

The Role of Principal Leadership in Improving the Effectiveness of Educational Facilities and Infrastructure Management: A Case Study of School Principals in High Schools in Bandung City

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Submitted : 03-11-2024, Accepted : 02-12-2024, Published : 04-01-2025

Abstract

This study aims to analyze the role of school principal leadership in improving the effectiveness of educational facilities and infrastructure management in senior high schools in Bandung City. This study uses a quantitative approach with descriptive analysis methods. Data were collected through questionnaires distributed to 50 respondents consisting of teachers and educational staff at several senior high schools in Bandung City. The results show that the leadership of the principal has a significant effect on the effectiveness of educational facilities and infrastructure management. Principals who apply a participatory, communicative, and visionary leadership style are able to improve the coordination, utilization, and maintenance of educational facilities more effectively. In addition, the involvement of teachers and staff in the management process also strengthens a shared sense of responsibility for the sustainability of school facilities. The conclusion of this study confirms that the effectiveness of facility and infrastructure management is highly dependent on the quality of principal leadership. Therefore, improving the managerial and leadership competencies of principals needs to be a focus in efforts to develop the quality of education.

Keywords: Principal Leadership, Effectiveness, Facility and Infrastructure Management, Education, High School

Introduction

Education serves as a fundamental pillar of national development, and its success depends on various factors, including the quality of educators and students, as well as the effective management of educational resources and infrastructure. Principals play a crucial role in this context, acting as educational managers and leaders who shape policy direction regarding the management of facilities and infrastructure (Gule et al., 2024). Effective school infrastructure management is crucial for creating a conducive learning environment, which directly impacts the teaching and learning process (Jannah & Wahyuningsih, 2024). Furthermore, educational resource management, including the planning and allocation of personnel and facilities, is crucial for optimizing educational outcomes (Chasbullah & Rindaningsih, 2024).

Educational facility management is crucial for fostering an effective learning environment, yet it often faces significant challenges, including budget constraints and inadequate maintenance (Donumo & Lestari, 2024). Effective budget allocation enables

principals to prioritize essential expenditures, ensuring that facilities are not only maintained but also upgraded to meet evolving educational needs (Donumo & Lestari, 2024). Furthermore, implementing sound procurement strategies is crucial for acquiring necessary resources efficiently and cost-effectively, which directly impacts the quality of educational infrastructure (Fatimah & Haerullah, 2024).

Effective leadership is crucial for principals to manage this complexity and ensure that facilities support high-quality learning outcomes. Strong leadership skills enable principals to navigate the challenges of educational facility management, which is crucial for creating a conducive learning environment (Erlina & Hakim, 2025). Developing modern infrastructure is crucial for schools to keep pace with educational advancements, highlighting the need for investment in school facilities (Miri et al., 2024). Furthermore, understanding the relationship between curriculum development and infrastructure is crucial, as it directly impacts how educational facilities are utilized (Supatmi, 2023).

In Bandung City, effective school facility management is crucial for optimizing learning outcomes. While some secondary schools have adequate infrastructure, many do not utilize these facilities efficiently, leading to a suboptimal educational experience (Nabil et al., 2025). This situation requires innovative leadership from principals who can creatively address these challenges through visionary thinking and collaboration with various stakeholders (Supatmi, 2023). By fostering collaborative partnerships with local authorities and private organizations, principals can leverage external resources to improve facility management and infrastructure development (Saputri & Fatmawati, 2024).

LITERATURE REVIEW

Principal Leadership

Principals play a crucial role in managing educational resources, including the strategic allocation of facilities and infrastructure to support teaching and learning. Their leadership is

crucial not only for administrative tasks but also for fostering motivation and creating a conducive environment for students and staff (Dekamoy et al., n.d.). According to Mulyasa (2013), principals are the driving force behind a school's success in achieving its educational goals, which include academic achievement, social development, and emotional well-being (Chasbullah & Rindaningsih, 2024).

Educational Facilities and Infrastructure

Educational facilities encompass a variety of resources essential for effective teaching and learning, including classrooms, laboratories, libraries, and various learning media. Classroom infrastructure, encompassing both physical and technological elements such as desks and audio-visual aids, is crucial for fostering an engaging learning environment (Yunita et al., 2023). Furthermore, learning media, such as textbooks and digital platforms, play a crucial role in making education accessible and engaging, impacting the overall effectiveness of the teaching and learning process. Finally, educational technology, encompassing tools such as learning management systems and educational apps, can personalize the learning experience and improve educational outcomes when effectively integrated into these facilities (Butin et al., 2009).

