

SCHOOL FACILITY AND MANAGEMENT IN INDONESIA: A SYSTEMATIC LITERATURE REVIEW OF AVAILABILITY, CHALLENGES AND SUSTAINABILITY

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Abstract

School facility play an important role in supporting educational quality, student wellbeing, and learning effectiveness. However, challenges related to the availability, management, and sustainability of educational facilities remain evident in many Indonesian school. This study aims to systematically review previous studies on school facility availability and management in Indonesia using the Systematic Literature Review (SLR) approach. The review followed the PRISMA framework through the stages of identification, screening, eligibility, and inclusion. Literature searches were conducted using four databases, namely Scopus, Google Scholar, ERIC, and ProQuest. A total of 12 studies underwent the quality appraisal process using an adapted version of the Critical Appraisal Skills Programme (CASP) checklist, in which three low-quality studies were excluded, resulting in nine studies in the final thematic synthesis. The findings indicate that school facilities in Indonesia continue to face challenges related to infrastructure disparities, inadequate sanitation and learning facilities, weak maintenance practices, and disaster-related vulnerabilities, particularly in border, disaster-prone, and underserved areas. The review also reveals that school facility management practices remain largely operational and fragmented, focusing primarily on maintenance, utilization, supervision, and budgeting process. In addition, school facilities were found to influence students' learning experiences, well-being, literacy engagement, and participation in educational activities. Overall, this study highlights the importance of strengthening sustainable facility management systems, equitable infrastructure development, and resilience-oriented educational policies to support safe, inclusive, and effective learning environments in Indonesia.

Keywords: Educational Infrastructure, Facility Management, School Facilities, Systematic Literature Review

Abstrak

Fasilitas sekolah memiliki peran penting dalam mendukung kualitas pendidikan, kesejahteraan siswa, dan efektivitas pembelajaran. Namun, tantangan terkait ketersediaan, pengelolaan, dan keberlanjutan fasilitas sekolah masih ditemukan di banyak sekolah di Indonesia. Penelitian ini bertujuan untuk meninjau secara sistematis

studi-studi sebelumnya mengenai ketersediaan dan manajemen fasilitas sekolah di Indonesia dengan menggunakan pendekatan Systematic Literature Review (SLR). Proses tinjauan dilakukan dengan mengikuti kerangka PRISMA melalui tahapan identification, screening, eligibility, dan inclusion. Penelusuran literatur dilakukan menggunakan empat basis data, yaitu Scopus, Google Scholar, ERIC, dan ProQuest. Sebeanyak 12 studi menjalani proses quality appraisal menggunakan adaptasi Critical Appraisal Skills Program (CASP) checklist, di mana tiga studi berkualitas rendah dikeluarkan sehingga menghasilkan sembilan studi yang termasuk dalam sintesis tematik akhir. Temuan penelitian menunjukkan bahwa fasilitas sekolah di Indonesia masih menghadapi berbagai tantangan terkait kesenjangan infrastruktur, keterbatasan fasilitas sanitasi dan pembelajaran, lemahnya praktik pemeliharaan, serta kerentanan terhadap bencana, khususnya di wilayah perbatasan, daerah rawan bencana, dan wilayah tertinggal. Tinjauan ini juga menunjukkan bahwa praktik manajemen fasilitas sekolah masih bersifat operasional dan terfragmentasi, dengan fokus utama pada pemeliharaan, pemanfaatan, pengawasan, dan proses penganggaran fasilitas. Selain itu, fasilitas sekolah ditemukan berpengaruh terhadap pengalaman belajar, kesejahteraan, keterlibatan literasi, dan partisipasi siswa dalam kegiatan pembelajaran. Secara keseluruhan, penelitian ini menekankan pentingnya penguatan sistem manajemen fasilitas berkelanjutan. Pembangunan infrastruktur yang merata, serta kebijakan pendidikan berbasis ketahanan untuk mendukung lingkungan belajar yang aman, inklusif, dan efektif di Indonesia.

Kata kunci: Fasilitas Sekolah, Infrastruktur Pendidikan, Manajemen Fasilitas, Systematic Literature Review.

