

A Study on the Use of Eco-Tech in the Space Design of Coastal Hotels

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Abstract- In today's modern society, human beings are facing more and more serious energy and environmental problems. Therefore, sustainable development is an important task for human beings. With people's attention to ecological technology, it has gradually appeared in the design of architectural environment space, and its use for architectural space design is bound to become a trend. This study designed and planned a new type of hotel space, using ecological technology to construct the hotel's internal facilities. In this way, it not only follows the trend of modern development, but also uses green technology to save energy and reduce emissions, to achieve a balance between man and nature in the design space. The main idea of Eco-Tech is to use technology to improve energy efficiency and recycling efficiency to achieve sustainable development goals. At present, the development of social energy saving is important, but the combination of energy saving and space design is still in the development stage. This study aims to apply energy saving technology to hotel space design in the future. Previous research has shown that Eco-Tech is not a simple concept. First, ecological technologies should be defined, and then the necessary ecological elements and energy-saving technologies should be selected according to the definition. In this paper, ecology is divided into three aspects, and the realization of energy saving is defined according to these three aspects, and 13 energy saving elements are determined, and the design cases of energy-saving hotels in coastal areas at home and abroad are respectively analyzed with the developed "residential space model analysis table". Results show that the suitable energy saving measures are proposed to construct the hotel space in the coastal space. The factors of technological development results from satisfying the objective conditions of economic, natural, social and technological development. It is important to understand the dynamics of ecological technology, master the inherent law of the evolution of technological elements and its impact on the environment, accelerate economic development and reduce the adverse impact on the environment in order to develop the technology or ecosystem to reduce pollution. The application of ecological technology in people's daily use of buildings has been well proved. This study aims to the ecological technologies involved in the design of coastal architectural space and provide design strategies for sustainable development in the future. This

study established the space design suitable for energy saving through the previous literature and research, and analyzed and designed the energy saving technology through the relevant data investigation and case analysis. On this basis, the author puts forward some suggestions of coastal space design applying ecological technology.

Keywords: Coastal space, Hotel planning, Eco-Tech, Space design, Design method

1. INTRODUCTION

Indent this the first oil crisis in the Middle East in the 1970s, Western intellectuals, including the U.S., realized the importance of environmental crisis for human survival, and thus came up with the concept of Eco-Tech [1]. Eco-tech is a combination of economics and technology, whereas, eco-tech is ecology and technology is science and technology. Ecosystem issues such as energy conservation and natural environmental improvement using science and technology are related to environmental concepts. Today, due to the mass production and consumption of human beings, society is developing rapidly. However, due to excessive energy consumption and development, energy overload is occurring. Therefore, how to deal with climate change, insufficient resources, and ecological environment imbalance is a problem that mankind should focus on solving. The construction industry accounts for 35% of global environmental pollution. This includes air pollution, light pollution, electronic pollution, and other forms of pollution. Construction enterprises also cause more and more serious damage to the natural environment. 40% of the world's energy is consumed in buildings. The carbon dioxide used in air conditioning, water temperature, heating and lighting accounts for 40-45%, and 20-50% of all industrial waste comes from the

construction industry [2]. According to statistics in Korea, 75 % of the total energy consumption in the construction sector is used for residential buildings (including hotels and houses), and more than 78 % of it is used for heating and emergency use. Since modern times, with the development of science and technology, the ability of human beings to understand nature and transform nature has been greatly improved, so that more nature has become humanized nature, and people have conquered nature and made great achievements in the use of nature. At the same time, the destruction of the original natural environment has also reached a quite serious degree. The original intention of the ecological environment is a link composed of ecological relations, which is the comprehensive embodiment of human life and production of various natural resources. Therefore, the higher the level of science and technology development, the greater the degree of human impact on the ecological environment, science and technology and ecological environment show a positive correlation, it is necessary for human to correctly understand the impact of science and technology on the ecological environment and arouse global attention, in order to play a positive impact and reduce the negative impact[3]. At present, human and natural problems exist in the world: population problem, resource problem, environmental problem, ecological problem is quite prominent. The construction industry is an important component of social and economic development. The concept of environmental protection in the natural original form of design and construction is of great significance for the sustainable development of the whole society. Therefore, through the concept of ecological technology and the understanding of the definition of waterside hotel space design, this paper analyzes the Eco-Tech that can be used in environmental protection hotel, studies the characteristics of energy-saving technology hotel in waterside space, and finally draws the means of designing environmental protection hotel along the coast, so as to provide a basis for the application of Eco-Tech in hotels[4]. The purpose of this study is to understand the application law of ecological technology through prior literature and research, classify and sort out the three steps of ecological technology, establish the space design suitable for energy conservation in application, and analyze and design the energy conservation technology through relevant data investigation and case analysis. Based on this, some suggestions of coastal space design applying ecological technology are put forward.

