

SUSTAINABILITY AS A TRENDY PRACTICE IN INTERIOR DESIGN

الاستدامة كممارسة عصرية في العمارة الداخلية

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ABSTRACT

As economic and social productivity has advanced significantly over the years, our overall living standards have seen remarkable improvements. This progress has inevitably led to a shift in societal expectations regarding the environments in which we live and work. With increased industrialization and urbanization, there is a growing demand for enhanced environmental quality to foster better well-being among individuals. Given that people now spend nearly 90% of their time indoors, the quality of indoor environments has emerged as a critical issue that directly affects both health and comfort.. This heightened awareness has shifted our focus toward how our living and working spaces are designed, constructed, and maintained, employing methods such as surveys and case studies. Sustainability has evolved from being merely a trend to becoming a standard practice that significantly influences our daily choices. Terms like "green," "sustainable," and "recyclable" have become integral to everyday conversations and are central to discussions in universities and international forums, reflecting a collective commitment to building a more sustainable future for all through evidence-based practices.

KEYWORDS

Sustainable Transformations; eco-friendly; sustainable materials.

الملخص

مع التقدم السريع في الإنتاجية الاقتصادية والاجتماعية، شهدت مستويات معيشتنا تحسناً مستمراً، مما ساهم في رفع جودة الحياة بشكل عام. ومع تحول المجتمع نحو التصنيع والتحضر، ازدادت احتياجاتنا بشكل ملحوظ، مما أدى إلى ارتفاع المطالب بجودة البيئة في حياتنا اليومية. وبما أن الأشخاص يقضون حوالي ٩٠٪ من وقتهم في الأماكن المغلقة، أصبحت جودة المساحات الداخلية قضية أساسية لا يمكن تجاهلها، وهي مرتبطة ارتباطاً وثيقاً بحياة الجميع ورفاهيتهم.

اليوم، أصبح مفهوم الاستدامة جزءاً أساسياً من ثقافتنا، وانتقل من كونه مجرد اتجاه إلى مبدأ ثابت وجوهري في جميع جوانب حياتنا. أصبحت مصطلحات مثل "أخضر"، "مستدام"، و"قابل لإعادة التدوير" من القضايا الحيوية التي تطرح بشكل يومي، فضلاً عن كونها موضوعات رئيسية لطلبة الجامعات في مشاريعهم، وكذلك في الفعاليات الدولية. كما تعكس أهداف الأمم المتحدة للتنمية المستدامة التحديات العالمية التي نواجهها جميعاً، بدءاً من الصحة والتعليم وصولاً إلى الطاقة والنمو الاقتصادي والاستهلاك والإنتاج المستدام، بالإضافة إلى قضايا تغير المناخ وغيرها من التحديات الكبرى التي يجب أن نواجهها بشكل جماعي.

الكلمات المفتاحية

التحويلات المستدامة؛ صديق البيئة؛ المواد المستدامة.

1. INTRODUCTION

People are increasingly recognizing the importance of enhancing the quality of living environments in human settlements. To adapt to the evolving needs of daily life, they are advocating for higher quality of life standards. Since the indoor environment is closely linked to everyone's health and well-being—and given that people spend most of their time indoors—its quality is especially significant. As awareness grows regarding environmental materials and the ecological quality of indoor spaces, there is a greater emphasis on pursuing improvements. (INDEVCO Consultancy, n.d.).

A low-carbon economy is characterized by low energy consumption, minimal emissions, and reduced pollution. Being low-carbon involves energy efficiency, and such an economy prioritizes low energy use and environmental sustainability (Xu, W., & Zhang, Y., 2022).

1.1 Harmful Materials

Certain building materials, such as clay bricks, lime, cement, and surface bricks, can contain trace amounts of radon. When inhaled, radon can enter the lungs and harm the respiratory system, potentially leading to respiratory diseases. Materials that emit radon pose a risk of internal radiation exposure, which can increase the likelihood of cancer in the human body.

In interior architectural materials, items such as artificial wood panels, wallpaper, paint, carpet adhesives, and composite wood flooring often contain formaldehyde. These harmful substances can volatilize over time, releasing formaldehyde, benzene, and other volatile organic compounds into indoor air (Del Bello, R., 2022).

