Research on the Functionality of University Library Construction Based on Energy Saving and Environmental Protection

Dongmei Yu¹, Xing Lv² and Yu Han³,*

¹Library, JiLin Engineering Normal University, Changchun 130052, China
²School of Economics and Trade, JiLin Engineering Normal University, Changchun 130052, China
³School of Information Engineering, JiLin Engineering Normal University, Changchun 130052, China

*Corresponding author e-mail: 2052552927@qq.com

Abstract. In recent years, the energy conservation and environmental protection construction of university libraries and the coordinated development of ecological environment are important topics in the construction of socialist culture in China. In-depth study of energy conservation and environmental protection measures for library construction, through the use of excellent and ingenious design and the use of emerging technologies, do our best. Reduce the operating costs of libraries and realize the construction of green energy-saving and environmentally-friendly libraries. The university is building or expanding libraries to meet the needs of school expansion. The library plays an important role in the university and is one of the university's landmark buildings. According to the actual design of library construction design, this paper expounds that energy conservation and environmental protection are the inevitable trend of university library architectural design development.

1. Introduction
University libraries must ultimately make full use of the resources inside and outside the library to provide readers with a variety of convenient green quality services. To build a green library is to adhere to the reader-oriented, ecological basis, use high-tech achievements, continuously improve the efficiency of resources and energy use, continuously strengthen and improve the use of functions, and continuously extend the service life, that is, to achieve green at all stages. To achieve planning and design based on the needs of readers, functions, layout, and facilities must fully consider the reader's ease of use, comfort and safety, while strengthening the selection of green materials, achieving green construction, fully reflecting the human environment and the natural environment. Coordination and unification, providing readers with a cultural space of environmental protection, energy saving, health and comfort [1].

2. Library building energy conservation and environmental protection concepts and standards
Energy-saving and environment-friendly university libraries from the site selection, planning and design to the end of construction, this type of library is conceived from the overall ecological needs of
the building with the concept of human ecology, and through the elements of the interior and exterior of the building, the materials and energy are in the building. The ecosystem is cyclically transformed inside and outside, obtaining a low-consumption, no-waste, non-polluting, and ecologically balanced building environment. The most prominent feature is to solve the most use with the least energy, and achieve energy conservation and environmental protection [2]. Taking energy utilization and protection as an opportunity, people have re-explored the importance of building energy conservation and environmental protection. Governments and international organizations have formulated policies and established comprehensive standards for building energy conservation and environmental protection design. China's building energy conservation work is fully rolled out in the construction field. This standard is a major measure to vigorously develop energy-efficient buildings, formulate and enforce energy-saving, material-saving and water-saving standards. It is the technical basis for building energy-saving and comprehensive implementation of building energy-saving. An effective approach, as an important criterion for building energy conservation, will play an important role in easing the contradiction between energy shortage and social development. Library building is in the era of transition from traditional to modern concept. The change directly affects the requirements of library building for energy conservation and environmental protection standards [2]. The implementation of national comprehensive standards puts higher requirements on library building energy conservation and environmental protection. Implementation of energy conservation and environmental protection standards, construction drawing review, completion acceptance, etc., encourage the adoption of new and high-efficiency energy-saving technologies and materials, and actively apply new and renewable energy sources [3]. This is the scientific basis for library building energy conservation and environmental protection work.

Figure 1. Green building energy-saving energy distribution

3. Research on the function design of energy-saving and environment-friendly university library construction

3.1. Choosing an address is the key to library construction

3.1.1. Choosing a reasonable location. The location of the university library should be located at the center or sub-center of the campus, close to the teaching area. It should be built on the main axis of the campus, adjacent to the main garden area of the campus, adjacent to the teaching building and experimental building. The traffic is convenient, with the radius of the student living area. This will not only facilitate the readers to study in the library during the day, but also make it easier for the library to use the collection resources at night. The planning and location of the new campus of Baise College is designed according to the above principles.
3.1.2. *Beautiful environment.* Quietness is the most basic requirement of the library, and it is also the ideal place for the library. It is also the basis for creating a good borrowing and research atmosphere. To this end, the library must be close to the main roads and have a certain distance to avoid noise pollution. The planning of the new pavilion of Baise College fully considers this subtle and important factor. The site is selected away from the noise-contaminated teaching areas such as stadiums, roads and vocal buildings [3].

