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FULL LENGTH ARTICLE

Evaluating the Sustainability Criteria of the Damascene Islamic House Based on the Leadership in Energy and Environmental Design (LEED)

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ABSTRACT

This study examines the architectural elements that characterize the Islamic style, such as the inner courtyard, mashrabi yas (latticework screens), windcatchers, and others, explaining their role in achieving a balance between human needs and climatic conditions. It also explores the traditional building materials used in the Damascene house and their role in providing thermal insulation and adapting to the surrounding environment. The study employs a descriptive -analytical approach, collecting data through an analysis of historical and contemporary literature on the Damascene house as a model of traditional Islamic architecture. This includes the use of sustainable materials (stone, tuff, wood, etc.) and designs that achieve energy efficiency and rely on renewable energy sources (mashrabiyas, windcatchers, and inner courtyards). These elements are then compared with their counterparts in modern architectural designs. To assess the sustainability of the Damascene house, it was evaluated using the Leadership in Energy and Environmental Design (LEED) system. The number of points it could receive if it met the LEED assessment criteria was calculated, and its sustainability rating was determined. The LEED system assigns several ratings that reflect the degree of sustainability achieved by a building: Standard, Silver, Gold, and Platinum. The study concluded that the high level of sustainability provided by the Damascene house makes it a successful sustainable model that combines Islamic cultural heritage with harsh and challenging climatic conditions. It received a Platinum rating with a sustainability score of (82.85%). This undersc ores the need to draw inspiration from the creative elements found in the Damascene house in modern building designs, achieving significant economic savings and reducing negative environmental impacts. A set of recommendations and proposals was developed t o utilize the elements and components of the Damascene Islamic house in achieving the desired sustainability.

Keywords: Damascene Islamic House ▪ Sustainability ▪ LEED System ▪ Environmentally Friendly Materials ▪ Thermal Comfort ▪ Natural Ventilation

1. INTRODUCTION

Islamic architecture is one of the most prominent cultural achievements, combining spiritual, aesthetic, and functional dimensions. It is distinguished by its ability to adapt to environmental and climatic conditions while preserving the cultura l identity and social values of Islamic societies throughout the ages. The traditional Islamic architectural style, especially the Damascene house, is a prominent example of how to employ local building materials and rely on creative,

innovative design elements to achieve thermal comfort, natural ventilation, and rationalize energy consumption. These concepts converge with what is now known as the principles of sustainability [7-8].

Rapid climate change and the steady increase in resource consumption within buildings impose significant challenges on the construction industry, related to the need to find sustainable solutions that achieve justice and equality between successive generations by reducing environmental damage, relying on renewable energy sou rces, and ensuring the sustainability of the indoor environment to ensure the well-being of users. Hence the importance of this study, which seeks to examine the impact of building materials and energy on achieving the sustainability of the traditional Dam ascene house and comparing its innovative solutions with modern technologies used in the construction industry. This study connects the past with the present and confirms that this connection is not a return to the past, but rather an inspiration for creative solutions that can contribute to formulating a modern model for sustainable buildings that combines authenticity and innovation while simultaneously responding to current environmental and social challenges. In the context of this stu dy, data will be collected through the analysis of historical and contemporary literature on the Damascene house as a model of traditional Islamic architecture and compared with modern architectural designs, and the rate of sustainability achieved will be measured based on the American Leadership in Energy and Design (LEED) system, as an attempt to highlight the role of the Damascene Islamic house in achieving sustainability and to draw inspiration from the creative elements it contains in modern building d esigns in a way that ensures the achievement of economic, environmental and social benefits for buildings [16-19].

2. RESEARCH PROBLEM

In light of global climate change and excessive energy consumption in modern buildings, the problem of insufficient utilization of the sustainability principles achieved by buildings constructed in accordance with the Islamic architectural style, such as the Damascene house, emerges. This includes innovative elements that rely on renewable energy sources and contribute significantly to creating a comfortable indoor environment (such as mashrabiyas, malaqaf, the interior courtyard, etc.), in addition to the sustainable materials that comprise the Damascene house (such as stone, clay, and wood) and their role in achieving sustainability principles.

3. RESEARCH HYPOTHESIS

Since it is difficult to find a unified rating system for the sustainability of buildings and structures across all countries (this is the conclusion reached by many studies dealing with this type of research), due to the dif ferences in construction conditions from one place to another and the uniqueness and culture of each country [19], the research hypothesizes that the sustainability of the Damascene Islamic house can be measured using the American Leadership i n Energy and Environmental Design (LEED) system.

4. RESEARCH OBJECTIVES

- Review previous studies on the impact of construction materials (such as clay, stone, and wood), as well as the elements included in the Damascene house (malaqaf, mashrabiya, and the in terior courtyard), on achieving building sustainability by increasing the efficiency of the internal environment, as these elements provide natural ventilation, thermal comfort, rationalization of energy and water use, and minimization of environmental impact. - Measure the degree of sustainability that a Damascene house could achieve if evaluated according to the LEED system. - Propose recommendations for employing the components of the Damascene house within the modern construction industry.

5. RESEARCH METHODOLOGY

This research relied on the descriptive -analytical approach. Data were collected through an analysis of historical and contemporary literature on the Damascene house as a model of traditional Islamic architecture. This literature included sustainable materials (such as stone, incense, wood, etc.), as well as energy -efficient designs that rely on renewable energy sources (such as mashrabiyas, malaqaf, and the inner courtyard). Field visits were also conducted to models of Damascene Islamic houses, and observations were recorded. These components were compared to their corresponding designs adopted by modern architecture in terms of sustainability. The sustainability assessment criteria included in the LEED system were then applied to the Damascene hou se to determine its potential sustainability. Recommendations were developed to draw inspiration from the innovative elements contained in the Damascene house and employ them to improve the sustainability of modern buildings. Figure 1 shows the research plan and methodology followed.