2. LEADING RESEARCH

2.1 The Concept of Eco-Tech Hotel Space Design

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As the society develops, problems such as energy waste, environmental pollution and destruction of the balance of nature are becoming more and more serious. The problem of energy conservation is becoming more and more important. This is not only related to energy, but also to nature and the environment. Eco-Tech is a combination of ecology and technology (Eco-Tech). Eco-Tech is a concept that uses science and technology to address ecosystem issues such as energy conservation through buildings. Sustainable design combines living radius and ecological science and technology[5]. The goal of sustainable design is to eliminate harmful factors to the environment through design. The purpose of ecological science and technology is to use technology to protect and economize natural resources in the natural environment. The concept of Eco-Tech has been around since the 60's. The types of environment-friendly buildings include energy-saving buildings, biological buildings, self-sustaining buildings, buildings combining climate, metabolic buildings, symbiotic buildings, high-tech buildings, organic buildings, green buildings, ecological buildings and so on, which are all the results of ecological exploration of buildings in different environments. It's all about sustainable urban and architectural development. It can be seen that the space design of the Eco-Tech hotel is designed to achieve the means of energy saving through ecological technology.

2.2 Eco-Tech Hotel Space Design Elements

Ecological technology refers to all means and methods to meet people's needs, save resources and energy, and protect the environment. Compared with the concept of environmental protection technology and clean production technology, it is more extensive and universal. The most essential feature of ecological technology is that it will hardly cause environmental pollution and ecological damage when used[6]. Ecological technology should be based on the latest scientific knowledge of modern biology, ecology, information science and so on. Subjectively, human beings hope to develop technologies or ecosystems that reduce pollution, but objectively, the factors of technological development are the results of meeting objective conditions such as economic, natural, social and technological development.

There should be an understanding of the dynamics of ecological technology to also further understand the internal law of the evolution of the dynamics of ecological technology to understand the internal law of the evolution of technological elements and its impact on the environment, and to speed up economic development and reduce the adverse impact on the environment. The

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application of ecological technology to buildings used by people on a daily basis is well demonstrated.

2.3 The Technique and Principle of Space Design of Eco-Tech Hotel

According to the principle of region and suitability, the ecological science and technology building comprehensively considers the climatic characteristics, geographical environment, natural resources and other factors of each region[8]. These factors include, suitable external wall installation system external wall insulation system, shading system, window insulation system, natural ventilation system, natural lighting, solar energy and building integration, geothermal heat pump air conditioning, heavy water reuse, ecological technology building materials, intelligent control, and other

technologies[9]. Its characteristics are that, after screening, optimization and agglomeration, the building energy conservation technology system with local characteristics is formed, the site is selected in a planned way, the effective recycling of resources is used, the energy saving effect is achieved, the building environment is complete, the waste discharge is reduced, the environment is harmless, and the building technology is diversified. In the future, buildings will greatly reduce energy consumption through various advanced energy saving technologies and means, and finally achieve the goal of zero energy consumption [10].