3.1.3. *Advantages of the library's high terrain.* The library should be built in a place with high terrain and good ventilation. It should not be built in a low-lying position. Because the low-lying position is often poorly ventilated, it is easy to accumulate water and humidity, which is not conducive to the preservation of collection resources. The library is the representative of elegant architecture and cultural temperament image. It is necessary to build the library on the main axis of the campus, and also consider the greening and beautification around the library. It should be as suitable as possible with the surrounding environment to create a harmonious scene. The effect is to make the library a beautiful and unique landscape on campus. The new site of Baise College is selected on the high ground of Linhu. The surrounding area of the pavilion is full of green trees and beautiful scenery [4].

3.1.4. *Expansion of subsequent sustainable development.* In the overall campus planning, priority should be given to sustainable development issues, especially the sustainable development of libraries. With the increasing scale of university education and the continuous improvement of the quality of running schools, in addition to meeting the needs of libraries, libraries must pay attention to the development of informationization and digitalization. The library must have complete functions, detailed services, harmonious environment and people-oriented. The issue of sustainable development must be fully considered when building a new library [5].

![Figure 2. Green Library Energy Saving Energy Classification Description](image)

4. *Energy saving and environmental protection is the development trend of library construction*

4.1. *Library building materials selection and natural energy utilization*  
The energy conservation and environmental protection measures in the architectural design of the library should proceed from the building itself, emphasizing that the architectural design should achieve the "people-oriented" effect. Libraries should pay attention to the choice of building materials. The quality of building materials should meet the strategic requirements of sustainable development,
and strive to adopt environmentally friendly materials that have low energy consumption and affect small ecological environment, no radiation and no pollution. In particular, the selection of decorative materials in the building must comply with national testing standards, Energy and environmental protection provide positive conditions. Libraries should make full use of natural energy [6]. At the beginning of the library construction, we should consider the use of the surrounding environment and climatic conditions according to the local climatic conditions to maximize energy conservation and environmental protection. When designing a library, natural lighting and ventilation design should be the top priority, whether it is the first choice for energy conservation and environmental protection. Due to the open plan of the building, the library has a large area and a long opening time. It is a large water and electricity user in the university. To this end, building a library of energy conservation and environmental protection is the trend of the times and the aspirations of the people.

4.2. Energy-saving design of library lighting and air conditioning systems
Indoor lighting is a major factor in the power consumption of libraries. The difference in lighting design methods directly affects the power consumption. In the architectural design of the library, the large reading room is used to make the reading room fully illuminate, and the shading facilities are used to turn the direct light into diffused light, reducing glare, taking into account the reading areas, collection areas, electronic reading room areas, public services and The different requirements of the illuminance, uniformity, light color and brightness of the leisure area determine the arrangement of the bookshelf according to the different directions of the light strip. The illuminance of the reading area should be higher than other areas. At the same time, it also fully considers the need of energy saving. When selecting lamps and lanterns, we mainly choose energy-saving lamps, and boldly select some new-style light-emitting lamps to reduce the light loss of embedded lamps. The rational use of air conditioning systems is the key to library energy conservation. The heating and cooling efficiency of different air-conditioning units is very different, and the energy consumption per unit area can be 1 to 2 times. Reasonable design, careful construction and scientific operation management can reduce the energy consumption of the air conditioning system. For example, the new library of the Xipu Campus of Southwest Jiaotong University is based on the above principle, using water source heat pump air conditioning units, using groundwater as a heat exchange medium for circulating refrigeration and heating. Compared with air-cooled units, the one-time investment is very small, but the power is saved. Up to 30% - 40%, the overall energy saving effect.

