Konferensi Internasional Inovasi dan Keterlibatan Masyarakat - ICoICE
31 Oktober - 1 November 2024
Universitas 17 Agustus 1945 Surabaya

"The Role of Architects and Stakeholders in Realizing Resilient Elementary Schools in Densely Populated Areas"

Case Study: Muhammadiyah 2 Elementary School in Sidoarjo

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Abstract

According to 2021 data from the Central Statistics Agency (BPS), over 50% of Indonesia's population resides in urban areas. This has resulted in intense land use, limited availability, and high land prices. As Thomas H. Roberts highlighted in Catanese & Snyder (1992), primary education in urban, densely populated areas faces significant challenges such as limited space, accessibility issues, and environmental impacts, which can hinder these facilities from meeting quality standards set by the government (Ministry of Education, 2021).The collaboration of architectural design and educational stakeholders plays a pivotal role in enhancing school resilience by fostering safe, comfortable, and socially supportive learning environments. Features like natural lighting, proper ventilation, and the integration of green spaces can improve students' mental and physical well-being. This study adopts a qualitative approach with a case study design to examine the roles of various stakeholders in addressing the development of educational facilities within constrained spaces. The method delves into how sustainable architectural principles can be applied to create resilient primary schools. The findings aim to inform strategic policy recommendations that support equitable access to primary education in densely populated urban settings.

Keywords: Resilience, Architecture, Stakeholders, narrow land, educational building.

I. Introduction

Education is one of the main pillars in community development, especially in densely populated areas. According to data from the Central Statistics Agency (BPS) in 2021, more than 50% of Indonesia's population lives in urban areas, the level of education participation in Indonesia is still uneven, especially in densely populated areas. In Sidoarjo, for example, although there are many schools, the quality of education is often hampered by various faktor such as inadequate infrastructure and limited resources. Therefore, it is important to explore how architectural design and stakeholder engagement can improve school resilience in the region.

Architectural resilience is a concept that prioritizes the ability of buildings to adapt and survive in the face of various challenges, both physical and social environments. Hidayati (2019) explained that resilient design not only considers functional aspects, but also social and environmental aspects. In the context of schools, resilient design can include the use of environmentally friendly materials, flexible layouts, and facilities that support teaching and learning activities effectively. Thus, architectural resilience can be a solution to improve the quality of education in densely populated areas.

However, there are differences in the context and approach used. For example, the research conducted by Ichsan et al. (2020) focuses more on effective communication between schools and stakeholders, while this research emphasizes more on architectural resilience as a result of such collaboration. This shows that although there are similarities in themes, the approach taken can vary according to the existing local context.

The findings of this study also reinforce the argument put forward by McDonald et al. (2019) about the importance of stakeholder perception in creating a supportive learning environment. In SD Muhammadiyah, the positive perception from parents and the community towards school programs contributes to the improvement of elementary school education in urban areas, especially densely populated areas, which are often hampered by various problems, such as limited space, accessibility, and negative environmental impacts, so that the facilities can be recognized for their quality by the Government (Ministry of Education, 2021).

Stakeholders play a crucial role in school development, ranging from the government, the community, to educational institutions. Each stakeholder has different responsibilities and contributions in creating a quality educational environment. Sari and Pramono (2021) noted that collaboration between the government and the community in the development of educational infrastructure is very important to achieve sustainability. Therefore, a deep understanding of the role of each stakeholder in the context of school development in densely populated areas is very important.

The participation of stakeholders, including parents, teachers, and the surrounding community, is very important in supporting the development of adequate facilities. According to Jaenudin (2024), stakeholder involvement in school management decision-making can improve the overall quality of education. In this study, it was found that the existence of communication forums between schools and parents was able to increase parental participation by up to 60%, which had a positive impact on the development of educational programs in schools.

Statistics show that schools that have high stakeholder involvement tend to have better academic success rates. Athiyah (2019) noted that the quality of school management is positively correlated with student performance. In the context of SD Muhammadiyah, the data shows an increase in national exam scores by 15% after the implementation of collaborative programs with parents and the community.

Furthermore, research by Khairunisa et al. (2021) on the resilience of online learning during the COVID-19 pandemic shows that collaboration between schools and parents is very important in maintaining the quality of education. In SD Muhammadiyah, even in a

challenging situation, the existence of good communication between teachers and parents helps students to adapt to new learning methods, so as not to reduce the quality of education received.