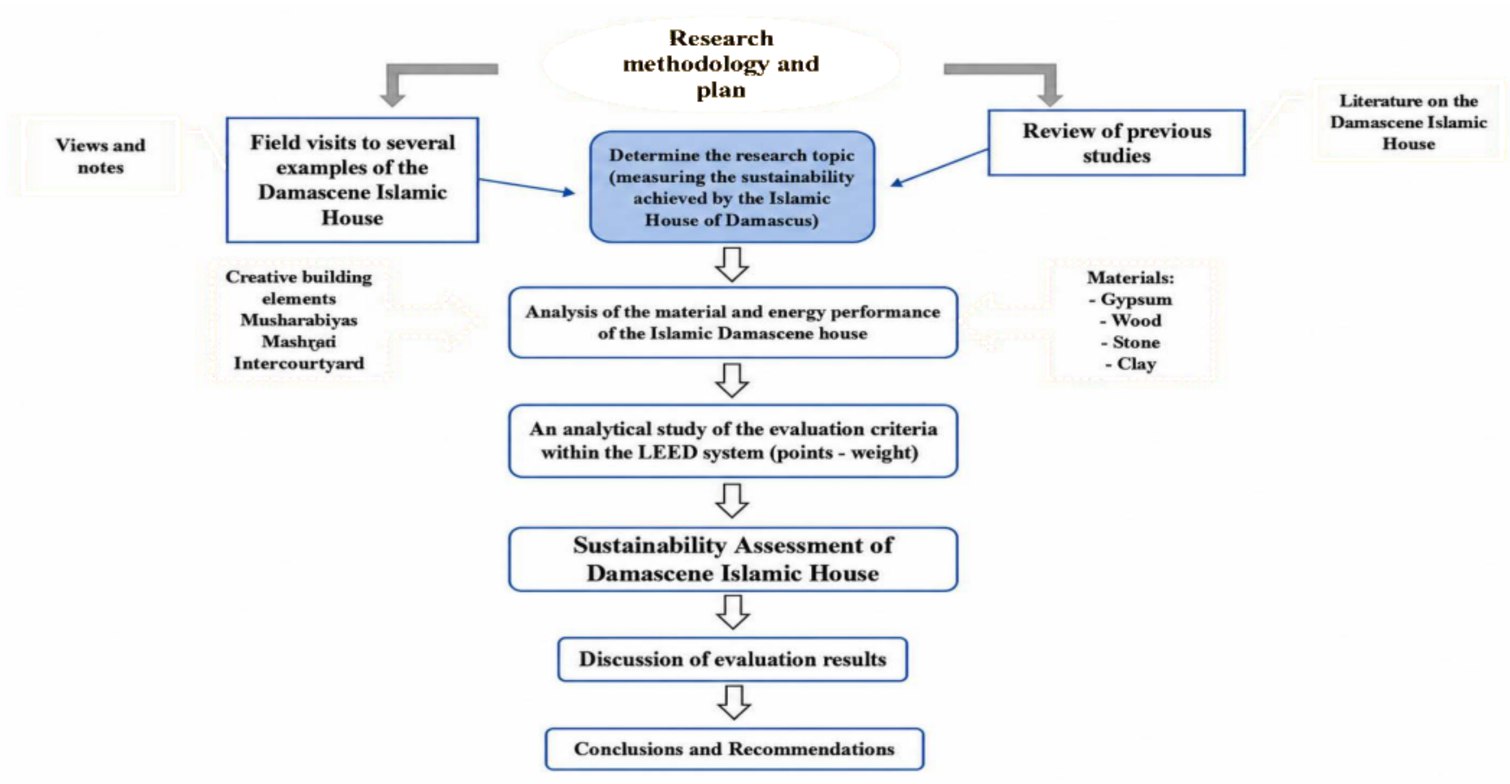

Figure 1. Research plan and methodology

6. LITERATURE REVIEW

Through their study "Formation in Islamic architecture as a tool to confront climate change" (Towards a Contemporary Employment of Sustainability Principles in Islami c Architecture), Abouelanwar and his colleagues demonstrated how to employ traditional Islamic architectural elements such as courtyards, mashrabiyas, and wind towers to address climate change and achieve sustainability. The results showed that using mashrabiyas significantly reduced operating temperatures by up to 14%, reduced solar peaks by approximately 77.8%, and improved natural lighting by 35.5%. These results highlight the significant role of Islamic architectural elements in reducing energy consumpt ion for cooling and improving indoor environmental quality, making them effective tools for creating contemporary, environmentally friendly architectural solutions [9]. Through his study, "Environmental and cult ural sustainability of the architectural elements of two historical mosques in historic Jeddah," researcher Waheeb sought to analyze the role of Islamic architectural elements in achieving environmental and cultural sustainability by studying two historical mosques in the city of Jeddah. The study showed that the use of materials such as clay or brick helped resist heat, while the presence of the inner courtyard contributed to moderating the local climate through night ventilation and water evaporation from fountains. It also explained that elements such as iwans and mashrabiyas played a pivotal role in enhancing natural air movement and achieving thermal comfort. The importance of these results is highlighted in linking environmental sustainability with the preservation of the cultural and architectural identity of the historic city [10].