Effectiveness of Facilities and Infrastructure Management

Effectiveness in educational infrastructure management is essentially about aligning outcomes with planned objectives, as articulated by Siagian (2011) (Luthfiyah et al., 2024). To optimize this learning process, effective educational infrastructure management is crucial, as it increases efficiency and effectiveness in achieving desired outcomes (Siregar, 2021). Furthermore, using effectiveness metrics allows institutions to evaluate how well their facilities contribute to these objectives, thus facilitating continuous improvement (Yahya et al., 2023).

Methods

This study uses a qualitative approach with a descriptive method. This study aims to understand in depth the phenomenon of the principal's leadership role in managing educational facilities and infrastructure, not just measuring it with numbers. The sample in this study was 10 public and private high schools in Bandung City. The respondents in this study were the principal, vice principal for facilities and infrastructure, teachers, and educational staff related to the management of facilities and infrastructure. The informant collection technique used purposive sampling, namely the deliberate selection of respondents based on considerations of relevance and direct involvement in the management of facilities and infrastructure, totaling 50 respondents.

Results and Discussion

Results

1. Research location overview

This research was conducted at several senior high schools (sma) in bandung city. These schools were selected because they have implemented a structured facility and infrastructure management system and have principals with diverse leadership experience. Field observations and interviews were conducted over three months, involving 50 respondents consisting of principals, vice principals for facilities and infrastructure, teachers, and administrative staff.

2. The principal's leadership role in managing facilities and infrastructure

Based on the results of in-depth interviews and questionnaires, it was found that the principal has a strategic role in managing facilities and infrastructure through three main functions: planning, implementation, and evaluation.

A. Facilities and infrastructure planning

Eighty-six percent of respondents stated that the principal plays an active role in developing the school goods and facilities needs plan (rkbfs) with the management team.

The principal leads regular coordination meetings and involves teachers and staff in

prioritizing needs. This demonstrates that participatory and visionary leadership can increase the effectiveness of prioritizing school facility procurement.

B. Implementation and maintenance

The majority of respondents (82%) assessed that the principal plays an active role in overseeing the procurement and maintenance of facilities and infrastructure. The principal ensures that each facility is used according to its intended purpose and innovates in the maintenance system, such as: establishing a technical maintenance team that works on a schedule, encouraging the use of digital systems in asset inventory, and involving teachers and students in maintaining the cleanliness and security of school facilities.

C. Evaluation and supervision

As many as 78% of respondents acknowledged that principals conduct regular evaluations of the condition of facilities and infrastructure through school management meetings. These evaluations focus not only on physical aspects, but also on efficiency, utilization of learning spaces, and the alignment between needs and availability of facilities.

3. Leadership strategies in improving management effectiveness

From the results of the thematic analysis of interviews, four main strategies were found to be used by school principals at bandung city senior high schools:

- 1) The principal involves all elements of the school (teachers, students, and school committee) in the decision-making process, particularly regarding priorities for building and improving facilities.
- 2) The principal acts as a motivator and innovator by instilling the value of shared responsibility for maintaining school facilities.
- 3) Every decision on procurement of facilities is based on the results of a needs survey and previous facility condition data, not based on estimates.

- 4) The principal collaborates with the bandung city education office, school committee, and the private sector to obtain funding support for the maintenance and procurement of new facilities.

4. Effectiveness of facilities and infrastructure management

Analysis of the questionnaire results showed that the effectiveness of facility and infrastructure management increased significantly after the principal implemented participatory leadership and a regular monitoring system. Aspects considered most effective by respondents included: suitability of facilities to learning needs (88%), timely maintenance (82%), transparency of budget use (80%), and optimization of learning space utilization (85%). These findings indicate that strong, collaboration-oriented principal leadership has a positive impact on the performance of school facility and infrastructure management.

5. The impact of leadership on school performance

Field findings show that increasing the effectiveness of managing facilities and infrastructure also has an impact on students' learning comfort, which improves academic results, increases teacher motivation in implementing learning, and a positive image of the school in the eyes of the community and external parties.

6. Summary of findings

Table 1. Research findings

Research aspects	Key results	Impact
Planning	The principal involves all elements of the school	Improved accuracy and transparency of facility needs
Implementation	Active supervision and scheduled maintenance systems	Facilities are better maintained and optimally utilized

Evaluation	Regular, data-based evaluations	Facility repairs are faster and more precise
Leadership strategy	Participatory, transformational, and collaborative	Management effectiveness increases significantly
Supporting factors	Internal and external support	Strengthens program sustainability
Inhibiting factors	Limited budget and human resources	Requires efficiency strategies and technical training

Discussion

1. The research results indicate that principals in senior high schools in bandung city play a strategic and multifunctional role in managing educational facilities and infrastructure. This role encompasses the interconnected functions of planning, implementation, and evaluation. This finding aligns with mulyasa's (2013) opinion, which states that principals act as educational managers responsible for planning, organizing, implementing, and supervising all school resources, including facilities and infrastructure.

