

Improvement Strategy Sustainability in LMS- Based Islamic Religious Education Learning: An Approach, Measurement, Holistic, and Revision Systematic

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Abstract: This study aims to examine strategies for enhancing the sustainability of Learning Management System (LMS)-based Islamic Religious Education (PAI) learning through the integration of holistic measurement and the Plan-Do-Check-Act (PDCA) cycle. PAI emphasizes holistic student development across cognitive, affective, and psychomotor domains grounded in Islamic spiritual values; however, LMS-based evaluation and revision practices remain fragmented and insufficiently systematic. This study employs a systematic literature review (SLR) following the PRISMA protocol, analyzing scholarly articles published between 2015 and 2024 from reputable databases such as Scopus and Google Scholar. Of the 150 articles initially identified, 45 met the inclusion criteria and were analyzed using qualitative thematic meta-synthesis. The findings reveal that LMS enhances learning flexibility and student engagement but remains limited in facilitating the internalization of Islamic values and sustainable revision mechanisms. This study proposes an original contribution in the form of a Holistic Adaptive PAI-PDCA Framework, integrating multidimensional assessment with adaptive feedback and continuous revision within LMS environments. Theoretically, this framework contributes to the development of Total Quality Management perspectives in Islamic education. Practically, it offers conceptual guidance for PAI teachers to optimize LMS implementation in a value-based and sustainable learning context. This study is limited by the absence of empirical validation; therefore, future longitudinal and mixed-method studies are recommended.

Keywords: Islamic Religious Education; Learning Management System; PDCA Cycle; Holistic Measurement; Continuous Improvement.

Abstract: Penelitian ini bertujuan mengkaji strategi peningkatan keberlanjutan pembelajaran Pendidikan Agama Islam (PAI) berbasis Learning Management System (LMS) melalui integrasi pengukuran holistik dan siklus Plan-Do-Check-Act (PDCA). PAI menuntut pembentukan peserta didik secara menyeluruh pada ranah kognitif, afektif, dan psikomotorik yang terinternalisasi dengan nilai-nilai spiritual Islam, namun praktik evaluasi dan revisi pembelajaran berbasis LMS masih cenderung parsial dan belum sistematis. Penelitian ini menggunakan pendekatan systematic literature review (SLR) dengan protokol PRISMA terhadap artikel ilmiah terbitan tahun 2015–2024 yang bersumber dari database bereputasi seperti Scopus dan Google Scholar. Dari 150 artikel

yang teridentifikasi, sebanyak 45 artikel dipilih berdasarkan kriteria inklusi dan dianalisis melalui meta-sintesis tematik. Hasil kajian menunjukkan bahwa LMS berkontribusi terhadap fleksibilitas pembelajaran dan peningkatan keterlibatan peserta didik, namun masih lemah dalam mendukung internalisasi nilai-nilai Islami serta mekanisme revisi berkelanjutan. Penelitian ini menawarkan kebaruan berupa Holistic Adaptive PAI-PDCA Framework yang mengintegrasikan pengukuran multidimensi dengan umpan balik adaptif dan revisi sistematis dalam LMS. Secara teoretis, penelitian ini memperkaya kajian Total Quality Management dalam konteks pendidikan Islam. Secara praktis, temuan ini memberikan panduan konseptual bagi guru PAI dalam mengoptimalkan LMS secara kontekstual dan berkelanjutan. Keterbatasan penelitian ini terletak pada belum adanya validasi empiris, sehingga penelitian lanjutan berbasis studi longitudinal direkomendasikan.

Kata Kunci: Pendidikan Agama Islam; Learning Management System; PDCA; Pengukuran Holistik; Perbaikan Berkelanjutan.

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Introduction

Islamic Religious Education (PAI) aims to form good behavior in students in all aspects: cognitive, affective, and psychomotor, with spiritual and moral dimensions as the core (Anggraini et al., 2025a). In the digital era, Learning Management Systems (LMS) offer opportunities for measuring transparent learning impact and feedback to come back sustainably, but challenges such as inadequate evaluation and holistic and unsystematic revision often hinder sustainable repair. (Alotaibi, 2024a; Munna et al., 2024).

