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Infrastructure Management for Improved Learning Outcomes: Insights from Junior High Schools in Southwest Aceh, Indonesia

Dedi Istakri ¹, Hizir Sofyan ^{2,*} and Ismail Ismail ¹

¹ Graduate School of Education Administration, Universitas Syiah Kuala, Banda Aceh 23111, Indonesia; dedi.i@mhs.usk.ac.id (D.I.), ismail.kutaradja@usk.ac.id (I.I.)

² Department of Statistics, Faculty of Mathematics and Natural Sciences, Universitas Syiah, Banda Aceh 23111, Indonesia; hizir@usk.ac.id (H.S.)

* Correspondence: hizir@usk.ac.id

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Abstract

This qualitative study explores the management of facilities and infrastructure at two junior high schools in Southwest Aceh Regency, Indonesia (SMP Negeri 1 Susoh and SMP Negeri 2 Susoh) and examines its impact on learning quality. The research methodology includes observations, structured interviews, and documentation to collect data from key stakeholders such as principals, deputy principals, and teachers. The findings emphasize the critical role of detailed planning and collaboration among teachers, principals, and school development teams in aligning facility needs with curriculum requirements. Efficient use, storage, maintenance, and care of educational assets are essential for maximizing their functionality and longevity. The study also highlights the importance of comprehensive inventory management that adheres to regulatory guidelines to ensure effective resource control and supervision. However, the schools face challenges including limited land availability, insufficient funding, human resource constraints, and inadequate government support, which impede their ability to provide well-rounded learning environments. The study points out the necessity for ongoing improvement efforts by principals to adapt educational facilities to evolving educational demands. It recommends prioritizing investments in facilities, staff training, and policy enhancements to address these challenges and foster comprehensive educational development. Future research should assess the effectiveness of these management practices in various contexts and their long-term impact on student outcomes.



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1. Introduction

Effective management of school facilities and infrastructure is crucial for achieving educational excellence [1]. This process involves careful planning, diligent maintenance, and preservation of these assets to ensure they remain functional and valuable [2, 3]. In educational settings, the quality of learning is heavily dependent on the environment provided, making

effective facilities management a critical priority for school administrators and the entire educational community [4].

Junior high schools, like all educational institutions, rely on their infrastructure to support effective learning [5]. Maintaining these assets in optimal condition is a shared responsibility that extends beyond school administrators to include every member of the educational community.

This collective stewardship is necessary not only to meet regulatory standards but also to create an environment that fosters comprehensive learning experiences and promotes academic success.

In Indonesia, the management of educational facilities holds significant importance as it serves as a foundation for maintaining the quality and consistency of the education sector [6, 7]. Adherence to the Minimum Service Standards (MSS) is a crucial aspect of this management, encompassing various requirements for infrastructure, facilities, and resources essential for delivering quality education. These standards ensure that educational institutions provide a conducive environment for effective teaching and learning, contributing to the overall development and success of students.

However, despite national standards, many regions, including Southwest Aceh Regency, face persistent challenges regarding the adequacy of educational infrastructure [8, 9]. For instance, the 2023 education report card for Southwest Aceh Regency revealed a value of 55.88% [10], which falls below the threshold of 60% set by Regulation of the Minister of Home Affairs Number 59 of 2021 for meeting the Minimum Service Standards (MSS) for education [11]. This disparity underscores the intricate relationship between infrastructure adequacy and academic performance, emphasizing the critical need for targeted interventions to enhance both the physical learning environment and student outcomes in Southwest Aceh Regency.

In the digital age, technology holds immense potential to enhance learning outcomes, thereby elevating the importance of infrastructure availability and condition [12, 13]. A supportive learning environment, facilitated by robust infrastructure, is essential for enabling immersive digital-based learning experiences. These experiences play an important role in developing students' numeracy skills and other key competencies crucial for success in the 21st century. Therefore, investing in modern, well-maintained facilities becomes imperative not only to harness the benefits of technology but also to adequately prepare students for the demands of the digital era [6].