INTRODUCTION

The quality of education in schools is strongly influenced by the physical environmental factors that support the learning process (Widati, 2018). School facilities are not supplementary elements, but serve as essential prerequisite for ensuring a safe, comfortable and productive learning environment for both students and teachers (Elvi Mailani et al., 2024). Global research has consistently shown that adequate infrastructure plays a critical role in enhancing student motivation, engagement and academic achievement (Zurainan et al., 2021). Key component such as classrooms, laboratories, libraries, sports facilities, and access to clean water and proper sanitation are integral to establish a conducive educational setting (Agarwal, 2020).

However, in Indonesia, challenges in the provision and management of school facilities remain a critical concern. Regional disparities, limited budgets, and weak maintenance have led to widespread issues such as damaged infrastructure, inadequate learning space, and insufficient access to essential facilities like laboratories and libraries (Wijayanti et al., 2024). Local studies have also indicated many laboratories in secondary schools are underutilized due to lack of adequate equipment and trained personnel (Indriastuti et al., 2013).

Furthermore, facility management challenges also include aspects of sustainability and inclusivity. UNESCO report (2020) emphasizes the importance of applying universal design principles in the construction of school facilities to be inclusive of all students, including those with special needs. The reality on the ground reveal that many schools in

developing countries, including Indonesia, still fall short of meeting accessibility standards for people with disabilities (Glewwe & Kremer, 2006). This gap is not merely a technical issue, but also reflects the lack of integration of social justice principles within the governance of education system.

Several international studies also highlight that the availability of physical facilities cannot be separated from supporting facilities such as dormitories or safe student housing. For instance, research conducted in Oman demonstrates that residing in campus dormitories has a significantly contribute to students' independence and academic performance. This finding suggests that the development of educational facilities must also consider the social dimensions of students' lives (Khan et al., 2020). In addition, facility management plays vital role in shaping student's character and promoting healthy living habits. A study in Pakistan found that the quality of sports facilities in schools is significantly associated with student's physical condition and obesity levels of children and adolescents (Tanveer et al., 2024). Furthermore, effective school library management has also been linked to enhance information literacy and promoting a reading culture within educational institutions (Spear, 2018).

Along with the advancement of educational technology that support pedagogical teacher' competence (Athallah et al., 2025). The rise of the smart classroom concept, new challenges have emerged. Digital literacy, internet connectivity, and the integration of interactive devices have become essential indicators in evaluating modern school facilities (Kaur et al., 2022). However, the digital divide between regions and the limited digital infrastructure in Indonesian schools continue to hinder the equitable implementation of these innovations (Hadiyat, 2014). These conditions highlight the need for digital infrastructure to be an integrated as core component of education facility management policies. Furthermore, inadequate education facilities have been shown to influence parental preferences in schools' selection. A study conducted in Riyadh found that parents tend to choose private schools due the superior quality of their facilities compared to public schools (Alsaiyadi, 2015). This finding suggests that the availability and effective management of facilities play significant role in shaping public perceptions of educational quality.

Although numerous studies have examined various aspects of school facilities in Indonesia, existing research tend to be fragmented and context-specific, often focusing on isolated cases or particular types of facilities. More importantly, there is a lack of integrative analysis that systematically connect issues of availability, management practices, or specific challenges. As a result, there is a lack of integrative analysis that systematically connect these dimensions into a coherent understanding. This fragmentation limits the ability to identify recurring patterns such as disparities in facility provision, inefficiencies in management practices, and multidimensional challenges related to infrastructure, governance, and external risks. Consequently, existing literature provides limited support for developing comprehensive and evidence-based policy responses in the context of Indonesian education.

To address this gap, this study employs a Systematic Literature Review (SLR) approach to synthesize findings from selected studies in Indonesia. Unlike previous reviews that primarily provide descriptive summaries, this study seeks to offer a more analytical perspective that contributes to the development of more adaptive, context-sensitive, and sustainable facility management strategies in the Indonesian education system.

METHOD

This study employs a SLR approach guided by the Preferred Reporting Item for Systematic Reviews and Meta-Analyses (PRISMA) framework to ensure a systematically, transparently, and in replicable manner. PRISMA provides structured reporting guidance through four main stages: identification, screening, eligibility, and inclusion, allowing the study selection process to be clearly presented while minimizing potential bias in article selection (Moher et al., 2010).

