

Evaluating Sustainable Energy Standards in Hospitality Architecture: A Case Study of Trabzon's Zorlu Grand Hotel

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ABSTRACT

Sustainability, eco-friendly design, and green design concepts have become more prevalent due to the negative consequences of globalization. Sustainability affects various fields, such as health and architecture, in addition to impacting the tourism sector. Sustainable hotel practices begin with the site selection for the building. They are based on the principle of considering the building, environment, and human health as a whole, adopting principles that aim to minimize environmental problems and preserve natural resources. In this study, Trabzon Zorlu Grand Hotel, which holds a green hotel certificate and occupies an important location in Trabzon, was discussed to highlight the significance of sustainability in hotel buildings and emphasize environmental awareness. The study was conducted in three stages. Firstly, the theoretical context was developed. In the second stage, data related to the study area were obtained, and an interview was conducted with a hotel official using the observation method. In the final stage, the obtained data were evaluated, and recommendations were presented. The findings suggest that the hotel generally meets the sustainable hotel criteria in the context of water, waste management, energy, transportation, pollution, materials, sustainable lands, management, indoor quality, and innovation.

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1. Introduction

In recent years, the rapid increase in the world population, globalization, and intense competition have led to a significant rise in the consumption of natural resources. In response, people have started to adopt a more environmentalist attitude in an effort to

minimize the growing environmental problems and disasters caused by these issues (Ragheb *et al.*, 2016; Zeunert, 2017; Lami and Mecca, 2020; Philokyprou and Michael, 2021). This attitude not only changes people's expectations but also affects their preferences, directing them towards sustainable approaches that support environmentalism and green practices.

explained. This study expects to be an essential guideline for identifying the advantages and disadvantages of sustainable hotel buildings for the city.

2. Methodology

2.1 Sustainable Buildings and Rating Systems

Sustainable buildings are defined as designs that focus on the efficient use of resources and reduce the negative effects on human health and the environment. This is achieved through careful consideration of site selection, building placement, design, construction, management, maintenance, repair, and demolition processes throughout the building's lifecycle (Cassidy and Wright, 2003; Bahramian and Yetilmezsoy, 2020; Roberts *et al.*, 2020). Buildings can only have sustainable features if they are designed to respect and work in harmony with nature. Sustainable buildings should provide high levels of comfort by being organized in a way that minimizes energy consumption and environmental damage, without being disconnected from the natural world.

Green buildings or smart buildings have emerged in line with the concept of sustainability, used to denote environmentally friendly and ecologically-minded designs. These buildings are defined by various terms, such as "sustainable," "ecological," or "environmentally friendly," and are generally characterized by a holistic approach (Sur, 2012). Green buildings consider social, environmental, and economic factors throughout the entire building lifecycle, starting from site selection. They demonstrate efficient resource consumption aligned with the climatic conditions and local data of the region, preferring renewable energy sources and minimizing waste generation. These buildings also encourage the use of recyclable materials and are constructed in an environmentally respectful manner. Sustainable buildings protect the health and productivity of users, increasing employee productivity through measures such as natural lighting, good indoor air quality, and minimal noise pollution. They support the sustainable consumption of natural resources during use, minimizing negative environmental impacts and creating opportunities for resource recovery or recycling after the building's service life (Sev, 2009). Ensuring a building's sustainability is possible through the efficient, conscious, and cost-effective use of energy and materials, from the initial selection of materials to the evaluation of reusable components at the end of the building's lifecycle (Çillioğlu Karademir and Dağ, 2021). The goals of sustainable buildings include cost savings, high-quality and high-efficiency performance, meeting necessary health, safety, and comfort standards, reducing environmental pollution by considering waste reusability, and preserving non-renewable resources (Utkutuğ, 2011).

The term "sustainable building" is a more comprehensive expression that also includes the concept of "green building." When buildings are evaluated according to their sustainable features, the efficient use of resources and designs that respect nature are of paramount importance (Çillioğlu Karademir and Dağ, 2021). On the other hand, in green buildings, comfort conditions should be provided by adhering to nature (Öcal and İnce, 2012). The scope of the sustainable building and green building concepts was illustrated in Figure 3.