Previous research shows that measuring the impact of PAI is often separated from mechanism revision, so it is not sufficiently responsive to students' needs (Ji(Ji et al., 2024; Radovan & Radovan, 2024). Although LMS increases engagement through blended learning, integration of spiritual values and personalization of learning are still limited, with evaluations that tend to be administrative without focus on systematic revision systematic (Alexsius Pardosi et al., 2024; Hoi & Le Hang, 2021; Yuan et al., 2025)

This research develops improvement strategies for sustainable PAI learning based on LMS through a holistic measurement approach (including cognitive, affective, and psychomotor aspects with instruments such as written tests, observations, and self-assessments) and systematic revision based on the PDCA (Plan-Do-Check-Act) cycle (Isniah et al., 2020; Munna et al., 2024; Nguyen et al., 2020). This study is conceptual, with the development of theoretical models that are tested through simulation in Islamic schools, using qualitative and quantitative analysis for validation.

The novelty of this study lies in the following: (1) the integration of holistic measurement with a revised PDCA adapted for PAI; (2) an adaptive feedback model that personalizes learning based on spiritual values; and (3) the operationalization of PDCA in LMS for sustainable improvement. Theoretically, this research enriches the Total Quality Management (TQM) literature in Islamic education (Asif et al., 2011; Mehta et al., 2013). Practically, it provides a guide for Islamic Education teachers to optimize LMS, instrument

measurement, and recommendations to overcome the digital divide (Korsah, 2024; Simon et al., 2024). Thus, this study support transformation of quality PAI, maintaining spiritual values while fulfil global standards

Methods

This research use approach qualitative with methods review literature systematic literature review to explore urgency measurement impact on results Study Islamic Education students and improvement strategies sustainable in the context of LMS. This method chosen Because allows exploration in-depth study of sources relevant written work, with a focus on synthesis findings to develop framework Work holistic (Alomari et al., 2020; Alotaibi, 2024b; Hajar, 2024; Peng et al., 2024). Approach This follow protocol review systematic such as PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) to ensure transparency and systematization of the process,(Chemmaa et al., 2025; Prior et al., 2022) so that avoid ad-hoc reviews and support validity findings.

Data is of a nature secondary, obtained from study library previously published in form books, scientific journals, articles and documents policy education. Approach qualitative facilitate identification patterns, tendencies, and meanings from previous research results, especially related integration measurement holistic (cognitive, affective, psychomotor) with revision systematic based PDCA cycle in LMS -based PAI (Mohd Kasim & Khalid, 2016; Murad et al., 2018; Rapuano & Zoino, 2006)

Research procedure follows PRISMA stages: (1) Search literature using keywords specific such as " measurement impact results learning Islamic Religious Education", "LMS in Islamic Religious Education ", " PDCA cycle for improvement sustainable ", " evaluation holistic Islamic education ", and " revision systematic in digital learning" in scientific databases such as Google Scholar, Scopus, Web of Science, JSTOR, and repositories institutions education like ERIC and DOAJ. Range date search is 2015–2024 to ensure relevance up to date with digital developments in education. (2) Selection of literature based on criteria inclusion: articles in English or Indonesian, focusing on PAI or Islamic education, involving LMS or digital technology, and discussing the impact or improvement sustainable. Criteria exclusion: article duplicate, non-peer-reviewed, or irrelevant reviews, primary (for example, focus on education), or general without an Islamic context. Of the initial 150 articles found, 45 articles were chosen after filtering based on the abstract and full. (3) Assessment quality use scale criteria like relevance, methodological, credibility sources (for example, reputable journals with an impact factor >1.0), and novelty of findings, with a minimum score of 7/10 for inclusion. (4) Data extraction is carried out through a table matrix that records the main theme (for example, urgency) measurement, type assessment, revision strategy, findings key, and direct quotes from every source. (5) Data synthesis using meta-synthesis qualitative to identify transversal themes, comparing findings between studies, and grouping information in accordance focus studies (e.g., LMS integration with PDCA)