In supporting the data management and analysis process, this study utilized several tools selectively based on research needs. Retrieved articles were organized using Mendeley to facilitate references management and duplicate identification. The study selection process was conducted manually based on predefined criteria within the PRISMA framework. To ensure the quality and credibility of the selected studies, this study also employed the Critical Appraisal Programme (CASP) as a quality appraisal approach. Furthermore, data analysis was carried out using NVivo to support systematic coding, data organization, and theme development.

Databases

The literature search in this study was conducted using two primary databases, Scopus and Google Scholar. These databases were selected to ensure comprehensive coverage of both international and national publications relevant to the research topic. Scopus was used to identify peer-reviewed international journal articles with high academic credibility, while Google Scholar was utilized to capture a broader range of literature, including studies focusing on the Indonesian context.

Although these databases are known for their extensive coverage, there remains a possibility that some relevant studies may not be indexed or retrieved. To minimize this potential bias, this study also included ERIC and ProQuest as supplementary databases. ERIC and ProQuest are widely recognized for their focus on education-related research. The inclusion of these additional databases aims to enhance the completeness and robustness of the literature search.

Process of SLR for Screening Articles

Identification

At the identification stage, relevant studies were retrieved from selected databases, namely Scopus, Google Scholar, ERIC, and ProQuest. The search process was conducted using predefined keywords related to school facilities, facility management, and the Indonesian context. To improve the accuracy and consistency of the search, Boolean

operators such as “AND” and “OR” were applied to combine relevant terms and refine search results. The detailed search string used in each database are presented in **Table 1**. To ensure comprehensiveness, backward and forward snowballing techniques were also applied to identify additional relevant studies that were not captured in the initial database search.

The search was limited to publications from 2020-2026 to ensure that the selected studies reflect recent development of school facilities. This time was selected to capture current conditions and evolving practices within the Indonesian education context, where facility influenced by ongoing policy dynamics, development disparities, and emerging educational needs. A total of 502 records was identified from all databases.

Table 1. Search String

DATABASES	SEARCH STRING
SCOPUS	(“school facilities” OR “educational infrastructure”) AND (“management” OR “maintenance”) AND (“Indonesia”)
GOOGLE SCHOLAR	School Facilities” AND Management AND Indonesia
ERIC	(“school facilities” OR “school infrastructure”) AND management AND Indonesia
PROQUEST	(“school facilities” OR “school infrastructure”) AND management AND Indonesia