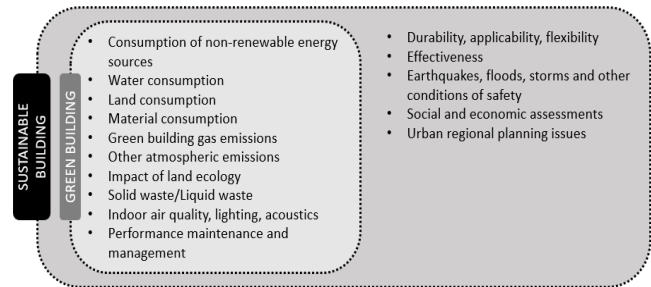


Figure 3. Scope of green building and sustainable building (adapted from Kibert, 2008; Yılmaz, 2012; Akadiri *et al.*, 2012; Wang and Adeli, 2014; Oduyemi and Okoroh, 2016)

While aiming to reduce the environmental impact of buildings and improve their sustainability performance, an objective and quantitative assessment system is needed for decision-making. In this direction, various Building Environmental Assessment (BEA) tools have been developed (Cole, 2005; Sev, 2009). BEA tools have evolved significantly since the introduction of BREEAM in the UK in 1990, with a rapid increase in the number of new assessment tools available. These assessment systems provide a measurable resource for describing the environmental impact of buildings in an objective way, as well as for revealing the importance of renewable energy sources in conservation (Çelik, 2009). The assessment systems create general and valid measurement standards for the concept of sustainability, aiming to demonstrate environmental and innovative formation in the building sector through a holistic building design approach. Additionally, these systems intend to increase user awareness about the benefits of green building (Şimşek, 2012; Yanılmaz and Tavşan, 2021). Alongside the widely used BREEAM (UK) and LEED (USA) sustainable green building evaluation systems, there are also other assessment frameworks such as SBTTool, Green Star, and CASBEE employed globally. As Table 1, this figure presents the sustainable green building criteria systems used around the world, including their year of creation, country of origin, assessment criteria, and certification levels.

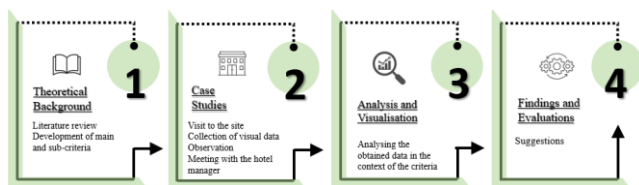
Table 1. Sustainable green building criteria systems in the world (adapted from Erdede *et al.*, 2014; Jalaei and Jrade, 2015; Doan *et al.*, 2017; Awadh, 2017; Zhang *et al.*, 2017; Shan and Hwang, 2018; Sánchez Cordero *et al.*, 2019)

Certification Systems	BREEAM	LEED	Green Star	CASBEE	SBTool
Year	1990	1998	2003	2001	1998
Country	England	America	Australia	Japan	Canada
Criteria	<ul style="list-style-type: none"> • Management • Energy • Water • Transportation • Health and Comfort • Waste • Material • Land use and ecology • Pollution • Innovation 	<ul style="list-style-type: none"> • Innovation and design • Indoor air quality • Materials and resources • Sustainable land • Water efficiency • Energy and atmosphere 	<ul style="list-style-type: none"> • Energy • Material • Indoor environmental quality • Transport • Management • Water • Land use and ecology • Pollution • Innovation 	<ul style="list-style-type: none"> • Indoor environment • Service quality • Land outdoor surroundings • Energy • Resources and Materials • Environment outside the land 	<ul style="list-style-type: none"> • Indoor air quality • Energy and resource consumption • Environmental loads • Social and economic principles • Cultural and perceptual principles • Site selection, project planning and development
Certificate levels	Passes (1 stars) Good (2 stars) Very good (3 stars) Perfect (4 stars) Extraordinary (5 stars)	Certificate (40-49 points) Silver (50-59 points) Gold (60-79 points) Platinum (80 points and over)	4 stars (45-59 points) 5 stars (60-74 points) 6 stars (75-100 points)	S, A, B+, B-, C	-1 (Negative) 0 (Acceptable) 3 (Good application) 5 (Best application)

The criteria in these evaluation systems are designed to create a unique system by considering the regional conditions, standards, climatic and living conditions of the countries (Erdede *et al.*, 2014). The LEED and BREEAM evaluation systems, in particular, have an international identity and are used by countries without their own certification systems (Saka, 2011; Tavşan and Bal, 2021).

2.2 Methods

The study conducted a systematic literature review to identify the sustainability criteria commonly used in sustainable hotel structures. Thus, the criteria of certification programs and evaluation programs developed specifically for sustainable hotels were examined. The study, addressing sustainable design approaches through hotel buildings, consists of 4 stages (Figure 4).