The successful implementation of effective facilities and infrastructure management in schools relies heavily on the collaborative efforts of school leaders, educators, and students [14, 15]. Each group has a vital role to play in ensuring that school assets are not only present but also functional and conducive to various educational activities. By working together towards this common goal, they can create a learning environment that

supports academic growth and fosters student achievement.

In this study, we will delve into the intricacies of facilities and infrastructure management in junior high schools (SMP) within Southwest Aceh Regency, focusing particularly on SMP Negeri 1 Susoh and SMP Negeri 2 Susoh. Our examination will encompass the planning, utilization, maintenance, and challenges associated with these assets, aiming to offer actionable insights to enhance the quality of learning in these schools. Specifically, we will explore strategies and interventions to improve infrastructure management, thereby elevating learning outcomes for students in Southwest Aceh Regency. The findings of this study will contribute to the broader discussion on educational development and effectiveness in the region and potentially provide a model for other areas grappling with similar challenges.

2. Materials and Methods

The workflow of this study is illustrated in [Figure 1](#), where it presents a concise, six-step workflow of the research study. The study employs a qualitative research approach and is conducted at two schools in Southwest Aceh Regency, Indonesia, from January to March 2024. Participants include key stakeholders such as principals, deputy principals, and teachers. The researcher serves as the primary instrument for data collection, supplemented by tools like interview guides, observation protocols, and document analysis frameworks. Data is collected through observation, structured interviews, and documentation. To ensure the credibility and validity of findings, the study applies techniques such as prolonged engagement, triangulation, peer debriefing, and member checking.

2.1. Research Approach

This study employs a qualitative research approach, which focuses on the intrinsic qualities and holistic experiences of phenomena rather than numerical data and statistical analysis. Qualitative research aims to comprehend phenomena in their entirety, capturing perceptions, motivations, and actions through descriptive language within specific natural contexts [16].

In this study, the research problem, although initially defined, remains open to evolution and refinement as the researcher immerses in the field and captures the richness of lived experiences. This approach enables the researcher to adapt and refine the research question as new insights emerge during the data collection process.

