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Investigation of building certification systems in terms of sustainable preservation: the case of Mardin city in Turkey

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ABSTRACT

The global threats that arise due to the changing needs as a result of the advancement of technology cause the rapid depletion of natural resources. This situation necessitates studies to protect resources and reduce energy consumption. Recent studies have particularly emphasized the concept of "sustainability". Today, as a result of the emergence of sustainability in buildings, certification systems have been developed in which the features of buildings are revealed. In this study, 4 certificate systems frequently used in different countries were discussed. First of all, these systems were examined, and their current data were revealed. The study aims to reveal the sustainability of a historical building located in an important historical city in Turkey according to criteria of the determined certification system. For this aim, the Old Government House in Mardin was discussed as a study area. The historical features of the building and plan features were included in the study area. In the findings of the study, the features of the historical building were determined according to the criteria of certification systems. In the evaluation of the features revealed, suggestions were made especially for the use of energy and water. At this point, to use simple renewable energy sources and systems will support the efficient and recycling of water in the building. This situation will contribute to the sustainable use of the faculty to a great extent. As a result, the sustainable preservation of historical buildings can be achieved in the long term by producing its own energy and using recyclable systems.

1. Introduction

The concept of sustainable development has become an important topic of discussion in recent years due to factors such as climate change, social equality, and economic welfare. The focus on sustainability also plays a critical role in preserving historical and existing structures. This process, in which we redecide "what to protect?" and "how to protect?", has forced people to think of new ways to reduce the economic benefits and, more importantly, the impact of historical resources on nature.

Today, the term "sustainability" is frequently used in all areas of human activity related to the production and management of resources. In addition to a structural methodology, sustainability has begun to represent a lifestyle [1]. Sustainable design is the conceptualization and realization of environmentally responsible and sensitive expression as part of nature's evolving matrix [2]. According to Brooker and Stone, in 2008 [3], it means *"...the use of natural resources and materials without destroying these resources in an unnecessary and wasteful way"*. Sustainability, for Mclennan [4], aims to maximize environmental quality while at the same time minimizing negative impacts on the natural environment. The terms "sustainable design" and "sustainable development" are often used interchangeably in the building industry. However, sustainable development is a much broader issue that shapes and informs the approach to sustainable design.

The World Commission on Environment and Development (WCED), established in 1983, published a report titled "Our Common Future" in 1987. This report, known as the "Brundtland Report", recognized sustainability as a balance between meeting current needs and maintaining the possibility for future generations to meet their own needs. As a result of this balance, the report proposed sustainable development that can guarantee a good life [5]. The Kyoto Protocol, signed in 1997, aimed to appropriately limit and reduce the greenhouse gas (GHG) emissions of industrialized countries and economies in transition. This protocol aimed to activate the United Nations Framework Convention on Climate Change (UNFCCC), which was signed in 1994 and partially aims to reduce the greenhouse gas effect in the atmosphere. Kyoto specifically addressed the direct impacts of the construction industry due to its heavy environmental impact and greenhouse gas [6]. In the same year, a United Nations conference was held in Istanbul (United Nations Conference on Human Settlements: Habitat II), in which practices aimed at ensuring sustainability in the same sector were defined and some issues such as cultural responsibilities and training of construction workers were discussed [7]. Although the events that negatively affect the environment sometimes have regional consequences, effects of the events are global. Therefore, practices related to the solutions to environmental problems should also be global. International studies on the environment are carried out at the global and regional levels. Conferences and meetings are held on global problems from past to present, and their numbers are gradually increasing (Fig. 1).

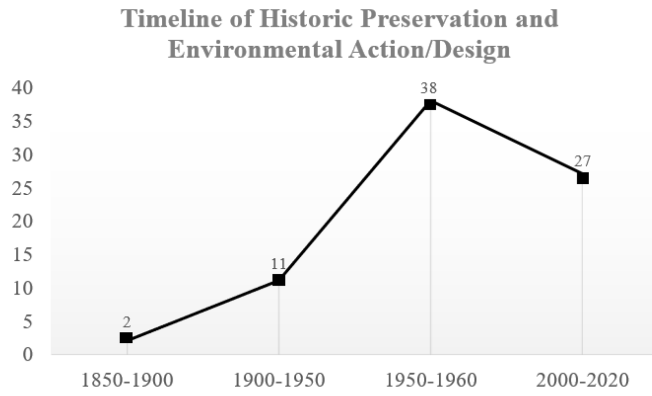

Fig. 1. Number of conferences on sustainability by years [Created by the authors based on 8, 9]

In recent years, the understanding of historical preservation has deeply affected the sustainability. As a result, many encouraging studies have been carried out to increase and develop research in the field of sustainability of cultural heritage. The increase in the number of conferences and meetings held over the years also confirms this situation.