**Figure 4.** Stages of the study (created by the authors)

In the first stage, the theoretical background on the topic was created based on a systematic and comprehensive literature review. Commonly used criteria and sub-criteria were determined based on sustainable building assessment systems and studies in the literature on the subject. Accordingly, 10 main criteria and 58 sub-criteria were identified and presented. The second stage involved fieldwork and consisted of three steps. In the first step was consisted visit to the site of Zorlu Grand Hotel. In the second step, general data about the study area (location, year of construction, visual datas etc.) were obtained. In the third step, on-site observation was conducted. In the fourth step, an interview form was prepared in line with the data obtained and the hotel official was interviewed. The interview form consists of sections including 10 main criteria that were determined in the first stage. These criteria include water, waste management, energy, transportation, pollution, materials, sustainable landscapes, management, indoor environmental quality and innovation. In the third step, on-site observation was conducted and visual data on the building was obtained. In the third stage, the data obtained during the fieldwork were analysed and visualised. Zorlu Grand Hotel's features were included under the main criteria. At the last stage, the analysed hotel was assessed in the context of the sustainable hotel design criteria identified earlier. Evaluations were offered as to whether the hotel meets the specified criteria and suggestions for improvement have been provided accordingly.

2.3 Sustainable Hotel Design Criteria

"Sustainable Hotel" is an expression that describes a hotel designed and operated to consume less energy and water, use resources more efficiently, reduce CO₂ emissions, have positive effects on global climate change, utilize local and recyclable materials, and demonstrate the social and environmental responsibility of its investors (Ertuğrul, 2018). The concept of sustainable hotels is becoming increasingly widespread, leading to changes in hotel designs and management practices. While some green hotels prefer to minimize the use of electronic devices, others aim to save resources by only changing sheets and towels at the request of customers (Ertuğrul, 2018). However, the ideal solution for touristic facilities in the developing and transforming world should be to reduce the total carbon footprint and water consumption through the adoption of new technologies. The sustainability of a hotel can be assessed through certification programs such as LEED, BREEAM, Green Star, and DGNB, which measure the environmental impact and performance of the building (Ertuğrul, 2018). Additionally, programs developed specifically for sustainable hotels, such as Green Globe and Green Key, can be utilized. In the case of Turkey, various certification schemes are available, including "Green Star" and "Blue Flag" from the Ministry of Culture and Tourism, "White Star

Environmental Programme" from the Turkish Hoteliers Federation, "Green Hotels" from the Hotel Association of Türkiye (TUROB), and "Green Key" from the Türkiye Environmental Protection Foundation (TUÇEV). Previously, the green pine symbol was used to certify environmentally-friendly accommodation establishments from 1993 to 2008, but this was replaced with the green star certificate in 2008 by the Ministry of Culture and Tourism (Güler and Tufan, 2013).

When sustainable hotel evaluation systems and studies on sustainable hotels in the literature were analysed (Sipahi, 2018; Gürez, 2019; Tavşan and Yanılmaz, 2019; Vatan and Poyraz, 2016; Giritlioğlu and Güzel, 2015), sustainable hotel design criteria were discussed under ten headings: water, waste management, energy, transport pollution, materials, sustainable lands, management, indoor environmental quality and innovation. The sub-criteria developed based on the literature review serve to expand the scope of the main criteria outlined in Table 2. These sub-criteria enable a more comprehensive analysis of the topic under study, reflecting important aspects and details identified in the available literature. This approach strengthens the holistic approach of the research by providing a more in-depth understanding and an objective set of criteria for the evaluation process.

Table 2. Sustainable hotel design sub criteria (Sipahi, 2018; Gürez, 2019; Tavşan and Yanılmaz, 2019; Vatan and Poyraz, 2016; Giritlioğlu and Güzel, 2015)

Water	Waste Management
<ul style="list-style-type: none"> Reducing water use Installing water-efficient equipment and fixtures, such as armatures, taps, showerheads, and toilets Implementing water-conscious landscape practices Recycling and reusing water Greywater and rainwater harvesting systems Identifying the areas of highest water consumption and taking targeted actions Regularly inspecting pipes and taps to promptly address any leaks Installing water filters and consumption-reducing devices in the hotel's kitchens, bathrooms, and other high-use areas 	<ul style="list-style-type: none"> Separating and collecting different waste streams, such as paper, plastic, glass, and organic matter etc. Investigating the amount and reusability of the various waste fractions Developing and implementing a comprehensive waste management plan, and monitoring its results Applying appropriate wastewater treatment methods
Energy	Transportation
<ul style="list-style-type: none"> Identifying areas with high energy use and implementing targeted precautions Installing meters on high-energy-consuming devices to monitor consumption Assigning staff responsible for collecting and analysing energy data Implementing energy-saving and energy-efficient measures Maintaining all devices to ensure they operate effectively Preferring alternative products that consume less energy Continuously monitoring the hotel's environmental performance and setting improvement targets Utilizing energy-efficient lighting systems, such as those with sensors Incorporating the use of renewable energy sources 	<ul style="list-style-type: none"> Providing bicycles and other environmentally friendly vehicles for use around the hotel Offering alternative transportation options Travel plans and information for guests Encouraging the use of public transport Limiting the maximum capacity of car parking facilities Developing personnel transport plans to minimize the use of vehicles