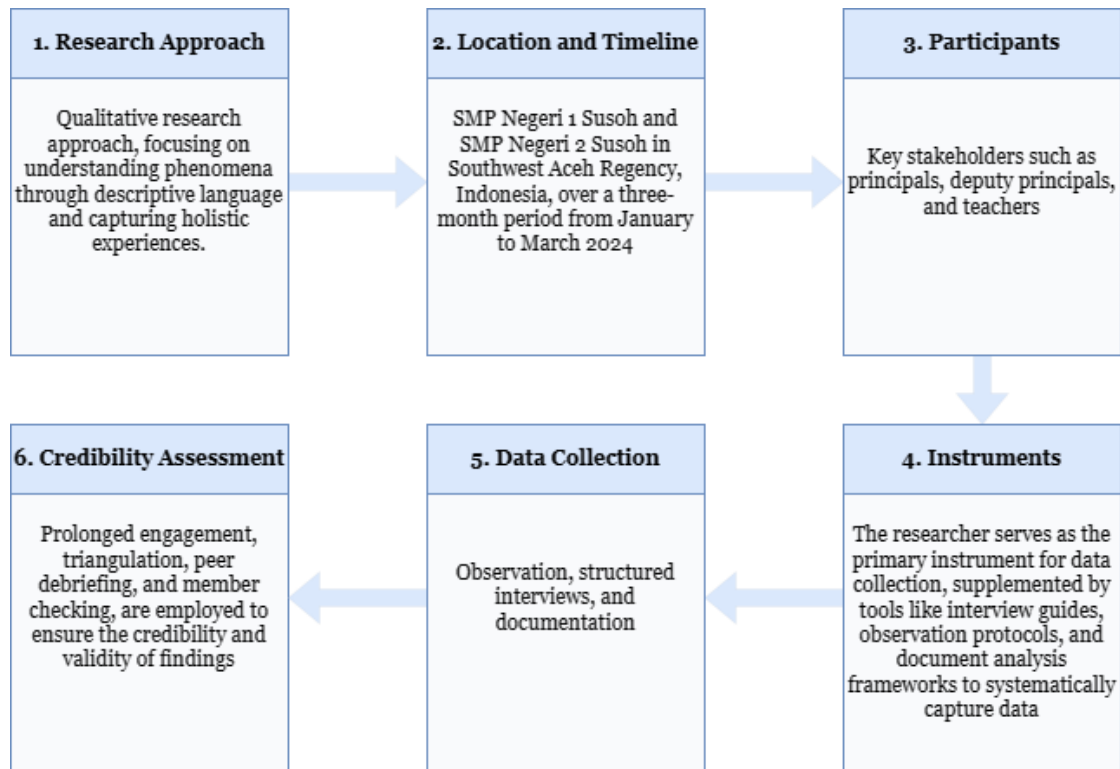


Figure 1. Workflow of this study.

2.2. Research Location and Timeline

The research was conducted at SMP Negeri 1 Susoh and SMP Negeri 2 Susoh in Southwest Aceh Regency, Indonesia. These schools provided the context in which the researcher explored the management of facilities and infrastructure. The research timeline was set for three months, from January to March 2024. During this period, the researcher engaged in data collection, processing, and analysis, as well as report writing and revisions. All these activities were conducted in accordance with the stipulations of the research permit, ensuring compliance with research protocols and ethical standards.

2.3. Research Participants

In qualitative research, participants serve as essential sources of data, providing valuable insights into the phenomenon under investigation [17]. This study focuses on key stakeholders at SMP Negeri 1 Susoh and SMP Negeri 2 Susoh, including principals, deputy principals responsible for facilities and infrastructure, and teachers. The selection process for participants in this study is carefully designed to ensure that individuals with direct knowledge and experience relevant to the research topic are included. Participants are purposefully selected from key stakeholders at SMP Negeri 1 Susoh and SMP Negeri 2 Susoh, such as principals, deputy principals responsible for facilities and infrastructure, and teachers.

The criteria for participant selection prioritize individuals who possess in-depth insight into the implementation of facilities and infrastructure management in junior high schools and its impact on the quality of learning. Specifically, participants are chosen based on their roles and responsibilities within the educational institutions, ensuring that they can offer valuable perspectives on the subject matter.

The selection process involves reaching out to potential participants and explaining the objectives of the study. Upon agreement to participate, individuals are selected based on their relevance to the research aims and their ability to contribute meaningful insights. This purposeful approach to participant selection facilitates the collection of rich and comprehensive data, enabling a deeper exploration of the challenges and opportunities associated with effective facilities and infrastructure management in these educational settings [18].

2.4. Research Instruments

In qualitative research, the researcher serves as the primary instrument for data collection [19]. As the study progresses and research objectives become clearer, supplementary instruments such as interview guides, observation protocols, and document analysis frameworks may be developed to systematically capture and compare data, enhancing the rigor and comprehensiveness of the research process.

Table 1. Summary of key aspects of facilities and infrastructure management for enhancing learning quality.

