

Green Library Practices and User Comfort: Evidence from the Malahayati University Library

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ABSTRACT

This research is grounded in the global warming crisis and the demand for sustainable development, which has pushed universities, including their libraries to adopt environmentally friendly practices known as the green library concept. The library of Malahayati University was selected as the research object because it already exhibits several green library indicators, although some users still report discomfort in certain areas. This study aims to analyze the implementation of the green library concept in improving user comfort at the Malahayati University Library. A qualitative approach with a descriptive method was employed. Data were collected through non-participatory observation, structured interviews, and documentation, involving the head librarian, librarians, service staff, and library users as informants. Data were analyzed through data reduction, data display, and verification, and validity was established through source, technique, and theory triangulation. The results show that the Malahayati University Library has implemented most green library principles, including full-glass windows for natural lighting, natural air circulation, recyclable materials, and a fish pond functioning as a passive cooling element. From an ergonomic perspective, air circulation, lighting, cleanliness, aesthetics, and noise insulation in the reading and discussion rooms meet comfort criteria, while the open area around the fish pond still causes discomfort due to heat and unpleasant odor. This study recommends optimizing fish pond maintenance and adding shading elements in the open area to achieve comprehensive user comfort

INTRODUCTION

Global warming is an environmental issue that continues to be a global concern. This phenomenon is characterized by a sustained annual increase in the Earth's average temperature, leading to the greenhouse effect, the melting of glaciers, disruptions to agricultural yields, and the extinction of various animal species (Nik, Agus, & Wiji, 2022). The Intergovernmental Panel on Climate Change (IPCC) has concluded that the rise in average temperatures since the mid-20th century is very likely caused by increased greenhouse gas emissions resulting from human activities, such as the use of fossil fuels, excessive consumption of electricity and water, deforestation, and the widespread use of air conditioners (Nik, Agus, & Wiji, 2022). One of the rarely recognized contributors to environmental damage is the paper industry, which is closely linked to logging; the greater the demand for paper, the greater the pressure on forest conservation (Meher & Parabhoi, 2017).

Islam has indeed taught the importance of maintaining the balance of nature as part of humanity's responsibility as stewards of the earth. Allah the Almighty states in the Qur'an, Surah Al-A'raf, verse 10, that humans have been placed on Earth along with the sources of their sustenance, yet only a few truly give thanks for it. This verse serves as a normative foundation that environmental stewardship, including that of educational institutions, is an expression of gratitude for the trust that has been entrusted to us.

Awareness of the importance of sustainable development has prompted various countries, both developed and developing, to integrate environmentally friendly principles into various sectors, including higher education. Higher education institutions possess the intellectual capacity and resources to integrate scientific knowledge and environmental values into their missions and programs, one of which is through the "green campus" movement (Walad, 2022). Ideally, this concept should also be applied to university libraries as one of the units most frequently accessed by the academic community, although to date, few libraries have fully met these sustainability indicators.

A green library, or eco-friendly library, is a contemporary library concept that prioritizes the principles of utility, aesthetics, and functionality of the library building while taking environmental conservation into account (Kesuma, Rahmawati, & Putri, 2022). The green library movement began to emerge in the early 1990s and has grown alongside increasing awareness among information professionals regarding energy efficiency and the reduction of environmental impact (Meher & Parabhoi, 2017). According to the Online Dictionary of Library and Information Science (ODLIS), a green library is defined as a library designed to minimize negative impacts on the natural environment and maximize indoor environmental quality through careful site selection, the use of natural, biodegradable construction materials, conservation of water, energy, and paper resources, and responsible waste management (Meher & Parabhoi, 2017). Characteristics of green libraries include the use of recyclable construction materials, the use of solar panels, building designs that maximize natural lighting, the availability of natural ventilation and cooling, the installation of

water-saving fixtures, the planting of greenery around the building, and the provision of eco-friendly furniture (Kesuma & Rahmawati, 2024).

The implementation of the green library concept offers a number of benefits, including aesthetic benefits in the form of a comfortable and pleasant library atmosphere that supports learning activities; climatological benefits in the form of a reduction in the air temperature around the building, thereby creating a cooler environment; and ecological benefits in the form of a balance between man-made structures and natural structures (Munawaroh, 2018). The primary objectives of the green library movement are to reduce waste and environmental impact, support sustainable socio-environmental development, and minimize levels of noise, air, and odor pollution that can disrupt patrons' activities inside the building (Syamsiati, 2018).