Pollution	Materials
<ul style="list-style-type: none"> Controlling and minimizing lighting pollution Reducing the emission of harmful gases Implementing measures to control indoor pollution sources Addressing noise pollution 	<ul style="list-style-type: none"> Utilizing recyclable materials Utilizing durable materials Prioritizing the use of regional and locally-sourced materials Selecting environmentally-friendly and healthy building materials
Indoor Environmental Quality	Management
<ul style="list-style-type: none"> Maintaining excellent indoor air quality Controlling cigarette smoke Implementing an effective lighting design that minimizes energy use Adopting sustainable landscape management practices Optimising daylight Optimising natural ventilation Providing thermal comfort Providing acoustic comfort for occupants Incorporating glare control measures, such as blinds or sun shades	<ul style="list-style-type: none"> Implementing an environmental purchasing policy Managing the environmental impact of the building Adopting responsible land management practices Utilizing existing buildings within the area Providing environmental awareness training for customers and staff Developing an informative handbook or materials to help customers understand the building's sustainable features
Sustainable Lands/Site	Innovation
<ul style="list-style-type: none"> Being centrally located to minimize transportation needs Optimising development intensity and community connectivity Increasing habitat protection and providing open spaces Diversifying environmental intensity and land use Being in close proximity to essential social facilities 	<ul style="list-style-type: none"> Integrating innovative design features Implementing advanced sustainable systems and technologies Incorporating additional functions that enhance the building's overall sustainability

3. Case Study: Trabzon Zorlu Grand Hotel

The Zorlu Grand Hotel was built in Trabzon in 1997 as the first and only five-star hotel in the region. Located on Maraş Street in Trabzon, the Zorlu Grand Hotel is centrally situated within the city (Figure 5). Due to its location, it contributes to both economic and social value in terms of cultural interaction and diversity. It is within walking distance of the bazaar centre, historical and architectural sites, shopping opportunities, and banks. The hotel is frequently preferred by both local and foreign visitors due to its central location and ease of transportation.

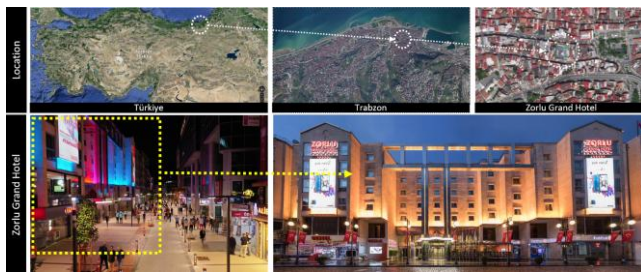


Figure 5. Views and location of Zorlu Grand Hotel (created by the authors)

Zorlu Grand Hotel offers its guests 160 luxuriously designed rooms, 6 meeting rooms, a health club, restaurants, and 24-hour room service. Apart from its hotel function, it also hosts various organizations such as congresses, seminars, business meetings, weddings, etc. The Zorlu Grand Hotel was chosen as the study

area for several reasons, (1) it is the first five-star hotel in Trabzon, (2) it is located in a central and significant area of the city, (3) it serves as an identity element for the city.

4. Findings and Evaluations

The Zorlu Grand Hotel was evaluated within the scope of the most common criteria and sub-criteria in certification systems.

In terms of the water criteria, as a result of the site visit and interviews with the hotel official, it was observed that there are insufficient solutions and practices to reduce water consumption in the hotel. Water-saving applications are available in the ornamental pool in the inner courtyard and the swimming pool on the upper floor. Due to the difficulty in transporting the pool water to the building, the water in the pools is regularly recirculated (Figure 6).



Figure 6. Views from inside the hotel of swimming pool and ornamental pool in the courtyard (created by the authors)

The use of single-flush toilets in the rooms was observed as a negative practice in terms of water saving. At this point, the use of dual-flush toilets instead of single-flush toilets would save a significant amount of water by allowing the user to choose the appropriate flush volume according to their needs. The equipment required for efficient water use, such as taps with filters, faucets, and fixtures, are available in the hotel rooms and kitchens (Figure 7).