In their study (Sustainable Building Materials in the Architecture of Saudi Arabian Oases: Past and Present Examining AlUla), Metallaoui and his colleague d iscussed the use of sustainable building materials in Saudi oases architecture throughout the ages, comparing their energy performance with modern materials. The results showed that traditional materials, such as rammed earth and natural bricks, reduced annual heat load by up to 52% compared to common materials such as conventional bricks. The study also examined the possibility of substituting new natural materials, such as hemp -lime bricks and biochar, to enhance building efficiency. The importance of thi s study lies in its confirmation that returning to natural or environmentally developed materials achieves tangible results in improving energy efficiency and reducing the carbon footprint [11]. Through their study (Sustaina bility Implications of Utilizing Islamic Geometric Patterns in Contemporary Designs, a Systematic Analysis), Ibrahim and his colleagues sought to explore the impact of integrating traditional Islamic geometric patterns into contemporary designs on achievin g sustainability. The results demonstrated that the use of these patterns in contemporary buildings is not limited to aesthetic and cultural aspects, but extends to positively impact thermal performance and natural lighting. They also provided a practical example of a green building powered by solar energy and using organic materials with high heat transfer efficiency. The importance of this study lies in highlighting that integrating Islamic geometric heritage with modern environmental solutions achieves i ntegrated sustainability that combines aesthetic and functional dimensions [12]. The study presented by researcher Alassaf (Comprehensive Review of the Advancements, Benefits, Challenges, and Design Integration of Energy-Efficient Materials for Sustainable Buildings) reviews the latest developments related to energy - efficient materials such as advanced insulation systems, smart glass, and green roofs, in addition to contemporary technologies such as dynamic building facades. The results showed that adopting movable facades that adapt to daily climatic conditions reduces energy consumption by up to 28%, which opens the way for more efficient design solutions. The importance of this study is highlighted by its link between modern technology and sustainability requirements, with the possibility of integrating it with the traditional principles of Islamic architecture to achieve more environmentally compatible buildings [13-15].

7. THE DAMASCENE ISLAMIC HOUSE

7.1 Identification

The Damascene Islamic house is a distinctive model of Islamic architecture that adapted to local climatic conditions, providing thermal comfort for residents of Damascus, a city with a hot and dry climate. These houses reflected a profound understanding of thermal comfort needs through the use of natural materials and architectural designs that helped regulate indoor temperature and humidity [3].

7.2 An analytical study of the materials used in the Damascene house

The Damascene house is ch aracterized by its diverse use of environmentally friendly building materials, extracted from natural sources and effectively employed to improve the quality of the interior environment and provide natural thermal insulation. These materials were not merel y a technical choice, but were based on a deep understanding of the interaction between the surrounding environment and the building, as well as the human need to maintain comfort within the space. Among the most important of these materials [5] are:

• Clay: This is one of the oldest and simplest materials used in construction and has a high thermal insulation capacity. In the Damascene house, walls were built using clay mixed with straw or other natural materials to increase insulation. Clay's ability to absorb and store heat for long periods, then gradually release it at night, made it an ideal choice in regions with hot climates during the day and cold at night. Clay is a good insulator against external heat, helping to maintain a comfortable temperature inside the house. The thickness of the clay walls also prevents rapid heat transfer, limiting the need for artificial air conditioning.

• Wood as a building material: It is primarily used in the upper parts of buildings, such as roofs and ceilings , as well as in doors and windows. Wood is known for its ability to retain heat in the winter, helping to naturally warm the home. In hot regions, wood contributed to reducing temperatures by allowing air to flow through wooden doors and windows. Although wood generally provides good insulation against heat, it does not have the same heat absorption capacity as clay. However, using wood in frames and roofs provides a balance between beauty and functionality.

• Stone: Stone is primarily used in foundations and exterior walls, especially in areas where stone is abundant. Stone has

a high resistance to thermal changes, as it can absorb cold at night and retain it during the day, enhancing thermal comfort inside the home. Although stone walls provide excellent insulation against heat, they can be heavy, which can affect the building's design and cost.

• Plaster: Plaster is primarily used to cover interior and exterior walls, as well as roofs. It is known for its ability to resist heat and humidity, helping to regulat e indoor temperature by absorbing and evaporating moisture when needed, improving indoor environmental quality and providing comfort for users. Although plaster helps improve thermal insulation and is more flexible in use, as it can be easily shaped and de corated for surfaces, it is not as effective as clay or stone.

• Gypsum: Used to decorate ceilings and walls, it has the ability to absorb excess moisture in the atmosphere, contributing to improved thermal comfort in hot homes. Gypsum helps improve sound in sulation, but it is less efficient at thermal insulation than some other materials, such as clay and stone. The above can be summarized in Table (1), which illustrates the materials used in Damascene houses, including their form, uses, function, efficiency, cost, and impact on the sustainability of Damascene houses.

Table 1: Details of the building materials used in the Damascene house.

Materials	**clay**	**stone**	**wood**	**gypsum**
Use	walls and ceilings	Walls, exterior surfaces, and foundations	Doors, windows and mashrabiyas	Arches and mashrabiyas (decoration)
Form	Reflects a warm, natural look with the ability to be reshaped as needed	Reflects a strong and authentic appearance	It can be shaped and assembled in various artistic ways, enhancing the traditional aesthetic of the house	It represents the most important element in the form and appearance of the Islamic Damascene house
Function	Thermal insulation, regulating internal temperatures, contributes to natural ventilation	High temperature protection, sound insulation, protection against harsh weather conditions	Aesthetic function (doors, windows and decoration) and contributes to natural ventilation (mashrabiyas)	Covering the interior surfaces (architectural decoration), and the quality of internal lighting distribution.
Efficiency	It absorbs heat during the day and releases it at night, thus achieving good efficiency in adjusting the temperature inside the house	High efficiency in improving thermal insulation, improving sound insulation	High quality natural insulation (heat and sound), high efficiency in terms of light weight and flexibility in design	Provides a smooth surface that contributes to good light distribution. It can contribute to insulation with the help of additional materials
Cost	Low cost (especially in areas close to its extraction)	Average cost	Average cost (depending on wood quality and availability)	Low cost
Impact on the Sustainability of the Damascene House	Improve indoor environment quality. reduce energy consumption	Reducing the building's energy consumption	Contributes to reducing harmful emissions (carbon)	Creativity and innovation, reduced energy consumption (may negatively impact sustainability if manufactured using non-environmentally friendly technologies)