From the perspective of a sustainable approach, historical buildings are experiencing problems in maintaining their existence with the increasing population and irregular urbanization. Therefore, historical buildings need integrated and sustainable conservation approach. However, restoration alone is not enough to ensure the sustainability of historical buildings [10,11]. Reusing historical buildings to meet today's comfort conditions is important in terms of sustainability and ecological values. The correct use of this opportunity brings some ecological gains. In this context, green building certification systems play a guiding role in terms of sustainable preservation and use in historical buildings. When sustainability and ecological approaches in the preservation of historical buildings are considered in the context of reusing, the unity of "Old and Green" should emphasize the right of the old to live together with the present [12]. Considering all these, it will be possible for historical buildings to be preserved and to gain a sustainable building identity without losing their original historical value and identity. Historical buildings struggle with natural disasters, environmental conditions, and chemical deterioration. In addition, the careless attitudes of some users toward these buildings accelerate the destruction process of historical buildings. On the other hand, preservation of historical buildings is possible through education, knowledge, and attention. Some sustainability methods have been developed to prevent negative consequences of the restoration of historical buildings.

This study evaluates the main criteria of certification systems to ensure liveable environment to future generations in line with the increasing understanding of sustainable preservation. During the evaluations, the issue of sustainable preservation of historical buildings, whose importance has increased especially in the last century, has been discussed. In this direction, the most common certification systems developed by different countries are the Building Research Establishment Environmental Assessment Method (BREEAM) by the United Kingdom, Leadership in Energy and Environmental Design (LEED) in the United States, Green Star in Australia, and Green Star in Japan. Certification programs developed by the Comprehensive Assessment System for Built Environment Efficiency (CASBEE) were examined [13-15]. In the study, first of all, the criteria in the certificate systems developed for the sustainability of buildings were determined, and the criteria that were focused on as common and frequently were revealed. These criteria are discussed by reused the historical building in Mardin Artuklu University Faculty of Engineering and Architecture in Mardin, an important cultural heritage city in Turkey. The study is important in terms of revealing the ecological criteria that are common and frequently emphasized in certification systems in different countries and evaluating these criteria over a historical building by associating them with the sustainable preservation approach.

2. Material and Method

2.1 Material

When it is aimed to reduce the environmental impact and increase the sustainability performance of buildings, an objective and quantitative evaluation system is required for decision-making. In this direction, various Building Environmental Assessment (BEA) tools have been developed and continue to be developed. Building environmental assessment tools have matured considerably since the introduction of UK BREEAM in 1990. There has been a rapid increase in the number of tools in use and under development [14, 16].

The first studies in the field of sustainability started as exercises to develop existing knowledge and ideas in a practical framework [17]. The majority of these methods evaluate "green" performance without considering social and economic issues [16]. According to Todd and Geissler [18], the relevance of the issues being evaluated should consist of the availability of resources, economic viability, and social acceptance. For this reason, the success of sustainability should be evaluated according to environmental issues, taking into account ecological, economic, and social aspects [19]. In the process of preserving historical buildings, it is necessary to make decisions using a sustainable conservation approach by evaluating the physical origin of the building as well as economically, environmentally, and socially. Considering the sustainable certification systems, the systems that certificated to the most buildings in the world are examined in this study. Accordingly, BREEAM, LEED, CASBEE, and Green Star certification systems are discussed. In addition, these systems are the most studied systems in the literature.

2.1.1 BREEAM

Since its announcement in 1990, the BREEAM system has been continuously updated and expanded to include the assessment of structures such as existing buildings, offices, supermarkets, new homes, and light industrial buildings [20]. BREEAM, the first BEA certification in the world, has become the most widely used tool to evaluate the environmental performance of buildings in the UK [21]. It is increasingly accepted as a certification system that presents sustainability criteria in environmental design and management [22]. BREEAM's goals are to reduce environmental impact, provide best environmental practices in design, and raise awareness of the impact of buildings on the environment. Versions of tools are under continuous development [14]. BREEAM certified buildings are often seen around the area where they were developed (Fig. 2). According to current data from 2022, 61 buildings in Turkey have BREEAM certificates.

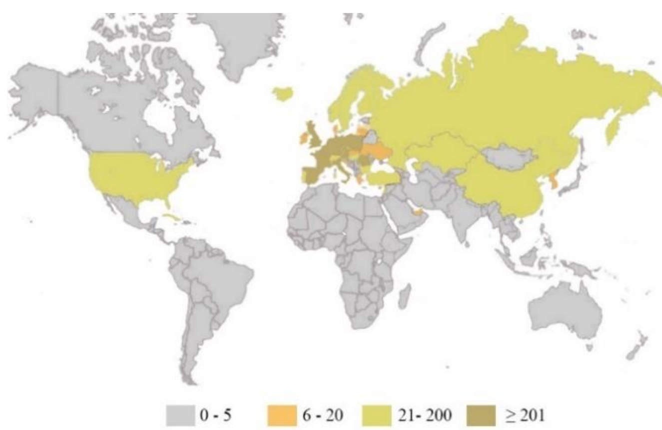

Fig. 2. Countries with BREEAM certificates in the world and the number range [Created by the authors based on BREEAM data]

2.1.2 LEED

LEED was established in 1998 by the United States Green Building Council (USGBC) through a consensus process involving many stakeholders to transform and improve their understanding of green buildings [23]. In this certification system, it is possible to follow the progress towards earning a LEED degree without the need for the expertise of the building design team members and consultants. The system aims to draw the attention of all individuals and organizations involved in the building design and implementation process to environmental values. LEED evaluates and certifies a total of eight different building types, such as new buildings, existing buildings, and renovations. When buildings with LEED certificates are examined, it is seen that they are common in the Americas, and their number has recently increased in Europe (Fig. 3).

