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SUSTAINABLE ARCHITECTURE AND DESIGN IN THE HOTEL INDUSTRY: COMBINING AESTHETICS AND ENERGY EFFICIENCY

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Abstract

The latest trends in the hotel industry emphasize the importance of sustainability through the integration of aesthetics and energy efficiency into hotel architecture and design. This article explores modern methods and approaches to creating sustainable hotel facilities that not only impress with their design, but also minimize their negative environmental impact. It is noted that the efficient use of natural resources and the use of environmentally friendly materials are becoming increasingly priorities for architects and designers. The article examines examples of successful implementation of the concept of sustainability in the hotel industry around the world, and also discusses the benefits of such an approach for business, the environment and society as a whole. It also highlights the importance of collaboration between the hospitality industry, architects, designers and environmental experts to develop innovative solutions that contribute to the creation of sustainable and attractive hotel properties. The continued development of sustainable architecture and design in the hotel industry has the potential to change the landscape of the hotel industry, making it more environmentally responsible and socially conscious. Guests increasingly prioritize environmentally friendly hotels, driving up demand for sustainable accommodations. Such objects, in turn, receive competitive advantages and increase their attractiveness in the eyes of consumers.

Key words: hospitality; tourism; sustainable architecture; hotel industry; sustainable tourism.

Introduction

The concept of sustainable development has undergone significant transformations over the past half-century. Initially emerging from environmental and conservation issues, it has expanded to encompass economic and social components, and more recently, cultural aspects related to the preservation of historical heritage. It can be confidently stated that sustainable development today is a process of economic and social changes in which natural resources, investment direction, orientation of scientific and technological development, personal development, and institutional changes are harmonized with each other, strengthening the current and future potential to satisfy human needs and aspirations. Thus, it should be acknowledged that the focus is primarily on ensuring the quality of human life. This article attempts to explore the perspectives of sustainable economic development concerning the influence of three components: architectural and construction opportunities, tourism, and the hotel business.

Results and discussions

Sustainable tourism development refers to a concept that seeks to meet the current needs of tourists without compromising the needs of future generations and the preservation of the environment, cultural heritage, and the social well-being of local communities. Defining the place of sustainable development in tourism encompasses several key aspects, as presented in Figure 1.

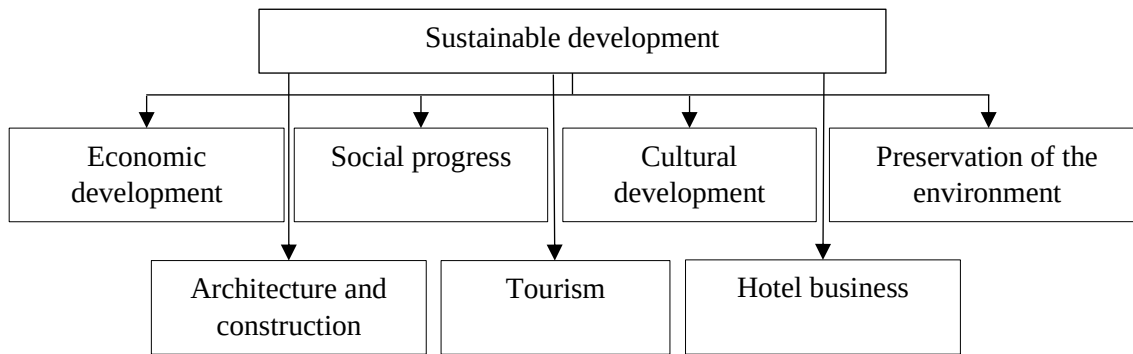


Fig. 1. The concept of sustainable development in relation to tourism activities
[developed by the author]

This scheme demonstrates the relationship between tourism activities and development in the context of sustainable tourism. Tourism activity can stimulate development, but it can also negatively impact the environment and local communities. From this, precise directions of interconnection can be formulated:

- Sustainable tourism aims to minimize the negative impact of tourism and maximize its positive influence.
- To achieve sustainable tourism, it is necessary to develop and implement policies and strategies aimed at sustainable tourism development.
- Collaboration with stakeholders, including local communities, businesses, and governments, is essential.
- Investing in education and raising awareness of the importance of sustainable tourism.

Thus, sustainable tourism becomes an important tool for development if it is developed and managed responsibly by all stakeholders. The concept of sustainable tourism is reflected in all areas of tourism activity, including the hotel business.

Since the beginning of the 21st century, characterized by the development of social production, economy, and the global tourism industry, the hotel business has also received an additional impuls [2, p. 62]. As a special type of building, a hotel building can carry the historical memory of a city or region, inheriting its architectural context. The architectural appearance of a hotel can also correspond to the historical context of the region and even the country, combining with new elements, transforming into a modern product and possessing its unique value.

