educational philosophy review of digital systems-based learning," *Lit. Int. J. Soc. Sci. Humanit.*, vol. 3, no. 1, pp. 90–106, 2024, doi: 10.52005/literate.v3i1.20.
[50] R. K. Ahmed, O. Ahmed, I. Pappel, and D. Draheim, "E-court system evaluation through the user's perspective: Applying the end-user computing satisfaction (EUCS) model," 2022.
[51] W. J. Doll and G. Torkzadeh, "The measurement of end-user computing satisfaction," *MIS Q.*, vol. 12, no. 2, pp. 259–274, 1988.
[52] M. A. Khan et al., "User satisfaction assessment of electronic hospital management information system using end-user computing satisfaction (EUCS) model," *BMC Med. Inform. Decis. Mak.*, vol. 24, no. 1, 2024.
[53] A. Widodo and S. Sutarman, "Analysis of user satisfaction with government websites using EUCS and IPA methods," *J. Inf. Technol. Comput. Sci.*, vol. 9, no. 4, 2024.
[54] Y. Firdaus, D. Darwis, and S. Samsugi, "Analysis of user satisfaction with academic information systems using the end-user computing satisfaction (EUCS) approach," *Sistemasi*, vol. 14, no. 1, 2025.
[55] N. Wijaya, S. Handayani, and A. Rahardjo, "User satisfaction analysis of learning management systems using end-user computing satisfaction (EUCS) model," *Int. J. Educ. E-Learning*, vol. 1, no. 2, 2022.
[56] E. Nurjanah and R. P. Laguatan, "Enhancing plant diversity learning with an ethnobotany-based e-booklet: A focus on the Pandeglang community," *J. Acad. Biol. Biol. Educ.*, vol. 2, no. 1, pp. 58–68, 2025, doi: 10.37251/jouabe.v2i1.1989.
[57] P. Kumar Tyagi et al., "The impact of artificial intelligence–based human resource management systems on organizational efficiency," 2023.
[58] B. Indonesia, *Indonesian Payment System: Implementation of Quick Response Code Indonesian Standard (QRIS)*, 2024.
[59] W. E. Forum, *How Digital Finance Can Be More Inclusive for Consumers*, 2025.
[60] A. Caniago, "The effect of non-cash payments systems on people's buying interest: A case study on purchases at malls in the Tangerang area," *Leadersh. J. Econ. Adm.*, vol. 1, no. 3, pp. 2961–8177, 2023.
[61] ..... Acropolium, "Top Financial Technology Trends Transforming FinTech in 2024–2025," 2024.
[62] S. N. Saindah, "The power of visual learning: Audio-visual health education to combat stunting in toddlers," *Journal of Health Innovation and Environmental Education*, vol. 2, no. 1, pp. 68–75, 2025, doi: 10.37251/jhiee.v2i1.2008.

[63] H. R. Hagad and H. Riah, "Augmented reality-based interactive learning media: Enhancing understanding of chemical bonding concepts," *Journal of Chemical Learning Innovation*, vol. 2, no. 1, pp. 52–59, 2025, doi: 10.37251/jocli.v2i1.1919.
[64] O. Tech, "Financial Transparency 2025: What Should Finance Teams Expect," 2025.
[65] M. A. Qardawi, *Fiqh al-Zakah: A Comparative Study of Zakah, Regulations and Philosophy in the Light of Qur'an and Sunnah*. Jeddah: Scientific Publishing Centre, King Abdulaziz University, 1999.
[66] K. S. Sargeant and R. J. Wuthnow, "Donor relationships and charitable giving in religious organizations," *Nonprofit and Voluntary Sector Quarterly*, vol. 50, no. 3, pp. 501–521, 2021.
[67] Islamic Relief Worldwide, "Orphan Sponsorship Program: Best Practices in Islamic Social Welfare," 2024.
[68] Y. Sun and H. Jung, "Machine learning modeling, IoT, and optimizing organizational operations through integrated strategies: The role of technology and human resource management," *Sustainability*, vol. 16, no. 16, p. 6751, 2024.
[69] S. Santos, M. Xavier, and C. Ribeiro, "Business process improvements in hierarchical organizations: A case study focusing on collaboration and creativity," 2024.
[70] A. Hosseini and S. Tayebi, "Toward smart cities in developing metropolises: A holistic examination of smart urban governance and citizen-centric approaches," *Journal of Urban Planning and Development*, vol. 151, no. 4, 2025.
[71] Protiviti, "Navigating Financial Services Compliance Priorities in 2025," 2025.
[72] W. H. DeLone and E. R. McLean, "The DeLone and McLean model of information systems success: A ten-year update," *Journal of Management Information Systems*, vol. 19, no. 4, pp. 9–30, 2003.
