

WOMEN, EDUCATION, AND SOCIAL WELFARE
VOL. 3 NO. 3 (2026)

ISSN: 3064-2469

The TA 'AWUN Model for Digital Library Management in Indonesian Islamic Boarding Schools

Syarijuddin Al Farisi*, Badrudin, Yana Aditia Gerhana, and Dewi Sadiah

To cite this article: S. Al Farisi, Badrudin, Y. A. Gerhana, and D. Sadiah, "The TA 'AWUN Model for Digital Library Management in Indonesian Islamic Boarding Schools," *Women, Educ. Soc. Welf.*, vol. 3, no. 3, pp. 909–925, 2026. https://doi.org/10.70211/wesw.v3i3.524

Published online: August 2, 2026

Submit your article to this journal

View crossmark data

Full Terms & Conditions of access and use can be found at
https://journal.wiseedu.co.id/index.php/jiswel/about

OPEN ACCESS

https://doi.org/10.70211/wesw.v3i3.524

Women, Education, and Social Welfare Vol 3 No 3 (2026)

Check for updates

Research Article

The TA'AWUN Model for Digital Library Management in Indonesian Islamic Boarding Schools

Syarijuddin Al Farisi*, Badrudin, Yana Aditia Gerhana, and Dewi Sadiah

Received: May 4, 2026	Revised: May 13, 2026	Accepted: July 29, 2026	Online: August 2, 2026

Abstract

Indonesian Islamic boarding schools (pesantren) must expand access to classical Islamic texts while safeguarding the chain of scholarly transmission (sanad) and etiquette toward knowledge (adab). This study developed and descriptively evaluated the TA'AWUN digital library management model through a mixed-methods Research and Development design using the Analysis, Design, Development, Implementation, and Evaluation framework. The study was conducted at Pondok Pesantren Daarul Haliim, West Bandung Regency, Indonesia. The stakeholder pool comprised one Islamic boarding school leader (kyai), two library managers, five Islamic teachers (ustadz), thirty boarding-school students (santri), and three alumni; fifteen informants contributed qualitative data, while thirty-seven participants completed quantitative measures. Expert appraisal increased from 90.00% before revision to 98.33% after revision, and the limited trial produced a practicality score of 3.76/4.00. During the one-month implementation, mean compliance with six standard operating procedures reached 92.3%. Twenty of twenty-five targeted classical Islamic books (kitab kuning) were digitized, and all received documented sanad verification. Santri digital literacy scores increased descriptively from 62.5 to 78.2 (N-Gain = 0.42). User satisfaction reached 3.54 among santri and 3.83 among ustadz, while overall technology acceptance was 3.78/4.00. These findings provide preliminary, context-specific evidence that value-responsive digitalization can improve access and operational consistency without displacing pesantren epistemic traditions. Multi-site and longitudinal evaluation is required before broader effectiveness claims are made.

Keywords: ADDIE; Digital Library Management; Islamic Boarding School; Sanad Verification; TA'AWUN Model.

Publisher's Note:

WISE Pendidikan Indonesia stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Copyright:

©

2026 by the author(s).

License WISE Pendidikan Indonesia, Bandar Lampung, Indonesia. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY 4.0) license (https://creativecommons.org/licenses/by/4.0/).



INTRODUCTION

Digital transformation in education is no longer limited to converting printed materials into electronic files. It entails coordinated changes in institutional strategy, services, competencies, infrastructure, and user practices [1], [2]. The literature further shows that digital literacy is multidimensional: it includes technical operation, critical information evaluation, ethical participation, and the capacity to apply digital resources purposefully [3], [4], [5], [6]. For libraries, this shift creates opportunities to widen access, preserve vulnerable collections, and support learning beyond the physical reading room; however, it also exposes inequalities in connectivity, infrastructure, and user capability [7], [8].

These tensions are particularly salient in Indonesian Islamic boarding schools (pesantren), institutions in which education, residential life, religious authority, and community formation are closely integrated. Pesantren are expected to respond to technological change while retaining their distinctive educational identity [9], [10]. Recent studies report that the digital readiness of pesantren remains uneven because of limited infrastructure, variable staff competence, concerns about moral discipline, and uncertainty about how digital systems should accommodate religious values [11], [12].

Library management is a critical but underdeveloped component of this transition. Studies of pesantren and Islamic educational institutions have documented early-stage digital library initiatives, strategic reconceptualization of library services, digital management systems, curriculum adaptation, and application-based service improvement [13], [14], [15], [16], [17], [18], [19], [20], [21], [22]. Collectively, these studies demonstrate the importance of digital access, but most focus on administrative modernization, learning media, or general institutional management. They provide limited operational guidance for preserving the epistemic authority attached to classical Islamic texts traditionally printed on yellowish paper (kitab kuning), the chain of scholarly transmission (sanad), and etiquette toward knowledge and teachers (adab). School-library research similarly emphasizes digital literacy and service transformation but rarely addresses these value-specific verification requirements [23].

A further gap concerns the relationship between technical acceptance and cultural legitimacy. Digital preservation research stresses that digitized collections should retain contextual and provenance information rather than treating documents as decontextualized files [24]. Technology-acceptance research in mobile and digital libraries consistently identifies perceived usefulness, ease of use, service quality, and behavioral intention as important adoption factors [25], [26], [27]. In a pesantren, however, acceptance may also depend on whether users believe the system remains aligned with religious authority and established knowledge practices. The social position of the Islamic boarding school leader (kyai) is therefore relevant because institutional innovation is often legitimized through trust in the kyai and the wider pesantren community [28].