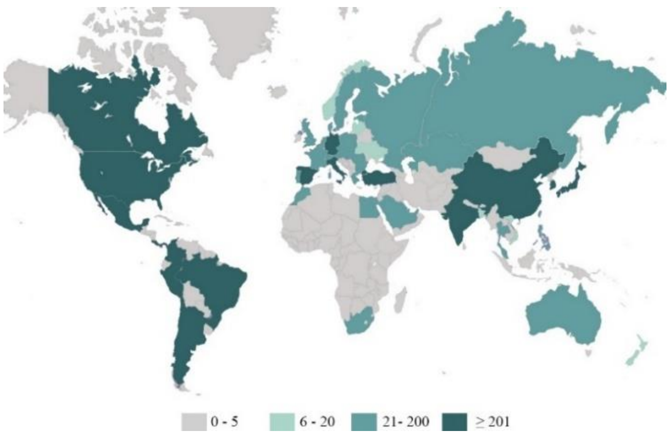

Fig. 3. Countries with LEED certificates in the world and the number range [Created by the authors based on LEED data]

2.1.3 Green Star

Green Star was developed by the Green Building Council of Australia (GBCA) in 2003 to create a collaborative rating tool to measure environmental awareness and awareness in the green building design and construction industry. Green Star focuses on life-cycle effects and sustainable use of buildings, as in the case of BREEAM. However, adjustments have been made for various differences between Australia and the UK, such as climate, local environmental, and construction industry standards [24]. Çoban [25] mentioned that 11% of commercial buildings in Australia have Green Star certification, and it has become an inevitable necessity for the design and construction of green buildings in Australia. The Green Star certificate, which was finalized and published in 2016, was named Green Star-NZ in New Zealand and Green Star-SA in South Africa, with changes according to regional and climatic factors (Fig. 4) [26].

Fig. 4. Countries with Green Star certificates in the world and the number range [Created by the authors based on Green Star data]

2.1.4 CASBEE

CASBEE was developed in 2004 by the Japan Sustainable Building Consortium (JSBC), which includes committees in the academic, industrial, and government sectors. It includes various criteria for different phases of buildings under evaluation such as planning, new design, and renovation [22, 27]. The evaluation process operates a different process than most other BEAs with its rating approach. This certification system addresses many aspects of the construction process [14]. According to current data from 2022, CASBEE-certified buildings are located in Japan (Fig. 5).

Fig. 5. Countries with CASBEE certificates in the world and the number range [Created by the authors based on CASBEE data]

2.2 Method

BREEAM, LEED, Green Star, and CASBEE are environmentally friendly building certification systems that aim to ensure sustainability in energy and environmental design and certify transformations with a certificate. In this study, BREEAM, LEED, CASBEE, and Green Star certification systems are discussed to limit the scope, which has a wide research area as a result of the awareness of sustainable conservation that has increased in recent years. A comparative method was used to determine common aspects of these certification systems. The comparative method aims to classify and explain the functional factors that are effective in the emergence and development of certain events. As a result of this method, the ecological concepts that certification systems commonly and frequently focus on are revealed by associating them with the understanding of sustainable conservation [28]. The criteria in the BREEAM, LEED, Green Star, and CASBEE certification systems in the study are summarized in Fig. 6.

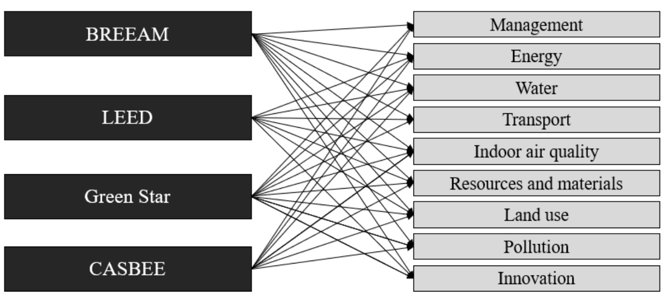

Fig. 6. The certificate systems and criteria examined within the scope of the study [Created by the authors based on 8, 12, 19, 29, 30, 31, 32]

The sub-criteria of these criteria were determined from existing studies, open-access web pages with certificate systems, and the articles they published (Fig. 7, Table 1).