It is important for researchers to take action on the complex role of architects and supported by Sakholder's collaboration in demonstrating how sustainable architecture principles can be applied in the design of elementary schools in densely populated areas, resilient, sustainable architecture includes the use of environmentally friendly materials, energy efficiency, and design that pays attention to the local context, school development in densely populated areas, including the government, communities, and parents of students. has an important role in determining the direction and policy of sustainable education.

II. Literature Review

A. The Concept of Resilience in Architecture

1. Definition of Architectural Resilience

According to the United Nations Office for Disaster Risk Reduction (UNDRR), resilient buildings can reduce losses and negative impacts from disasters (UNDRR, 2020). In the context of primary schools, resilience includes aspects of the physical safety of buildings as well as the ability to continue to function as a place of learning in emergency situations. Architectural resilience refers to a building's ability to withstand and adapt to various pressures and disturbances, both physical and social. According to Hidayati (2019), resilient architecture is not only able to deal with natural disasters, but also rapid social and economic changes. In the context of education, architectural resilience can be interpreted as the ability of schools to continue to function optimally despite facing various challenges. Architects have the responsibility to design buildings that not only meet functional needs but also consider aspects of sustainability and resilience. In the context of elementary schools, architects need to work closely with various stakeholders to ensure that the proposed design is acceptable and implemented properly (Jones, 2020).

2. Elemen-elemen Desain yang Mendukung Resiliensi

Beberapa elemen desain yang dapat mendukung resiliensi arsitektur antara lain penggunaan material yang tahan lama dan ramah lingkungan, desain ruang yang fleksibel, serta integrasi dengan lingkungan sekitar. Misalnya, penggunaan atap hijau dan sistem pengelolaan air hujan dapat membantu mengurangi risiko banjir dan meningkatkan kualitas udara di sekitar sekolah (Prasetyo, 2020). Selain itu, desain yang memperhatikan aspek sosial, seperti ruang terbuka untuk interaksi antar siswa, juga sangat penting dalam menciptakan lingkungan belajar yang positif.

B. The Role of Stakeholders in Education Development

1. Types of Stakeholders (Government, Community, Educational Institutions)

Stakeholders in education development consist of various parties, including the government, the community, and educational institutions. The government has a responsibility to provide policies and budgets that support education, while the community plays a role in supporting

and participating in school activities. Educational institutions, on the other hand, are responsible for managing and implementing quality educational programs. According to Nugroho and Lestari (2022), collaboration between these three stakeholders is very important to achieve sustainable education goals.

2. Relationship between Stakeholders and School Sustainability

Good relationships between stakeholders can create synergies that support school sustainability. When the government, society, and educational institutions work together, they can complement each other in meeting educational needs. For example, parental involvement in school activities can increase a sense of ownership and responsibility for children's education (Yusuf & Sari, 2020). In addition, community support in fundraising for school facilities can also help improve the quality of education.

C. Case Study of Schools in Densely Populated Areas

1. Characteristics of Schools in Densely Populated Areas

Schools in densely populated areas often have unique characteristics, such as the large number of students in a single class and the limitations of physical space. According to Budiarto and Haryono (2020), around 70% of schools in urban areas face the problem of limited space which has an impact on the quality of learning. In addition, many schools do not have adequate facilities, such as laboratories and sports halls, which are essential to support holistic learning.

2. Examples of Successful School Development

Despite the many challenges, there are also examples of success in school development in densely populated areas. For example, several schools in Jakarta have successfully implemented innovative and environmentally friendly architectural designs, such as the use of solar panels and stormwater management systems. This innovation not only improves energy efficiency, but also provides a good environmental education for students (Setiawan & Maulana, 2019). This success shows that with the right approach, school development in densely populated areas can be carried out effectively

III. Research Methods

This research method uses a qualitative approach with a case study design The research found the division of roles of each stakeholder in finding solutions for the development of educational facilities in a narrow land**,** Analyzing the architectural design of a comparative study at SD Muhammadiyah 2 Sidoarjo**,** This study aims to analyze the architectural design of SD Muhammadiyah 2 in Sidoarjo in the context of resilience. By evaluating existing design elements, it is hoped that aspects of space and accessibility that support or hinder the learning process can be found.