The concept of a green library is inseparable from the concept of spatial ergonomics, as both are oriented toward creating comfort for the people who carry out activities within them. Ergonomics is a field of study that harmonizes tools, methods, and the work environment with human capabilities and limitations to create a healthy, safe, comfortable, and efficient work environment (Tias, Latiar, & Hakim, 2024). According to Sanders and McCormick (1993), ergonomics focuses on two main objectives: improving the functional effectiveness of equipment and the environment, and maintaining and enhancing human values such as health, satisfaction, and workplace safety. In the context of libraries, the application of ergonomics is reflected in the alignment of work facilities with the principles of effectiveness, comfort, safety, health, and efficiency (ENASE) (Gunaidi & Yoanda, 2023).

Comfort itself can be understood as a spectrum of feelings ranging from the most comfortable to the least comfortable, as assessed based on each individual's perception of their environment (Fakhran, 2019). Rustam Hakim, as cited in a study on public space ergonomics, states that a person's comfort is influenced by several spatial design components, namely circulation, natural elements or climate (solar radiation, wind, rainfall, and temperature), noise, form, scent, safety, cleanliness, and aesthetics (Hakim, 2005). These factors serve as key indicators for assessing the extent to which a library space provides comfort to its users.

LITERATURE REVIEW

A number of previous studies have examined topics related to green libraries and patron comfort, though with varying focuses. Syamsiati (2018) concluded that the concept of a green library on a college campus can create a cool, fresh, and pleasant atmosphere, thereby making teaching and learning activities more comfortable; however, that study did not specifically examine the level of patron comfort. Panjaitan (2016) investigated the influence of interior design on library user comfort and found that air temperature and lighting were adequate, but the layout of tables and chairs was not yet optimal, without linking these findings to the concept of a green library. Munawaroh (2018) emphasized that a green library is not only related to the physical building but also to the collection, services, operations, and the behavior of both librarians and users.

Mondal (2021) underscored the urgency of the librarian's role as a catalyst for sustainability awareness through the provision of environmentally friendly information. Meanwhile, Walad (2022) and Sutrisno (2020) examined, respectively, the implementation of green libraries in the Industry 4.0 era and the application of ergonomic concepts to enhance user comfort, without directly integrating these two variables. The study by Bengi and Yuliana (2020) also examined the availability of library work facilities from an ergonomic perspective; however, it was conducted in a regional library and did not address aspects of green libraries.

Based on the mapping of previous research, a research gap has been identified: no study has yet been found that specifically combines the implementation of the green library concept with an analysis of patron comfort using a spatial ergonomics approach at private universities, particularly at Malahayati University. Based on pre-research observations, the Malahayati University Library has demonstrated several indicators of a "green library," such as the use of large glass windows for natural lighting and good air circulation. Visitation data for the 2021–2023 period show a total of 6,634 members, comprising 4,943 students, 308 faculty members, 161 staff/employees, and 1,222 general visitors, with a fairly high monthly visitation rate. However, there have also been complaints from library users regarding dust and an unpleasant odor emanating from the fish pond in the library's open-air area, raising questions about the extent to which the implementation of the "green library" concept has truly provided comprehensive comfort for library users.

The urgency of this study is further reinforced by the findings of Mutmainah (2023), who linked the implementation of green libraries to the UI GreenMetric World University Ranking achievements of higher education institutions in Indonesia, affirming that the existence of green libraries is increasingly becoming an indicator of the competitiveness of higher education institutions at both the national and international levels. Thus, research on the implementation of green libraries is not only relevant at the technical level of building management but also contributes to higher education institutions' strategic position within the global sustainability movement.

Based on the above discussion, this study aims to analyze the implementation of the green library concept in enhancing user comfort at the Malahayati University Library, from the perspective of spatial ergonomics. The results of this study are expected to provide a theoretical contribution to the development of green library studies in university library settings, as well as offer practical insights for the management of the Malahayati University Library in optimizing the application of this concept.

METHODOLOGY

This study employs a qualitative approach using descriptive methods. Qualitative methods were chosen because they can reveal, in depth, the phenomena of green library implementation and library users' comfort as they actually exist in the field, without manipulating research variables (Sugiyono, 2010). The qualitative approach serves as an umbrella for various types of research methods used to examine social life in its natural state, with the data analyzed consisting of interview transcripts, field notes, documents, and visual materials such as photos and videos (Adlini, Dinda, Yulinda, Chotimah, & Merliyana, 2022).