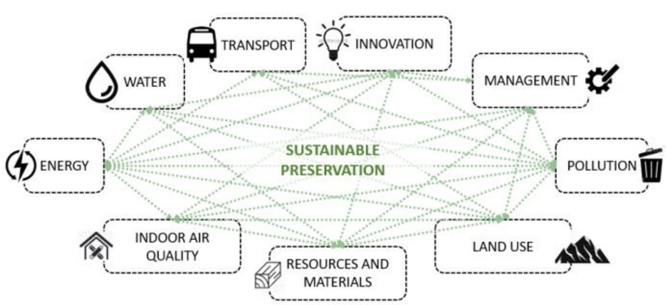

Fig. 7. Relation of common criteria of certification systems with sustainable preservation range [Created by the authors]

Table 1

The criteria and sub-criteria examined in the study [Created by the authors based on 29, 31, 32, 33, 34, 35]

Energy
• Low energy electronic devices • Low energy use • Thermal solar panels • Energy-efficient lighting systems • Renewable energy use • Energy efficiency in building systems • Energy consumption observation and measurement • Regular device maintenance
Indoor air quality
• Optimization of daylight utilization • Field of view • Glare control • Ensuring indoor and outdoor lighting levels and control • Ensuring lighting zones and controls • Natural ventilation • Indoor air quality and management • Controlling thermal comfort • Tobacco control • Acoustic • Space utilization
Transport
• Proximity to urban furniture and services • Ensuring sustainability of public transport system • Transportation alternatives • Transportation facilities • Bicycle and pedestrian facilities • Maximum parking capacity • Transportation resource ınformation point • Car maneuver opportunities • Reducing car use with a personal transportation plan
Water
• Reducing water consumption • Detecting leaks in mains water • Water treatment system • Sanitary ware use (Water-efficient faucets, smart thermostats, dual flush toilet, etc.) • Regular inspection and maintenance • Rainwater harvesting system and design • Water-efficient landscaping • Using water efficiently • Water recycling • Innovative wastewater technologies • Liquid leakage sensors • Onsite wastewater treatment systems
Resources and materials
• Adaptive reuse of buildings

• Insulation of the material • Versatility and durability of the material • Use of recycled materials • Reducing and reusing materials • Using local materials • Waste material management • Low-emitting materials • Environmentally friendly materials • Waste sorting (such as paper, plastic, glass, etc.)
Land use
• Conservation of the ecological value and characteristics of the land • Conservation of the ecological environment during construction impact • Reducing the environmental impact of construction • Reducing the long-term impacts of construction on biodiversity • The location and density of the building • Increasing the ecological value
Pollution
• Light pollution reduction • Noise pollution reduction • Reducing emissions of hazardous air pollutants • Controlling sources of indoor air pollution • Reducing CO_2 emissions • Pollution prevention during the civil construction • Decrease the global warming impact of construction
Innovation
• Innovative systems • Functional architecture • Innovation and creativity in design • Use of innovative technologies
Management
• Land management process • Use of existing buildings within the land • Verification of conformity • Management of the environmental impact of the construction site • Building manuals and building user guides

The determining criteria and sub-criteria are discussed in the context of Mardin province, which has significant effects on its surroundings and an important historical heritage in Turkey. The use of these certification criteria in the conservation process is important for the sustainability of the reuse of historical buildings.

Old Government Square, which is an important location for the province of Mardin, contains many historical buildings surrounding it. Old Government House is one of the most important these buildings. The building has a large scale in the silhouette of the historical Mardin city. Today, the building is used by the Faculty of Engineering-Architecture of Mardin Artuklu University. It has been evaluated whether the faculty building is compatible with the sustainability criteria. The fact that the building is located at an important point in the historical heritage and has an important place in the historical silhouette has been effective in determining it as a study area.

3. Case Study: Faculty of Engineering-Architecture, Mardin Artuklu University

Cultural heritage, which reveals many significant developments and the history of civilizations, provides a connection between what happened in the past and what might happen in the future. These can be considered documents and symbols reflecting the urban and architectural style of the period along with the economic, social, and cultural accumulation of human civilizations [36].

Specific cultural heritage samples in the city of Mardin, which is the study area, date back to the twelfth century, the Artuklu period, and the mid-nineteenth and twentieth centuries, the Ottoman period (Fig. 8) [37, 38].

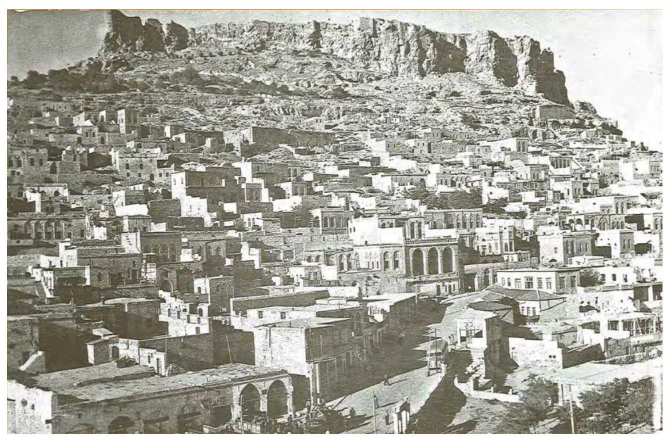

Fig. 8. View of the historical city of Mardin in 1932 [39]