Since there is no intervention for water use in the rooms, approximately 70% of the hotel's water consumption was caused by the rooms, and there were no practices to reduce consumption. Pipes and taps are regularly checked for leaks, and any problematic areas are addressed. The hotel has two water treatment systems, but this recycled water was not used in any of its spaces. Recycled water was also not used for the irrigation of landscaping materials used indoors.

When the hotel was examined in general, it was evident that the practices for reducing water use were insufficient. Rainwater was not recycled, and the collected rainwater was discharged. Especially in Trabzon's climate, which receives precipitation for a large part of the year, rainwater design would be a positive approach in terms of efficient water use and environmental factors. Currently, the use of potable mains water for irrigation activities or toilets is a significant environmental and economic loss. At this point, the presence of systems for the accumulation of rainwater in the building and its integration into the building's operations would provide significant returns in terms of reducing water consumption.



Figure 7. Water armatures in the kitchen and rooms of the hotel (created by the authors)

In terms of waste management, as a result of the site visit and interviews with the hotel official, it was determined that the hotel separates its waste into categories such as paper, plastic, glass, and the like, which is also applied in most of the public areas. The separate collection and utilization of the recyclable materials can be an investment in both the future and the economy. Food recycling was also taken into consideration in the hotel, ensuring that organic wastes were separated from other inorganic wastes. Every evening, the cooking oil in the kitchen is measured using a heat pump, and the oil is then collected for separation according to the measured levels. All hazardous wastes within the hotel are collected and removed at regular intervals by contracted private companies or the municipality. However, the hotel does not have any activities on the quantity or reuse of the separated wastes.

In terms of the energy criteria, as a result of the site visit and interviews with the hotel official, it was determined that the most intensive energy use in the hotel is the heating system. It was observed that high-energy-consuming devices are equipped with meters. While central heating system is used in the general areas of the hotel and split-type air conditioners are used in spaces such as the dining, meeting, and seminar halls. The modular design of split-type air conditioners, where the components can be divided into multiple units, allows the system to operate more efficiently and conserve energy. An additional benefit is the provision of clean ventilation in the environment due to the filters installed in these units. In the central heating system, since the entire building is heated simultaneously and the temperature values are maintained at a minimum, energy loss is less compared to individual systems (Figure 8).

Within the hotel, sensor-activated lights are utilized in restrooms and staff corridors to minimize energy consumption, while energy-efficient light bulbs are employed in common areas. Energy-consuming devices are systematically switched off in unused hotel spaces, with the relevant personnel responsible for this control. The hotel has a dedicated team tasked with energy management, and hotel personnel regularly monitor energy consumption. The finance manager organizes periodic meetings to emphasize the importance of effective energy use and reduction, developing strategies to decrease energy consumption. All energy-consuming equipment in the hotel undergoes regular maintenance to ensure efficient operation. At specific times of the day, staff members conduct electricity audits in personnel areas, switching off devices deemed unnecessary. However, the hotel currently does not utilize any renewable energy sources. Incorporating solar panels to harness solar energy is identified as a potential solution to improve the hotel's energy efficiency. Guest room access is provided through an electric card system. This system recognizes when customers leave the room with electronic devices still active, and automatically turns off those devices, representing an environmentally-friendly energy-saving application. While the hotel's overall energy use remains high, the observations indicate that there are various solutions and practices in place to address and reduce energy consumption.



Figure 8. Air conditioners used in the hotel's restaurant and seminar room (created by the authors)

Based on the site visit and interviews with the hotel official, it was determined that the hotel provides convenient transportation options for its guests and staff. If customers agree to the fee, they are transported from the surrounding area to the hotel. The hotel also has a personnel transport plan to shuttle its own staff, thereby

reducing the number of vehicles used and associated carbon dioxide emissions. The hotel's central location on Maraş Street, one of the busiest streets of the city, provides guests with various transportation alternatives such as minibuses, buses, taxis and private cars (Figure 9). However, the surround of the hotel does not have designated areas for the use of bicycles or other environmentally-friendly vehicles.

The hotel has an indoor car park with a capacity of 115 vehicles. Hotel guests can utilize the car park free of charge. When arriving at the hotel, guests are provided with brochures that introduce Trabzon's cultural sites, as well as its food and beverage culture. In addition to the hotel's own tour facilities, guests can also benefit from the services of private tour companies.