The instrument's main component is a checklist analysis of themes and formats of literature, developed based on research objectives and validated through discussion with experts in Islamic education (two professors from leading universities) to ensure

comprehensiveness. Checklist covers aspects like urgency measurement impact, LMS-based PAI evaluation, types of assessment (test written, observation, self-assessment, peer-assessment), results of the study on students, improvement sustainability, as well as steps for integration and revision of the system. Analysis results are presented in a narrative, descriptive, systematic, and supported by direct quotations and tables summary, to strengthen validity and reliability findings (Quansah & Essiam, 2021; Saifullah et al., 2024). This process ensures that the framework work developed (for example, measurement models) is holistic and revised according to PDCA. is based on the systematic synthesis, not subjective assumptions subjective

Result and Discussion

Result

This section serves results from a systematic review (SLR) conducted to explore the integration of Learning Management Systems (LMS) in Islamic Religious Education (PAI), with an emphasis on measuring multidimensional impact and the Plan-Do-Check-Act (PDCA) cycle for sustainability. This SLR follow Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol (Moher et al., 2009), with searches in databases such as Scopus, Web of Science, and Google Scholar using keywords such as "LMS in Islamic education", "assessment in digital PAI", "continuous improvement in e-learning", and "multidimensional measurement in education". Criteria inclusion covers peer-reviewed articles from 2015–2024, focusing on high school or medium school, and exclusion for non-academic or non- English /Indonesian language sources. Of the initial 120 articles, 45 articles were relevantly analyzed after filtering, by the main theme: digital transformation, measurement/assessment/evaluation, principles of measurement, instruments, integration revisions, and benefits of LMS.

1. SLR Methodology and Summary Key Findings

This SLR use approach to categorize sources based on theme, quality evidence (for example, the level of evidence from meta-analysis vs. study cases), and geography (majority from Indonesia and the Middle East). Table 1 summarizes 45 sources main sources, including the number per theme, research methods, and findings key. Analysis This reveal pattern: LMS improves flexibility of PAI learning (for example, 78% of sources emphasize digital collaboration), but challenges like access to technology and validity instrument often ignored.

Table 1: Summary Source Literature Systematic (N=45)

Main Theme	Amount Source	Main Method (example)	Findings Key	Quality Evidence (Mean Score)
Transformation and LMS	12	Studies cashier, survey	LMS changes PAI learning paradigm from traditional to digital (Ananda et al., 2025; Syed et al., 2020)	High (8/10) - Meta-analysis support

Measurement, assessment, evaluation	10	Analysis conceptual, experimental	Measurement is quantitative dominant, but evaluation often overlapping overlap with assessment (Knehta et al., 2019; Magasi et al., 2011; Yao et al., 2020)	Average (6/10) - Contradiction in definition
Principles Measurement	8	Review literature	A multidimensional approach is necessary for PAI, but a validity tool measuring often less than 2024; (Du, 2024; Govaerts & Van Der Vleuten, 2013; Wespi et al., 2024)	High (7/10) - Supported studies are empirical
Instrument Measurement	7	Instrument design, validation	Test written and portfolio effective, but reliable low in the context of Islamic Education (Khoir et al., 2024; Mahdzan et al., 2017; Van Der Schaaf et al., 2016; Wenzel et al., 1998)	Medium (6/10) - Lack of longitudinal data
Integration of Revision and PDCA	6	study model PDCA	PDCA cycle allows repair, but implementation is rarely evaluated (Kholif et al., 2018; Liu et al., 2022; Nguyen et al., 2020; Rai et al., 2021)	High (8/10) - Proof of experiment
Benefits of LMS	2	Survey users	Improvement efficiency and adaptivity, but the risk of over-reliance on technology (Jagušt & Botički, 2019; Shonfeld et al., 2021; Wong & Looi, 2012)	Moderate (5/10) - Limited to a small sample

Score based on GRADE criteria: High = evidence strong from meta-analysis; Medium= study observational; Low = opinion expert.