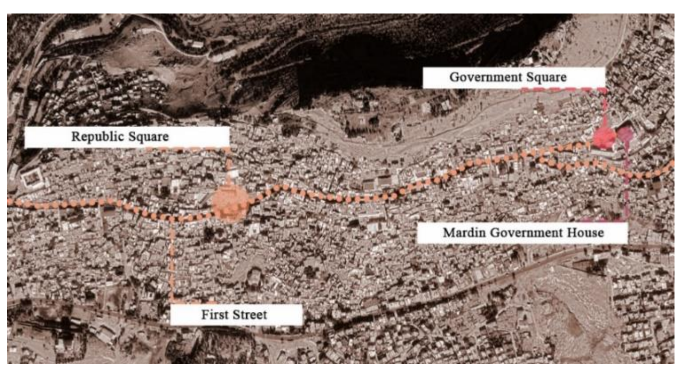

Fig. 9. The historical city of Mardin and the Old Mardin Government House, which is used as a faculty building today [Created by the authors using Google Maps]

In the old government square, which is at the most important point of the historical city of Mardin, a government office was built at the end of the 19th century. Although it is not clear, the year of its construction is 1874 in some studies [36]. In the late 19th century, the Mardin Government House changed and transformed its surroundings as well as its location. When built, it formed the Mardin Government Square (Fig. 9) [40]. The historical military barracks, the old courthouse, and the Mardin governor's office are surrounded by buildings that make the government office and the square important.

The faculty building was originally constructed from the basement, ground, and first floors. (Fig. 10) [40]. One of the most important sub-functions of the building is prison. Although the basement of the building was used as a prison in the 20th century, today there are still traces carved on the stones in the courtyard. The traces show the historical value of the building. The traces of the men's ward on the basement floor can be seen in the inscriptions engraved on the stones on the courtyard walls. The building was built with limestone specific to the Mardin and reused many times over time. Therefore, interventions and restorations implemented according to the needs of the period.

Fig. 10. Views of Mardin Artuklu University Faculty of Engineering and Architecture in 2022 [photographs by authors, 2022]

It has been used as a Governorship Building, Courthouse, Police Department, Gendarmerie, and Prison during the period from its original function to the present [41]. During the evaluation of the building according to the sustainability certificate criteria, the current use of the Faculty of Engineering and Architecture was discussed (Fig. 11).

Fig. 11. Floor plans and spaces of the faculty [Created by the authors]

4. Results

The Faculty of Engineering and Architecture was evaluated within the scope of the most common criteria in certification systems.

When the building was examined according to the *energy criteria*, the following observations were made.

- One of the most common methods in buildings that produce their own energy is renewable energy systems. In this context, photovoltaic solar panels that can be placed on roofs can provide high energy savings by converting the energy taken from sunlight into electrical energy.

However, such a system did not exist in the building.

- There have been no studies on whether the electronic devices used in the building are low-energy.
- The lighting systems used in the building are not energy-efficient. Decisions have been made without researching the optimum energy consumption level for lighting preferences.
- Water heaters with high energy consumption are used for hot water in the building. Also, it has been observed that the use of energy, which can easily provide hot water with a solar energy system, is not preferred.
- There is no user guide for energy-consuming systems in the building.
- Observations and measurements of energy-consuming systems are performed regularly.

When the building was examined according to the *indoor air quality criteria*, the following conclusions were drawn:

- In the use of the building as a faculty, some classifications are made between spaces according to daylight management. In addition, it has been observed that especially airy spaces are used by classrooms with large numbers.
- In the original landing of the building, there is a view of the existing Mesopotamian Plain. Therefore, both study rooms and studios have a great view during its use as a faculty building.
- There are jalousies in the study rooms and sun-blocking curtains in the studios for glare control.
- Indoor lighting is provided at a sufficient level because the faculty building is in use 24/7. However, there are deficiencies in outdoor lighting. Insufficient lighting is observed especially in the courtyard, iwan, and inner courtyard spaces located on the basement floor.
- The thermal comfort of the building is high due to its masonry system and thick walls. However, additional heating and cooling devices are required due to the climate effect of hot summers and cold winters in Mardin.
- Since smoking is prohibited inside the building, there are cigarette smoke detectors indoors.
- There are artificial ventilation and heating-cooling systems in many parts of the building due to the region's conditions, which are hot summers and cold winters. These systems also adequately meet the indoor comfort conditions by purifying the air.
- No evidence has been found about whether the materials used in the faculty are low-emission materials. However, it has been observed that the same materials have continued to be used since 2011, when the faculty building began to be used and that these materials are still comfortable.
- In terms of space utilization comfort, it has been determined that space changes are made every year according to the number of students, and space utilization comfort is provided.
- It has been observed that the glasses used in the building are double-glazed. Double-glazed glasses, which create a comfortable environment for sound and heat insulation, have also adapted to the new function of the building.