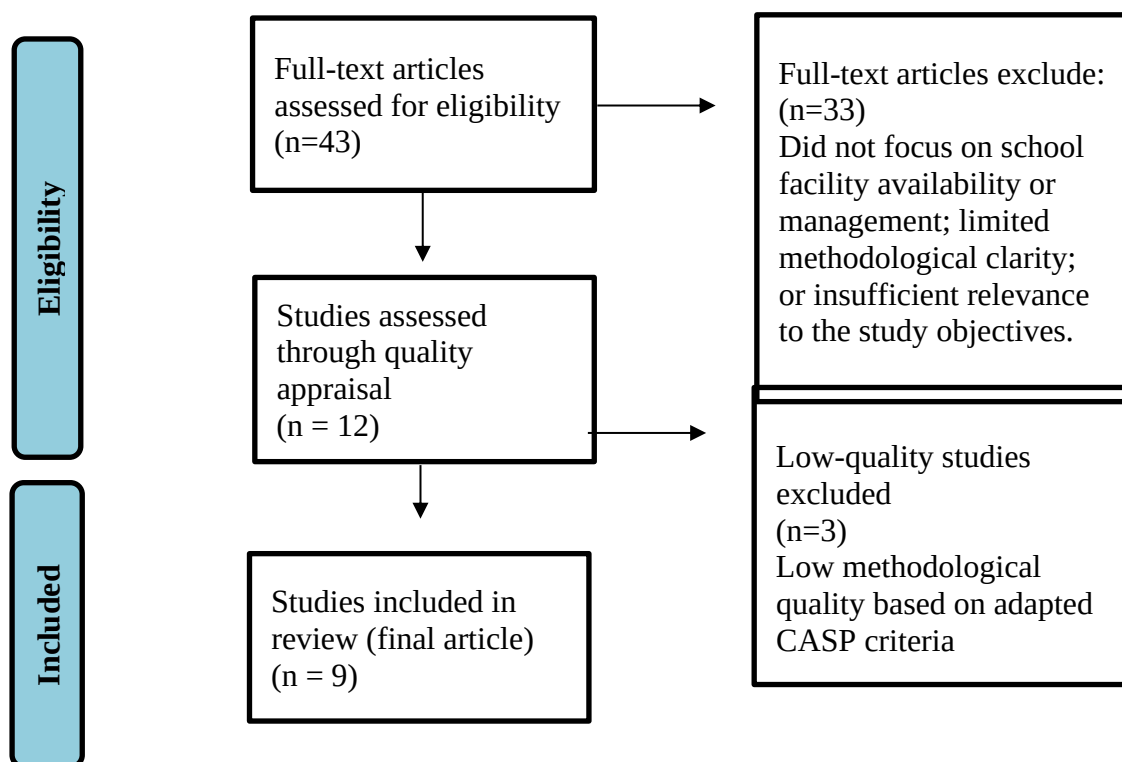
Screening

At the screening stage, duplicate records were removed, resulting in 482 unique records. These records were then screened based on their relevance to the research focus on school facility availability and management within the Indonesia context. The screening process was conducted using predefined inclusion and exclusion criteria, as presented in **Table 2**. As a result, 239 records were excluded, and 43 articles were retained for full text assessment.

Table 2. Data Selection Criteria

CRITERIA	INCLUSION	EXCLUSION
TYPE OF PUBLICATIONS	Journal articles	Books, Book chapter, conference preceeding, report and opinion paper
DATE OF PUBLICATIONS	2020-2025	Before 2020
PUBLICATIONS AREA	School Facility in Indonesia	Studies unrelated to school facilities or conducted outside Indonesia
LANGUAGE	English or Indonesia	Outside English or Indonesia

Eligibility



Each study was systematically assessed using a three-point scale consisting of Yes (1), Partial (0.5), and No (0). The total score for each study (maximum score = 10) was then used to categorize the overall quality into three levels: High (8.0-10), Medium (6.0-7.5), and Low (<5.5). following the quality appraisal, 12 were evaluated for methodological rigor. Three studies categorized as ‘Low’ quality were subsequently excluded from the final synthesis to ensure the credibility and reliability of the reviewed evidence. As a result, nine studies were retained for the final review and thematic analysis.

As presented in (Appendix 1), the appraisal results indicate that the majority of the selected studies demonstrate “Medium” to “High” methodological quality across the ten assessment criteria. Most studies clearly stated their research objective, employed appropriate research approaches and design, and adequately described their research contexts or samples. In addition, the reviewed studies generally demonstrated appropriate data collection and analysis procedures, while presenting findings were also evident in most studies. Furthermore, the majority of the selected articles were considered to provide meaningful contributions to the field of school facility management and educational infrastructure research in Indonesia. Variations in methodological reporting, and the comprehensiveness of contextual descriptions. These variations were taken into consideration during the interpretation and synthesis of the findings to ensure a balanced and critical review of the evidence.

RESULT AND DISCUSSION

The findings were organized into four main focuses: 1) the availability and physical condition of school facilities, 2) school facility management practices, 3) educational impact of schools’ facilities, and 4) disaster vulnerability and recovery challenges. Each

theme was analyzed narratively to identify recurring issues and patterns across the selected studies:

The Availability and Physical Condition of School Facilities

The availability and physical condition of school facilities remain significant issues across educational settings in Indonesia. Ahmed et al. (2023) and Royo et al. (2024) found that many schools in Central Sulawesi still experienced inadequate sanitation facilities, limited access to clean water, and insufficient menstrual hygiene support, particularly in disaster-affected areas. Similarly, Hiskya et al. (2025) reported that limited sports facilities reduced the effectiveness of physical education activities in border school along the Indonesia-Papua New Guinea border. Infrastructure vulnerability also emerged as a recurring issue, as Roi et al. (2023) identified that many schools building in Bandung, West Java were vulnerable to seismic risk and required further structural assessment, while Lassa et al. (2023) highlighted that flood disasters disrupted school activities and damaged educational facilities in several areas of Jakarta. Overall, these findings indicate that disparities in school facility availability and physical conditions remain evident across regions in Indonesia and reflect broader challenges related to infrastructure provision, maintenance, and disaster resilience.

