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Facilities and Infrastructure Management as a Strategic Pillar of Islamic Educational Governance: A Multiple-Case Study of Graduation Productivity at Public Senior High Schools in Jambi Province

Sahudi Ramli[1], Ahmad Syukri[2], Samsu[3]
[123] Program Doktor Pasca Sarjana Universitas Islam Negeri Sulthan Thaha Saifuddin Jambi, Indonesia
Email: naylamaulidya664@gmail.com, apramandoko@gmail.com, hasyim.asyari@uinjkt.ac.id

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Abstract:
Effective management of educational facilities and infrastructure constitutes a strategic organizational capability that directly influences institutional productivity and graduate quality. Grounded in the principles of Islamic educational management—particularly the concepts of amanah (trusteeship), mas'uliyyah (accountability), and ihsan (excellence)—this study investigates how facilities and infrastructure management contributes to improving graduation productivity at public senior high schools in Jambi Province, Indonesia. A qualitative multiple-case study design was employed, involving three purposively selected schools representing urban, semi-urban, and rural contexts. Data were generated through participatory observation, semi-structured interviews with 24 participants, and document analysis, and were analyzed using Braun and Clarke's (2022) thematic analysis framework assisted by NVivo 15. Six interrelated managerial dimensions were identified: strategic planning, optimal facility utilization, preventive maintenance, digital infrastructure integration, collaborative leadership, and constraint management. Schools that consistently apply Islamic management principles across all six dimensions demonstrate higher graduation productivity and graduate quality. The study contributes to the discourse on Islamic educational management by reconceptualizing facilities management as a strategic, values-driven organizational capability rather than a mere administrative function.

Keywords: *Islamic educational management; facilities management; graduation productivity; qualitative case study; Jambi Province*

Abstrak *:*
Pengelolaan fasilitas dan infrastruktur pendidikan yang efektif merupakan kemampuan strategis organisasi yang secara langsung memengaruhi produktivitas lembaga dan kualitas lulusan. Berlandaskan pada prinsip-prinsip manajemen pendidikan Islam—khususnya konsep amanah (kepercayaan), mas'uliyyah (pertanggungjawaban), dan ihsan (keunggulan)—penelitian ini mengkaji bagaimana pengelolaan fasilitas dan infrastruktur berkontribusi terhadap peningkatan produktivitas kelulusan di sekolah menengah atas negeri di Provinsi Jambi, Indonesia. Desain studi kualitatif multi-kasus digunakan, melibatkan tiga sekolah yang dipilih secara purposif yang mewakili konteks perkotaan, semi-perkotaan, dan pedesaan. Data dikumpulkan melalui observasi partisipatif, wawancara semi-terstruktur dengan 24 peserta, dan analisis dokumen, serta dianalisis menggunakan kerangka analisis tematik Braun dan Clarke (2022) dengan bantuan NVivo 15. Terdapat enam dimensi manajerial yang saling terkait: perencanaan strategis, pemanfaatan fasilitas secara optimal, pemeliharaan preventif, integrasi infrastruktur digital, kepemimpinan kolaboratif, dan manajemen kendala. Sekolah-sekolah yang secara konsisten menerapkan prinsip-prinsip manajemen Islam di seluruh enam dimensi tersebut menunjukkan produktivitas kelulusan dan kualitas lulusan yang lebih tinggi. Penelitian ini berkontribusi pada wacana mengenai manajemen pendidikan Islam dengan mengonseptualisasikan ulang manajemen fasilitas sebagai kemampuan organisasi yang strategis dan didorong oleh nilai-nilai, bukan sekadar fungsi administratif.

Kata Kunci*:* *Manajemen pendidikan Islam; manajemen fasilitas; produktivitas kelulusan; studi kasus kualitatif; Provinsi Jambi*

INTRODUCTION

The quality of educational outcomes is shaped not only by curriculum design and teacher competence but also by the availability and effective management of educational facilities and infrastructure. In Islamic educational thought, the management of institutional resources is inseparable from the principle of *amanah* (trusteeship), which obligates those entrusted with institutional resources to manage them with integrity, accountability, and purposefulness toward educational excellence (Nata 2016, 156; Muhaimin 2015, 43). As affirmed in Islamic scholarship, every leader is a steward (*ra'in*) responsible for those under their care—a principle extending to the management of school infrastructure as a public trust (al-Nahlawi 2004, 347). Contemporary Islamic educational management scholars increasingly recognize facilities management as a strategic dimension of institutional leadership rather than merely an operational support function (Latif et al. 2023; Qomar 2007).