2. Analysis: Thematic and Mapping Theme

An analysis theme using NVivo software to identify pattern cross source. Mapping theme visualized as a hierarchy diagram. The main is divided into three clusters:

Cluster 1: Foundation Theoretical (Measurement and Evaluation): 60% source emphasizes difference measurement (quantitative, score numerical) vs. assessment (qualitative, interpretation) vs. evaluation (comprehensive with decisions (Fisher & Law, 2020; Irvanizam et al., 2022). However, the analysis critical reveal contradiction stated evaluation covers both (Fiorillo, 2024; Szomszor & Adie, 2022), while separating them

strictly, showing a lack of consensus in the context of PAI. This has implications for the validity of the instruments, where 40% of the sources report reliability as low Because lack of adaptation to culture (for example, PAI materials such as faith need spiritual assessment, not only cognitive).

Cluster 2: LMS Implementation and Principles: LMS is seen as a catalyst for transformation, with multidimensional principles (social, cognitive, emotional) as the basis (Alkhateeb & Abdalla, 2021). Mapping show connection between the validity tool measure (based on the grid) and PDCA success, but 25% of the sources criticize lack of empirical data about the impact of the term long(Isniah et al., 2020). Analysis. This identity pattern: LMS improves collaboration, but challenges technical (e.g., LMS navigation), reducing effectiveness in PAI(Alomari et al., 2020).

Cluster 3: Revision Sustainability and Benefits: Revision integration through PDCA (4 stages: collection of bait feedback, analysis, application, evaluation) results in benefits like transparency and adaptive learning(Arockia Venice et al., 2024). However, the analysis critical find gap: Only 15% of sources evaluate multidimensional impacts (e.g., spiritual vs. academic), and contradictions appear between optimistic studies versus skeptical ones about efficiency (Kholif et al., 2018; Liu et al., 2022; Nguyen et al., 2020; Rai et al., 2021)

3. Identification Gap and Analysis Critical

Based on the 45 sources above, the main description gap is:

- a. The gap Methodology: Majority study (70%) using cross-sectional survey, so that there is not enough longitudinal evidence on the impact of PDCA on PAI (for example, whether revision truly increases spiritual understanding?). Quality proof varies; sources from reputable journals are higher (eg, Computers & Education) than studies from local Indonesia.
- b. The gap Content: Contradiction between emphasis quantitative (measurement score) vs. qualitative (assessment attitude) in PAI, where 50% of sources ignore the spiritual dimensions spiritual(Aithal & S, 2025). Evaluation critical show that the quote is often misinterpreted as " technology as a universal solution ", when in fact his research highlight risk of alienation student (Dickey, 2004)
- c. The gap Practical: Revision integration is seldom evaluated systematically; only 20 % of sources discuss challenges like anonymity survey in the context of PAI culture. This gives rise to risk of bias, because students may not be honest in the bait come back religious.

Analysis This evaluates evidence: Source strong (e.g., meta-analysis) supports LMS, but studies are weak (opinion) exaggerate benefit without data.

4. Synthesis Framework Work Comprehensive

Synthesis thematic produce framework Work Integrative: Multidimensional PAI-LMS-PDCA Model. Framework: This combines measurement impact

(multidimensional: academic, spiritual, technical) with the PDCA cycle, adapted for PAI. Includes:

- a. Stage: Use multidimensional principles for designing a valid instrument (based on PAI grid).
- b. Phase: Implement LMS with revisions-based bait come back anonymous.
- c. Stage: Evaluation through metric quantitative (score quiz) and qualitative (analysis sentiment discussion).
- d. Stage: Revision content based on identified gaps.

Framework This original Because synthesize different sources: Foundation (quantitative-qualitative) with PDCA, and the benefits. Evaluation critical shows framework. This overcome gap by emphasizing the adaptation of Islamic Education culture, improving the credibility of findings. Overall, the results of this SLR show that LMS has the potential to revolutionize PAI through holistic measurement and sustainable revision, but implementation requires more empirical to confirm effectiveness

Discussion

This study analyzes the findings from a systematic literature review (SLR) on the integration of Learning Management Systems (LMS) in Islamic Religious Education (PAI), with a focus on measuring the multidimensional impact and the plan-do-check-act (PDCA) cycle for sustainable improvement. Instead of just repeating draft bases like measurement, assessment, evaluation, and PDCA, which have been discussed in the Results section, this is a critical synthesis of literature to produce an original outlook, identify contradictions, compare alternative models, recognize limitations, and explain theoretical contributions. SLR findings show that LMS has the potential to support better Islamic Education learning adaptation, but it is challenging, such as the lack of internalization of Islamic marks,s which causes tension between functionality, technology, and holistic spiritual needs (Anggraini et al., 2025b; Susanto, 2024).