Data is collected through interviews with architects and relevant stakeholders, direct observation of the school's design, as well as documentation studies that include design plans and evaluation reports. Interviews are conducted using semi-structured guides to gain rich and in-depth information.

Research relationship flow.

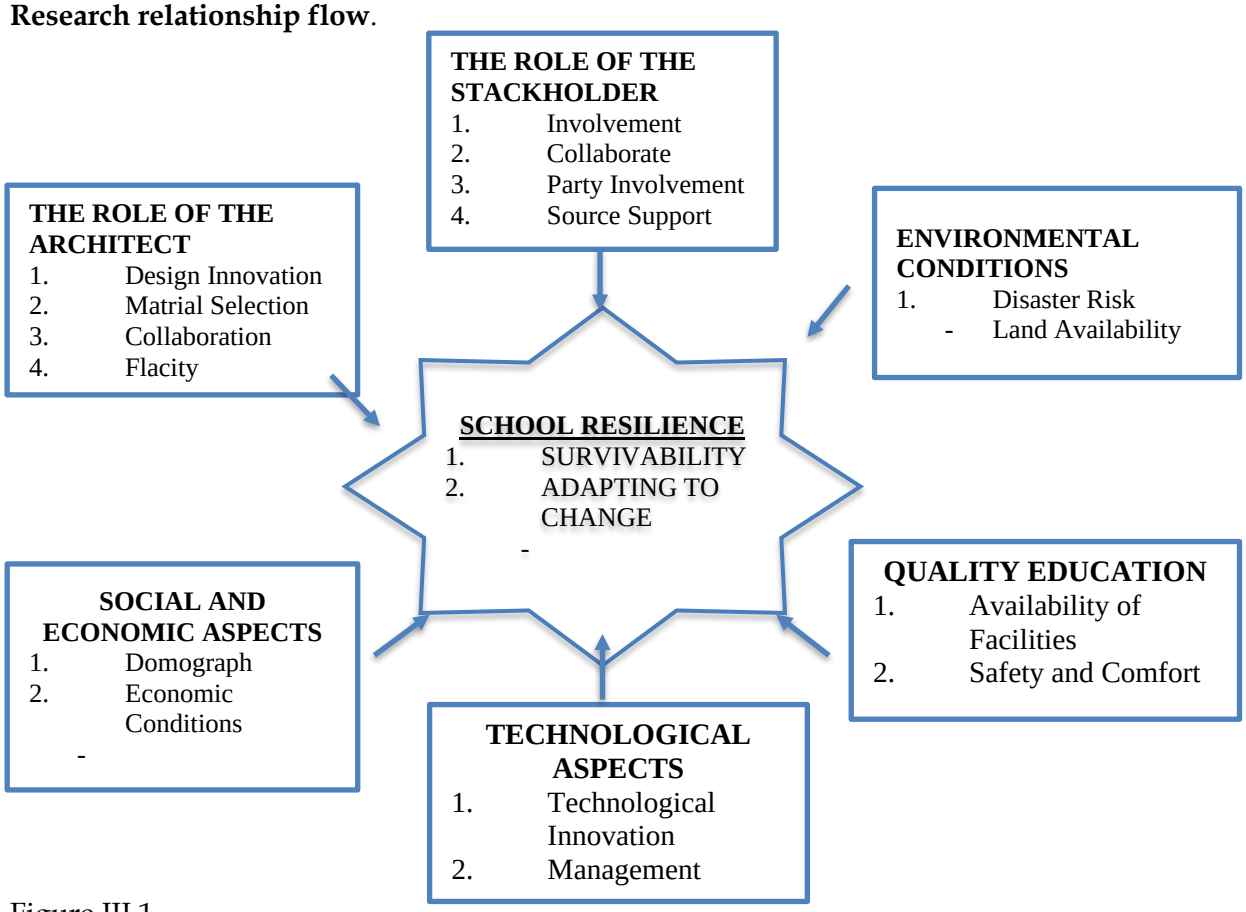

Figure III.1**.**

Main Variables

1. The Role of Architects
   Innovation Design: The level of creativity and innovation in designing disaster-resistant school buildings.
   Material Selection: The quality and longing of the materials used in construction.
   Collaboration with Engineers: the level of collaboration between architects and structural architects in project planning and execution.
   Design Flexibility: The ability of the design to adapt to the changing needs of the community and the environment.
2. Stakeholder Roles
   Community Involvement: The level of community participation in the school planning and design process.
   Cooperation with the Government: The level of support from the local government in terms of regulation and funding.
   Involvement of the Education Party: Participation from the school and the education authority in determining the needs of the facility.