5. Humanized design is the pursuit of architectural design of university libraries

5.1. The layout of the transportation network inside the library should be reasonable
The library should make reasonable arrangements for the collection of books and reading rooms under the premise of fully considering the flow of readers, and arrange the library and reading room with
large flow rate on the lower floors. When the new campus library of Baise College is arranged on the floor, the current publication and the newspaper reading room, the reading room and the circulation library are arranged on the first to third floors, which can reduce the mutual influence of readers. When arranging the functional rooms, consider the need to meet the overall growth of the literature and the space requirements for the natural growth of the literature in each discipline. Secondly, the traffic network of each floor must meet the design requirements of fire safety. The fire exits equipped must meet the fire protection needs and serve as a daily backup passage. Finally, individual designs for special areas, such as free reading areas, administrative offices, research studios, study rooms, etc., should be equipped with multiple channels or small classrooms. This not only facilitates the diversion of personnel and does not interfere with each other, but also facilitates the implementation of different management modes for the characteristics of each region.

5.2. Library layout and interior furnishings should be humanized
The energy conservation and environmental protection of library building design should not only be reflected in the technical level of the natural sciences, but also in the pursuit and expansion of the humanistic spirit. Humanized design is the pursuit of library architectural design. First of all, to meet the comfort of reading and the security of access to literature, the design principles should be based on the benefit of readers and librarians. The library should conduct in-depth investigations before the establishment of the library, solicit the opinions of the library people, refer to the mature practices of other libraries, and pay attention to satisfying the physiological needs of people in the design of the building. Especially in the design, indoor light, sound and heat are emphasized, airflow, etc. and the human body's psychological and physiological response to the environment, and strive to create a healthy and comfortable learning environment. Space design must consider the practicality, but also consider the comfort of the borrowing environment, the flexibility of the interior space and the artistry of the interior and exterior layout.

6. Strengthen the energy conservation and environmental protection university library construction function measures

6.1. Improve understanding of the construction of ecological libraries
As an emerging field, the ecological library has a vague understanding of the ecological library, which makes the construction of the ecological library difficult and difficult to promote. Therefore, we should first unify our thinking and understanding from the leadership level and raise the ecological library construction to an important agenda. Strengthen the concept of ecological library construction in management, and let the concept of ecological library construction be deeply rooted in the hearts of the people.

6.2. Strengthening the awareness of environmental protection and energy conservation in libraries
Affected by geographical location, the library is oriented towards the east and west, and it is difficult to achieve the natural ecological effect of warm winter and cool summer. The vertical ventilation is formed by the semi-basement and the "┣" shaped patio and cloister on both sides of the spine. Channel, but affected by spatial layout, safety performance and other factors, the wall of the inner corridor is windowless, resulting in a windshield and dark layout in the horizontal direction, which seriously affects the effect of natural ventilation and lighting, forming an outdoor sunny, The interior is brightly lit. Therefore, I believe that it is necessary to renovate the windowless wall of the inner corridor, and make full use of the "┫" shaped patio on both sides of the "book spine". For example, Shandong Jiaotong University uses the chimney effect to form good natural lighting and ventilation. At the same time, energy-saving lamps are used in the borrowing area with high frequency of use to improve the environmental protection and energy saving of the library.
6.3. Pay attention to the construction of humanistic ecological environment in the library
It reflects the concept of "people-oriented" and service-oriented library humanities and ecological construction. The twists and turns of the museum's inner corridors make many readers often get lost in the library. This can set clear signs and make rational use of deep inner corridors and dead corners, such as setting up small space quiet rooms, greening plants, hot and cold. Drinking fountains, etc. To build a reasonable collection system, we can learn from the book loan rankings, academic hotspots and special collections of the museum, so that the collections should be closely integrated with readers and scientific research.

7. Conclusion
The design of university library construction should be highly valued, especially when planning new campus construction, library planning and design is particularly important. When building a library on the new campus, reasonable site selection, environmental protection and energy saving and humanized design are the top priorities of library design. In order to meet the requirements of sustainable development, new libraries in universities should conduct in-depth investigation and research before building new libraries, and refer to the excellent concepts and practices of university halls in advanced regions, starting from the basic aspects of site selection planning, energy conservation and environmental protection, and humanized design. Design the library into a truly energy-efficient and environmentally friendly building. This is an inevitable trend in the construction of university libraries.

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