In the context of this research, principals demonstrated visionary and participatory leadership by involving all school components in the facility needs planning process. The involvement of teachers, staff, and the school committee in developing the facility needs plan has been shown to increase a sense of ownership and shared responsibility for the sustainability of school facilities. Therefore, it can be concluded that principal leadership that prioritizes participation and collaboration has a significant impact on the effectiveness of facility and infrastructure management.

2. The research results identified four main strategies implemented by school principals, namely:

1. Participative leadership
2. Transformational leadership
3. Data-driven leadership
4. Collaborative leadership

This strategy demonstrates that the principal acts not only as an administrator but also as a change agent capable of mobilizing human resources within the school. This aligns with Bass and Avolio's (1994) theory of transformational leadership, in which leaders act as motivators and inspirators, fostering collective awareness to achieve organizational goals. Thus, the effectiveness of facility and infrastructure management increases due to the collective commitment to maintaining and optimally utilizing facilities.

3. Effectiveness of school facilities and infrastructure management

Based on the questionnaire results, the effectiveness of facility and infrastructure management at Bandung city senior high schools is categorized as "very effective" (average score of 4.31 out of 5).

This achievement demonstrates the principal's ability to efficiently carry out managerial functions, particularly in procuring facilities according to learning needs, maintaining facilities regularly, maintaining budget transparency, and optimally utilizing learning spaces.

This finding supports Nurkolis's (2018) research, which states that the effectiveness of facility and infrastructure management is largely determined by the quality of the principal's leadership. The higher the principal's managerial skills and commitment, the more optimal the utilization of facilities and infrastructure to support educational quality. In other words, effective leadership serves as a key driver in maintaining the sustainable quality of educational facilities.

4. Supporting and inhibiting factors

Supporting factors

Several factors that strengthen the success of facility and infrastructure management include: the principal's leadership commitment in implementing school-based management (sbm), the involvement of all parties in the supervision and maintenance of facilities, and external cooperation with local governments, the business world, and the community. This finding is in line with sagala's (2012) theory which emphasizes that collective support and external partnerships are important components in the management of facilities and infrastructure based on school autonomy.

Inhibiting factors

On the other hand, there are still several obstacles such as limited maintenance budgets, lack of technical training for staff, and lengthy bureaucratic processes for procuring facilities. These obstacles reinforce suryosubroto's (2010) view that one of the main challenges in managing educational facilities is limited financial and administrative resources, which slow down the procurement and repair process for facilities.

5. The impact of leadership on school performance

This study found that effective principal leadership not only improves the quality of facility and infrastructure management but also impacts overall school performance, such as: a comfortable learning environment for students, higher teacher motivation, and a positive school image in the eyes of the community and stakeholders.

These results reinforce the theory of total educational management by hoy & miskel (2013), which asserts that principal leadership is central to school effectiveness. Without strong, results-oriented leadership, resource management (including facilities and infrastructure) will not achieve optimal goals.

6. Theoretical synthesis

Theoretically, the results of this study indicate a relationship between the principal's leadership style (variable x) and the effectiveness of facility and infrastructure management (variable y). Participatory, transformational, and collaborative leadership creates a conducive work environment, encourages shared responsibility, and increases the efficiency of resource use. This relationship model aligns with the concept of school-based management (sbm), which emphasizes the importance of decentralization of authority and participation of the school community in managerial decision-making.

Conclusion

Based on the results of a study conducted with 50 respondents, consisting of teachers and educational staff at several high schools in Bandung City, it can be concluded that the principal's leadership plays a crucial role in improving the effectiveness of educational facility and infrastructure management. The analysis shows that principals who are able to implement a participatory, communicative, and visionary leadership style contribute significantly to improving the quality of school facility management.

Effective leadership is reflected in the principal's ability to appropriately plan facility and infrastructure needs, optimize the use of available resources, and ensure ongoing maintenance and supervision of educational facilities. Furthermore, the involvement of teachers and staff in the decision-making process related to facility and infrastructure management has also been shown to increase a sense of ownership and shared responsibility for school assets.

Overall, this study confirms that the success of educational facility and infrastructure management depends not only on the availability of physical facilities but also on the quality of the principal's leadership in managing, directing, and motivating all school elements to actively participate. Therefore, improving the leadership competency of principals through managerial and educational leadership training is a strategic step to strengthen the effectiveness

of facility and infrastructure management, which ultimately has a positive impact on the quality of education in schools.

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