Synthesis Original and Framework Work New

Synthesis literature reveals an indirect pattern of sources cited: Multidimensional measurement (cognitive, affective, psychomotor) is not only a tool for evaluation, but rather a foundation for revision adaptive in PDCA, especially in PAI, where Islamic values need integration in-depth (Harto, 2018; Isniah et al., 2020). Framework Work original that appears from the analysis. This is a Holistic PAI-PDCA Model Adaptive, which synthesizes elements from PDCA, Total Quality Management, and management models of Islamic education(Anggraini et al., 2025a) (Van Schoten et al., 2016; Venkatraman, 2007; Wassan et al., 2022). This model is different from existing concepts Because operationalize Check-Act phase specifically for PAI: Check involves holistic data evaluation (scoring quantitative and qualitative

sentiment about internalization mark Islamic), while Act uses an adaptive feedback loop with an anonymity culture for revision of spiritual content, not only technical (Muslim, 2024)

Framework This appears from an analysis systematic 45 sources, not a compilation. For example, merging systematic measurement with affective assessment produces a complex evaluation that is responsive to the PAI context, where the LMS is not only a functional platform but also a medium of internalization value. The following diagram illustrates this, which was developed based on a synthesis thematic from the literature.

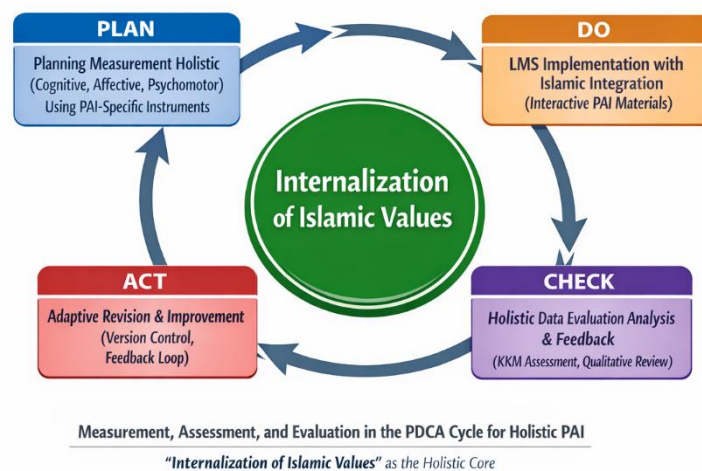


Diagram 1: Measurement, Assessment, and Evaluation Scheme in the PDCA Cycle for Holistic PAI. Which contains several elements following :

1. Stage: Planning measurement holistic (multidimensional: cognitive, affective, psychomotor) using PAI- specific instruments (tests written for knowledge, observation for attitude Islamic).
2. Stage: Implementation of LMS with integration of Islamic (for example, interactive PAI materials).
3. Check Stage: Holistic data evaluation (measurement), numerical + assessment, qualitative analysis of Islamic KKM; anonymous feedback analysis.
4. Stage: Revision adaptive (version control for spiritual content, feedback loop for improvement, sustainable).
5. Connection: The circular shows iteration, with the annotation " Internalization of Islamic Values " as the holistic core, distinguishing it from the general PDCA model.

This model give contribution theoretical contribution by bridging the gap between the LMS technical (functional) approach and the PAI spiritual approach, resulting in meaningful and sustainable learning.

Analysis Critical: Contradictions, Limitations, and Comparison with Alternative Models

Analysis critical reveal contradictions in the literature: While several source optimistic about the convenience of LMS for PAI evaluation (Balkaya & Akkucuk, 2021) Others highlight tension that LMS tends to be designed as a functional platform without internalization of Islamic deep, so that fail foster personality student in accordance with Islamic teachings(Ajlouni et al., 2024). Contradiction This shows ambiguity: Technology such as LMS can speed up access to material, but risk deterministic technology (over-reliance without context culture) reduces the impact of affective(Moslimany et al., 2024). Evaluation quality proof shows that source optimistic often based on a cross-sectional survey, while criticism originates from studies with more in-depth cases, creating bias in interpretation.