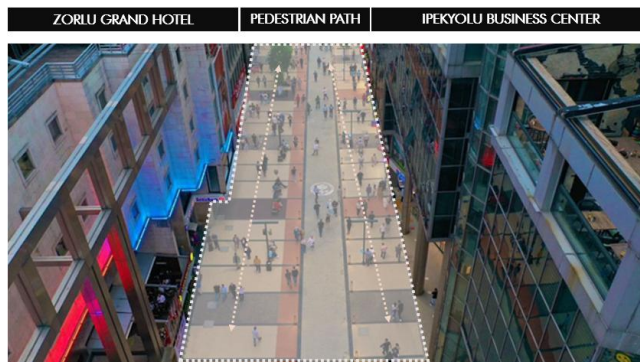


Figure 9. The hotel and pedestrian path (created by the authors)

In terms of pollution, the hotel officials stated that they have received positive feedback from the environment regarding the facade lighting used to create an aesthetic perception. They reported that the facade features 4 different color options, with white or yellow lighting being the predominant choices. The facade lighting, which is intended to create a visually impressive perception for the hotel's surroundings, does not generate visual pollution in the nearby environment.

According to the results of the site visit and interviews with the hotel official, it was reported that a filter system is used in the chimneys to reduce the emission of harmful gases when considering air pollution criteria. Regarding noise pollution, it was determined that the hotel does not generate any noise pollution to the surrounding environment.

According to the study site visit and interviews with the hotel official, when the material criteria were examined, it was determined that the materials used in the hotel were checked by the staff in terms of safety, health and price reviews. After three separate evaluations, the materials are selected by a dedicated commission. In the selection of materials, there is a partial emphasis on local choices specific to Trabzon. Waste batteries are separated, with rechargeable ones being identified. Both innovative materials and local materials are utilized in the hotel's applications. In the use of local materials, the hotel capitalizes on the variety of wood materials available in the Trabzon region.

As a result of the site visit and interviews with the hotel official when considering the sustainable land criteria, it was observed that the hotel is situated in the center of Trabzon, in a central area of the city near to social facilities. The hotel does not have any open landscape areas. In general, it was considered that there are no disadvantages for the building in terms of its function and land selection. The building's function can effectively utilize the advantages of its central location.

Based on the site visit and interviews with the hotel official when considering the management criteria, it was determined that the hotel has a purchasing department. This department is responsible for verifying the suitability of the materials and systems used in terms of health and comfort conditions. The hotel also contains various amenities and facilities, such as a health club, shops, a hairdressing salon, and a dry cleaning service. The shops within the hotel can be accessed both from inside the hotel and from Uzun Street, which forms the northern facade of the building (Figure 10). This organised plan allows the hotel's spaces to serve both its guests and the public.

The building has a positive economic impact on the city and its immediate surroundings and mobilises the domestic market. Courses are organised in the hotel to provide environmental awareness for the guests and hotel staff. While there is no formal handbook provided to hotel guests to help them better understand the building, the hotel staff offers relevant information. The hotel has its own personnel who are interested in HVAC, electrical, etc. systems.



Figure 10. Entrances of shops from Uzun Street and inside the hotel (created by the authors)

Based on the site visit and interviews with the hotel official, it was determined that the indoor air quality is primarily maintained through artificial ventilation. The hotel is regularly ventilated to address any potential air pollution problems. Some rooms overlook the inner courtyard and, since they lack windows to the exterior, their ventilation is solely provided through artificial. As the courtyard is covered with a transparent roof material, it can become very hot at certain times of the year, necessitating the use of air conditioning and VRF (Variable Refrigerant Flow) systems for cooling. VRF systems are regarded as an eco-friendly solution in terms of energy efficiency, precise and easy temperature control, adaptable design, lower noise levels, and enhanced safety. Regarding lighting, measurements are conducted for each hotel space, taking into account the area and function, thus the lighting is improved in any areas deemed inadequate. The hotel rooms are categorized into those facing the inner courtyard, those facing Maraş Street, and those facing Uzun Street (Figure 11).



Figure 11. View direction of the hotel rooms (created by the authors)

While the rooms facing Uzun Street and Maraş Street can benefit from natural ventilation and natural lighting, the rooms facing the inner courtyard are primarily reliant on artificial ventilation and lighting systems. Although the upper part of the inner courtyard is covered with a transparent material, allowing daylight to enter the space, it is stated that this natural lighting alone is insufficient, necessitating the continuous use of artificial lighting (Figure 12).



Figure 12. Rooms facing the inner courtyard in the hotel and roof cover of the inner courtyard (created by the authors)

Daylight and natural ventilation are not utilized in the meeting, seminar and wedding (events) halls of the hotel; therefore,

lighting and ventilation are provided by artificial means (Figure 13).