Aspect of Facilities and Infrastructure Management	Key Points
Planning and Procurement	<ul style="list-style-type: none"> • Planning process initiated in November • Bottom-up approach involving collaboration • Funding from various sources (BOS, APBK) • Systematic needs assessment for procurement
Storage, Maintenance, and Care	<ul style="list-style-type: none"> • Lack of dedicated storage facility • Categorized storage of learning resources • Maintenance efforts to uphold asset functionality • Building damage classification for budget planning
Inventory Management	<ul style="list-style-type: none"> • All inventory items belong to the state • Detailed recording of educational assets • Importance of standardized inventory recording • Regular supervision and control of assets
Challenges	<ul style="list-style-type: none"> • Limited availability of land • Insufficient funding from BOSP • Human resource constraints • Suboptimal assistance and inaccurate inventory data classification
Implications and Limitations	<ul style="list-style-type: none"> • Critical role of participatory planning • Importance of efficient utilization and maintenance • Crucial aspect of comprehensive inventory management • Limitations in generalizability and data reliance

Throughout the study, researchers take on various roles, from conducting initial exploratory inquiries to conducting focused data collection and analysis. They integrate their own insights and experiences with data collected through diverse instruments, aiming to construct a holistic understanding of the phenomenon under investigation. This approach ensures that research findings are firmly grounded in the lived experiences of participants and accurately reflect the intricacies of the research setting [19].

2.5. Data Collection Methods

To acquire empirical evidence that supports theory development and knowledge generation, this study employs a combination of observation, structured interviews, and documentation [20]. These methods are chosen to capture the complexities of the research phenomenon thoroughly. Following data collection, the study will undertake a rigorous analysis process. This will involve transcribing and organizing qualitative data from interviews and observations, systematically examining documents, and identifying recurring themes and patterns. Through iterative coding and thematic analysis, the researchers will distill the data into key findings and insights. Additionally, member checking or peer debriefing was utilized to ensure the validity and reliability of the analysis [21]. By employing these robust analytical techniques, the study aims to derive meaningful conclusions and contribute to a deeper understanding of facilities and infrastructure management in junior high schools.

2.6. Credibility Assessment

To ensure the credibility and validity of its findings, this study employs rigorous methods grounded in the principles of disciplined inquiry. Credibility, a crucial aspect of qualitative research, emphasizes the need for trustworthy and reliable data. The study adopts a multifaceted approach, incorporating techniques advocated by Lincoln and Guba, such as prolonged engagement, persistent observation, triangulation, peer debriefing, negative case analysis, referential adequacy checks, and member checking [22]. These techniques are systematically applied throughout the research process to enhance the truth value of the findings, instilling confidence among critical readers and research participants alike.

3. Results and Discussion

We present a comprehensive analysis of key aspects of facilities and infrastructure management aimed at enhancing learning quality within educational institutions. The summarized overview of these key points is shown in Table 1.

3.1. Facilities Planning and Resource Allocation

Effective facilities and infrastructure management are critical for enhancing educational outcomes. Our findings at SMP Negeri 1 Susoh and SMP Negeri 2 Susoh demonstrate that careful planning and resource allocation are essential to supporting educational activities and achieving learning objectives. Our research shows that planning at these schools begins in November each year. School principals use evaluation reports from

the previous year to identify needs and allocate resources for the upcoming year. This planning process involves both teachers and principals who collaboratively draft plans. These drafts are then reviewed at higher administrative levels to ensure alignment with broader educational goals.

Regular work meetings involving school development teams play a crucial role in discussing and refining these plans, fostering a collective approach to decision-making and ensuring the plans are comprehensive and responsive to the actual needs of the schools. Funding for these initiatives comes from several sources, including the School Operational Assistance (BOS) and the District Revenue and Expenditure Budget (APBK). The procurement process is systematic and based on detailed needs assessments, which help optimize resource use and enhance learning quality.

Our findings indicate that a well-structured planning and procurement process not only prevents potential problems but also supports the successful implementation of educational programs. Schools that effectively align their infrastructure with their curricular needs tend to experience better educational outcomes. The focused approach to planning and resource allocation at both schools underscores the critical role of strategic management in improving the quality of education, demonstrating that structured and thoughtful planning processes are essential for aligning facilities and resources with the evolving needs of their curricula, significantly enhancing the learning environment.