Resource Support: Access to resources and funds for school development.

Discussion Analysis:

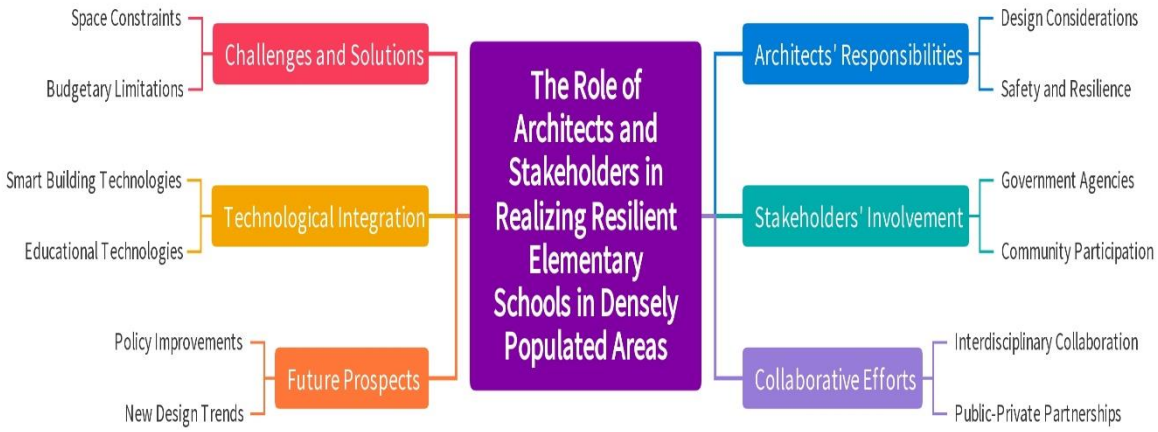

Table. III.2.

Supporting Variables

1. Environmental Conditions
   Natural Disaster Risk: The level of disaster risk faced by densely populated areas.
   Land Availability: Availability of space for the construction of schools and other supporting facilities.
2. Social and Economic Aspects
   Community Demographics: Demographic characteristics of the community that affect educational needs.
   Economic Conditions: The level of the community's economy that can affect funding and support for schools.
3. Technology Aspects
   Technological Innovation in Education: The use of technology in the learning process and school management.
   Building Management System: The use of technology to unify and manage school infrastructure.

Outcome Variables

1. Quality of Education
   Availability of Facilities: The availability of facilities that support the teaching and learning process.
   Safety and Comfort: The level of safety and comfort of the learning environment for students.
2. School Resilience

Ability to Survive Crises: The occurrence of good schools can function during and after disasters.

Adaptation to Change: The ability of schools to adapt to changing needs of society and the environment. Using these variables, you can conduct a comprehensive analysis of the role of architects and stakeholders in creating resilient primary schools in densely populated areas. These variables can also be used as a basis for data collection and research methodology development. From the flow diagram of the variable relationship, a comprehensive analysis can be carried out on the role of architects and stakeholders in creating elementary schools, especially SD Muhammadiyah 2 Sidoarjo which is resilient in densely populated areas.