School Facility Management Practices

The reviewed studies show that research on school facility management practices in Indonesia is implemented through different forms of educational support management, particularly in libraries, laboratories, and infrastructure development systems. Fiqriansyah (2021) highlighted that library management practices focused on improving reading services, organizing collections, and supporting students' reading interest through better facility utilization. In laboratory settings, Fitri & Wahyu (2023) found that management challenges were mainly related to equipment readiness, maintenance routines, and operational support for practical learning activities. Meanwhile, Fitriani et al. (2025) emphasized that the implementation of school facility management still required improvements in supervision and evaluation processes to optimize facility utilization within schools. Kaenong et al. (2023) applied a system dynamic approach to examine budgeting simulations and long-term facility fulfillment in vocational schools, particularly regarding classrooms, vocational practice rooms, toilets, and teacher's workspaces. Collectively, these studies indicate that school facility management practices in Indonesia vary depending on the type, function, and operational needs of school facilities.

Educational Impacts of School Facilities

The review studies demonstrate that school facilities have direct implications for students' learning, experiences, participation, and educational engagement. Fiqriansyah (2021) found that effective library facility and service management significantly influenced students' reading interest, indicating the importance of supportive learning environments in encouraging literacy activities. Similarly, Hiskya et al. (2025) reported that the

availability and condition of sports facilities affected the implementation of physical education learning activities in border schools. Ahmed et al. (2023) further highlighted that inadequate sanitation and WASH facilities negatively affected students' comfort, hygiene experiences, and wellbeing, particularly among female students in post-disaster school settings. In addition, Fitri & Wahyu (2023) showed that limitations in laboratory facility readiness influenced the effectiveness of practical learning implementation. Collectively, these studies indicate that school facilities play an important role in shaping the quality, accessibility, and effectiveness of educational experiences in Indonesian schools.

Disaster Vulnerability and Recovery Challenges

Several reviewed studies highlighted disaster vulnerability and post-disaster recovery as major challenges affecting school facilities in Indonesia. Lassa et al. (2023) reported that flood disasters disrupted learning activities and damaged educational infrastructure, affecting both school accessibility and learning continuity in affected areas. Roi et al. (2023) further found that many school buildings remained structurally vulnerable to seismic risks and required additional technical assessment to ensure safety standards. Meanwhile, Royo et al. (2024) emphasized that post-disaster recovery was not only related to rebuilding infrastructure, but also to maintaining safe and functional school facilities, particularly WASH services for students. The study highlighted challenges such as unreliable water supply, inadequate sanitation facilities, weak maintenance practices, and limited intervention sustainability in post-disaster schools. Ahmed et al. (2023) similarly reported that sanitation and hygiene facilities' remained inadequate several years after the disaster, especially regarding access to clean water and hygiene support. Collectively, these studies indicate that disaster-related challenges in Indonesian schools involve not only physical infrastructure vulnerability, but also long-term facility management, maintenance capacity, and recovery sustainability.

DISCUSSION

The findings of this review demonstrate that issues related to school facilities in Indonesia are not solely technical or infrastructural problems but also reflect broader disparities in educational access and development across regions. Several reviewed studies consistently reported inadequate sanitation facilities, limited sports infrastructure, vulnerable school buildings, and unequal access to educational support facilities, particularly in disaster-prone, border, and underserved areas. These findings support previous studies which argue that the quality of educational environments significantly influences learning conditions, student participation, and educational outcomes (Agarwal, 2020; Zurainan et al., 2021). The persistence of these problems indicates that educational infrastructure development in Indonesia remains uneven and strongly influenced by regional, environmental, and socioeconomic conditions.

The review also reveals that school facility management practices in Indonesia are still largely focused on operational and immediate needs rather than long-term sustainability

and strategic infrastructure governance. Existing studies primarily discuss facility utilization, maintenance routines, budget allocation, supervision, and service management within specific educational facilities such as libraries, laboratories, sanitation facilities, and vocational infrastructure. Although these practices contribute to educational activities, several studies highlighted weaknesses in maintenance consistency, infrastructure readiness, and evaluation processes (Fitri & Wahyu, 2023; Fitriani et al., 2025). Kaenong et al. (2023) further demonstrated that infrastructure fulfillment in vocational schools requires long-term budgeting strategies and systematic planning approaches to support educational participation rates. These findings suggest that school facility management in Indonesia still tends to be reactive and fragmented, particularly in addressing long-term infrastructure sustainability and equitable facility development.