The comprehensive goal of hotel architectural design is to provide investors and operators with a specific environment for professional and technical services, as well as to generate consistent profit [4, p. 24]. Based on this, it can be said that studying the directions of hotel architectural design development and new trends of design ideas in the context of sustainable tourism will contribute to informing about market demand trends and providing useful reference information for investors, builders, designers, and tourism professionals.

The author has examined four main categories of hotels that reflect the essence of the concept of sustainable development:

- Green eco-hotels;
- Local (ethno) hotels;
- Individual, unique hotels;
- High-tech hotels.

Green eco-hotels, often referred to as green hotels, are more broadly interpreted internationally as "eco-efficient and energy-efficient hotels [1, p. 168]. They refer to hotels that offer both environmental

and economic benefits. They ensure tourists' efficient resource use while simultaneously protecting the environment.

The environment contributes to consumers' healthy lifestyles. The development of eco-hotels is currently the most recognized worldwide. The most authoritative standard for assessing ecological construction is LEED (Leadership in Energy and Environmental Design), introduced by the US Green Building Council in 2003. [3, p. 27]. LEED advocates for the effective reduction of negative impacts on the environment and residents in architectural design. It promotes efficient greening of buildings by standardizing the concept of green buildings. Amenities, energy-saving measures, ecological diet, eco-friendly lifestyle, and other features distinguish eco-hotels favorably, adding original design solutions and enhancing competitiveness. It is important to note that integrating energy and energy efficiency into hotel architecture and design not only contributes to environmental sustainability but also creates unique and attractive spaces for guests. Original design solutions inspired by the principles of sustainable development can become not only a symbol of modernity but also an additional source of attracting and satisfying guests, thereby increasing the hotel's competitiveness.

An example of such a hotel is the Royal Park Hotel, Singapore, depicted in Figure 2.



Fig. 2. Parkroyal on Pickering, Singapore [10]

Every fourth level of the 16-storey "Royal Park" Parkroyal on Pickering is a lush garden with terraces, many crystal clear cascades and waterfalls. The hotel's interior uses natural wood, stone, pebbles and huge glass structures. Green spaces occupy 15 thousand square meters. m., the hotel also uses environmental technologies: light, motion and rain sensors, energy saving and water recycling systems, solar panels and rainwater collection technology. Parkroyal on Pickering was included in Forbes' list of seven hotels of the future.

Another example of this trend is the Eco-Castle Chateau Mcely in the Czech Republic, which is presented in Figure 3.



Fig. 3. Eco-castle Chateau Mtsely, Czech Republic [7]

The first “green” hotel in the Czech Republic, awarded the European Ecolable label, and “The best environmental hotel in the world” according to the World Travel Awards [14]. The Chateau Mtsely castle (a 17th century noble estate) was reconstructed and became a luxury five-star eco-hotel. It is located on a hill among the ancient trees of St. George's Forest, an hour's drive from Prague. The 23 rooms of Chateau Mtsely are provided with electricity from renewable sources, garbage is sorted, and wastewater is filtered through its own treatment system. The collected rainwater is used to water the English castle park. The restaurant's menu includes dishes prepared from natural products from local suppliers.

Thus, green eco-hotels are shining examples of collaboration between architects, designers and environmental experts to develop innovative solutions to create sustainable and attractive hotels. These collaborative relationships enable hybrid solutions to promote more efficient use of resources, reduce environmental impacts and improve guest experience. In addition, these relationships help shape innovative design and architectural strategies that can be adapted and applied not only to the hotel industry, but also to other industries. Collaborative efforts between architects, designers and environmental experts to create green eco-hotels are helping to shape integrated approaches to sustainable development. This includes using innovative technology, developing efficient construction methods, and taking into account the needs and preferences of guests.

Local or ethnic hotels are unique hotel properties that reflect local culture, traditions, architecture and lifestyle. An ethnic hotel represents the history of a nation, the traditions of the people, their preferences and characteristics. The creation of such hotels has become unusual, but already quite popular. This is not just a comfortable atmosphere, the beauty of the interior and special decoration, but also an opportunity to plunge into an entire era of a separate nation, feel how certain peoples lived, and surround yourself with the style and taste of a separate ethnic group. Local or ethnic hotels play an important role in sustainable development as they help preserve and promote the cultural and natural heritage of the region. A typical example is Vinotel in Georgia, which is shown in Figure 4.