The research was conducted at the Malahayati University Library (UPT), located at Jalan Pramuka No. 27, Kemiling, Bandar Lampung, from September 2024 until the required data was deemed sufficient to address the research questions.

RESULTS

Implementation of the Green Library at the Malahayati University Library Unit

A library that prioritizes social sustainability is a green and sustainable library, that is, a library that takes economic, social, and environmental aspects into account in its management (Kesuma, Rahmawati, & Putri, 2022). Green buildings are generally assessed using the LEED (Leadership in Energy and Environmental Design) rating system developed by the U.S. Green Building Council, which covers six categories: sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, and design innovation (Mondal, 2021).

An interview with the Head of the Malahayati University Library revealed that the library has met a number of "green library" criteria, including the use of recyclable materials and environmentally friendly features such as natural ventilation and lighting. These findings indicate that the implementation of a "green library" at the Malahayati University Library focuses more on passive building design, namely, the optimization of sunlight and natural airflow, than on active technologies such as solar panels or sensor-based energy-saving systems, which, according to preliminary observations, have not yet been fully implemented.

These findings are consistent with the results of Bullard's study (as cited in Mishra, 2023), which show that library users tend to value and prefer libraries that implement environmentally friendly practices, and that libraries adopting green practices benefit from cost savings and increased community engagement. Thus, the steps taken by the Malahayati University Library to optimize natural lighting and air circulation can be viewed as a "green library" strategy that aligns with user preferences while also being operationally efficient.

Library Space Comfort for Patrons

Space is the second most important element after the collection of library materials in a library, as patrons spend a significant amount of time reading and searching for information within it. A well-designed space is believed to influence reading interest and attract visitors (Fakhran, 2019). A study by Weaver et al. (in Mishra, 2023) comparing green and traditional library practices found that libraries implementing eco-friendly practices benefit from reduced energy costs, increased user satisfaction, and improved staff morale, and are better able to attract and retain both users and staff.

Based on interviews with circulation staff, the library's quiet and peaceful atmosphere was found to provide comfort for patrons visiting and studying at Malahayati University. This perception was also confirmed by one library user who stated that the discussion rooms and reading rooms were quite comfortable, especially since they were equipped with air conditioning. These findings indicate that factors such as noise and artificial air circulation in enclosed spaces have been managed quite well, thereby supporting learning activities.

Based on the spatial ergonomics framework proposed by Hakim (2005), several comfort components have been met at the Malahayati University Library, namely smooth air circulation, adequate natural lighting through glass windows, cleanliness of the space, an aesthetically pleasing interior with an archipelago-inspired cultural theme, and soundproofing in the reading and discussion rooms. However, natural or climatic factors, particularly solar radiation and temperature, as well as odor issues, remain challenges in the open areas around the windows and the fish pond. These discomforts indicate that the implementation of a "green library" in open areas is not yet fully optimal, even though, in general, the library has successfully applied most of the green library principles in its enclosed spaces.

Conditions and Application of Ergonomic Concepts in Library Spaces

Ergonomics, as explained by McCormick, focuses on the human factor in the design of equipment, facilities, and work environments, with two main objectives: to improve the functional effectiveness of equipment use and to uphold human values such as health, satisfaction, and workplace safety (Sanders & McCormick, 1993). A well-designed library space should incorporate architectural principles such as comfort, beauty, and harmony, thereby providing physical and mental satisfaction to its users (Pratiwi, 2015).

The Head of the Malahayati University Library Unit explained that the library has installed floor-to-ceiling glass windows to maximize natural lighting and air circulation, and has built a fish pond as an additional feature designed to absorb heat from the room. A circulation services staff member added that the library's facilities are in fairly good condition, featuring several discussion rooms modeled after traditional houses – equipped with air conditioning, tables, chairs, and projectors – as well as an open reading area. However, an administrative staff member explained that the fish pond is maintained once a month by partially replacing the pond water with well water from around the building, which suggests that this maintenance frequency is not yet fully effective in preventing unpleasant odors from developing over the course of a month.

This was also confirmed by several library users who were interviewed. One student stated that the facilities available at the library are comprehensive, with a large collection of books on the shelves, but there is still an unpleasant odor in some areas. Another library user noted that the library space is quite comfortable, especially in the discussion room modeled after a traditional house. Overall, it can be concluded that the Malahayati University library is in good condition, with sufficient lighting from the glass windows and good air circulation, making the indoor areas cool, quiet, and comfortable to use. However, library users' interest in using the open areas near the fish pond and windows is relatively low due to the unpleasant odor and uncomfortable temperature.