3.2 Implementation of Facilities Management

In exploring the implementation of facilities management at SMP Negeri 1 Susoh and SMP Negeri 2 Susoh, our study highlights the crucial role of principals in optimizing facility use to improve learning outcomes. Referencing the Regulation of the Minister of National Education of the Republic of Indonesia Number 24 of 2007, which sets standards for school facilities and infrastructure, we observe that effective management practices significantly contribute to the quality of education.

Our research reveals that principals are central to ensuring facilities are used properly and maintained regularly. This involves strategic organization of resources and routine maintenance to maximize the facilities' utility and longevity. Collaboration with the Department of Education is vital in identifying and addressing facility deficiencies, thereby enhancing the overall effectiveness of the educational environment.

Furthermore, principals are tasked with the ongoing monitoring of facilities, which includes regular reporting and data collection to assess usage and detect any issues promptly. The delegation of these responsibilities to designated personnel, such as deputy principals, is critical for maintaining continuous oversight and ensuring that educational facilities support the broader goals of enhancing learning and educational outcomes.

3.3 Storage and Maintenance Practices

Our study examined the storage and maintenance practices at SMP Negeri 1 Susoh and SMP Negeri 2 Susoh, which, despite lacking dedicated storage facilities like warehouses, manage their learning resources effectively. Resources are systematically categorized and securely stored in various locations such as computer labs, science labs, teacher rooms, and administrative offices, each equipped with storage cabinets and enhanced security measures to protect sensitive equipment and items.

Maintenance is primarily focused on sustaining asset functionality through proper usage and timely repairs. Our findings indicate that schools regularly undertake maintenance activities, which include repairing or replacing damaged parts and electronic components. These tasks are guided by technical maintenance plan documents and are vital for preventing premature deterioration of assets, thereby ensuring their longevity and optimal functionality.

Furthermore, building damage—whether due to aging, human intervention, natural disasters, or excessive functional use—presents a significant challenge. Damage is categorized into mild, moderate, and severe levels, assisting principals in budgeting for maintenance according to the needs. This categorization aligns with the financial planning required by the Regulation of the Minister of Public Works and Public Housing of the Republic of Indonesia Number 22/Prt/M/2018, which governs State Building Construction.

The practices of robust storage, proactive maintenance, and diligent care are essential in preserving and enhancing the functionality of school facilities and infrastructure. These practices are not only crucial for asset preservation but also significantly contribute to creating an improved learning environment for students.

3.4 Inventory Management

Our research at SMP Negeri 1 Susoh and SMP Negeri 2 Susoh delved into the role of comprehensive inventory management in improving learning quality by optimizing the use of educational assets. Effective inventory

management is foundational for maintaining control and overseeing educational resources, as stipulated by the Regulation of the Minister of Home Affairs of the Republic of Indonesia Number 108 of 2016 [23].

The process of inventory management in these schools begins with the systematic coding of items and detailed documentation of acquisition details. This structured approach not only streamlines control procedures but also ensures adherence to standard operational protocols. By maintaining standardized formats for inventory records, particularly for government-provided facilities and infrastructure, the schools enhance their management capabilities and oversight.

Regular supervision of these assets is crucial. It helps staff become familiar with the school's equipment, which in turn fosters accountability and effective management of resources. Our findings underline the importance of systematic inventory practices in ensuring educational assets are optimally utilized, which significantly enhances the quality of learning. Through rigorous and comprehensive inventory management, schools can provide optimal support for educational activities, ensuring resources are available and in good condition, thus contributing positively to the educational process.

3.5 Challenges in Facilities and Infrastructure Management

Managing facilities and infrastructure effectively to improve learning faces several hurdles in schools. A major issue is the limited availability of land, which restricts the construction of key structures like health rooms, auditoriums, laboratories, sports fields, and storage areas. This lack of space limits the school's ability to provide a well-rounded learning environment.