A preliminary assessment at Pondok Pesantren Daarul Haliim, West Bandung Regency, Indonesia, found that library operations were entirely manual. The institution had no written digitalization plan, standard operating procedures (SOPs), Online Public Access Catalog, digital collection, or documented mechanism for embedding sanad and adab in digital services. Students had difficulty locating specific books on unlabeled shelves and carrying heavy printed texts, while teachers reported that required references were not always available when

preparing instruction. These conditions established the contextual need for a digital library model that could improve access without weakening the pesantren's epistemic safeguards.

Accordingly, this study aimed to develop and descriptively evaluate the TA'AWUN model across six development questions: stakeholder needs, model design, product development, implementation, performance evaluation, and user acceptance. TA'AWUN abbreviates Tentukan (define), Atur (organize), Akselerasi (accelerate), Wawas (monitor and learn), Uji (test), and Nilai (evaluate). Its proposed contribution lies in combining a simplified continuous-improvement cycle, manual sanad verification by two senior ustadz through a signed verification record (Berita Acara), and a pentahelix collaboration structure involving academia, government, industry, media, and community/alumni actors. The article reports the development process and treats the observed outcomes as preliminary single-site evidence rather than causal proof of effectiveness.

METHODS

Research Design

This study used a mixed-methods Research and Development design organized through the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) framework. Mixed methods were selected to integrate stakeholder explanations of cultural and operational needs with quantitative indicators of feasibility, practicality, implementation performance, digital literacy, satisfaction, and technology acceptance [29]. The developmental design was appropriate because the study sought to produce and iteratively refine a context-specific management model rather than test a causal intervention against a control condition.

Participants and Sampling

The study was conducted at Pondok Pesantren Daarul Haliim, West Bandung Regency, Indonesia, from December 2024 to April 2026. Purposive sampling was used to include stakeholders with direct authority, operational responsibility, teaching experience, technology expertise, or end-user experience, consistent with the logic of information-rich case selection [30]. The stakeholder pool comprised one kyai, two library managers, five ustadz, thirty santri, and three alumni. Fifteen informants participated in interviews and focus-group discussions. Quantitative questionnaires, tests, and implementation measures involved two managers, five ustadz, and thirty santri (n = 37). Because participant groups overlapped across data-collection activities, these figures describe study roles and should not be summed as independent samples.

Evaluation Domains and Indicators

The evaluation comprised two principal domains: digital library management quality and user acceptance. These domains were treated as operational evaluation constructs rather than latent variables because the study used descriptive scores and developmental benchmarks rather than a structural measurement model.

Digital library management quality was assessed through validity, practicality, and implementation performance. Expert appraisal covered clarity of the model, alignment with sanad and adab, completeness of input-process-output-impact components, integration of pentahelix collaboration, clarity of the guidebook, completeness of six SOPs, and ease of

implementation. Practicality focused on user comprehension, SOP clarity, platform usability, and overall satisfaction. Performance indicators included SOP compliance, the number of digitized books, the proportion receiving sanad verification, digital literacy scores, and user satisfaction.

User acceptance was assessed through six indicators adapted to the Technology Acceptance Model and digital-library research: perceived ease of understanding and application, perceived usefulness for management or learning, comfort with the application, intention to continue using it, willingness to recommend it, and alignment with pesantren values [25], [26], [27]. All questionnaire items used a four-point scale from 1 (strongly disagree or very unsatisfactory) to 4 (strongly agree or very satisfactory).

Instruments and Data Collection Techniques

Data were collected through complementary qualitative and quantitative instruments. Table 1 summarizes each instrument, its purpose, the data source, and the administration phase.

Table 1. Data Collection Instruments

Instrument	Purpose	Data Source	Timing
Needs analysis questionnaire	Identify gaps between ideal and actual conditions	Santri, ustadz, and managers	Analysis phase
In-depth interview guides (6 versions)	Explore perceptions, challenges, expectations	Kyai, managers, ustadz, santri, and alumni	Analysis, development, implementation, evaluation
Observation checklists (initial and implementation)	Document physical conditions and SOP compliance	Library facilities, processes	Analysis, implementation
Expert validation sheets (content, instrument, application)	Assess validity of model, instruments, and platform	3 experts (library management, IT, research methodology)	Development phase
User response questionnaire (practicality)	Measure practicality of the model	Managers and ustadz	After limited trial
Satisfaction questionnaires (for santri and ustadz)	Measure user satisfaction with digital library services	Santri (30) and ustadz (5)	After implementation
TAM questionnaire (acceptance)	Measure user acceptance based on TAM	Managers and ustadz, santri	After implementation
Digital literacy test (pre-test and post-test)	Measure improvement in digital literacy	Santri (30)	Before and after training

Instrument	Purpose	Data Source	Timing
SOP observation sheet	Measure SOP compliance (6 SOPs)	Library processes	Weekly during implementation

The interview guides were piloted for readability with five santri and two ustadz. Quantitative instruments were reviewed by a research-methodology expert before administration. Internal consistency was evaluated for the satisfaction and acceptance scales. Because coefficient alpha can be sensitive to item structure and assumptions, it was interpreted as one source of reliability evidence rather than a definitive property of the instruments [31], [32].

Data Collection Procedures

Data collection followed the five ADDIE phases. During Analysis (January–February 2025), needs questionnaires were administered to thirty santri, five ustadz, and two managers; interviews and observations documented existing services and cultural requirements. During Design (March 2025), the research team drafted the model, six SOPs, evaluation instruments, guidebooks, and the Sanad e-Library platform. During Development (March–June 2025), experts appraised the products, a limited trial involved two managers, three ustadz, and five santri, and revisions were made. During Implementation (March–April 2026), the revised model was used for one month after two days of training for managers and ustadz and one day for santri, with a 70% practice and 30% theory allocation. During Evaluation, satisfaction, technology acceptance, and digital literacy post-tests were administered, followed by stakeholder interviews. The manuscript states that evaluation extended into May 2026; this endpoint requires author confirmation because the overall research period is reported elsewhere as ending in April 2026.

