Holistic Catholic Education:
Synthesizing Environmental Stewardship, Interfaith Dialogue, and Sustainability
ISBN : 978-623-10-7056-2

CHAPTER XVII

Development And Management Of Environmentally Friendly Educational Facilities

Marselinus Heriteluna (mheriteluna@yahoo.com)
Poltekkes Kemenkes Palangka Raya

Abstract

Building and managing environmentally friendly educational facilities is important to support the planet's sustainability. These facilities reduce negative impacts on the environment and provide significant benefits for improving residents' quality of life, health, and comfort and reducing operational costs in the long term. The implementation of green education facilities, which include the use of environmentally friendly technology, has a positive impact from an economic, social, and environmental perspective. Although they require a significant initial investment, green schools have been proven to reduce energy costs, improve student health, and foster environmental awareness. In Indonesia, schools such as SMA Negeri 8 Jakarta and Green School Bali have proven that environmentally friendly technology in education is beneficial from an environmental perspective and positively impacts operational cost efficiency and learning outcomes. However, the main challenge faced is the high initial cost of building environmentally friendly facilities, so policies are needed that support financing and increase awareness about the long-term benefits of this investment.

Keywords: green educational facilities, environmentally friendly, qualitative approach.

Introduction

Amid increasing awareness of climate change and its impact on the planet, many sectors, including education, seek to reduce their ecological footprint. Education is important in shaping a generation that cares about sustainability and the environment. Therefore, developing and managing

ISBN : 978-623-10-7056-2

environmentally friendly educational facilities is one of the strategic steps to support sustainability goals.

Green building involves designing and managing buildings prioritizing energy efficiency, wise use of natural resources, and reduced carbon emissions. The construction of this facility aims to preserve the environment and improve the comfort, health, and productivity of its residents, especially students and teachers.

This paper discusses the basic principles of developing and managing environmentally friendly educational facilities. It will also discuss the economic, social, and challenges faced in applying the green building concept in the education sector. This research also presents case studies from several countries, including Indonesia, that have implemented the concept of environmentally friendly educational facilities.

Literatur Review

Developing eco-friendly educational facilities is part of the global trend towards sustainability in various sectors. According to research by Della et al. (2018), sustainability in building design includes various aspects, such as using environmentally friendly building materials, energy efficiency, and optimal water management. Many schools and universities are beginning to adopt green building principles to support environmental sustainability in education.

Eco-friendly educational facilities are part of the global trend towards sustainable development. According to the USGBC (United States Green Building Council, 2019), green buildings are designed and constructed to reduce or eliminate negative environmental and human health impacts. In education, this includes applying various aspects of design and technology, such as energy efficiency, using environmentally friendly building materials, and adequate water and waste management. Some of the key concepts in eco-friendly buildings in the education sector include:

1. Energy-Efficient Design: Eco-friendly buildings efficiently use natural resources, such as solar panels, natural ventilation systems, and natural lighting, to reduce reliance on electrical energy. Green education facilities are designed by paying attention to optimal natural lighting, cross-ventilation, and using environmentally friendly building materials, such as good thermal insulation, reducing the need for artificial heating and cooling.

ISBN : 978-623-10-7056-2

2. Use of Environmentally Friendly Building Materials: One important aspect of green building design is selecting building materials that are recyclable and have minimal environmental impact. Building materials such as bamboo and environmentally friendly concrete have been introduced in various countries' educational projects (Arif, 2020).
3. Use of Renewable Energy: Green schools often utilize renewable energy, such as solar panels or wind turbines. This can significantly reduce dependence on fossil energy, which is more expensive and negatively impacts the environment.
4. Water and Waste Management: Eco-friendly schools are usually equipped with efficient stormwater management and waste treatment systems to minimize the use of clean water and reduce waste. Water management is another important aspect of eco-friendly educational facilities. Rainwater management and wastewater treatment systems can reduce dependence on clean water supplies from limited natural resources. At Green School Bali, for example, rainwater collection is used for non-potable purposes, which reduces the use of groundwater and drinking water (Sugiarto, 2019).

   Likewise, with waste management, especially solid waste and organic waste. Many schools and universities worldwide are implementing recycling and composting programs to reduce negative environmental impacts. Schools implementing a sound recycling system in the United States can reduce up to 60% of the volume of waste generated daily (Green Schools Alliance, 2017).
5. Health and Comfort of Residents: Eco-friendly buildings also consider residents' air quality and comfort, such as students and teachers. Reducing CO2 levels and using non-toxic materials are important in creating a healthy learning space (Koch, 2016).