Reflects a warm, natural look with the ability to be reshaped as needed. Reflects a strong and authentic appearance It can be shaped and assembled in various artistic ways, enhancing the traditional aesthetic of the house. It represents the most important element in the form and appearance of the Islamic Damascene house. Function Thermal insulation, equalizing internal temperatures, contributes to natural ventilation High temperature protection, sound insulation, protection against harsh weather conditions Aesthetic function (doors, windows and decoration) and contributes to natural ventilation (mashrabiyas) Covering the interior surfaces (architectural decorations), and the quality of internal lighting distribution Efficiency It absorbs heat during the day and releases it at night, thus achieving good efficiency in adjusting the temperature inside the house. High efficiency in improving thermal in-sulation, improving sound insulation High quality natural insulation (heat and sound), high efficiency in terms of light weight and flexibility in design Provides a smooth surface that contributes to good light distribution. It can contribute to insulation with the help of additional materials.

Cost Low cost (especially in areas close to its extraction) Average cost Average cost (depending on wood quality and availability) low cost Impact on the Sustainability of the Damascene House Improve indoor environment quality, reduce energy consumption Reducing the building's energy consumption Contributes to reducing harmful emissions (carbon) Creativity and innovation, reduced energy consumption (may negatively impact sustainability if manufactured using non-environmentally friendly technologies) Source: prepared by the researcher. Currently, with the technological develop-ment in the field of construction industry, the reliance on the aforementioned materials in the design and implementation of buildings has been relatively reduced, and there are now modern alternatives that are more resource -intensive and emit carbon gases, and have led to an increase in energy consumption from non - renewable sources, which in turn negatively affects the environment and the economy in many countries, thus creating major challenges in achieving sustainable development. The following is Table No. (2) that shows a comparison between the building materials that were used in the Damascene house and some of the modern materials used .

Table 2: Comparison between the materials used in the Damascene house and modern materials according to some standards.

Comparison Criteria	Traditional materials	Modern materials
Thermal Insulation	Thermal insulation is provided by the nature of the clay material used primarily in Damascene houses, as it keeps coolness in the winter and prevents it in the summer. Wood, due to its wood fiber composition, provides thermal comfort, and stone provides good natural insulation against high temperatures.	The necessary insulation is provided by chemical additives to reinforce concrete or by using advanced insulation technologies (fiberglass/polystyrene, for example). Double or other glazing is also used to reduce the effects of high or low temperatures, and other modern technologies.
Natural Ventilation	Especially trick allows natural air exchange between spaces, and terraces and balconies play an important role in the natural ventilation process, as do upper openings and kahrabee.	It relies on mechanical ventilation and smart systems that assist air flow and adjust the temperature inside.
Sustainability	Wood, if harvested sustainably, is an environmentally friendly material. Clay and stone are abundant and renewable materials that do not seem the environment. Thanks to its old orients with its gardens and green roofs, play a supporting role in moderating temperatures. In addition, Traditional wind energy and sunlight, according to Damascene house techniques (such as lattice work and mashrabiyas), contribute a significantly to achieving sustainability principles.	A cost fate to recycle makes the materials used in the construction industry are among the mix a harm.M to the environment during their lifecycle. Although some modern technologies lower the cost to use materials such as solar panels and environmental technologies that achieve sustainability and reduce environmental impact, the cost can be relatively high.
Efficiency	High efficiency	Modern materials show high efficiency but rely on assistive technologies.

Thermal insulation is provided by the nature of the clay material used primarily in Damascene houses, as it keeps the heat in the winter and prevents it in the summer. Wood, due to its wood fiber composition, provides thermal comfort, and stone provides good natural insulation against high temperatures. The necessary insulation is provided by chemical additives to reinforced concrete or by using advanced insulation technologies (fiberglass/polystyrene, for example). Double or double glazing is also used to reduce the effects of high or low temperatures, and other modern technologies. Natural Ventilation

Exposed brick allows natural air exchange between spaces, and terraces and balconies play an important role in the natural ventilation process, as do upper openings and windows. It relies on mechanical ventilation and smart systems that control air flow and adjust the temperature inside. Sustainability

Wood, if harvested sustainably, is an environmentally friendly material. Clay and stone are also natural and renewable materials that do not harm the environment. Plants used on roofs, such as gardens and green roofs, play a supporting role in moderating temperatures. In addition, harnessing wind energy and sunlight, according to Damascene house techniques (such as latticework and mashrabiyas), contributes signifi-cantly to achieving sustainability principles. According to several studies, the materials used in the construction industry are among the most harmful to the environment and deplete resources. Although some modern technologies have begun to use materials such as solar panels and environmental tech-nologies that achieve sustainability and reduce environmental impact, the cost can be relatively high. Efficiency High ef-ficiency Modern materials show high efficiency but rely on assistive technologies. Source: prepared by the researcher.