Graduation productivity—understood not merely as completion rates but as the holistic quality of graduates in terms of academic achievement, character, and twenty-first-century competencies—represents a critical measure of institutional effectiveness. Research consistently demonstrates that schools providing conducive learning environments with adequate facilities, reliable technology, and well-maintained infrastructure generate higher student engagement, lower dropout risks, and stronger graduation outcomes (Barrett et al. 2023; Bush 2020; OECD 2023). However, the relationship between facilities management as an organizational *process* and graduation productivity remains underexplored, particularly within the framework of Islamic educational governance.

In Indonesia, national education policy requires every school to meet minimum standards of facilities and infrastructure. Nevertheless, significant disparities persist among regions in infrastructure quality, technological readiness, and maintenance systems, disparities especially pronounced in provinces with diverse geographical and socio-economic contexts such as Jambi (Ministry of Education, Culture, Research, and Technology 2022). Existing research predominantly examines infrastructure through quantitative availability indicators while neglecting the managerial processes—planning, utilization, maintenance, and leadership—that determine whether infrastructure translates into meaningful educational outcomes (Amaratunga et al. 2021; Earthman 2021).

Furthermore, the conceptual positioning of facilities management within Islamic educational governance remains underdeveloped. Most studies treat Islamic principles as normative backdrop rather than an analytical lens capable of explaining managerial behavior under resource constraints. This gap is significant because Islamic management values—including *mas'uliyyah* (accountability to God and stakeholders), *ihsan* (striving for excellence in every action), and *shurah* (deliberative consultation)— provide a distinctive normative framework that can explain variations in managerial behavior beyond what purely secular theories predict (Nata 2016; Samsu 2022; Mukhtar, Risnita, and Prasetyo 2020).

This study addresses these gaps through a qualitative multiple-case study of three public senior high schools in Jambi Province: SMAN 1 Kota Jambi (urban), SMAN 1 Batanghari (semi-urban), and SMAN 7 Sarolangun (rural). These schools were selected because they maintain consistently high graduation rates while representing contrasting contexts of infrastructure availability and managerial practice. The study pursues three objectives: (1) to identify the dimensions of facilities and infrastructure management that contribute to graduation productivity; (2) to analyze how Islamic educational management principles are operationalized through facilities management practices; and (3) to examine how contextual factors moderate the relationship between infrastructure management and graduation outcomes.

METHOD

Research Design and Site Selection

This study employed a qualitative multiple-case study design following Yin (2024) and Creswell and Poth (2018), which enables cross-case comparison while preserving contextual richness. Three public senior high schools in Jambi Province were purposively selected based on five criteria: (a) Grade A national accreditation; (b) graduation rates consistently above the provincial average for three consecutive years; (c) implementation of school-based facilities management; (d) willingness to participate; and (e) representation of urban (SMAN 1 Kota Jambi), semi-urban (SMAN 1 Batanghari), and rural (SMAN 7 Sarolangun) educational contexts. Data collection was conducted between January and June 2026.

Participants and Data Collection

A total of 24 participants were selected through purposive sampling, comprising three school principals, six vice-principals, nine senior teachers, three facilities coordinators, and three school committee representatives. Data were generated through methodological triangulation (Denzin and Lincoln 2018): (1) *participatory observation* of facility conditions, classroom environments, laboratories, and ICT infrastructure; (2) *semi-structured in-depth interviews* lasting 45–90 minutes each, audio-recorded with informed consent, exploring strategic planning, maintenance systems, digital infrastructure, leadership practices, and Islamic management values; and (3) *document analysis* of School Strategic Plans (RKS), Annual Budget Plans (RKAS), facility inventories, maintenance records, accreditation documents, and graduation reports (2022–2025).