Figure 13. Views of meeting and wedding hall (created by the authors)

Regarding the acoustic criteria, as a result of the site visit and interviews with the hotel official, it was determined that the noise pollution generated by the bar and wedding hall within the hotel could not be adequately prevented in the hotel's interior spaces. Particularly, the rooms located near the event and organisations are negatively impacted by the noise. The reason for this is that the indoor sound insulation has not yet reached a level that meets the hotel's requirements. Since indoor acoustic precautions are extremely significant in hotel buildings, the insulation between floors should be increased to a sufficient level.

Regarding the innovation criteria, based on the site visit and interviews with the hotel official, it was observed that the hotel employs its own team of architects. The materials and equipment used in the hotel are regularly updated by following innovative systems and technologies.

The status of each sub-criteria of the sustainability criteria of Zorlu Grand Hotel in Trabzon was determined (Figure 14). In the evaluation graph created for the building to meet the criteria, red colour indicates that the building does not meet the criterion, green colour indicates that the building meets the criterion, yellow colour indicates that the building both meets and does not meet the criterion, and white colour indicates that there is no information about that criterion in the building. Accordingly, for each sub-criteria, the scores of the sustainability criteria were obtained by summing the reds as 0 points, greens as 1 point, yellows as 0.5 points and blanks as 0 points.

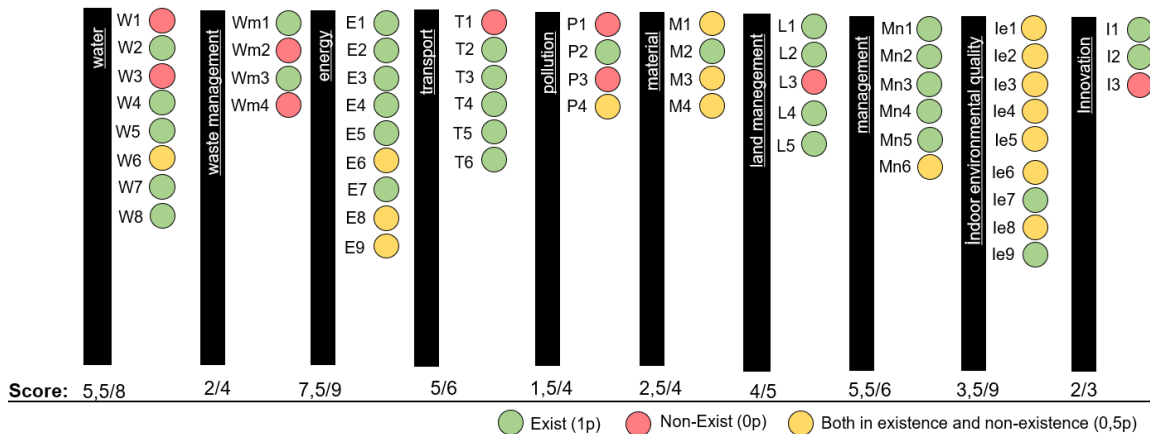


Figure 14. Evaluation of Zorlu Grand Hotel in the context of sustainability criteria (created by the authors)

The percentage of each criterion was determined by comparing the maximum score that can be obtained from the sustainability criteria with the scores obtained by Zorlu Grand Hotel (Figure 15). According to the data obtained, the sustainability status of the

sustainability criteria is as follows, management (%92), energy (%83), transport (%83), land management (%80), water (%69), innovation (%66), material (%63), waste management (%50), indoor environment quality (%39), and pollution (%38).

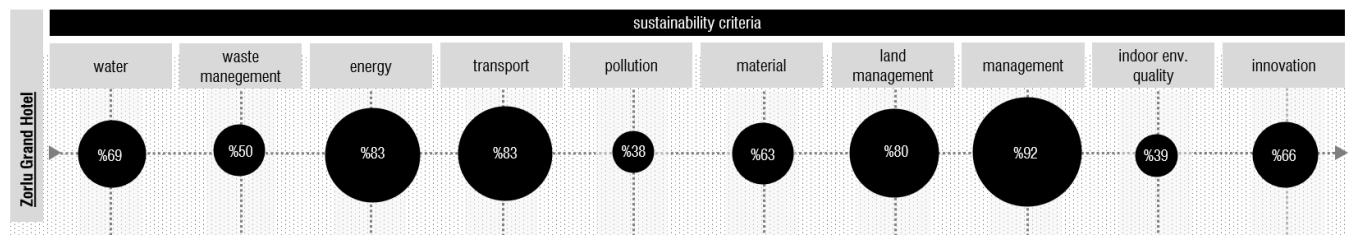


Figure 15. Percentage of Zorlu Grand Hotel achieving sustainability criteria (created by the authors)

The building exhibits strong performance in the management (92%) and energy (83%) criteria, indicating robust sustainability governance and effective energy strategies have been implemented. Transportation (83%) and land management (80%) also score highly, demonstrating a commitment to sustainable mobility and responsible land use practices. However, the building's sustainability profile also reveals areas that require further attention. Water usage (69%) and innovation (66%) fall within the mid-range, suggesting potential for optimisation in water conservation measures and the adoption of innovative sustainable solutions.