   Green buildings not only benefit the environment but can also improve the quality of life for their residents. Research by Küller et al. (2006) shows that a healthy environment with natural lighting, good ventilation, and higher air quality can improve students' concentration and performance. The use of non-toxic and environmentally friendly building materials, such as low-VOC (Volatile Organic Compounds) paints, also contributes to the long-term health of school residents.
6. Energy Costs in Conventional Schools: According to a report by the World Green Building Council (2018), schools that apply environmentally friendly

ISBN : 978-623-10-7056-2

principles can reduce energy consumption by 30 to 50% compared to conventional schools. Although the initial investment is more significant, lower operating costs can offset the initial expenses in the long run. Conventional schools tend to use fossil energy sources and have infrastructure that is not designed for energy efficiency. Lighting, heating, and cooling systems often rely on electricity from non-renewable sources, which are more expensive and environmentally unfriendly. Building design that is not optimal in energy use causes waste and increases operational costs.

A study by The Green Schools Initiative in the United States showed that schools that apply green principles can save 20% to 30% of their annual energy costs compared to conventional schools. In Indonesia, examples of schools that have implemented renewable energy systems, such as Sekolah Alam Indonesia in Jakarta, reduce energy costs by up to 25% by using solar panels and efficient energy management systems.

Conventional schools rely more on heating and cooling systems that use electrical energy from inefficient fossil resources. Some of the factors that make conventional school energy costs higher include:

1. Dependence on Fossil Energy: Most conventional schools rely on electrical energy derived from fossil fuels, which are more expensive and cause high carbon emissions.
2. Inefficient Building Design: Conventional schools often have designs that pay less attention to energy efficiency factors, such as adequate natural lighting, ventilation, and thermal insulation, increasing the need for energy for lighting, heating, and cooling.
3. Limitations in Resource Management: Inefficient resource management, such as water and electricity waste, adds to conventional schools' operational costs.

According to The Green Schools Initiative (2013), conventional schools cost much more energy than eco-friendly schools, mainly due to a lack of investment in energy-efficient technology and design.

International Case Studies :

Green School Bali, Indonesia: Green School Bali is a successful example of implementing environmentally friendly educational facilities that use

ISBN : 978-623-10-7056-2

bamboo as the primary material. The school adopts renewable energy and stormwater management systems. In addition, it integrates a curriculum that educates students to care more about the environment (Sugiarto, 2019).

The Green Building School in Sweden: Many schools in Sweden have been designed using green building principles, including renewable energy, environmentally friendly building materials, and efficient energy management. One successful example is The Green School in Gothenburg, which saves 30% of energy costs yearly (Holm, 2014).

National Case Studies

SMA Negeri 8 Jakarta: This school uses solar panels to reduce dependence on conventional electricity. This technology reduces operational costs and provides a concrete example for students about the importance of using renewable energy (Rahmawati, 2020).

Methode

The method used in writing this paper is a qualitative approach with literature study and document analysis. The author collects various references from international and local literature relevant to developing and managing environmentally friendly educational facilities. Some sources used include academic journals, research reports, scientific articles, and case studies related to continuing education facilities in various countries.

In addition, the author analyzes case studies from several countries and schools in Indonesia to illustrate the application of green building principles in the management of educational facilities. The data collected was analyzed descriptively to understand better the benefits and challenges of implementing environmentally friendly educational facilities.

Discussion

Eco-Friendly Building Design

One of the main elements of eco-friendly educational facilities is building design that pays attention to energy efficiency and natural resource management. School buildings that use green technologies such as solar panels, natural ventilation systems, and eco-friendly building materials can significantly reduce operational costs in the long run.

ISBN : 978-623-10-7056-2

Social and Economic Impacts of Green School Implementation

Social Impact

1. Student Health and Comfort: Green schools are designed to create a healthier student environment, with better air quality, more comfortable temperatures, and natural lighting that can improve learning comfort. For example, a study published by The Center for Green Schools found that environmental quality in green schools positively impacts student absenteeism, which is lower than in conventional schools with poor air quality and ventilation.
2. Environmental Awareness: Green schools also serve as a means of environmental education. Students studying in green schools are more aware of environmental issues and concerned about nature conservation. This sustainability education shapes the character of students who are more responsible for the future of planet Earth.

Economic Impact

1. Operational Cost Savings: While the initial investment required to build a green school is quite high, operational costs can be significantly reduced in the long run. Based on an analysis conducted by The Green Schools Initiative (2013), schools that implement eco-friendly design can save up to 25% in their annual energy expenditure.
2. Improved Student Learning Outcomes: Several studies show that students who study in green schools tend to have better learning outcomes. A study conducted by The Center for Green Schools in the US shows that the test results of students who study in eco-friendly schools can increase by 5-10% compared to students who study in conventional schools. A healthy and comfortable environment supports students' concentration and improves their ability to absorb the subject matter.

Case Study: Green School Bali, Indonesia

Green School Bali is a successful example in Indonesia in integrating sustainability into building design. The school uses bamboo as the main material, which is not only environmentally friendly but also strong and durable. In addition, the school also utilizes renewable energy and stormwater management systems, which reduce dependence on limited natural resources (Sugiarto, 2019).