	Concept	Advantage	Disadvantage
Solar energy	Solar energy refers to the energy used in a range of technologies from which light and heat emitted from the sun are generated. Solar technology is widely authorized to capture, convert and distribute sunlight in a passive or active manner.	universality, harmlessness, high productivity, tolerance	dispersivity, instability, high cost, inefficiency, solar waste panel pollution
Water energy	Water energy is a kind of renewable energy, mainly used in the utilization of hydroelectricity.	low cost; continuous renewable; harmlessness	greatly influenced by natural conditions
Wind energy	Wind energy is the energy available to mankind using air movement and belongs to renewable energy (including hydro, bioenergy, etc.).	low cost, renewable, eco-friendly, clean	instability, low conversion rate, noise pollution in production areas, slow development of new energy
Biomass energy	Biomass refers to the various organisms formed by photosynthesis, including all plants and microorganisms.	widely distributed, rich in resources, green, renewable	the available land is limited, the possibility of land conflict is high, energy density is low
Marine energy	Marine energy not only provides abundant fishery products and minerals, but also contains huge energy reserves.	clean, abundant in total resources, many ways to produce energy	instability, unbalanced distribution, utilization is not high
Geothermal Energy	Geothermal energy is extracted from the earth's crust as natural heat energy, which comes from lava columns and exists as energy.	Total amount of resources is large, utilization is high, generation cost is low, stability is high	Non-renewable; limited area for development

Table 1: The advantages and disadvantages of commonly used renewable resources [7]

2.4 Present the Research Methodology



Figure 1: Keyword sorting

The scope of this study is the ideal type of hotel design in a diverse society. Since the 1960s, the tourism hotel industry, as a national revitalization industry, has been actively involved not only by the government but also by the people. Moreover, driven by the continuous increase of the tourism industry, the hotel industry grows rapidly [11]. The range of analysis objects is three kinds of eco-hotels in different countries. Based on the previous literature and research, this study conducted relevant data survey and case analysis, and summarized the key words as shown in Figure 1. Based on the key words, Eco-Tech was analyzed and designed. On this basis, the paper puts forward some suggestions for the space design of eco-hotel[12]. Therefore, this study consists of five chapters, their sequence and introduction are as follows. The first chapter is the research background and objectives, research defense and methods and research on the introduction of the current. In the second chapter, the definition and elements of ecology are first understood. Second, the concept of environmental protection hotel space design, environmental protection hotel space design elements, environmental protection hotel space design trend was analyzed. Third, the evaluation index model of case analysis is put forward. Fourth, the above case evaluation index model is used to select a number of ecological hotel space design cases applicable to abstract design at home and abroad for analysis, and sort out the small conclusions drawn by case analysis. The third chapter is the analysis of the factors related to the ecological technology hotel space


design and the influence of the technological means of the ecological hotel design on the hotel space design. In the fourth chapter, with the previous research results as the center, the ecological concept applies to the design proposal of the technical hotel space design. Finally, the research content of this paper is a comprehensive investigation, and the final conclusion is given.

3. Eco-Tech Hotel Analysis Model

For the model analysis, the above design elements of the ecological technology hotel were first analyzed, and the methods and principles of the design of the ecological technology hotel were extracted in turn. The core of an environmental protection building is to replace the natural energy with the energy used in the building to produce an energy saving effect. The analysis of environmental protection factors was done based on the three stages of the following process: energy acquisition, energy saving, and energy saving technology.

The case of using energy-saving technology in coastal areas is selected as the analysis object, and the factors of ecological technology summarized above are combined for analysis, which is conducive to studying the influence of climate, geography or cultural habits of different regions on spatial design. The hotels designed by energy-saving technology are arranged in chronological order as shown in the [Table. 2].

Table 2: Case description

NO.	Image	Countries	Name	Time	Environmental protection measures
S1		The Norwegian	Svart hotel	2018	Capable of spontaneous electricity
S2		Bali	Suarga Padang Padang hotel	2018	Harness the sun's energy
S3		China	Lanting Anlu Hotel	2021	Use environmentally friendly materials

Ecological technologies are classified into categories (A,B,C) according to energy acquisition, energy conservation and and energy technologies application.

Then, the elements of ecological technologies are integrated and numbered to facilitate analysis. The specific arrangement can be shown in [Table. 3].