Data Analysis

Qualitative material from interviews, open-ended responses, observations, and documents was analyzed thematically through data condensation, display, and conclusion drawing. Coding combined categories derived from the research questions (for example, sanad preservation, technical constraints, and collaboration) with patterns emerging from the data. Themes were compared across participant groups and data sources. The reporting was revised to emphasize transparency, reflexivity, and coherence between the analytic claims and the available evidence [33].

Quantitative analysis was conducted in SPSS version 26 using descriptive statistics and predefined developmental criteria. Expert-appraisal percentages were categorized as 85–100% (very feasible), 70–84% (feasible), 50–69% (moderately feasible), and below 50% (not feasible). Practicality and acceptance means were categorized as 1.00–1.75 (not practical/very low), 1.76–2.50 (less practical/low), 2.51–3.25 (practical/high), and 3.26–4.00 (very practical/very high). Digital literacy change was summarized using normalized gain, g = (post-test - pre-test)/(maximum score - pre-test), with g >= 0.70 interpreted as high, 0.30–0.69 as

medium, and below 0.30 as low. No inferential test or control-group comparison was reported; therefore, changes are presented descriptively and should not be interpreted as causal effects.

Validity and Reliability of Instruments

All quantitative instruments underwent expert appraisal, and the model, research instruments, and application were reviewed before implementation. Table 2 reports the available validation results. The manuscript identifies three model validators but describes their expertise inconsistently across sections; the exact validator roles should be confirmed by the authors.

Table 2. Expert Validation Results

Validated Object	Number of Experts	Mean Score (1–4)	Percentage	Category
Model content (first validation)	3	3.60	90%	Very feasible
Model content (second validation)	3	3.93	98.33%	Very feasible
Research instruments	1	3.80	95%	Very feasible
Sanad e-Library application	1	3.75	93.75%	Very feasible

The eight-item santri satisfaction questionnaire produced Cronbach's alpha = 0.89, the six-item ustadz satisfaction questionnaire alpha = 0.87, and the six-item technology-acceptance questionnaire alpha = 0.91. These coefficients exceed the conventional 0.70 benchmark, although future studies should supplement alpha with additional reliability and construct-validity evidence [31], [32].

Ethical Considerations

Ethical approval was reported from the Research Ethics Committee of the Postgraduate Program, UIN Sunan Gunung Djati Bandung (No. B-142/Un.05/PS/PPK.00/03/2025). Participants received information about the study's purpose, procedures, potential risks, and benefits. Written consent was obtained from adult participants and from legal guardians of underage santri. Participation was voluntary, withdrawal was permitted without consequence, and reporting used participant codes rather than personal names. Research files were stored in password-protected form.

RESULTS AND DISCUSSION

Results

Needs Analysis for the Digital Library Management Model

The needs analysis identified a substantial difference between desired and existing library services. Interviews with fifteen informants showed that the library had no written plan, SOPs, Online Public Access Catalog, digital collection, or documented procedure for integrating sanad and adab. Santri described difficulty carrying large printed books and locating specific kitab kuning on unlabeled shelves. Ustadz reported delays in obtaining references for lesson preparation. The kyai established three conditions for digitalization: every digital book should

have complete sanad information, access should be restricted to pesantren members and non-commercial use, and adab toward books should remain central.

Questionnaire responses from thirty santri, five ustadz, and two managers supported these priorities. Table 3 presents the five highest-rated service needs.

Table 3. Highest-Rated Needs for Digital Library Services

Rank	Need Item	Mean Score (1-5)	Category
1	Search feature by book title, author, or field of study	4.8	Very High
2	Search feature by author name (scholar)	4.8	Very High
3	Download feature for offline study	4.7	Very High
4	Access to turats books (tafsir, hadith, fiqh, nahwu) in one platform	4.6	Very High
5	Sanad information for each digital book	4.6	Very High

All fourteen need items completed by santri had means above 4.3 on the five-point needs scale. Training in searching for and downloading digital books received a mean of 4.4, indicating a strong perceived need for guided digital-literacy support at the start of the project.

Design of the TA'AWUN Digital Library Management Model

The design phase produced TA'AWUN, a six-stage contextual adaptation of continuous improvement: Tentukan, Atur, Akselerasi, Wawas, Uji, and Nilai. The cycle is supported by pentahelix collaboration and a hybrid integrity mechanism that combines digital access with manual sanad verification. Figure 1 illustrates the conceptual architecture; it visualizes relationships already specified in the original manuscript and does not introduce additional empirical data.