Access to the faculty building is provided through First Street, which is the widest one in Mardin. First Street has a one-way traffic flow between the entrance of the city called Diyarbakır Gate and the exit of the city called Savur Gate. The faculty building is accessed by a dead-end road (Government Street) at a junction called “Three roads” towards the end of First Street. The faculty is located at the end of Government Street (Fig. 12).

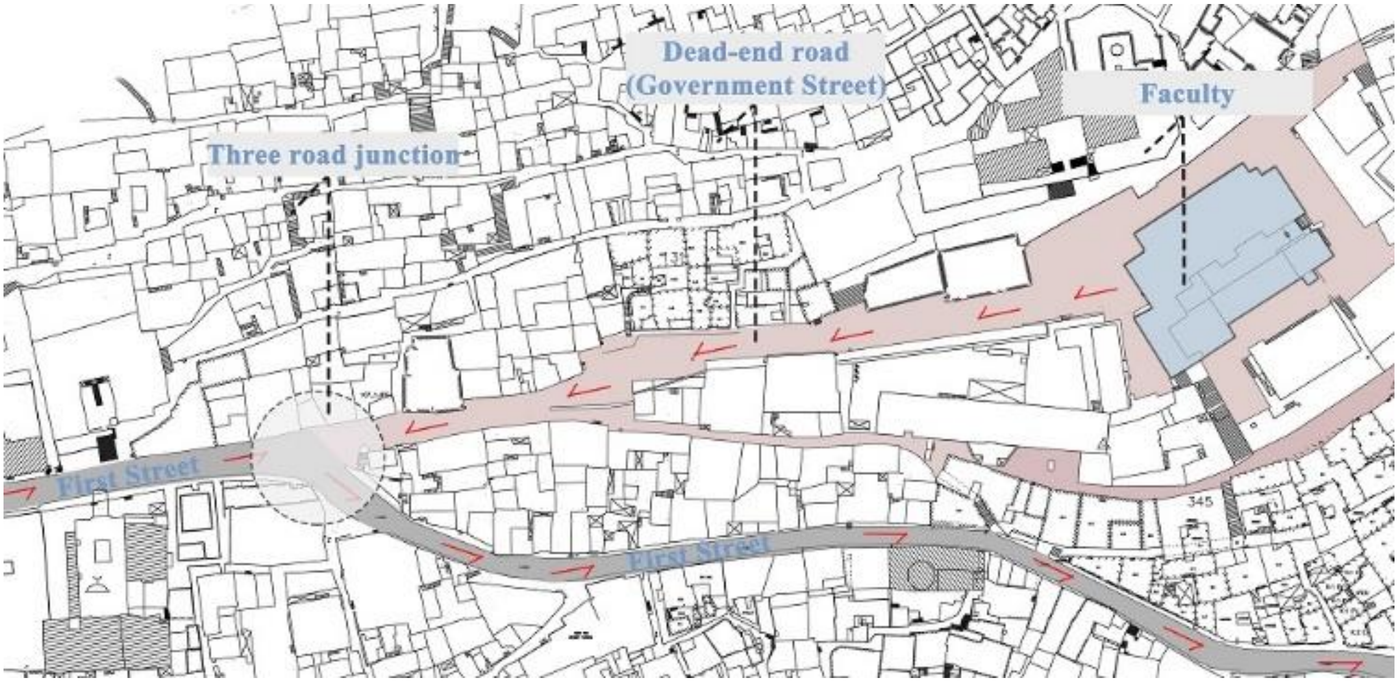

Fig. 12. Access to the faculty [created by the authors]

When the building was examined according to the *transportation criteria* with these pieces of information, the followings were determined:

- Due to the fact that the current location of the faculty building is within the old Mardin heritage, it has been observed that it is close to the squares and public areas in the city.
- Most of the public vehicles in Mardin provide transportation to First Street. Therefore, access to the faculty can be provided easily.
- There is no alternative provided for transportation to the faculty building except public transportation and private cars. Bicycle paths could not be planned, and pedestrian access roads were planned very narrowly. While it is not possible to organize bicycle paths in the city of Mardin with hilly terrain, the insufficient width of pedestrian paths creates a negative situation.
- The number of car parking lots for academic and administrative staff in the faculty is quite insufficient.
- Cars are parked near the faculty without an order, therefore, the manoeuvring areas of the cars for the exit are quite limited.
- The management does not have a transportation plan for its own personnel. Most of the personnel use their private cars to reach the building. This situation causes an increase in the number of cars in the city and also causes parking problems around the building due to the density of cars.

When the building is examined according to the water criteria, it is determined that:

- There is no current plan for reducing water consumption.
- Detection of main water leaks is carried out by officers.
- Water treatment systems are available in kitchens.
- There are no water-efficient faucets, smart thermostats, or dual flush toilets.
- A rainwater harvesting system has not been planned in the building.
- Garden landscapes in the courtyard of the building are sprinkled on the building's water tank. However, sprinkling using rainwater harvesting or water treatment systems will contribute to energy efficiency.
- There is no system for recycling water and innovative wastewater technologies.
- There is no system for wastewater management.