Data Analysis and Trustworthiness

Data were analyzed using Braun and Clarke's (2022) six-step thematic analysis framework assisted by NVivo 15. Trustworthiness was established through prolonged engagement, data and method triangulation, member checking, and peer debriefing (Lincoln and Guba 1985). Participant confidentiality was maintained through pseudonymous coding (P1–P24), and ethical approval was obtained from the institutional research ethics committee prior to data collection.

RESULT AND DISCUSSION

Results

Thematic analysis generated six interrelated themes explaining how facilities and infrastructure management contributes to graduation productivity. Table 1 provides an overview of the themes and their distribution across the three school contexts.

Table 1 Distribution of Identified Themes Across School Contexts

Theme	SMAN 1 Kota Jambi (Urban)	SMAN 1 Batanghari (Semi-Urban)	SMAN 7 Sarolangun (Rural)
Strategic Planning	Comprehensive	Moderate	Priority-based
Optimal Facility Utilization	High	Moderate	Constrained
Preventive Maintenance	Systematic	Periodic	Corrective
Digital Infrastructure Integration	Advanced	Developing	Limited
Collaborative Leadership	Strong	Moderate	Community-driven
Constraint Management	Moderate	Moderate	High

Strategic Planning Aligned with Islamic Accountability (Mas'uliyyah)

All three schools incorporated facilities planning into their School Strategic Plans (RKS), reflecting the Islamic management principle of *mas'uliyyah* (accountability). Implementation depth varied significantly. At SMAN 1 Kota Jambi, annual collaborative planning meetings involved principals, teachers, administrative staff, and school committees, with approximately 28% of

operational budgets (2023–2025) allocated to infrastructure improvement. Principal P1 explained: "Every infrastructure investment must be justified by its direct contribution to student learning outcomes. We are accountable to parents, the government, and, ultimately, to God for how we manage these resources." SMAN 7 Sarolangun prioritized essential maintenance over development due to limited financial capacity, yet demonstrated strong accountability through transparent resource allocation and community reporting. Facilities coordinator P21 noted: "We prioritize what directly affects classroom learning. Everything is documented and reported to our school committee."

Optimization of Learning Facilities through Ihsan (Excellence)

Observations revealed that schools with similar physical resources produced different educational outcomes because of differences in utilization quality, reflecting the Islamic principle of *ihsan* (performing every action with excellence). SMAN 1 Kota Jambi maximized science laboratories, digital classrooms, and library resources through scheduled practical sessions and blended learning throughout the academic year. Teacher P8 noted: "Students are more motivated when practical activities are supported by complete laboratory facilities. Learning becomes more meaningful and connects to real life." SMAN 1 Batanghari demonstrated creative optimization by integrating available multimedia equipment into instruction despite fewer resources, while SMAN 7 Sarolangun compensated for infrastructure limitations through collaborative learning and rotating laboratory schedules. Table 2 compares utilization practices across schools.

Table 2 Comparison of Infrastructure Utilization Practices Across Schools

Facility Type	SMAN 1 Kota Jambi	SMAN 1 Batanghari	SMAN 7 Sarolangun
Science Laboratory	Scheduled weekly practicals	Bi-weekly, teacher-guided	Rotating groups
Digital Classroom/ICT	Full LMS integration; daily	Selective multimedia use	Offline apps; shared lab
Library	Digital catalogue; open daily	Conventional + e-reference	Conventional; limited hours
Sports & Recreation	Structured PE; maintained	Adequate; maintained	Partially functional

Preventive Maintenance and Institutional Sustainability

Schools implementing preventive maintenance demonstrated better infrastructure quality and fewer instructional disruptions. SMAN 1 Kota Jambi employed semester-based inspection schedules covering classrooms, electrical systems, laboratory equipment, ICT infrastructure, and sanitation, with clearly distributed responsibilities among administrative personnel and external contractors. Facilities coordinator P5 stated: "Preventive maintenance is a long-term investment. Every rupiah spent on prevention saves five on emergency repairs—and more importantly, it protects learning continuity." SMAN 7 Sarolangun primarily conducted corrective maintenance after facility deterioration due to budget constraints, occasionally disrupting practical learning sessions. Despite this, school leaders maintained continuity through temporary classroom arrangements and community support, demonstrating resilient stewardship under resource constraints.