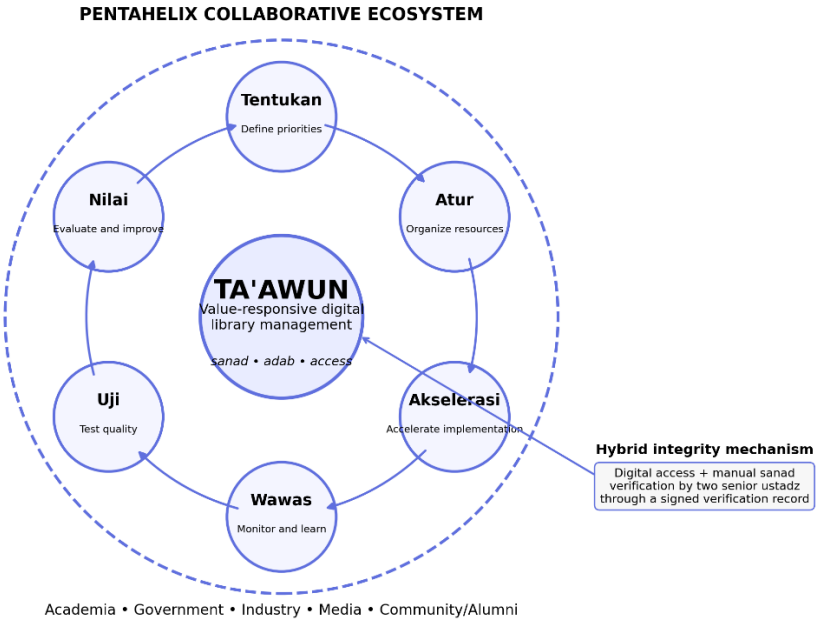


Figure 1. Conceptual Framework of The TA'AWUN Digital Library Management Model.

The model package comprised: (1) a digitalization planning document containing vision, objectives, key performance indicators, and a roadmap; (2) six SOPs covering registration, search and download, book digitization, monitoring and evaluation, technical problem handling, and physical borrowing; (3) satisfaction, SOP-observation, and digital-literacy instruments; (4) a web guide and a twenty-page pocket guide; and (5) the Sanad e-Library platform. The platform included search by title, author, and subject; subject categorization; download controls; a 'Rare - Online Only' label; an administrator dashboard; and a pentahelix collaboration menu. The platform address was supplied in the original manuscript, but its public availability should be confirmed before publication.

Development and Validation of the Model

Three experts appraised the initial model. The first round produced a mean of 3.60/4.00 (90.00%). Revisions added mandatory sanad verification by at least two ustadz through a signed verification record, improved mobile responsiveness, adjusted the first-year visit-growth target from 75% to 50%, and added technical cases to the training module.

A limited trial with two managers, three ustadz, and five santri produced a practicality mean of 3.76/4.00 (94.00%). After revision, the second model-appraisal mean reached 3.93/4.00 (98.33%). Table 4 summarizes the changes for the aspects reported in both rounds.

Table 4. Expert Validation Results Before and After Revision

Aspect	Pre-Revision Mean	Post-Revision Mean	Increase
Clarity of SOP for book digitalization (sanad verification)	3.00	4.00	+1.00
Mobile responsiveness of platform	3.00	4.00	+1.00
Realism of KPI targets	3.00	3.67	+0.67
Overall model feasibility	3.60	3.93	+0.33

Implementation of the TA'AWUN Model

The revised model was implemented for one month from March to April 2026. Participants included two managers, five ustadz, thirty santri, the kyai, and three alumni serving as information-technology volunteers. Managers and ustadz received two days of training, while santri received one day. The mean post-training score for managers and ustadz was 85.3/100, indicating that participants met the study's descriptive comprehension benchmark.

Weekly implementation was assessed against the six SOPs. Table 5 presents the compliance rates.

Table 5. Weekly Compliance with Standard Operating Procedures (%)

SOP	Week 1	Week 2	Week 3	Week 4	Average
1. User registration (manual)	100	100	100	100	100
2. Search and download	85	90	95	100	92.5
3. Book digitalization with sanad verification	70	75	80	85	77.5

SOP	Week 1	Week 2	Week 3	Week 4	Average
4. Monitoring and evaluation	90	95	100	100	96.25
5. Technical problem handling	80	85	90	95	87.5
6. Physical book borrowing	100	100	100	100	100
Average	87.5	90.8	94.2	96.7	92.3

Average SOP compliance increased from 87.5% in Week 1 to 96.7% in Week 4, with an overall mean of 92.3%. User registration and physical borrowing reached 100% throughout the period. Digitization with sanad verification had the lowest overall compliance (77.5%) because two-person verification and metadata entry required additional time, although its weekly rate increased from 70% to 85%.

Twenty of the twenty-five targeted books were digitized (80%), including three rare books such as a 1970 edition of Tafsir Al-Qurthubi. All twenty digitized books had signed sanad-verification records. The platform dashboard recorded 253 aggregated downloads after launch, and the author-search function was reported as the most frequently used feature.

Evaluation of the Model

The developmental evaluation compared baseline or target values with post-implementation observations. Table 6 presents the reported key performance indicators. These comparisons are descriptive because the study did not include a control group or report inferential statistics.

Table 6. Key Performance Indicators Before and After Implementation

Indicator	Baseline	Target	Post-Implementation	Status
SOP compliance (%)	0	≥90	92.3	Achieved
Number of digitized books	0	≥25	20 (80%)	Partially achieved*
Sanad verification (%)	0	100	100	Achieved
Santri digital literacy score (max 100)	62.5	≥10 points increase	78.2 (+15.7)	Achieved
Santri satisfaction (1-4 scale)	2.8 (estimated*)	≥3.5	3.54	Achieved
Ustadz satisfaction (1-4 scale)	3.0 (estimated*)	≥3.5	3.83	Achieved

Note: The original manuscript labels baseline satisfaction values of 2.8 for santri and 3.0 for ustadz as estimates. Their source and calculation should be confirmed by the authors. The kyai also stated that the quality of sanad verification was prioritized over the numerical digitization target; consequently, twenty fully verified books were considered acceptable for the first month even though the target of twenty-five was not reached.

Santri digital literacy increased from 62.5 to 78.2, a descriptive difference of 15.7 points and N-Gain = 0.42 (medium). Santri satisfaction reached 3.54/4.00 and ustadz satisfaction reached 3.83/4.00. Perceived usefulness (3.80) and intention to continue use (3.90) were the

strongest santri satisfaction indicators, whereas clarity of sanad information in the application was lowest (2.80) because the platform did not yet display a dedicated sanad field.