When the building was examined according to the *resources and materials criteria*, conclusions were drawn as in the the following:

- The original facade of the historical building was reused in the transformation of the faculty building.

- During the transformation of the building into a faculty, it was analyzed that the original structural system was suitable for reuse. However, a new structural system for the second floor and roof was integrated into the building (Fig. 13).

Fig. 13. Faculty building – a) Reconstruction of the second floor and roof during the period the building was restored in 2009 [40], b) Today's view

- The building was built of limestone unique to Mardin.
- It has been observed that both the materials selected during the restoration process and the original materials of the building have high strength and still provide comfort.
- There is a waste material storage area for existing materials in the faculty. This situation allows the reuse of materials in the education-teaching process for students.
- There are recycling bins for waste material management within the building. Waste sorting has been carried out.
- Spent battery collection and recycling are carried out in the building.

When the Old Government House and today's Faculty of Engineering and Architecture, located in the historical city of Mardin, are examined according to the land selection/use criteria, it has been seen that:

- The building land is located on the slope of Mardin Mountain. Therefore, the land allowed the efficient design of daylight and prevailing wind. As a result of the construction of the building in accordance with the land possibilities, it is seen that ecological values are benefited from the building.
- The land is close to the building density in the city and urban public spaces (Fig. 14).

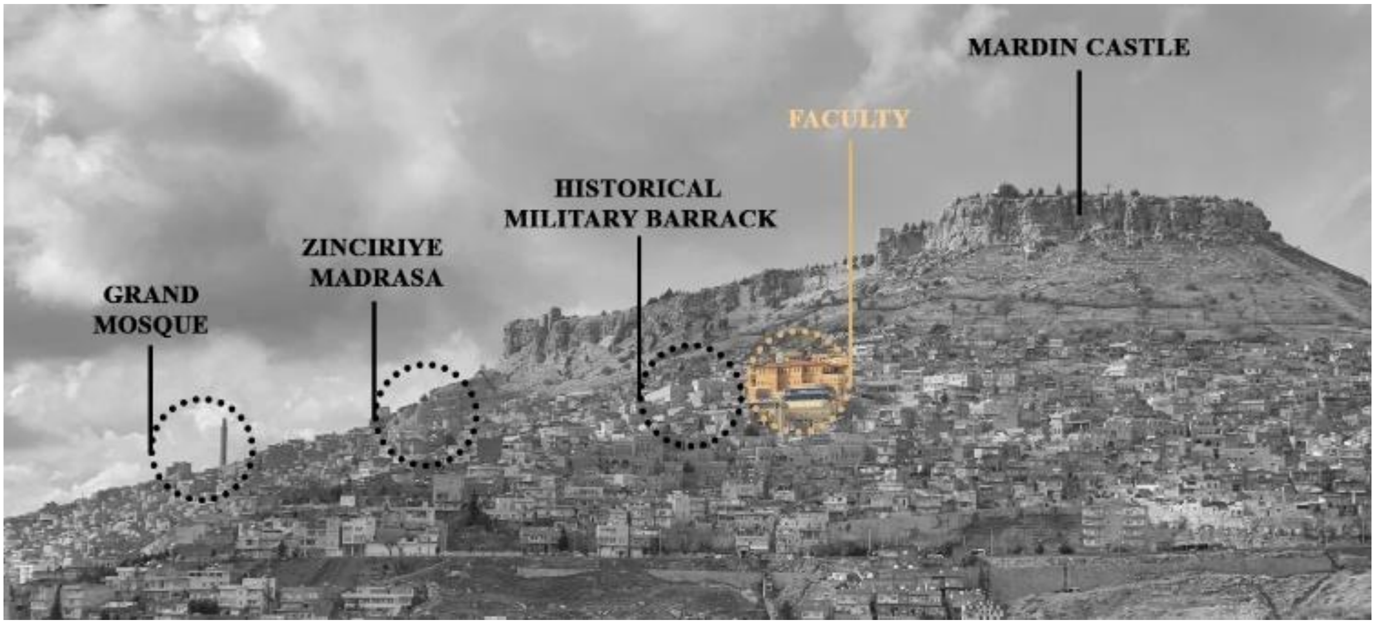

Fig. 14. Faculty building in historical Mardin city [photograph by authors, 2022]

- Sufficient data have not been obtained to determine whether the existing ecological values of the land have been increased.

When the faculty building is examined according to the pollution criteria, which is another common criterion of certification systems, it has been found that:

- The building does not cause any light or noise pollution in the environment. However, there is no study to reduce light and noise pollution from the outdoor environment. Especially in the historical city of Mardin, it is thought that advanced research should be done about the noise pollution caused by the tourist attractions.
- The fuel oil used in the faculty heating system may increase the greenhouse gas rate in the atmosphere and the effect of global warming.