Digital Infrastructure and Twenty-First-Century Learning

Digital transformation emerged as a critical dimension of contemporary facilities management. SMAN 1 Kota Jambi invested substantially in wireless internet, learning management systems, projectors, and online assessment platforms. Students reported improved independent learning: "We can access learning materials and review examination topics anytime through the school's platform" (P18). SMAN 1 Batanghari expanded digital infrastructure through government assistance programs, while SMAN 7 Sarolangun experienced connectivity

constraints that limited digital learning. School leaders at SMAN 7 maximized existing ICT resources through shared computer laboratories and offline learning applications, reflecting the Islamic management ethos of optimizing available resources (*iqtisad*) rather than awaiting ideal conditions.

Collaborative Leadership and Shurah-Based Governance

Leadership emerged as the organizational factor connecting all infrastructure management dimensions. School principals consistently operationalized *shurah* (deliberative consultation) by involving teachers, administrative staff, school committees, parents, alumni, and local government in infrastructure planning and decision-making. Principal P1 explained: "Infrastructure management cannot be handled by the principal alone. Our committees deliberate every major investment decision together." This collaborative governance model increased organizational transparency and stakeholder commitment to educational quality, consistent with distributed leadership theory's emphasis on shared rather than hierarchical decision-making (Harris 2020; Hallinger 2020).

Constraints and Contextual Challenges

Despite achievements, four major constraints were identified. Table 3 summarizes challenges and their relative severity across contexts.

Table 3 Major Constraints in Facilities Management Across School Contexts

Constraint Category	SMAN 1 Kota Jambi	SMAN 1 Batanghari	SMAN 7 Sarolangun
Financial limitations	Moderate	Moderate	High
HR capacity in facilities	Low	Moderate	High
Digital infrastructure gaps	Low	Moderate	High
Geographic accessibility	None	Low	High

Financial limitations were the most frequently cited challenge across all schools. School committee representative P22 noted: "Government funding covers essential operational needs, but infrastructure modernization requires supplementary funding from external partnerships and community contributions." Rural SMAN 7 Sarolangun faced compounded challenges: limited budgets, specialist personnel shortages, and higher procurement costs due to geographical remoteness.

Discussion

Islamic Educational Management as an Analytical Framework

The findings demonstrate that facilities and infrastructure management is not merely a technical function but a strategic expression of Islamic educational governance. Three Islamic management principles consistently explained observable differences in managerial behavior and graduation outcomes. First, *amanah* (trusteeship) manifested in how school leaders framed infrastructure decisions as acts of institutional stewardship. Principals who articulated clear accountability to multiple stakeholders—students, parents, community, and God—demonstrated more systematic and evidence-based planning (Nata 2016; Latif et al. 2023). This finding extends Muhaimin's (2015) framework of Islamic institutional leadership, which positions infrastructure stewardship as a dimension of spiritual accountability rather than bureaucratic compliance.

Second, *ihsan* (excellence in practice) explained the utilization gap between schools. Schools maximizing the use of existing facilities through creative pedagogical strategies—even under resource constraints—demonstrated higher student engagement and graduation productivity. This resonates with the resource-based view (Barney 1991), which posits that institutional performance depends not on resource availability alone but on the capability to deploy resources effectively. The Islamic concept of *ihsan* provides a normative motivation for

this capability: suboptimal performance is itself ethically unacceptable in Islamic management thought (al-Nahlawi 2004, 349; Qomar 2007).

Third, *shurah* (deliberative consultation) explained variations in leadership effectiveness. Schools that institutionalized participatory decision-making in infrastructure governance demonstrated stronger stakeholder commitment, more creative constraint management, and more sustainable maintenance cultures. This is consistent with distributed leadership theory (Harris 2020; Hallinger 2020; Leithwood, Harris, and Hopkins 2020). The distinctively Islamic contribution lies in *shurah*'s normative grounding: consultation is morally obligatory, generating deeper institutional commitment that secular distributed leadership theory alone does not fully explain.