Fig. 4. Hotel Vinotel, Georgia [13]

Vinotel Boutique Hotel is situated in the heart of the Old Town of Tbilisi. Housed within a historic building, part of which dates back to the late 19th century, the interiors faithfully replicate traditional Georgian houses, adorned with antique furniture, paintings, and stained glass windows. A particular source of pride for Vinotel is its wine cellar, rumored to have once connected to a tunnel leading to the neighboring temple. This area of Old Tbilisi was historically inhabited by winemakers, and as such, the hotel regularly hosts tastings with expert sommeliers. Thus, Vinotel Boutique Hotel not only contributes to the advancement of sustainable tourism by preserving and restoring the city's historical heritage but also fosters the preservation and promotion of Georgian traditions and cultural values through its unique architectural and cultural experiences.

Another similar example is the Puteus Palace Heritage Hotel in Croatia, depicted in Figure 5.



Fig. 5. Puteus Palace Heritage Hotel, Croatia [11]

Hotel Puteus is a restored palace dating back to 1467, one of the oldest on the entire Adriatic coast. The village of Puciscu, where the hotel is located, is often called one of the most beautiful in Europe. The houses here were built from limestone, which is mined nearby. In the village there is the only mason school in Croatia, and to the east of it, on the island, there are ancient quarries. Some of them were founded during the Roman Empire. Historical preservation for tourism is one of the most important areas of sustainable tourism, from the point of view of several aspects: preservation of cultural heritage, attracting tourists, educational opportunities, etc.

Individual, unique hotels are architectural masterpieces that are unlike traditional hotels. They are unique and inimitable. The architectural solutions of such hotels often implement sustainable development trends, which also makes these hotels stand out and make them individual. Also, unlike traditional ethnic hotels, so-called individual hotels do not have sufficient scale and level of luxury. They involve unusual architectural and design solutions based on the natural landscape and climatic features of the construction site. These hotels seem to fit into the environment, complement it and do not in any way disturb the ecological and biological balance. These hotels may have only a few dozen or even a few rooms, where each room and architectural appearance of the building has unique features that match the environment. One interesting solution in this direction is the Icehotel in Sweden, which is presented in Figure 6.



Fig. 6. Icehotel, Sweden [9]

This hotel art project made of snow and ice has been running since 1989. Every winter the hotel premises are rebuilt in a new way. The material is frozen water from the unique Turna Elv River, which has never been used for industrial purposes, which is especially important in the context of sustainable tourism development. Every spring the ice melts, so the rooms are never the same from year to year - always different walls, decor and furniture. Visitors are provided with thermal underwear, hats and sleeping bags. After a night on reindeer skins, guests are served breakfast with hot lingonberry juice. Regardless of the outside temperature, the rooms never get colder than -7°C .

Another unique property can be considered The Manta Resort in Tanzania on the island of Pemba, which is presented in Figure 7.



Fig. 7. The Manta Resort, Tanzania [12]

The Manta Resort would be a regular seaside resort hotel, if not for one room - a floating house with an underwater room. Underwater Room is located 250 m from the shore. On the deck of an exotic design, you can sunbathe with a cocktail in hand during the day or look at the stars at night, also with a cocktail (all inclusive). The huge windows of the underwater bedroom provide an all-round view: you can watch the life of reef fish, squid and octopuses, knowing that you can swim with them at any time. This hotel is a project of the Swedish company Genberg Underwater Hotels, which is engaged in creating underwater apartments around the world [5].

The presented examples of sustainable architecture and design demonstrate how tourism can be integrated into the ecosystem of an area and not disturb it, but make tourism part of nature. This is because a sustainable approach includes not only the construction and operation of facilities, but also a wide range of practices and strategies aimed at preserving and restoring the environment.

High-tech hotels are hotels that, thanks to their technological solutions implemented within the framework of architectural composition and design, become representatives of sustainability in tourism. The time has come when guests need more advanced technology. Hence the demand and development of innovative technologies in hotel architecture around the world. One of the striking examples of this trend is the Helix Hotel, Abu Dhabi, presented in Figure 8.