When the building was examined based on the innovation criteria, findings were as follows:

- The transformation of the building as a Faculty of Engineering and Architecture plays an important role in the approach to sustainable preservation.
- There is an innovative approach that meets modern and new technological requirements in the general design approach of the faculty.

When the building was examined according to the management criteria, it has been observed that:

- The use of existing buildings in the area has been transformed according to the necessary situation for the education process. This ensures effective use of the spaces.
- There are no building user guides or pieces of information.

5. Evaluation and Discussion

In this study, the common criteria of the certification systems developed for sustainable methods were discussed, and the findings of Mardin Artuklu University Faculty of Engineering and Architecture were revealed.

When the energy criteria are evaluated, adequate use of renewable energy sources has not been found. It is thought that this situation will prevent the building from being self-sufficient in the long-term use of the building, although it has been reused. In addition, it is expected in the sustainable preservation approach that buildings will reduce the impact of global warming, which is one of the current problems of the 21st century. However, it is seen that the energy systems used in the faculty building increase the effect of global warming. It is possible for the building to produce its own energy in the long-term by integrating the use of renewable energy systems (photovoltaic solar panels, low-energy electronic devices, energy-efficient lighting systems, building user guides, etc.). The use of solar panels to benefit from solar energy in the climate of Mardin, which has sunny weather most of the year, will result in positive energy efficiency. However, such systems should be carried out without damaging the historical heritage of the building and the city.

When the use of indoor air quality criteria is evaluated, it has been determined that transforming spaces according to user needs and density is effective as it allows flexible spaces. At the same time, the positioning of the spaces in the Mesopotamian Plain landscape visually increases comfort and quality. Besides, jalousies and sun-blocking curtains allow daylight control.

Today, a large number of visitors go to Mardin. In this context, the evaluation of transportation criteria makes it necessary to control the transportation routes and the number of cars parking in Mardin. Although the location of the building in the historical city has provided an advantage, it has also caused a great disadvantage based on transportation criteria. Due to the problems mentioned in the findings, it is necessary to replan pedestrian, bicycle paths and car roads and to replan car parking lots. In addition, lack of a personnel transportation plan in the faculty increases the number of private vehicles and carbon dioxide emissions.

When the water criteria were evaluated for the faculty building, it was seen that the water consumption was not controlled. There was no systems for water recycling and rainwater harvesting. It is seen that a similar situation with the energy criteria also occurs for the water criteria. The integration of systems such as control of water consumption, use of water-efficient or sensor faucets, smart thermostats, dual flush toilets, and rainwater-harvesting systems will make a great contribution to the sustainable use of the faculty. There is no planning for the harvesting system and design of rainwater in the building. This situation has been seen negatively in terms of the use of water, despite the thirst problem frequently encountered in the world in recent years. Today, the use of potable water in sprinkles or toilets is a major environmental and economic problem. At this point, a rainwater-harvesting system must be integrated into the building. The presence of these systems will provide significant gains in terms of reducing water consumption.

The evaluation of material and resource criteria indicates that the preservation and reuse of the original state of the building are compatible with the concept of sustainable preservation of historical buildings. In addition, the waste material storage area and recycling bins included in the building have made significant environmental contributions.

When land use criteria are evaluated for the faculty, it is thought that there is no disadvantage for the building, apart from some transportation problems. The building has been used with a function that can use the advantages of its location. This is a positive approach in the context of sustainable preservation.

The pollution criteria show that there is noise pollution originating from the outdoor environment. It is thought that research should be carried out together with local governments regarding this situation. In addition, ecological chimney filter technology should be integrated into the building to reduce the emissions of gases.

When the innovation criteria are evaluated, the building adapts rapidly to the continuous technological developments thanks to the function it is used today.

The management criteria indicate that the number of research done or to be done on waste and energy consumption should be immediately increased. Building management guides for the systems to be developed should be created, and the user should be included in this system.

6. Conclusion

It is the common good of all societies to preserve and implement the sustainability of historical buildings. The use of renewable and recyclable systems that produce their own energy in the long term in the sustainable preservation of historical buildings provides ecological results in the interaction of the building with the environment.

The necessity of increasing ecological approaches in historical buildings has emerged once again with the study. In a world where resources are rapidly depleted, the use of renewable energy resources must be rapidly expanded. Research and development studies should be carried out for the dissemination of ecological construction techniques. Ecological courses should be organized to increase the environmental awareness of the people in the region. Smart systems and innovative ideas should be integrated into buildings. While all these are being realized, the most important point is that the original values of the historical building should not be damaged.

This study, which evaluates the use of historical buildings through sustainable architectural criteria, reveals that new systems can also be a guide for historical buildings. In the study, positive and negative situations were evaluated, and suggestions were made over a reused historical building. The findings of the study provide a basis for its application in different contemporary or historical buildings. At the same time, it is thought that the research on Mardin Artuklu University Faculty of Engineering and Architecture will play an encouraging role in a reorganization that can meet ecological needs of historical buildings.

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