Strategic Planning and Graduation Productivity

Strategic planning emerged as the foundational dimension connecting facilities management to graduation productivity. Schools integrating infrastructure development into their institutional strategic plans demonstrated greater consistency between resource investment and educational objectives, supporting Bush's (2020) argument that strategic educational planning improves organizational effectiveness by aligning resource allocation with institutional priorities. The Islamic dimension is significant: planning in Islamic management theory is understood as a form of *ikhtiyar* (purposeful choice) that reflects long-term commitment to the institution's educational mission (*risalah*).

Preventive Maintenance and Educational Sustainability

Preventive maintenance proved more effective than corrective approaches for sustaining learning continuity and protecting institutional investments, consistent with sustainable facilities management theory (Amaratunga et al. 2021; Earthman 2021). From an Islamic perspective, the obligation to prevent harm (*dar' al-mafsadah*) before it occurs is a recognized Islamic legal maxim applicable to institutional management. The financial disparities among schools reveal a systemic challenge: rural schools operating under tighter budgets are structurally disadvantaged in implementing preventive maintenance, reinforcing inequities in graduation productivity. This suggests that equitable educational financing must incorporate dedicated maintenance allocations.

Digital Infrastructure and Educational Justice (*'Adalah*)

Digital infrastructure has become an essential component of contemporary educational facilities management (OECD 2023; UNESCO 2024). Digital technologies improved graduation productivity not by replacing teachers but by expanding learning access and flexibility. The Islamic management principle of *tajdid* (renewal and adaptation) supports embracing technological innovation in service of the educational mission (Samudi, Rahmianti, and Nurdin 2022). The significant digital divide between urban and rural schools, however, raises concerns about educational justice (*'adalah*) that Islamic management frameworks must explicitly address. Infrastructure equity is not merely a policy concern but an ethical imperative rooted in Islamic values of fairness and equal access to knowledge.

Proposed Conceptual Model

Based on the cross-case findings and theoretical integration, this study proposes an Islamic Educational Management model linking facilities management to graduation productivity through six strategic dimensions mediated by Islamic governance values. The model posits that the effectiveness of each managerial dimension is moderated by three Islamic management principles—*amanah*, *ihsan*, and *shurah*—which collectively determine whether infrastructure management functions as a strategic organizational capability or remains a routine administrative activity. This model extends existing educational management frameworks (Bush 2020; Hallinger 2020) by incorporating Islamic normative dimensions as explanatory and moderating variables, offering a culturally grounded theoretical contribution to Islamic educational management discourse in Southeast Asian contexts. Conceptually, this study advances the argument of Samsu

(2022) and Mukhtar, Risnita, and Prasetyo (2020) that effective Islamic educational leadership integrates normative values with strategic management functions.

CONCLUSION

This study demonstrates that effective facilities and infrastructure management constitutes a strategic determinant of graduation productivity in public senior high schools in Jambi Province. Six interrelated dimensions—strategic planning, optimal facility utilization, preventive maintenance, digital infrastructure integration, collaborative leadership, and constraint management—collectively shape the quality of learning environments that foster student success. Schools that operationalize Islamic educational management principles—particularly *amanah* (trusteeship), *ihsan* (excellence), and *shurah* (deliberative consultation)—across all six dimensions consistently demonstrate higher graduation productivity, irrespective of infrastructure quantity. This finding challenges the conventional view of facilities management as an administrative support function and repositions it as a values-driven strategic capability central to Islamic educational governance. Practically, school principals should integrate facilities management into institutional strategic planning while grounding infrastructure decisions in Islamic accountability principles; local governments should establish equitable, dedicated maintenance funding mechanisms; and national quality assurance systems should incorporate infrastructure management effectiveness indicators. Future research should employ mixed-methods or longitudinal designs across multiple provinces and include Islamic boarding schools (*pesantren*) and madrasah to further elaborate the relationship between Islamic management values, infrastructure governance, and educational productivity.

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