User Acceptance of the Model

Technology acceptance was assessed through six indicators on a four-point scale. Table 7 reports the results for managers, ustadz, santri, and the combined descriptive mean.

Table 7. Technology Acceptance Results

User Group	Perceived Ease of Use	Perceived Usefulness	Comfort with App	Behavioral Intention	Recommendation	Alignment with Pesantren Values	Mean
Managers (n=2)	3.5	4.0	3.5	4.0	3.5	4.0	3.75
Ustadz (n = 5)	3.8	3.8	3.6	4.0	3.8	4.0	3.83
Santri (n = 30)	3.7	3.9	3.6	3.9	3.8	3.7	3.77
Overall	3.73	3.90	3.58	3.97	3.73	3.85	3.78

Overall acceptance was 3.78/4.00. Behavioral intention received the highest mean (3.97), followed by perceived usefulness (3.90) and alignment with pesantren values (3.85). Comfort with the application was lowest (3.58), which participants associated with slow access during the 19:00–21:00 peak period and the absence of a login function. Although lower than the other dimensions, this score remained within the study's 'very high' category.

Interview accounts were consistent with the descriptive ratings. The kyai stated, 'I am proud of what has been achieved. The digital library not only facilitates students but also preserves rare books. Most importantly, sanad is maintained even though it is not yet in the application.' One ustadz explained, 'The search feature by author name is extremely helpful. I no longer have to go to the library to find Shahih Bukhari.' A santri added, 'Now I can search for books myself without having to come to the library. Just open my phone, type the author's name, and download.

Discussion

The results suggest that the practical value of TA'AWUN lies in translating broad calls for pesantren digital transformation into a sequenced library-management process. Previous research has documented institutional adaptation, digital literacy constraints, early-stage library automation, curriculum transformation, and application-based service improvement [9], [10], [11], [12], [13], [14], [15], [16], [17], [18], [19], [20], [21], [22], [23]. TA'AWUN extends this literature by specifying who defines priorities, how resources and SOPs are organized, how implementation is accelerated, how performance is monitored, how outputs are tested, and how revisions are decided. This operational specificity is important because transformation frameworks are less useful when institutions lack the staff, infrastructure, and shared vocabulary needed to enact them [34], [35], [36], [37], [38].

The model's most distinctive feature is the hybrid sanad-verification procedure. Digital preservation scholarship argues that provenance and contextual meaning should accompany

digitized cultural resources [24]. In the present setting, the signed review by two senior ustadz served as a local provenance-control mechanism while the platform's metadata field was still incomplete. This mechanism also reflects the kyai's legitimizing role and the importance of trusted social relations in pesantren development [28]. Nevertheless, the study assessed implementation at one institution; it did not establish that the procedure is sufficient for every type of classical text or transferable to pesantren with different scholarly traditions.

SOP compliance and acceptance scores show that the model was implementable and positively received during the one-month trial. The acceptance pattern—high usefulness and behavioral intention but lower comfort—resembles broader digital-library research showing that perceived usefulness, ease of use, information quality, and enabling conditions jointly shape adoption [25], [26], [27]. The 3.78 mean is also consistent with favorable user responses reported for a pesantren smart-digital application [39]. Direct numerical comparison should remain cautious because the instruments, samples, systems, and rating scales differ across studies.

The 15.7-point increase in digital literacy and medium N-Gain provide encouraging descriptive evidence for the training component, but they do not demonstrate causation. Digital-literacy reviews emphasize that capability develops through a combination of technical practice, critical information use, confidence, ethical judgment, and sustained support [3], [4], [5], [6]. The implementation barriers reported here—peak-hour connectivity, limited logging, and differing user confidence—also parallel the digital divide and service-transition difficulties described in educational and library settings [7], [8]. Longer observation and a stronger digital-literacy instrument are therefore needed to determine whether the observed gain is maintained and generalized beyond basic platform use.

The relatively low score for digital display of sanad information identifies a substantive design priority. Users accepted manual verification because they trusted the responsible ustadz, yet reliance on interpersonal assurance may become difficult as collections and user populations expand. Future development should add structured provenance fields, reviewer identity or role metadata, verification dates, version control, and access permissions while preserving appropriate confidentiality. Such enhancements would allow cultural integrity to be represented within the information architecture rather than maintained only through off-platform documentation.

Pentahelix participation helped compensate for resource limitations through alumni technical support, donor-provided server capacity, and links to a digital-library community. This finding is consistent with work suggesting that cross-sector collaboration can strengthen pesantren management [40]. However, dependence on volunteers and donations also creates sustainability risk. Institutional budgeting, succession planning, staff development, and service-level responsibilities should therefore be incorporated before wider replication.

The partial achievement of the digitization target illustrates the difference between output volume and verified quality. Only twenty of twenty-five books were digitized, but all completed books received sanad verification. This trade-off is defensible within the institution's stated priorities, yet it should not be reframed as full target achievement. Future evaluations should report both throughput and verification time, identify bottlenecks, and determine whether verification standards can be maintained as the monthly volume increases.

The study supports three bounded contributions. First, it offers a context-responsive library workflow that links digital management, value integrity, and collaboration. Second, it introduces perceived value alignment as a proposition for extending technology-acceptance analysis in traditional religious institutions; this proposition was operationalized descriptively but not tested as an independent predictor. Third, it demonstrates how continuous-improvement and quality-management ideas can be translated into locally intelligible stages [1], [2], [35], [36], [37], [38]. These contributions should be understood as model-development outcomes rather than confirmation of a new general theory.