The building's performance is relatively weaker in the areas of material selection (63%), waste management (50%), indoor environmental quality (39%), and pollution control (38%). These lower-scoring criteria represent opportunities for improvement, as addressing shortcomings in sustainable material use, waste reduction, indoor air quality, and pollution mitigation could significantly enhance the overall sustainability of the project. Overall, the sustainability assessment highlights a mixed performance, with notable strengths in management, energy, and transportation, balanced by areas that require targeted interventions to elevate the building's sustainability profile further. Addressing the identified weaknesses in material, waste, indoor environment, and pollution management could enable the project to achieve a more comprehensive and well-rounded sustainability approach.

5. Conclusions and Recommendations

As a result of the negative consequences of globalization on our resource-depleted planet, the importance of ecological practices and sustainable approaches in architectural buildings has increased. Today, one of the most focused issues has been the sustainability of buildings. The concept of sustainability, which has an impact on many sectors, has also affected the tourism and building industries, leading people to the use of green, environmentally friendly and ecological structures. The results obtained from this study, which examines sustainable approaches through the case of Trabzon Zorlu Grand Hotel, are listed below:

- For a sustainable approach, it is important to utilize renewable resources in hotel buildings. In this regard, leveraging the geographical and climatic conditions of the building becomes crucial. Considering that Trabzon experiences rainfall for the majority of the year, the presence of a rainwater harvesting system can be observed an ecological approach to reduce the building's water consumption.
- Hotels are buildings that generate high levels of waste due to intensive circulation and utilization. It is necessary to minimize and recycle the wastes produced from various units and areas. Strategies for effective waste management should be implemented and monitored. In this regard, collaboration with companies that specialize in waste management practices can be beneficial.
- It is necessary to provide training courses for the staff to disseminate sustainable approaches and ecological construction techniques. Courses and workshops should be conducted for both hotel staff and business owners, emphasizing the importance of research and development activities in the field of sustainability.
- Today, with the increasing activities of tourism, the number of initiatives for hotel utilization is increasing. At this point, all types of projects and applications should be approached with a sustainable approach, smart systems and innovative ideas should be utilized. The management process of hotels should be followed, considering the reduction of natural resource destruction. In addition, the materials used should have sustainable properties, and be recyclable. These are the main issues that should be emphasized ecologically.
- Energy is one of the areas with the highest consumption in hotel buildings, as in Zorlu Grand Hotel. Decreasing environmental problems and saving energy can be achieved by increasing the use of renewable energy sources. Accordingly, it should be ensured that the building sector benefits from scientific researches and collaborates with expert scientists in the process.

- Transportation is one of the most important criteria for hotel buildings due to the access of guests from different regions and guest diversity. Providing alternatives in transportation, environmental characteristics of the building, proximity to social facilities should be considerable. Works and practices should be conducted to reduce the use of fuel and the emission of harmful gases caused by the use of vehicles. The use of bicycles or vehicles that can generate their own energy should be increased and the use of public transport should be supported.
- The pollution criteria, which includes lighting, air and noise sources in hotel buildings, can be considered in two points as (1) pollution originating from the hotel and affecting the external environment and (2) the effects of pollution arising from the external environment on the hotel. It is important to make regulations for the prevention of both disturbing factors in terms of both in-hotel and environmental control.

The positive and negative evaluations conducted in the study, focusing on sustainable approaches through the example of Zorlu Grand Hotel, will guide new applications to be implemented. The findings and suggestions of the study provide a basis for hotel buildings in different regions to adopt sustainable approaches according to the specific conditions of each region, and to be applied in contemporary ecological architectural models. It is believed that the study will facilitate the adoption of technological and technical applications for hotel buildings serving a social purpose, as well as for buildings of different scales with ecological considerations. Nevertheless, the findings of this study can serve as a reference for future research on sustainable hospitality architecture in regions with different geographical and climatic conditions. In particular, how the sustainable energy standards examined in Zorlu Grand Hotel can be applied to other hotels in similar climatic conditions can be discussed in detail. Furthermore, sustainability criteria that can be optimised for hotels in different locations should be examined in more depth in terms of regional material and energy usage. Future studies can contribute to the dissemination of sustainable architectural approaches by addressing more comprehensively how these findings can be adapted for accommodation buildings of different scales.

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