Table. 3: Eco-tech Technology Theorem

	Echo tech element	No.	Technology	
Acquisition of energy	Natural energy	Solar energy	A1	Solar power technology
		Water energy	A2	Hydropower technology
		Wind energy	A3	Wind power generation technology
		Bioenergy	A4	Biomass
		Marine energy	A5	Ocean power technology, tidal power technology
		Geothermal energy	A6	Geothermal technology
Conservation of energy	Natural environment	Light environment	B1	Reasonably control the window area ratio
		Water environment	B2	Environmental and environmental protection technology
		Atmospheric	B3	Reduce the area of the building facade; Strengthen the thermal insulation of other parts; The use of environmental and environmental protection technology building energy saving new materials.
Technology utilization of energy	Ecological technology	Alternative technology	C1	Copper substitution technology; Ozone Layer Substance Replacement Technology
		Lose technology	C2	Greenhouse effect gas reduction technology; Sludge storage reduction technology.
		Recycling technology	C3	Power-saving technology; Fuel saving technology; Water-saving technology.
		Resourcing technology	C4	Biotechnology

Combined with the collated energy-saving technology, the analysis model is constructed, and the selected objects are analyzed by using the analysis model. Through the analysis index model, the embodiment of different types in energy-saving technology is comprehensively analyzed. In this way, energy saving technology can be used in coastal space[Table. 4].

4. RESEARCH RESULTS

Ecological energy-saving building is a building that combines ecology, Insert comma after this word and other disciplines, and is designed according to the natural environment and climate characteristics of the construction area. On the basis of a comfortable environment, from the perspective of architecture, nature and human body structure, through the planning and design of the building, efficient energy-saving measures are selected to minimize the resource demand

of the building and promote the coordination between the building and the environment. In the case of paying attention to the overall performance of the building, only the ecological energy technology building as the support, can truly become an ecological energy-saving building. The global hotel industry is characterized by decentralized management. Chain hotels accounted for about 41.1% of total hotel rooms in 2022. China and Europe, in particular, have lower penetration rates than the world average. The 1.5% CAGR in the number of hotel rooms worldwide from 2018 to 2022 is due to the solid macro environment and the growth of the travel market. Affected by the novel coronavirus, the global hotel supply will continue to be depressed. With the development of the hotel, hotel designers only comply with the trend of The Times, in order to avoid the hotel being eliminated.

Table 4: Case analysis

Eco- tech		Implementing eco-tech													
		Item	A1	A2	A3	A4	A5	A6	B1	B2	B3	C1	C2	C3	C4
Geodesign	Climate														
	Direction	S1						S2/3							
	Ventilation							S1/2/3							
	Energy		S2/3												
Structural design	Wall														
	Floor												S1		
	Ceiling					S2							S1/2		
	Window														
Function design	Lighting							S1/2/3							
	Electric power					S2									
	Hydraulic												S3		
	Cooling											S1/2/3			
	Heating											S1/3	S1/2/3		
	System										S1	S1/2	S2		
Material design	Burned addition fee										S3	S2/3			
	Material content												S1/2		
	Insulation materials												S1/3		

According to domestic and foreign cases, C is the most important factor, B is the most important factor, and A is the most important factor. C ranked first in Korea,

and A was in front of B. Element A is A1 technology, that is, solar energy is the most widely used, B1 light environment is the most important, C2, C3 reduction

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technology is more frequently used. In short, C technology is the most common environmental technology in space design. That is, in the design of energy-saving technology hotel, energy technology utilization is the most common. Summarizing the above analysis results, we can understand that the application of energy-saving technology in hotel design mainly embodies in four aspects.

The first is to meet the requirements of green energy conservation in the use cycle. Architectural planning, design, construction, operation, transformation, demolition and other links determine the life cycle of the building. Considering building components, the cycle regularly meets the requirements of environmental protection and energy conservation, including the collection and transportation of raw materials, and provides a good living environment for customers by fully considering and utilizing environmental factors.

Second, adapt to the environment and protect the environment. In the process of Eco-Tech architecture design, we should take full account of climate, ecology, topography, vegetation, natural water system, history, culture, landscape and so as to make full use of the surrounding environment.