[73] K. Fairuz et al., "Do mosques use Islamic bank services: Evidence from Indonesia," *International Journal of Monetary Economics and Finance*, vol. 15, no. 3, pp. 232–247, 2022.
[74] J. Nielsen, "Usability 101: Introduction to usability," Nielsen Norman Group, 2024.
[75] E. Øby, "Assessing transparency and methodological precision in variable measurement within organizational research: Implications for validity," *Quality & Quantity*, vol. 59, no. S1, pp. 489–506, 2025.
[76] F. D. Davis, "Perceived usefulness, perceived ease of use, and user acceptance of information technology," *MIS Quarterly*, vol. 13, no. 3, pp. 319–340, 1989, doi: 10.2307/249008.
[77] V. Venkatesh and H. Bala, "Technology acceptance model 3 and a research agenda on interventions," *Decision Sciences*, vol. 39, no. 2, pp. 273–315, 2008, doi: 10.1111/j.1540-5915.2008.00192.x.
[78] T. H. Davenport, *Competing on Analytics: The New Science of Winning*. Boston: Harvard Business Review Press, 2007.
[79] R. Kohavi, D. Tang, and Y. Xu, *Trustworthy Online Controlled Experiments: A Practical Guide to A/B Testing*. Cambridge: Cambridge University Press, 2020.
[80] ISACA, "Five Key Priorities for Governance Practitioners in 2025," 2024.
[81] G. Piccoli, A. Esposito, and C. Bartoli, "Successful implementation of information systems: Lessons from three case studies," *Information Systems Management*, vol. 38, no. 2, pp. 142–158, 2021.
[82] A. S. A. P. Salin, Z. Ismail, and M. Smith, "The impact of corporate disclosure and website informativeness on enhancing corporate governance and performance," *Journal of Governance and Regulation*, vol. 13, no. 4, pp. 306–315, 2024.
[83] B. Ponti, A. Cerrillo-i-Martínez, and F. Di Mascio, "Transparency, digitalization and corruption," in *Understanding and Fighting Corruption in Europe*, 2021, pp. 97–126.
[84] U. Witt and H. Worch, "Growth-induced crises and transitions in the governance of firm organizations," *Journal of Economic Behavior & Organization*, vol. 212, pp. 1182–1191, 2023.
[85] M. A.-M. Mesaadah and S. D. S. Al-Daboubi, "The impact of administrative governance in achieving organizational commitment: The Jordanian Ministry of Transport as a case study," in *Digital Transformation and Public Services*, 2025, pp. 1659–1673.
[86] National Geographic, "How technology is impacting religion and faith," 2024.
[87] Future Network, "Three trends driving digital transformation: Improving trust and transparency," 2023.
[88] X. Jiechang and X. Qiyan, "Digital technology empowers China's service sector growth: Mechanism and implementation path," *China Economist*, vol. 17, no. 6, pp. 41–53, 2022.
[89] B. N. Hien, N. T. K. Tuyen, N. T. Lan, N. T. K. Ngan, and N. N. Thanh, "The impact of digital government initiatives on public value creation: Evidence from Ho Chi Minh City, Vietnam," *Revista de Gestão Social e Ambiental*, vol. 18, no. 2, p. e04892, 2024.
[90] N. R. D. Companies, "Insights from the 2024 United Nations E-Government Survey: Global progress in digital government," 2024.
[91] Z. A. H. Munir, "The effect of financial report transparency and zakat management on muzakki trust in BAZNAS Lombok Timur," *Al-Risalah: Forum Kajian Hukum dan Sosial*, vol. 21, no. 2, pp. 194–207, 2021.
[92] V. Varone, "Transparent administration on the test bench of the new transparency governance: Towards a single platform," *Federalismi.it*, vol. 2023, no. 5, pp. 250–274, 2023.
[93] A. J. Rocco, "Organization theory," in *Encyclopedia of Sport Management*, Edward Elgar Publishing, 2024, pp. 674–676.
[94] A. I. and F. Commission, "Laying a strong foundation for 2025: AI ethics in religious contexts," 2024.
[95] T. P. Discourse, "Religious organizations and AI regulation: Navigating new legal landscapes," 2025.
[96] C. S. Sciences, "Technology and religion: Digital transformation in religious practice," *Cogent Social Sciences*, vol. 10, no. 1, 2024.
[97] Center for Religion and Civic Culture (CRCC), "A year of crisis and opportunity: 2024 trends in religion and society," 2024.
[98] F. in Psychology, "Digital engagement strategies for religious organizations targeting Generation Z," *Frontiers in Psychology*, vol. 16, 2025.