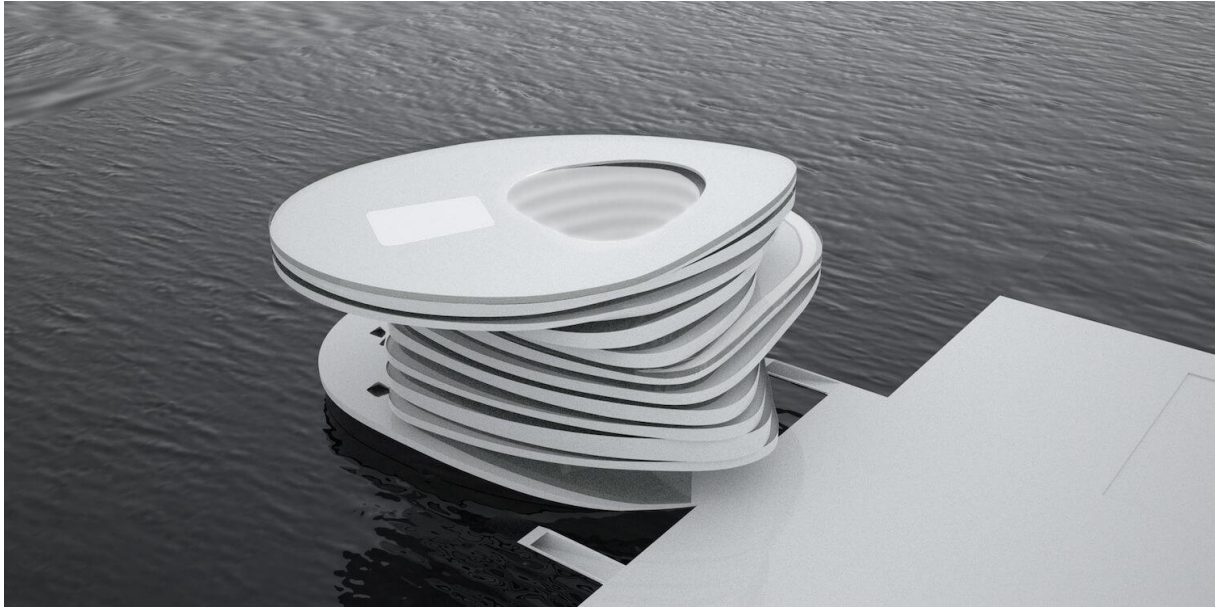


Fig. 8. Helix Hotel, Abu Dhabi [8]

This hotel has not yet been built, but has already been rated for its high-tech solutions in the field of heat and energy saving. The 208-room hotel will be equipped with the latest Grow panels, which are mounted on the exterior of the facade and accumulate solar and wind energy. The temperature and humidity in the building will be regulated using a waterfall in the inner covered courtyard - the atrium. A huge glass sliding wall will be opened periodically to allow fresh sea breezes to enter the room.

The most interesting hotel in this area from the point of view of sustainability in tourism should be recognized as the Breeze project - the world's first hotel with zero energy consumption in Amsterdam, which is presented in Figure 9.