7.3 An analytical study of the innovative building elements in the Damascene house

The innate human need to adapt to the surrounding environment has led to the innovation of special techniques and designs in the Islamic (Damascene) house that ensure comfort and quality of the i nternal environment of his dwelling. Among the most important of these means are the inner courtyard, mashrabiyas, and malaqaf. In this section, the spotlight will be placed on these techniques, their method of operation will be analyzed, and their role in achieving sustainability in the Damascene house [1]. 7.3.1. Inner courtyard The inner courtyard is an essential element of the Damascene house. This design originated thousands of years ago, inspired by the need for social and cultural privacy while providing nat ural thermal comfort without relying on mechanical devices. The courtyard acts as a thermal regulator based on physical principles such as natural ventilation, shade, evaporation, and thermal mass, making it a sustainable building model [2].

Figure 2. The inner courtyard of the Damascene house

How the inner courtyard works? The interior courtyard relies on several interconnected mechanisms to regulate temper-ature and humidity inside the house, which are: • Natural Ventilation and Air Flow: The courtyard acts as a natural chimney, with hot air rising during the day, drawing cool air from surrounding rooms through the lower openings and expelling warm air through the upper openings. At night, the opposite occurs: the air in the courtyard cools due to radiation to the sky, sinks, and enters the rooms, cooling them. This process relies on temperature differences and enhances air movement, reducing the internal temperature by up to 5-6°C in some areas. • Shading and Solar Radiation Control: The shape of the courtyard (height versus width) determines the amount of shade. High walls (e.g., 24 meters) provide ample shade, reducing exposure to direct sunlight and limiting the

sky view factor (this prevents overheating at noon and allows low-angle winter sun to enter for heating). North-facing ori-entation is preferred to reduce intrusive radiation, which cools the air by 5 K during peak hours. The use of low - reflective materials, such as brick, reduces thermal reflectance by 0.3, making the courtyard 1.47 cooler. • Evaporative Cooling and Humidity: Water is used in the courtyard via fountains or sprinklers on the ground. Water evaporates as hot air passes over it, absorbing heat, increasing humidity, and cooling the air. Plants (such as 75% tree and grass coverage) also enhance this through transpiration, reducing the average radiant tem-perature by up to 50 Kelvin during peak hours. This process is effective in arid climates, where evaporation stops when the wet -bulb and dry -bulb temperatures are balanced.

• Thermal Mass and Thermal Storage: Courtyard walls are constructed from high-thermal mass materials, such as clay bricks, which absorb heat during the day and release it slowly at night, delaying heat transfer and maintaining stable indoor temperatures. This reduces the need for cooling, with energy savings of up to 21% compared to modern buildings.

7.3.2. Mashrabiyas in the Damascene house The mashra-biya is a traditional element of the Damascene Islamic house. It is a window enclosed by a decorative wooden lattice, of-ten projecting from the surface of the house's exterior wall. These elements were created to adapt to the hot desert climate, where they are essential for providing privacy for residents, especially women, while maintaining the natural flow of air and light. Mas hrabiyas are an essential part of the sustain-able environmental design of the Damascene house, relying on simple physical principles to achieve natural ventilation without the need for mechanical devices. Their mechanism relies on harnessing external winds, evaporation, and control-ling solar radiation, making them an environmentally friendly model [5-6].

Figure 3. Mashrabiyas in the Damascene house

How the mashrabiyas work? Mashrabiyas act as a mediator between the interior and exterior, allowing a steady flow of air through their carefully designed mesh openings. Mashrabiyas typically consist of a lower section with narrow wooden bars (to maintain privacy) and an upper section with wider bars (to increase airflow). This design increases the size of the openings compared to traditional windows, enhancing natural ventilation and allowing cool air to enter, especially in hot regions. Their protrusion from the wall also allows for venti-lation from three directions, improving air distribution within the room. Evaporative Cooling: One of the key scientific aspects is the principle of evaporative cooling. Porous clay jars filled with water are placed inside the mashrabiya. When the outside wind passes over these jars, the water evaporates on their surfaces, drawing heat from the air and cooling it before it enters the house. This process increases the humidity of the dry air, making it more comfortable. In addition, the wood used in the mashrabiya absorbs moisture from the cold air at night and then releases it during the day when heated by sunlight, enhancing natural cooling without painting or covering the wood. Temperature and Humidity Control: In the summer, mashrabiyas prevent direct solar radiation from entering the room through their circular grating design, which significantly reduces heat gain inside the room. Airflow helps remove excess heat through the natural perspiration of the residents, while maintaining a moderate indoor temperature. In the winter, the openings allow low -angle sunlight to p enetrate, warming the room without the need for additional heating. Regarding humidity, mashrabiyas act as a natural regulator. The large wooden gratings increase the surface area exposed to the air, which promotes evaporation and raises the humidity level in dry air during the day. This makes the indoor environment more comfortable, especially in dry regions. Privacy and Natural Lighting: In addition to ventilation, mashrabiyas provide a high degree of privacy. Residents can see outside without being seen thanks to the difference in light levels between the interior and exterior. They also allow indirect lighting, which reduces glare and maintains uniform lighting inside the home without increasing heat.

The malaqaf (wind catchers) in the Islamic Damascene house The malaqaf is one of the most important elements in the Damascene house. It is part of the building solutions that take hot and dry climate conditions into ac-count and contribute to improving thermal comfort within the home. Malaqaf is a smart method that has been used for centuries to provide effective natural ventilation and reduce the need for artificial air conditioning [4]. The malaqaf have openings at the top of the building to allow hot air to rise and exit, while there is another open ing at the bottom to allow cold air to enter. The design of the catchers helps cool the incoming air by exposing it to shade and reducing the effect of direct sunlight. Therefore, the importance of catchers lies in reducing the internal temperature of the house without the need for air conditioners or industrial air conditioning. They also work to ventilate the place in a way that contributes to reducing high humidity levels, which contributes to providing thermal comfort for residents. The use of catchers also helps reduce energy consumption, making them an environmentally sustainable solution .