DISCUSSION

The Relationship Between Green Libraries and Spatial Ergonomics in Ensuring User Comfort

The findings of this study show that green libraries and spatial ergonomics are two complementary and inseparable conceptual frameworks in efforts to ensure user comfort. Green libraries provide environmentally conscious design principles at the macro level, such as the selection of building materials, water and energy management, and the optimization of natural light and ventilation. Meanwhile, spatial ergonomics translates these principles into measures of comfort directly experienced by library users at the micro level, such as temperature, noise, scent, and furniture layout. When these two frameworks are applied in harmony, as seen in the reading room and enclosed discussion room at the Malahayati University Library, the result is a space that is both ecologically efficient and comfortable to use.

Conversely, in areas where the application of green library principles remains partial- in this case, the open areas around the fish pond and the glass windows the gap between green design and ergonomic comfort becomes more apparent. The fish pond, originally intended as a passive cooling element, actually has the potential to cause comfort issues in the form of unpleasant odors if not maintained properly. Similarly, glass windows designed to maximize natural light can create a localized greenhouse effect, resulting in increased indoor temperatures at certain times of the day if they are not equipped with shading elements such as curtains, louvers, or protective vegetation. This situation underscores that the implementation of a green library cannot stop at the initial design stage but requires ongoing maintenance and evaluation to ensure that ecological goals and user comfort objectives are achieved simultaneously (Mishra, 2023).

A comparison of these findings with the study by Bengi and Yuliana (2020) at the Central Aceh Regency Regional Library further strengthens this argument. Their study found that not all library work facilities met ergonomic standards, even though the rooms were generally well-organized, indicating that ergonomic suitability needs to be evaluated at the level of specific facility components, not just at the general room level. A similar pattern was found in this study, in which the enclosed spaces of the Malahayati University Library

Unit were generally ergonomic, but certain components in the open areas, namely odor management and heat radiation, still required improvement.

The practical implication of these findings is the need for a more detailed approach to evaluating green libraries, one that not only assesses the presence or absence of green elements, such as glass windows or fish ponds, but also evaluates the quality of the sustainable management and maintenance of those elements. Thus, library administrators can ensure that every green library element truly contributes positively to patrons' comfort, rather than causing side effects that actually reduce comfort in certain areas.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the data analysis and discussion presented, it can be concluded that the Malahayati University Library has implemented most of the green library principles, particularly in the aspect of passive building design such as the use of full-glass windows for natural lighting and natural air circulation, the use of recyclable materials, and the inclusion of a fish pond as an additional room-cooling element. From an ergonomic perspective, factors such as air circulation, lighting, cleanliness, interior aesthetics, and soundproofing in the reading room and enclosed discussion rooms have met the comfort criteria for library users, thereby supporting quiet and comfortable learning activities. However, the implementation of the "green library" concept is not yet fully optimized in the open areas around the windows and the fish pond, which still cause discomfort due to solar heat radiation and unpleasant odors resulting from insufficiently intensive pond maintenance.

These findings both reinforce and complement previous studies that examined green libraries and patron comfort separately (Syamsiati, 2018; Panjaitan, 2016; Munawaroh, 2018), by demonstrating that the successful implementation of a green library in enclosed spaces does not necessarily guarantee uniform comfort throughout the entire library, particularly in open areas that are in direct contact with natural elements.

Based on these conclusions, this study makes several recommendations. First, for the management of the Malahayati University Library, it is recommended to increase the frequency and intensity of fish pond maintenance and to consider adding shade elements or sunshades to the window areas to reduce heat radiation, thereby creating overall comfort in accordance with green library standards. Second, library users are encouraged to continue utilizing and maintaining the facilities provided to ensure the sustainability of the library environment. Third, for future researchers, this study is still limited to a qualitative descriptive approach at a single research site; therefore, it is recommended to conduct follow-up research focusing on the sustainability aspects of green libraries using quantitative methods or with a broader scope of research subjects to obtain more comprehensive generalizations of the results.

FURTHER STUDY

This study still has its limitations, so further research on the topic of Green Library Practices and User Comfort: Evidence from Malahayati University Library is needed to make this study more complete and give readers and writers more insights.

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