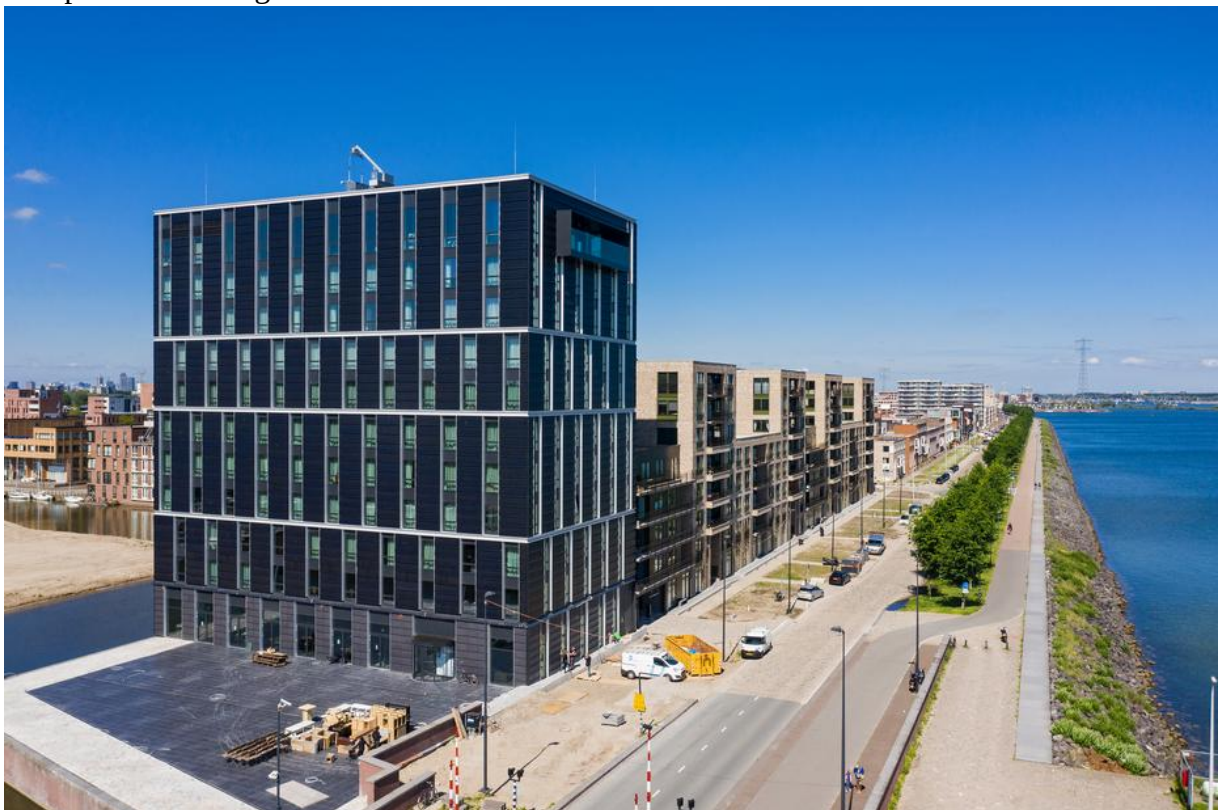


Fig. 9. Hotel Breeze, Netherlands [6]

The Breeze Hotel is part of the new eco-district of Amsterdam on IJburg Island. The concept of the facility is designed with the highest standards of environmental friendliness and energy efficiency in mind. For instance, the air conditioning system eschews freon and standard cooling methods. Instead, it relies on underground shafts with tanks that heat or cool the air. The focus is on ecological sustainability, energy-efficient technologies, and sustainable development in tourism activities.

During the exploration of numerous potential sites, the project authors found a planned area for the hotel on the newly formed IJburg Island, conceived by the Amsterdam municipality as an eco-district. To construct the hotel on this site, eco-certification was required. It was then discovered that Professor Ben Bronsema at Delft University of Technology had been developing an alternative conditioning system with minimal energy consumption, without using freon or standard air cooling methods for several years [15].

The system prototype was inspired by African termite mounds, which the group extensively studied. The system works with three shafts in the building. Two contain air, which either heats or cools water in two isolated underground tanks depending on the atmospheric temperature. One shaft has a fine water cascade, acting as a climate cascade, cooling or heating the air to +18 degrees Celsius. In case there is a need to increase the air temperature, each room is equipped with a split system that simply heats the air to the desired temperature. The heated and exhausted air is expelled into the atmosphere through recuperators. The recuperators return the extracted energy back into the building's energy system. As a result, the building always has fresh air, additionally purified with water. There is no noise or vibration from conditioning units, nor are there harmful gases and liquids in the system during equipment production or building renovation. Space is saved due to the absence of bulky cooling units. Additionally, minimal electricity is used for cooling.

All other hotel solutions are also aimed at reducing energy consumption. The entire staff attire, from clothing to shoes, is made from reusable materials, and the bedding in the rooms is made from recycled materials. Seasonal and local produce is used in the kitchen, some of which is grown within the hotel. All cosmetics are sourced from a manufacturer that only uses natural ingredients. In addition to this, the entire building facade, except for the glazing, is covered with solar panels. The construction of the building's enclosing structure is done to the highest energy efficiency standard. Therefore, the hotel's electricity needs are entirely covered by its own generated energy.

To sum up the above, creating environmentally friendly hotel facilities requires a comprehensive approach and the application of various methods and approaches. The use of energy-efficient technologies, such as lighting, heating, and ventilation systems, reduces energy consumption and harmful emissions. The use of renewable energy sources helps reduce reliance on fossil fuels and decrease environmental pollution. Efficient management of water resources, including rainwater collection and purification, as well as waste recycling, contributes to water resource conservation and pollution prevention. Waste minimization and the use of materials with a low carbon footprint help reduce environmental impact and waste volume. Integration with the local community promotes sustainable relationships and reduces the ecological footprint by supporting local initiatives and using local resources. Overall, the application of these methods and approaches enables the creation of hotel facilities that not only provide comfortable accommodation for guests but also respect and preserve the environment for future generations.

Conclusion

In conclusion, it should be noted that the discussed directions of development in architectural solutions for modern hotels and the examples presented in the article undoubtedly do not exhaust the full spectrum of trends in this industry. However, in the author's opinion, this overview can serve as a certain foundation for further research in the field of sustainable development of the hotel business and tourism.

The continuous development of architecture and design in the hotel industry has the potential to reshape the landscape of this sector, making it more environmentally oriented and socially responsible. Guests increasingly prefer eco-friendly hotels, which stimulates the demand for such establishments. In response, these hotels gain competitive advantages and become more appealing to consumers.

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