Figure 4. The malaqaf in the Islamic Damascene house

How The malaqaf work? The malaqaf are based on the prin-ciple of thermodynamics, where the temperature difference between the inside and outside forces hot air outwards, cre-ating negative pressure that helps draw in cooler air from outside. This requires orienting them in a way that takes advantage of the prevailing winds in the area. This, in turn, allows light winds to be directed inwards, helping improve airflow and ventilation of interior spaces. Therefore, the con-cept of hoods is based on the principle of thermodynamics, where the temperature difference between the inside and out-side forces hot air outwards, cr eating negative pressure that helps draw in cooler air from outside. During the day, the air inside is warmer than the air outside, forcing t he hot air out through the hoods and replacing it with cooler air.

8. THE DAMASCENE HOUSE AND THE LEADER-SHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED) SYSTEM

The Leadership in Energy and Environmental Design (LEED) system was launched by the US Green Building Council. LEED is a voluntary, non-governmental organization that aims to unify building standards and efficiency c riteria to achieve desired sustainability goals. LEED certification is awarded to buildings based on systems that ensure that a building, home,

or urban complex was designed and constructed according to building systems whose primary goal is to achieve the highest quality performance in energy, environmental, and human aspects. This is achieved through sustainable site develop-ment, conservation of raw materials and water, and minimal resource waste, as well as energy efficiency, design efficiency, and indoor environment. Each LEED classification consists of several criteria and honorary points. The criteria are essen-tial and must be met by any project applying for certification. Additional points are optional, and when obtained, the project receives a higher LEED score. (Rezaallah A., Bolognesi C., Khoraskani R. A. 2014) - The scores a building receives through LEED are based on the number of points it has ac-cumulated according to the requirements and points of each classification. (USGBC, 2009): • 40-49 points: The building is LEED-certified and awarded the certified certification. • 50-59 points: Silver rating. • 60-79 points: Gold rating. • 80+ points: Platinum rating, the highest LEED rating.

Table 5: Evaluate elements according to the LEED system with the relative weights for each of them

No.	Evaluation Criteria	Relative Weights
1	Sustainable Site	**24**
2	Water Efficiency	**9**
3	Energy Use	**32**
4	Construction Materials and Resources	**13**
5	Indoor Environmental Quality	**13**
6	Management, Design, and Innovation	**9**
Total		**100**

This is illustrated in the following chart:

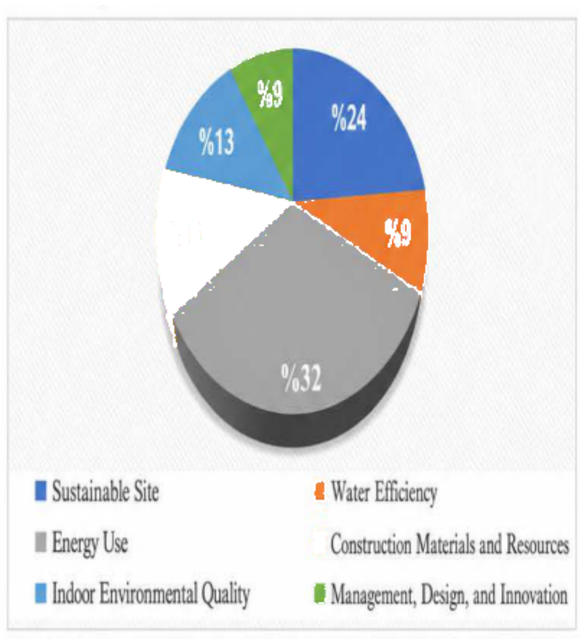

Figure 5. Relative weights of sustainability assessment criteria according to the LEED system

Table 4: The points allocated to each category of evaluation criteria and their corresponding relative

Assigned Points	Sub criteria	Main Criteria	Total Points	Category
M	Initial Classification	Integrated Project Design	11	**Innovation in design**
1	Integrated Team			
1	Professional Party with Extensive Experience in LEED Standards			
1	Design Effectiveness			
1	Design Orientation for Solar Utilization			
M	Planning for Sustainability	Resilience Management Processes		
M	Durability Management			
3	Third Party Durability Verification			
4	Regional Creativity and Design (Each Creativity is awarded one point)	Regional Creativity and Design		
2	Site Selection		10	**Site and Links**
3	Preferred Locations			
1	Existing Infrastructure			
3	Communication Methods			
1	Access to Open Space			
1	Reducing the wet area of the site	General Site Supervision	22	**Site Sustainability**
m	Erosion and erosion			
m	Absence of noxious vegetation	Agriculture		
2	Basic general site design			
3	With or without grass (grass)			
2	With or without drought-tolerant plants			
m	Reducing water use in irrigation			
1		Land Heat Influence		
4	Permeability	Surface runoff management	13	**surface runoff**
1	Control of permanent erosion			
2	Management of surface runoff			
2		Use of non-toxic pesticides		
4		Compact development (density distribution)		
4	Rainwater harvesting system	Water Reuse	15	**Water efficiency**
1	Home water recycling system			
3	Using public water purification systems			
3	Highly efficient irrigation system	Irrigation Systems		
1	Third-party inspection monitoring			
4	Reducing irrigation system water consumption by at least 45%			
6		Indoor Water Use		
3		Highly Efficient Sanitary Wares		
6		Very Highly Efficient Sanitary Wares		
m	Energy Star Performance in the Home	Improving energy performance and raising it to the best level	38	**Energy and Atmosphere**
34	Exceptional Energy Performance			
2	Hot Water Distribution Efficiency	Home hot water distribution system		
1		Pipes in the hot water distribution system		
m	Chiller Load Test	Managing home cooling appliances		
1	Choosing the Right Chiller Units			
5	Detailed structural files	Active ingredients in the structure	16	**Materials and sources**
M	Use of FSC tropical hardwood species			
8	Preferred environmentally friendly materials	Environmentally friendly products		
M	Construction waste management plan			
3	Construction waste reduction	Waste management		
5	Detailed structural files			
13		Energy Star Indoor Air Mechanism	21	**Indoor environmental quality**
2		Improved Outdoor Ventilation		
1		Improved Air Exhaust		
1		Third-Party System Inspection		
2		Very Good and Excellent Air Filtration and Purification		
2		Indoor Pollutant Control		
M	Training on basic operating principles	Landlord and Tenant Education	3	**Awareness and education**
1	Improving and developing training			
1	Public awareness			
1		Construction Manager Education		