Third, to provide an efficient living environment. Ecological energy-saving buildings should provide more convenient living space on the premise of creating a harmonious and beautiful environment, keeping comfortable living environment, improving indoor environment, reducing pollution and ensuring safety.

Fourth, to improve the overall utilization of resources. Select green energy-saving technology, engineering and materials, optimize resource allocation, reduce resource occupancy and consumption, fully improve resource utilization, promote comprehensive utilization of resources, prolong construction life, improve performance and applicability. In the design stage, no matter where the hotel is, it should take into account the environment, topography, water source, climate, architectural direction and spacing of the hotel. This paper studies the design of energy-saving hotels in the future, and provides reference for the future research of energy-saving hotels.

5. CONCLUSION

Eco-energy saving building is a broad concept. Eco-energy saving standards fully consider the cost of

technology, materials and design, with a high return on investment and a significant reduction in resource expenditure. The energy cost of the hotel is generally about 7%~12% of the annual revenue. If the concept of ecological energy saving is determined in the initial design, the mid-term selection of building materials, and the later operation management, the energy consumption of the hotel can be reduced by at least 25%. In this way, the operating expenses of the hotel will be reduced, and the resources will be saved. Therefore, as a future-oriented hotel design, the Eco-Tech hotel is bound to attract attention. From the three selected cases, C is the most required factor, followed by B and A. C ranks first in China, and A is ahead of B. Element A is A1 technology, that is, solar energy is the most widely used, the light environment of B1 is the most important, and the decrement technology of C2 and C3 is frequently applied. In a word, among the ecological technologies related to space design, C technology is the most widely used.

Through this study, it is learned that in the hotel design stage, no matter which region the hotel, it is necessary to comprehensively consider the environment, terrain, water source, climate, building direction, spacing and other factors near the hotel, make full use of the nearby wind, solar and other natural resources, design the hotel according to the local natural climate characteristics, and minimize the pollution and damage to the nearby environment during the operation of the hotel. In the selection of hotel building materials, the wall should have load-bearing, wind, heat insulation and other functions. From the overall structure of the hotel, the wall accounts for a large proportion. The new green energy-saving wall can reduce the hotel's energy consumption. In western developed countries, the new energy-saving wall has been widely used. In addition to the characteristics of ordinary walls, these walls also have environmental protection characteristics. Not only good performance, but also good function, and protect the environment. Doors and Windows are the most heat conduction places in buildings, through the insulation effect of doors and Windows, can save about 40% of the overall energy consumption of the building. The annual consumption of hotel air conditioning is large, and it is very important to take insulation measures when building hotels. The hotel's thermal insulation effect is mainly roof, door and window insulation, the use of the latest thermal reflection coating glass, thermal insulation effect is better. If well insulated, the temperature of a hotel room can be

preserved for a long time, which can save energy. In addition, in terms of energy conservation and management during the operation of the hotel, the daily operation of the hotel can automatically bankrupt the washbasin regulation water pipe or infrared sensor faucet and other energy-saving sanitary tools; To save water, adjust the water pipe of the washing station or install the infrared sensor sensor faucet; Each room is installed with water meters, electricity meters, gas meters, timely record energy consumption, weekly, monthly, annual control consumption; Management personnel regularly inspect mechanical equipment, avoid leakage, water leakage caused by waste of resources, to ensure timely treatment; Due to the decrease of elevator use at night, some elevator use is restricted at night.

Through this paper, we can understand the specific design principles of ecological technology hotel design. In order to meet the requirements of green energy saving in the use cycle, it is necessary to adapt to the environment, protect the environment, and improve the overall utilization rate of resources. Architectural planning, design, construction, operation, transformation, demolition and other links determine the service cycle of a building. Considering the building materials, the cycle includes the collection and transportation of raw materials to meet the requirements of environmental protection and energy conservation on a regular basis. Energy saving technology is fully considered and utilized at each stage to provide customers with a good living environment. It provides a reference for the backward research of energy-saving hotel.

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