ISBN : 978-623-10-7056-2

Cost Influence and Economic Impact

Developing environmentally friendly educational facilities requires a higher initial cost than conventional buildings. However, these investments can result in long-term savings through reduced operational costs, such as energy and water. For example, a study by JISC (2016) shows that schools that adopt green building principles reduce energy costs by up to 40% within the first 5 years. Therefore, even though the initial cost is higher, eco-friendly development can be more economical in the long run.

Water and Waste Management

Water and waste management are important components in constructing environmentally friendly educational facilities. Rainwater management systems and water-saving equipment can reduce dependence on clean water sources. In some international schools, such as The Green Building School in Sweden, rainwater management systems meet non-potable water needs, reducing costs and environmental impacts (Holm, 2014).

Environmental Education for Future Generations

Environmentally friendly educational facilities involve infrastructure and the education provided to students. Eco-friendly schools integrate sustainability education into their curriculum to form a more environmentally conscious generation. Students studying in facilities that support sustainability will be more motivated to apply these principles daily.

Case Study: The Green Building School in Sweden

Schools in Sweden that adopt green building principles also focus on environmental education. By equipping students with knowledge about green technology and sustainability, they become agents of change that can inspire the communities around them to care more about the environment.

Conclusion

The construction and management of eco-friendly educational facilities is not just a trend but also an urgent need to ensure the planet's sustainability. Environmentally friendly facilities provide more significant benefits than just reducing negative environmental impacts. They also improve residents' quality of life, health, and comfort and reduce operational costs in the long run.

ISBN : 978-623-10-7056-2

The implementation of environmentally friendly educational facilities provides clear benefits in terms of energy, social, and economic costs. Although it requires a significant initial investment, green schools can significantly reduce energy costs in the long run. More than that, green schools have a positive social impact, such as improving student health and fostering environmental awareness. Economically, green schools help reduce operational expenses and can improve student learning outcomes. Case studies in Indonesia and abroad show that the implementation of green schools can produce far-reaching positive impacts, not only for schools but also for society and the environment as a whole.

In Indonesia, several schools, such as SMA Negeri 8 Jakarta and Green School Bali, have shown that the application of environmentally friendly technology in education benefits the environment and has a positive impact on operational and student learning costs. However, the main challenge in implementing eco-friendly educational facilities is the high initial cost. Therefore, it is important to continue encouraging policies that support financing environmentally friendly facilities and raise awareness about the long-term benefits of these investments.

Reference

Arif, M. (2020). Sustainable Education Facilities: Green Building in the Classroom. Journal of Green Building, 15(4), 103–120.

Della, A., et al. (2018). Environmental Sustainability in Educational Infrastructure. Journal of Environmental Design, 25(2), 77-89.

Green Schools Alliance. (2017). Recycling and Waste Reduction in Schools. Green Schools Report, 7(1), 22-40.

Holm, T. (2014). Sustainable Educational Buildings: Case Studies and Lessons Learned. Journal of Sustainable Building Practices, 12(1), 45–58.

Koch, R. (2016). The Health Benefits of Green School Design: A Review. Journal of School Health, 86(8), 552–560.

Küller, R., et al. (2006). *The Psychological and Health Effects of Green Buildings on School Children

Rahmawati, D. (2020). The Role of Solar Panels in Indonesian Schools: A Case Study of SMA Negeri 8 Jakarta. Indonesian Journal of Environmental Studies, 3(2), 35-50.

ISBN : 978-623-10-7056-2

Sugiarto, A. (2019). Green School Bali: A Model for Sustainable Education. Green Building Indonesia Journal, 7(3), 123–135.

The Green Schools Initiative. (2013). Green Schools and Energy Efficiency. [online] Available at: www.greenschoolsinitiative.org [Accessed 12 January 2025].

The Center for Green Schools. (2020). The Impact of Green Schools on Student Learning. [online] Available at: www.centerforgreenschools.org [Accessed 12 January 2025].

JISC. (2016). Sustainable Education Facilities: Design and Impact. JISC Report on Green Building in Schools, 14(5), 90–105.

World Green Building Council. (2018). The Business Case for Green Schools. [online] Available at: www.worldgbc.org [Accessed 12 January 2025].

Author's Profile



Marselinus Heriteluna, born in Buntok, South Barito Regency, completed his Bachelor's Degree in Nursing from the Nursing Science Study Program (PSIK) Program B FK UNPAD Bandung (1999). Masters in Educational Management (S2) at Liverpool John Moores University, Liverpool, UK (2014) and Doctorate in Educational Management at Malang State University (2014). Overseas Experience, in 2006 following a Study Visit to Sidney, Australia, managing the Model Ward at Calvary Sidney Hospital. In 2008, he attended the Mission Week Congress in Chiang May, Thailand, and Tuguogerao, Philippines. Experience in managing education as Deputy Director III and previously Chair of the Nursing Department (2009) and Research and Community Service Unit (2016). Also teaches at STIPAS Tahasak Danum Pambelum Palangka Raya and STIKES Eka Harapan Palangka Raya. Wrote several books of works and IPR