8.1 Evaluation of the Islamic House of Damascus according to the LEED system

Through this paragraph, the criteria included in the (LEED) system will be applied to a model of the Islamic Damascus house and the points that it can acquire will be calculated and thus the evaluation corresponding to it will be known according to the (LEED) evaluation system, according to the preparation of a series of Table (5) divided in such a way as to facilitate the comparison and evaluation process.

Table 5a: Calculating the points earned for the Damascene house according to the (sustainable location) criterion

Category (LEED)	Main Criteria	Points	Application requirements	Points earned (Damascene House)
Sustainable site	**Preventing pollution from construction activities**	2	Avoid transporting soil from one location to another.	1
			Prevent sewage from mixing with clean groundwater and contaminating it.	1
	Developing the site by maximizing open spaces	2	Identify and provide open spaces for all different activities.	1
			Pay attention to the design elements of spaces.	0
	Protection from floods and other negative impacts	2	designing appropriate surfaces and watering plants.	1
			Establish water collection tanks.	1
	Preventing pollution of natural water resources	1	Prevent polluting collected rainwater.	1
	Protection from the direct or indirect effects of heat	2	Reducing areas exposed to sunlight.	1
			Use natural building materials.	1
	Reducing and limiting environmental pollution (sunlight)	2	Control natural lighting.	1
			Use treatments to control lighting.	0
	Saving building space	2	Avoid over-utilizing spaces and minimize areas used only for short periods.	0
			Benefit from combining spaces to save space and provide flexibility in use.	0

Table 5b: Calculating the points earned for the Damascene house according to the criterion (rationalization of water consumption)

Category (LEED)	Main Criteria	Points	Application requirements	Points earned (Damascene House)
Rationalization of Water Consumption	**Evaluating the efficiency of water consumption within the building**	2	Rationalizing clean water consumption	1
			Performing regular network maintenance	0
	Using innovative technologies in wastewater treatment	4	Reducing wastewater quantities	1
			Utilizing water recycling processes	0
			Establishing purification and recycling networks	0
			Increasing the use of recycled water	1
	Total	**6**		**3**

Table 5c: Calculating the points earned for the Damascene house according to the criterion (use of renewable energy sources)

Category (LEED)	Main Criteria	Points	Application requirements	Points earned (Damascene House)
Use of Renewable Energy Soures	**Preventing pollution from construction activities**	2	Reducing energy consumption	1
			Relying on natural alternatives	1
	Developing the site by maximizing open spaces	2	Reducing the use of environmentally harmful appliances	1
			Relying on natural ventilation	1
	Protection from floods and other negative impacts	2	Utilizing the building's shape to reduce energy consumption	1
			Relying on natural lighting in the building	1
	Preventing pollution of natural water resources	1	Balanced energy use during construction, operation, and maintenance	1
	Total	**7**		**7**

Table 5d: Calculating the points earned for the Damascene house according to the criterion (preserving resources and natural sources of materials)

Category (LEED)	Main Criteria	Points	Application requirements	Points earned (Damascene House)
preserving resources and natural sources of materials	**Collection and Storage of Recyclable Materials**	2	Allocate spaces for storing, collecting, and preparing materials for recycling.	1
			The proportion between the volume of consumed materials and the size of the collection sites.	0
	Utilizing Local Materials	1	Using local materials in ways that are environmentally friendly leads to significant cost savings.	1
	Use of renewable materials	1	Using renewable materials leads to overall cost savings.	1
	Total	**4**		**3**

Table 5e: Calculating the points earned by the Damascene House according to the (creativity and innovation) criterion

Category (LEED)	Main Criteria	Points	Application requirements	Points earned (Damascene House)
Creativity and Innovation	**Innovation and creativity in the building**	1	Benefit from new and innovative operational, design or building materials that increase the effectiveness of use	1
	Total	**1**		**1**

Table 5f: Calculating the points earned for the Damascene house according to the standard (Indoor environmental quality of the building)

Category (LEED)	Main Criteria	Points	Application requirements	Points earned (Damascene House)
Indoor environmental quality of the building	**Air quality and movement technology within the building**	1	Distributing spaces appropriately and in accordance with natural air movement	1
	Knowledge of the natural conditions surrounding the building	2	Implementing various building treatments to control the quantity and quality of incoming air	1
			Controlling and reducing temperatures	1
	Continuity and continuity of air movement	2	Taking into account the correct considerations for natural ventilation methods	1
			Increasing the exposure of internal spaces to external natural ventilation	1
	Reducing sources of pollution within the building	2	Using natural building materials that reduce polluting emissions	1
			Using types of insulation that protect the building	1
	Controlling lighting sources within the home	2	Utilizing natural lighting by distributing internal spaces in a manner consistent with the external source	1
			Utilizing solar energy	1
	Evaluating mechanisms and means of controlling the	2	Introducing modifications that suit the needs of residents and operators alike	0
	building's internal environment		Continuously assessing natural conditions to establish appropriate standards	0
	Evaluating the interaction between the internal and external environments	2	Achieving the principle of communication between internal and external spaces	1
			Controlling direct sunlight glare and using permanent shading elements to provide appropriate protection	1
	Total	13		**11**

9. DISCUSSION AND RESULTS

Based on the group of tables (5) above and Table No. (1), the evaluation results can be summarized and presented according to the following Table (6).