Another important finding is that school facilities influence educational experiences beyond physical infrastructure alone. The reviewed studies indicate that facilities contribute to students' learning engagement, physical well-being, literacy development, hygiene experiences, and participation in school activities. Effective library management was associated with increased student reading interest (Fiqriansyah, 2021), while adequate sports facilities supported the implementation of physical education activities in schools located in border regions (Hiskya et al., 2025). Similarly, inadequate sanitation and WASH facilities negatively affected students' comfort and well-being, particularly among female students in post-disaster school environments (Ahmed et al., 2023). These findings reinforce the argument that educational facilities should not only be viewed as supporting infrastructure, but also as important components shaping inclusive, healthy, and effective learning environments.

This review also highlights the importance of integrating disaster resilience perspectives into school facility management and educational infrastructure policies. Several studies identified that flood disasters, seismic vulnerability, and post-disaster infrastructure damage continue to affect the sustainability of educational activities in Indonesia (Lassa et al., 2023; Roi et al., 2023). Furthermore, Royo et al. (2024) emphasized that post-disaster recovery challenges are closely associated with the sustainability of WASH services, maintenance practices, and long-term infrastructure functionality in schools. Despite these findings, disaster preparedness and resilience-based facility management remain relatively underexplored in the broader context of educational facility governance in Indonesia. This indicates the need for more integrated approaches that combine infrastructure development, maintenance systems, disaster preparedness, and educational continuity planning.

Overall, the findings of this review suggest that improving school facilities in Indonesia requires not only infrastructure expansion, but also stronger management systems, equitable resource allocation, and resilience-oriented educational policies. Greater collaboration between schools, governments, and local communities is essential to ensure

that educational facilities can effectively support safe, inclusive, and sustainable learning environments.

LIMITATION

This study has several limitations that should be acknowledged when interpreting the findings. First, the review was limited to studies published between 2020 and 2025, which may exclude earlier studies that could provide additional insight into the development of school facility management in Indonesia. Second, the literature search was restricted to four databases, namely Scopus, Google Scholar, ERIC, and ProQuest. Although these databases provide broad academic coverage, it is possible that relevant studies indexed in other databases were not captured in the review process. Third, the selected studies varied in research design, scope, and methodological quality, which may affect the consistency and comparability of findings across studies. In addition, most of the reviewed studies were context-specific and focused on particular regions, school levels, or facility types, limiting the generalizability of the findings to all educational contexts in Indonesia. Finally, this review focused primarily on the availability and management of physical school facilities and did not extensively examine emerging issues such as digital infrastructure, smart classroom systems, or technology-based facility management practices, which may become increasingly important in the future development of education in Indonesia.

CONCLUSION

The findings indicate that school facilities in Indonesia continue to face various challenges related to infrastructure availability, physical condition, management practices, and disaster vulnerability. Disparities in the provision of school facilities remain evident, particularly in disaster-prone, border, and underserved areas, where schools frequently experience inadequate sanitation facilities, limited learning infrastructure, and vulnerable building conditions.

The review also demonstrates that school facility management practices in Indonesia are still largely operational and fragmented, with most studies focusing on facility utilization, maintenance, supervision, and budgeting processes within specific educational contexts such as libraries, laboratories, sanitation facilities, and vocational schools. In addition, the findings highlight that educational facilities influence students' learning experiences, well-being, literacy engagement, and participation in educational activities. Disaster-related challenges further reveal the importance of integrating resilience and sustainability perspective into educational infrastructure management and policy development.

In general, this review suggests that improving school facilities in Indonesia requires not only infrastructure expansion, but also strengthening management systems, sustainable maintenance practices, equitable resource allocation, and resilience-oriented educational policies. This study provide insight for policymakers, school administrators, and education practitioners in developing more adaptive and sustainable school facility

management strategies, while also providing directions for future research on educational infrastructure and facility governance in Indonesia.

APPENDIX

Appendix 1. CASP quality appraisal of included studies
DOCX File. Appendix 1

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