Financial constraints also pose a significant problem, particularly the limited funds available from the School Operational Assistance Program (BOSP). These financial limitations restrict the school's options for making necessary repairs, especially for damages that are categorized as minor ($\leq 30\%$ damage). This lack of funding affects the school's ability to maintain and improve its facilities, which in turn impacts the quality of education.

Another challenge is the shortage of qualified personnel, which affects how effectively the facilities are used and managed to enhance learning. The absence of skilled staff limits the school's capacity to fully utilize and maintain its infrastructure, preventing optimal use for educational purposes.

Further complicating matters, weak support from regional governments and issues with inventory data

classification hinder effective facilities management. These problems make it difficult for schools to plan, procure, and maintain facilities efficiently, impacting their ability to achieve educational goals. To address these issues, schools need ongoing evaluation and improvement of their facilities management practices. Detailed planning and careful procurement are essential to meet school needs effectively. School principals must continually push for gradual improvements to align educational facilities with changing educational demands.

A comprehensive approach that includes planning, utilization, storage, maintenance, and inventory management is essential for ensuring that facilities significantly support the educational process. Despite the challenges, especially those related to human resources and expertise, it's crucial for school leaders to integrate educational facilities with the broader education system to make a real impact on education.

3.6. Practical Implications and Recommendations

The findings from our study offer several actionable recommendations for enhancing learning quality through improved facilities and infrastructure management in schools. Firstly, the critical importance of thorough planning was evident, particularly involving collaboration among teachers, principals, and school development teams. This collaborative, bottom-up approach ensures that facility needs align with the evolving curriculum needs. We recommend that school leaders prioritize participatory planning to optimize resource allocation and procurement, thus ensuring educational goals are met effectively.

Secondly, our research emphasizes the importance of efficient utilization, storage, maintenance, and care of educational facilities. Principals should cultivate a culture of responsibility among all stakeholders and adhere to standard operational procedures to extend the longevity and functionality of school assets. Additionally, partnering with regional education authorities could address existing infrastructural inadequacies, further enhancing the learning environment.

Lastly, comprehensive inventory management stands out as crucial for optimizing the use of facilities. Schools should follow regulatory guidelines closely and implement systematic practices for recording, monitoring, and valuing assets. Such measures will greatly enhance the control and supervision of educational resources, leading to more effective and efficient facility management.

Implementing these recommendations will improve how schools manage their facilities, which will help create a better learning environment. By focusing on collaborative planning, responsible care of facilities, and thorough inventory management, schools can make sure their resources support educational goals effectively. This will lead to a cleaner, more organized, and supportive setting for students, enhancing their learning experiences and outcomes. These improvements will not only make schools more efficient but also more inviting places for students to learn and grow.

3.7. Limitations and Future Studies

This study also has certain limitations that should be acknowledged. The research focuses on two specific schools, SMP Negeri 1 Susoh and SMP Negeri 2 Susoh, which may limit the generalizability of the findings to other educational contexts. Additionally, the study primarily relies on qualitative data, and incorporating quantitative measures could provide a more comprehensive understanding of the impact of facilities management on learning outcomes.

Future research should explore the effectiveness of facilities and infrastructure management practices across a broader range of schools and geographic regions. Comparative studies could clarify how contextual factors impact the implementation and success of these strategies. Moreover, longitudinal investigations could offer valuable insights into the long-term effects of infrastructure optimization on student achievement and school performance.

4. Conclusions

This study highlights the significant impact that effective management of facilities and infrastructure has on improving learning quality in junior high schools. Our findings demonstrate that through careful planning, efficient use of resources, proper storage, regular maintenance, and systematic inventory practices, schools can create an environment that supports better learning outcomes. However, we also identified persistent challenges, including budgetary constraints and limited physical space, which complicate these efforts. To address these issues, it is crucial for school stakeholders to work together and prioritize investments in both physical facilities and the training of personnel. Policy enhancements should also be considered to support these improvements. By focusing on these areas, schools can better overcome the obstacles they face and contribute more effectively to the holistic development of students.

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