Table 6: Comparison between LEED system points and their weights with the points earned for the Damascene house with equivalent weights

No.	Evaluation criteria	Points (LEED)	Weights %	Points Earned (Damascene House)	Equivalent Weights (Damascene House)
1	**Sustainable site**	13	24	9	**16.6**
2	**Rationalization of Water Consumption**	6	9	3	**4.5**
3	**Use of Renewable Energy Sources**	7	32	7	**32**
4	**preserving resources and natural sources of materials**	4	13	3	**9.75**
5	**Indoor environmental quality of the building**	13	13	11	**11**
6	**Creativity and Innovation**	1	9	1	**9**
Total		**44**	**%100**	**34**	**%82.85**

This can be explained according to the following charts:

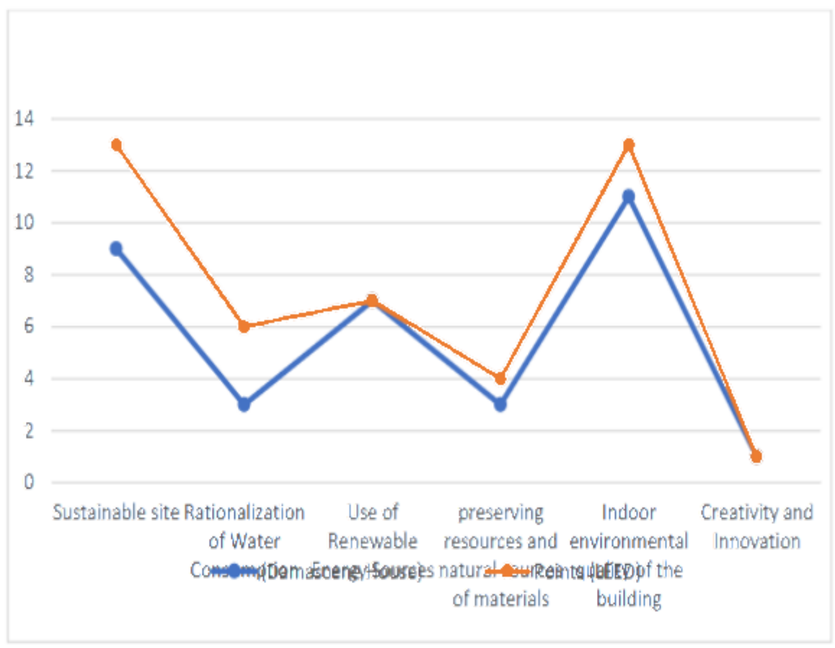

Figure 6. Comparison of points allocated to LEED criteria with corresponding points earned by the Damascus Housert Title

Figure 7. Comparison between the weights of the evaluation criteria according to the LEED system and the corresponding weights earned by the Damascus Houset

1- The significant abundance in energy consumption achieved by the Damascene house due to its absolute reliance on renewable natural resources (such as wind energy, sunlight, and renewable local natural building materials that do not require complex manufacturing processes), in addition to the innovative technologies employed (such as latticework, mashrabiyas, and the internal courtyard), and the natural ventilation, thermal comfort, natural lighting, and quality of the indoor environment provided by these technologies. 2- Relying on local, natural materials such as stone, incense, wood, gypsum, and others. These materials are easily accessible and cost-effective, in addition to their importance in reducing harmful emissions. 3- Innovative and cre ative ideas in designing and implementing elements of the Damascene Islamic house, such as latticework, mashrabiyas, the interior courtyard, and others.

10. CONCLUSION AND RECOMMENDATIONS

This research confirms that the Islamic Damascene house is not merely a decorative artistic style, but rather an integrated ecosystem that achieves a balance between humans and the environment. This ensures the principles of sustainability based on justice and equity between successive generations and the avoidance of extra vagance, in accordance with the words of God Almighty: "And those who, when they spend, are neither extravagant nor niggardly, but hold a medium (way) between those extremes".

The high degree of sustainability that the Damascene house can provide makes it a successful sustainable model that combines Islamic cultural identity and high-quality climatic conditions. This underscores the need to draw inspiration from the creative elements found in the Damascene house in modern building designs, achieving significant economic savings and minimizing the negative impact on the environment.

The research highlights the need to integrate the components of the Damascene house into the modern construction industry by innovating technologies that mimic these traditional elements and drawing inspiration from solutions that could contribute to formulating a modern model of sustainable buildings that combines authenticity and innovation while si-multaneously responding to current environmental and social challenges.

The research recommends conducting a comprehensive and periodic assessment of the Damascene Islamic house using updated versions of the LEED system to keep pace with de-velopment and modernity, thus ensuring a more accurate, transparent, and realistic evaluation. The researcher also ad-vises conducting an assessment of the Damascene Islamic house using other assessment systems such as BREEAM, ES-TIDAMA, CASBEE, PBRS and others, this should be done by analyzing the local context, reviewing the literature and standards of these systems to determine which is most suitable for local conditions, and comparing the results to enhance the positive aspects and mitigate the negative ones. The elements of sustainability within the Damascene Islamic house can also be drawn upon and considered as the cornerstone that helps develop a system for evaluating sustainable buildings locally that includes all economic and environmental aspects, and is familiar with the culture of the community, its social nature ure, and its historical and cultural identity, and links authenticity and modernity in order to achieve the desired sustainable development.

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