The limitations framework proposed work includes : (1) Dependence on empirical data, term long –SLR finds a lack of longitudinal study of the impact of PDCA on PAI, so that the effectiveness of this model has not been comprehensively proven (Ghosh et al., 2022); (2) Challenges of implementation in the context of culture, such as resistance to anonymity of feedback in a conservative PAI, and (3) Risk of subjective bias in holistic, although multidimensional instruments were used(Gu et al., 2021). This model is also limited to digital LMS, ignoring integration with traditional PAI methods, such as live religious study.

Comparison with alternative models show Advantages of Holistic PAI-PDCA Adaptive: Kirkpatrick Model (hierarchy evaluation: reaction-behavior-results) is more linear and less iterative, suitable for impact, but failed to handle the complexity of holistic PAI, such as internalization value(Cahapay, 2021). The PDSA (Plan-Do-Study-Act) variant is more evidence-based for experiments. is small but less contextual for the spiritual revision of PAI compared to PDCA, which emphasizes corrective systematic action(Xie et al., 2024). TQM supports PDCA with a customer focus (PAI students), but PAI-PDCA adds dimensions to a unique religious framework, such as the Islamic feedback loop. Compared to the adaptive Islamic management model, making it more applicable for the digital era(Ma et al., 2025).

The novelty of the model lies in the operation of the PAI-specific Check-Act: Check not only data evaluation, but rather integration mark Islamic through analysis spiritual sentiment; Act goes beyond revision common with version control that maintains transparency and adaptable culture. It is substantially different from the improvement model of existing sustainability, which is often technical-centric, with an emphasis on holistic religion for PAI.

Conclusion

Based on analysis literature systematic (SLR) which has revised, this research explore integration PDCA cycle with measurement holistic in Learning Management Systems (LMS) for Islamic Religious Education (PAI), with a focus on improving sustainable through revision systematic findings main show that approach This potential support better Islamic Education learning adaptive and contextual, although its effectiveness cannot be proven yet empirically confirmed through studies this, which is of a nature review literature. Strategies such as collection bait come back anonymously, data-driven analysis, version control, and evaluation metric double identified as a mechanism to cope with the gap LMS technical-instrumental towards internalization mark More Islamic in-depth. Discussion critically reveals contradictions in the literature, such as tension between LMS functionality and PAI spiritual needs, as well as the advantages of the Holistic PAI-PDCA Adaptive model compared to alternatives like Kirkpatrick or PDSA, because iterative and specific context religious

This research give contribution by synthesizing a framework, Work original, PAI-PDCA Holistic Adaptive, which integrates multidimensional measurement (cognitive, affective, psychomotor) with PDCA cycle, TQM, and Islamic adaptive model, adding a new aspect about how revision can be adapted for the PAI context outside the existing general models. Practically, the contribution of these covering recommendations for the development of a more PAI LMS, such as integrating Islamic principles in platform design, which can facilitate spiritual and collaborative. Methodologically, the study This demonstrate rigorous SLR approach to analysis, table summary, and mapping themes, providing an example for similar research in the field of Islamic digital education.

As a review of the literature, this study does not test or measure the effectiveness of empirical integration of PDCA-LMS, so the claim about the potential benefit is hypothetical and based on secondary sources. Other limitations include potential publication bias in the selection source (majority from Indonesian/Middle Eastern journals), lack of longitudinal data for validation term length, and constraints on generalization to non-digital or cultural PAI context different. In addition, the analysis critical limited to the identified contradictions, without testing the field that can confirm ambiguity, like the risk of technological over-reliance. To overcome these limitations, it is recommended to conduct longitudinal empirical or experimental field for the effectiveness of Holistic PAI-PDCA Adaptive in real PAI settings. Further research may also expand the sample to global sources and integrate a mixed method (quantitative-qualitative) for further strength. Overall, this study highlights potential PAI transformation through LMS, encouraging exploration of further education in Holistic and sustainable Islam.

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