For practice, the model provides a planning document, six SOPs, evaluation tools, guidebooks, and a functional prototype that may inform similar initiatives. Adoption elsewhere should begin with a contextual needs assessment rather than direct copying because pesantren differ in governance, scholarly lineages, connectivity, collections, and staff capacity. For policy, the results indicate that digital-support programs should fund not only hardware and platforms but also metadata quality, staff training, local-value safeguards, maintenance, and long-term monitoring.

For research, subsequent studies should use multi-site designs, longer implementation periods, validated multidimensional digital-literacy measures, automated usage logs, and comparative conditions. A larger sample could test whether perceived value alignment explains acceptance beyond usefulness and ease of use. Qualitative work should also examine how santri, ustadz, librarians, and kyai negotiate authority when digital provenance records differ from established oral or manuscript-based traditions.

Overall, the one-month implementation indicates that TA'AWUN is feasible, practical, and acceptable within the studied institution according to the study's predefined descriptive criteria. The findings do not justify claims of universal effectiveness, but they provide a documented basis for iterative refinement and more rigorous evaluation.

CONCLUSION

This study developed the TA'AWUN model for value-responsive digital library management at Pondok Pesantren Daarul Haliim. The model combined six continuous-improvement stages, pentahelix collaboration, and manual sanad verification by two senior ustadz. During the one-month implementation, overall SOP compliance reached 92.3%; twenty kitab kuning were digitized and all received documented sanad verification; santri digital literacy increased descriptively by 15.7 points (N-Gain = 0.42); satisfaction reached 3.54 among santri and 3.83 among ustadz; and technology acceptance averaged 3.78/4.00. These results answer the developmental objective by showing that the proposed workflow could be implemented and was positively received in the study setting. Its principal contribution is not proof of universal effectiveness, but a context-sensitive mechanism for linking digital access with provenance, religious values, and collaborative governance. Broader claims require longitudinal, multi-site, and comparative evaluation, together with technical improvements in sanad metadata, user authentication, automated logs, and sustainable institutional funding.

LIMITATIONS

The findings are bounded by a single-site developmental design, a one-month implementation period, small stakeholder groups, and the absence of a control condition. Consequently, causal attribution and statistical generalization are not warranted. Questionnaire responses may be affected by social-desirability pressures in an innovation endorsed by the kyai, and the eight-item true/false digital-literacy test may not represent the full construct. Manual activity records may contain recording error, while unstable connectivity, the absence of user accounts, and incomplete automated logging affected the user experience. The platform also relied partly on alumni volunteers and donor support, which may not be available elsewhere. Finally, the manuscript contains unresolved administrative and methodological details—including the April/May 2026 endpoint, validator-role descriptions, and estimated baseline satisfaction scores—that should be confirmed before submission.

AUTHOR INFORMATION

Corresponding Author

Syarijuddin Al Farisi – Department of Islamic Education, Universitas Islam Negeri Sunan Gunung Djati Bandung, (Indonesia);
orcid.org/0009-0008-2668-673X
Email: saf6969@gmail.com

Authors

Syarijuddin Al Farisi – Department of Islamic Education, Universitas Islam Negeri Sunan Gunung Djati Bandung, (Indonesia);
orcid.org/0009-0008-2668-673X
Badrudin – Department of Islamic Education, Universitas Islam Negeri Sunan Gunung Djati Bandung, (Indonesia);
orcid.org/0000-0003-1213-1895
Yana Aditia Gerhana – Department of Islamic Education, Universitas Islam Negeri Sunan Gunung Djati Bandung, (Indonesia);
orcid.org/0000-0003-0105-9170
Dewi Sadiah –Department of Islamic Education, Universitas Islam Negeri Sunan Gunung Djati Bandung, (Indonesia);
orcid.org/0009-0001-6765-8240

AUTHOR CONTRIBUTION

S. A. F. conceptualized the study, developed the research design, coordinated qualitative and quantitative data collection, conducted the descriptive and thematic analyses, and drafted the manuscript. B. contributed to the theoretical framework, supervised the research, advised on the integration of quality-management principles with pesantren values, and critically revised the manuscript. Y. A. G. contributed to the design and validation of the Sanad e-Library platform, supervised technical implementation, advised on the development process and data analysis, and reviewed the methods and results. D. S. contributed to pedagogical and pesantren

contextualization, supported instrument development, supervised training and implementation, and critically reviewed the manuscript. All authors have read and approved the final version and agree to be accountable for the integrity of the work.

CONFLICT OF INTEREST

"The authors declare no conflict of interest."

DECLARATION OF USE OF AI IN SCIENTIFIC WRITING

ChatGPT (OpenAI) was used for language refinement and editorial structuring. The authors must review and approve all revisions and remain fully responsible for the accuracy of the content, data, interpretations, and references.

REFERENCES

[1] L. M. Benavides, J. W. Tamayo Arias, M. D. Arango Serna, J. W. Branch Bedoya, and D. Burgos, "Digital transformation in higher education institutions: A systematic literature review," Sensors, vol. 20, no. 11, Art. no. 3291, 2020. https://doi.org/10.3390/s20113291

[2] M. Alenezi, "Deep dive into digital transformation in higher education institutions," Education Sciences, vol. 11, no. 12, Art. no. 770, 2021. https://doi.org/10.3390/educsci11120770

[3] S. Farias-Gaytan, I. Aguaded, and M. S. Ramirez-Montoya, "Transformation and digital literacy: Systematic literature mapping," Education and Information Technologies, vol. 27, no. 2, pp. 1417–1437, 2022. https://doi.org/10.1007/s10639-021-10624-x

[4] H. Tinmaz, Y.-T. Lee, M. Fanea-Ivanovici, and H. Baber, "A systematic review on digital literacy," Smart Learning Environments, vol. 9, Art. no. 21, 2022. https://doi.org/10.1186/s40561-022-00204-y