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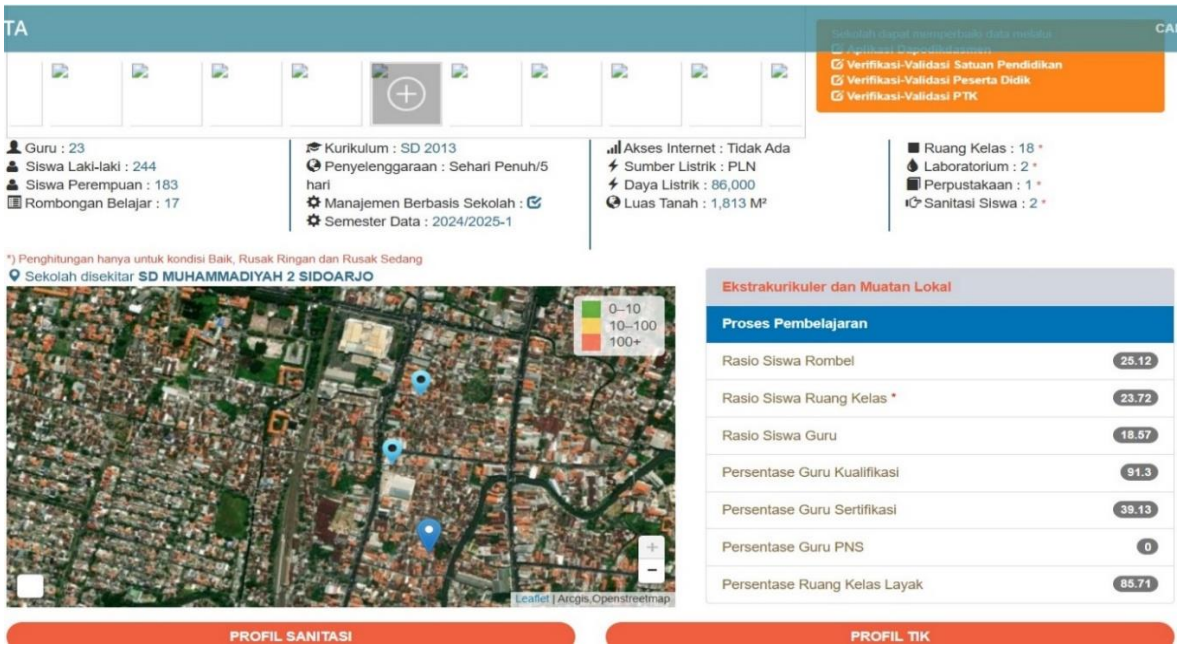

Picture. 2 (source google map) date.01.November 2024

Table 1. Results of the Billing Scale

No.	Policy makers	Percentage value
1	Architect's Participation in Decision-Making	30.00
2	School Leadership Support In long-term needs	25.00
3	Holistic Support from Parents	20.00
4	Building a Conducive Learning Environment	10.00
4	Building a Conducive Learning Environment	10.00
5	Improved Communication and Transparency	5.00

Source: Interview (2024)

Although this study provides significant insights into the role of stakeholders in school development in densely populated areas, there are some limitations that need to be noted. First, this research is qualitative and limited to one location, namely SD Muhammadiyah Sidoarjo. Therefore, the results of this study may not be generalized to other schools in different areas. Further research with a quantitative approach and involving more locations can provide a more comprehensive picture.

Second, limitations in data collection can also affect the results of the study. Despite interviews and observations, it is possible that some stakeholder perspectives are not fully represented. This can affect the understanding of the dynamics that occur in schools. Future research should consider more diverse data collection methods to get a more complete picture.

Third, this study does not explore external factors that may affect architectural resilience, such as government policies or regional economic conditions. These factors can have a significant impact on school development and stakeholder engagement. Therefore, it is important to consider the broader context in subsequent research.

Fourth, this study does not discuss in depth the long-term impact of stakeholder engagement on the quality of education. Further research can explore the relationship between stakeholder engagement and student education outcomes in the long term.

Finally, although this research contributes to the understanding of architectural resilience, there are still many aspects that need to be further researched. More in-depth and comprehensive research will be very useful to develop more effective strategies in improving the quality of education in densely populated areas.

Conclusion

From the results of this study, it can be concluded that the analysis of the role of architecture and stakeholders in school management decision-making has significant implications for the quality of education. The involvement of architects, stakeholders, principals, school committees, and parents of students, policy makers in supporting elementary schools in Muhammadiyah Elementary School that are resilient in densely populated or urban areas so that they can be flexible.

Acknowledgments

We would like to express our sincere gratitude to you. Retno Hastijanti and Mr. Darmansjah Tjahja Prakasa, all lecturers of Untag Surabaya who have provided support during this research. Thank you to all stakeholders, teachers, parents of students, school committees, and the surrounding community who have participated in this research. As well as thanks to the organizing institutions of ICoICE and the parties who have provided resources and research materials. This support makes a great contribution to the success of our research.

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