[5] C. Audrin and B. Audrin, "Key factors in digital literacy in learning and education: A systematic literature review using text mining," Education and Information Technologies, vol. 27, no. 6, pp. 7395–7419, 2022. https://doi.org/10.1007/s10639-021-10832-5

[6] G. Falloon, "From digital literacy to digital competence: The teacher digital competency framework," Educational Technology Research and Development, vol. 68, pp. 2449–2472, 2020. https://doi.org/10.1007/s11423-020-09767-4

[7] M. Rafiq, S. H. Batool, A. F. Ali, and M. Ullah, "University libraries response to the COVID-19 pandemic: A developing-country perspective," The Journal of Academic Librarianship, vol. 47, no. 1, Art. no. 102280, 2021. https://doi.org/10.1016/j.acalib.2020.102280

[8] E. Beaunoyer, S. Dupéré, and M. J. Guitton, "COVID-19 and digital inequalities: Reciprocal impacts and mitigation strategies," Computers in Human Behavior, vol. 111, Art. no. 106424, 2020. https://doi.org/10.1016/j.chb.2020.106424

[9] A. Syaikhu, "Islamic boarding school management in the digital era: Integrating tradition and innovation in Islamic education," FALASIFA: Jurnal Studi Keislaman, vol. 16, no. 2, pp. 120–130, 2025. https://doi.org/10.62097/falasifa.v16i02.247

[10] K. Kasman, "Islamic boarding school management in the modern era: Literature review of local wisdom-based management models," Bulletin of Indonesian Islamic Studies, vol. 4, no. 1, pp. 210–222, 2025. https://doi.org/10.51214/biis.v4i1.1539

[11] S. Mahmudah and I. Ridwan, "Religious digital literacy among Islamic boarding school students through a critical study of the Salafiyah Islamic boarding school curriculum," West Science Islamic Studies, vol. 3, no. 4, 2025. https://doi.org/10.58812/wsiss.v3i04.2326

[12] C. Fanaqi, A.-N. A. Nurwaidi, and A. S. Wahyuni, "Digital literacy as a tool for countering radicalism among Islamic boarding school students (santri)," Profetik: Jurnal Komunikasi, vol. 18, no. 1, 2025. https://doi.org/10.14421/pjk.v18i1.3167

[13] T. Mudiarto, "Manajemen perpustakaan berbasis digital di Madrasah Aliyah Pondok Pesantren Muhammad Basiuni Imran Sambas," CBJIS: Cross-Border Journal of Islamic Studies, vol. 7, no. 2, pp. 410–418, 2025. https://doi.org/10.37567/cbjis.v7i2.4466

[14] Z. D. Rahman, S. S. Fauziah, A. Zohriah, and M. Bachtiar, "Rekonseptualisasi definisi dan peran strategis manajemen perpustakaan pondok pesantren di era digital," Literatify: Trends in Library Developments, vol. 6, no. 2, pp. 211–231, 2025. https://doi.org/10.24252/literatify.v6i2.58173

[15] A. Amirudin and A. N. Mizan, "Digital transformation of Islamic boarding school management and its implications for improving educational services in Lampung Province," Qanun: Journal of Islamic Laws and Studies, vol. 4, no. 4, pp. 1796–1814, 2026. https://doi.org/10.58738/qanun.v4i4.1313

[16] Y. T. N. Rahmawati and Hamdanah, "Digitalization of Khunuzul Imam Kauman Islamic Boarding School Bondowoso in the digital age," Al-Fahim: Jurnal Manajemen Pendidikan Islam, vol. 7, no. 1, pp. 107–127, 2025. https://doi.org/10.54396/alfahim.v7i1.1916

[17] S. I. Fuadi, R. Raharjo, I. Ikhrom, and L. N. Zulfa, "Narrating curriculum transformation in Islamic boarding school: Integrating tradition and digital practices in Islamic boarding school education," International Journal of Educational Narratives, vol. 4, no. 2, pp. 405–413, 2026. https://doi.org/10.70177/ijen.v4i2.3477

[18] M. Huda, "Modernization of Islamic boarding school education: Utilization of the Pintro application system to enhance quality management of Islamic boarding school services," Cendekia: Jurnal Kependidikan dan Kemasyarakatan, vol. 23, no. 1, pp. 142–158, 2025. https://doi.org/10.21154/cendekia.v23i1.10511

[19] M. Frandani, A. M. Tamam, and A. Ahmad, "Internal quality management model in Islamic boarding school-based madrasah," QALAMUNA: Jurnal Pendidikan, Sosial, dan Agama, vol. 16, no. 1, pp. 219–240, 2024. https://doi.org/10.37680/qalamuna.v16i1.4760

[20] A. J. Abdillah, Kholisin, I. Asrori, and Y. Seraiaia, "Development of digital mind mapping based on Imrithi for Nahwu learning at Islamic boarding school," Izdihar:

Journal of Arabic Language Teaching, Linguistics, and Literature, vol. 8, no. 2, 2025. https://doi.org/10.22219/jiz.v8i2.36850
[21] H. Hidayah, Muhammad, and Ahyar, "Collective digitalisation system (SiDiK): Digital transformation of Thohir Yasin Islamic Boarding School, East Lombok," EL-HIKMAH: Jurnal Kajian dan Penelitian Pendidikan Islam, vol. 19, no. 1, pp. 1–18, 2025. https://doi.org/10.20414/elhikmah.v19i1.12646
[22] E. Fauzia, M. S. Zuhdi, and Maftuhah, "Curriculum management in pesantren in the Society 5.0 era at Darunnajah Jakarta Islamic Boarding School," Jurnal Isema: Islamic Educational Management, vol. 10, no. 2, pp. 146–162, 2025. https://doi.org/10.15575/isema.v10i2.44315
[23] R. Rodin, S. Wahyuni, Maisonah, and Zulkifli, "Manajemen perpustakaan sekolah dan tantangan literasi abad ke-21: A systematic review," Library Insights Journal, vol. 2, no. 1, pp. 1–29, 2025. https://doi.org/10.15408/lij.v2i1.50318
[24] N. Barbuti, "Thinking digital libraries for preservation as digital cultural heritage: By R to R4 facet of FAIR principles," International Journal on Digital Libraries, vol. 22, no. 3, pp. 309–318, 2021. https://doi.org/10.1007/s00799-020-00291-7
[25] H. Rafique, A. O. Almagrabi, A. Shamim, F. Anwar, and A. K. Bashir, "Investigating the acceptance of mobile library applications with an extended Technology Acceptance Model," Computers & Education, vol. 145, Art. no. 103732, 2020. https://doi.org/10.1016/j.compedu.2019.103732
[26] I. Ali and N. F. Warraich, "Meta-analysis of technology acceptance for mobile and digital libraries in academic settings using the Technology Acceptance Model," Global Knowledge, Memory and Communication, vol. 74, nos. 9–10, pp. 3114–3131, 2024. https://doi.org/10.1108/GKMC-09-2023-0360
[27] I. Ali and N. F. Warraich, "Use and acceptance of technology within academic and digital library contexts: A meta-analysis of the UTAUT model and future directions," Journal of Librarianship and Information Science, vol. 56, no. 4, pp. 965–977, 2024. https://doi.org/10.1177/09610006231179716
[28] N. Azizah and S. Sugiono, "Social modalities of kiai in the development of Islamic boarding school," Journal of Educational Management Research, vol. 4, no. 1, pp. 68–81, 2025. https://doi.org/10.61987/jemr.v4i1.783
[29] M. S. Ramirez-Montoya and J. Lugo-Ocando, "Systematic review of mixed methods in the framework of educational innovation," Comunicar, vol. 28, no. 65, pp. 9–20, 2020. https://doi.org/10.3916/C65-2020-01
[30] S. Campbell, M. Greenwood, S. Prior, T. Shearer, K. Walkem, S. Young, D. Bywaters, and K. Walker, "Purposive sampling: Complex or simple? Research case examples," Journal of Research in Nursing, vol. 25, no. 8, pp. 652–661, 2020. https://doi.org/10.1177/1744987120927206
[31] A. F. Hayes and J. J. Coutts, "Use omega rather than Cronbach's alpha for estimating reliability. But…," Communication Methods and Measures, vol. 14, no. 1, pp. 1–24, 2020. https://doi.org/10.1080/19312458.2020.1718629
[32] S. Nurjanah, M. Iqbal, and Zafrullah, "Psychometric quality of multiple-choice tests under classical test theory: AnBuso, Iteman, and R," Jurnal Penelitian dan Evaluasi

Pendidikan, vol. 28, no. 2, pp. 161–172, 2024. https://doi.org/10.21831/pep.v28i2.71542
[33] V. Braun and V. Clarke, “One size fits all? What counts as quality practice in reflexive thematic analysis?” Qualitative Research in Psychology, vol. 18, no. 3, pp. 328–352, 2021. https://doi.org/10.1080/14780887.2020.1769238
[34] A. Fauzi, M. Arif, and A. Mustofa, “Realizing the ideal model of digital Islamic boarding schools: A systematic literature review,” Mumtaz: Jurnal Pendidikan Agama Islam, vol. 5, no. 2, pp. 259–288, 2025. https://doi.org/10.69552/mumtaz.v5i2.3288
[35] R. Rada, I. K. Dewi, A. Mashar, and R. Alamsyah, “Beyond the classroom: Total quality management and digital innovation in education,” Al-Tanzim: Jurnal Manajemen Pendidikan Islam, vol. 8, no. 4, pp. 1276–1288, 2024. https://doi.org/10.33650/al-tanzim.v8i4.9608
[36] Sudirman, N. Tarihoran, and E. Nugraha, “Technology adaptation strategy in Islamic boarding school quality management: Systematic literature review and meta-analysis,” Multidisciplinary Indonesian Center Journal, vol. 2, no. 3, pp. 2407–2425, 2025. https://doi.org/10.62567/micjo.v2i3.738
[37] R. Rustandi and A. Kusnawan, “Management of Islamic boarding schools in the implementation of digital da'wah literacy based on religious moderation and gender relations in West Java,” Jurnal Dakwah Risalah, vol. 34, no. 1, 2023. https://doi.org/10.24014/jdr.v34i1.24545
[38] A. G. Pathollah and I. Kamilah, “Implementasi TQM model PFDCAD dalam meningkatkan mutu pendidikan pesantren di PP Manbaul Ulum,” At-Tahsin: Jurnal Manajemen Pendidikan, vol. 1, no. 1, pp. 30–43, 2022. https://doi.org/10.59106/attahsin.v1i1.10
[39] U. Aertha, D. H. Satyareni, and A. Farhan, “Analisis kepuasan pengguna aplikasi Pesantren Smart Digital menggunakan model Task Technology Fit,” Jurnal Sistem Informasi Bisnis, vol. 6, no. 1, pp. 112–121, 2025. https://doi.org/10.55122/junsibi.v6i1.1589
[40] A. S. Hamdi and E. Suwanto, “Manajemen pengelolaan pondok pesantren berbasis pentahelix,” Aisyah Journal of Intellectual Research in Islamic Studies, vol. 3, no. 1, pp. 55–62, 2025. https://doi.org/10.64834/aisyah.v3i1.39