If the air circulation of the indoor spaces is inadequate, the concentration of formaldehyde can continue to rise. Benzene, commonly found in paints and coatings, is highly harmful to human health. When benzene levels in indoor air exceed 2.4 mg/m³, individuals may experience symptoms such as headaches, chest tightness, nausea, and vomiting within a short time. Consequently, the issue of harmful pollutants in interior environments has become one that cannot be overlooked (Xu, W., & Zhang, Y., 2022).

1.2 The “3rs” to Help the Planet

- **Reduce.**
- **Reuse.**
- **Recycle. (Marinos, K. D., & Mourtsiadis, A., 2015).**

1.3 Sustainable Strategies in Interior Architecture

To evaluate the effectiveness of a sustainable strategy, an interior architectural design deemed environmentally sustainable must adopt a holistic approach. The interior design is a key element of the building's environment and interacts directly with its occupants. It is essential to anticipate the potential impacts of the interior setup on the natural environment, as the interior serves as an indirect medium of influence. (INDEVCO Consultancy, n.d.).

Sustainable strategies in interior architectural design for resource efficiency and effective waste management, "based on principles and strategies common to the built environment," must account for interrelationships and aim to minimize the environmental costs of completing interior spaces. This is crucial for defining the role of the interior design discipline in meeting environmental responsibility.(Lantitsou, K. I., & Panagiotakis, G. D., 2017).

1.4 Sustainability and Conservation

Current buildings account for:

40% of the world's overall primary energy use.

24% of global carbon dioxide emissions.

Therefore, sustainable management of these existing structures is crucial, particularly through energy retrofitting initiatives. (ResearchGate, n.d.).

2. THE MAIN PROBLEM ISSUED THAT

Sustainable interior architecture aims to create comfortable, functional spaces while minimizing environmental impact. In existing buildings, this can include harnessing natural light through skylights and well-positioned windows. Upgrading to energy-efficient appliances and lighting systems helps lower energy consumption, while enhancing the building envelope through better insulation and ventilation reduces reliance on energy-intensive heating and cooling. This paper will examine the challenges and opportunities in sustainable preservation.

3. THE OBJECTIVE

This paper outlines various sustainable design approaches, focusing on strategies for waste prevention and sustainable interior design that can mitigate the negative impacts of harmful practices on the natural environment. It also addresses the challenges involved in sustainable preservation.

4. SUSTAINABILITY IN INTERIOR DESIGN

The design must be mindful in its use of space, employ construction materials with a low environmental impact, and aim to minimize pollution, waste, and energy consumption throughout its use.

Sustainability seeks to eliminate negative environmental effects, making approaches such as Sustainable design, green design and environmentally responsible design interchangeable in their application. The main sustainable design aims are:

- Waste reduction.
- Establishing a healthy environment.
- Decreasing reliance on non-renewable resources.

In summary, sustainable interior design takes A long-term strategy for safeguarding the environment, while green design focuses more on addressing immediate environmental issues and is typically more narrowly associated with sustainable architecture. (Lantitsou, K. I., & Panagiotakis, G. D., 2017).

Sustainable interior design is especially worth exploring, as it remains a complex and highly relevant topic this year.

5. ELEMENTS ARE REQUIRED FOR SUSTAINABLE BUILDING DESIGN

The seven key components of green building include:

- Environmentally friendly building materials
- Energy efficiency and renewable energy
- Indoor air quality
- Water efficiency
- Waste reduction
- Smart growth
- Sustainable development and toxics reduction. (INDEVCO Consultancy, n.d.).

5.1 Energy Efficient Design

Energy consumption significantly contributes to environmental and ecological changes, with buildings being responsible for a large share of greenhouse gas emissions resulting from their energy use. Interior and exterior architecture designers are vital in improving a building's energy efficiency by minimizing the energy required for heating, lighting, and operating appliances. They also play a key role in integrating renewable, non-carbon-based energy sources into the building's design. (Chen, J., Elbashiry, E. M. A., Yu, T., Ren, Y., Guo, Z., & Liu, S., 2018).

5.2 Heat and Light

Are key factors that interior designers can optimize? Since a significant amount of a building's heat is lost through windows, it is essential to install high-quality windows that Prevent heat from escaping the interior space.

5.3 Curtains and Drapes

Should be designed to block by controlling window treatments like blinds or shades, occupants can efficiently regulate both cold air and heat from the sun, helping to maintain the temperature of the interior spaces in an energy-efficient way.

5.4 Carpets

Serve as Highly effective thermal insulators, capable of retaining up to 10% of a room's heat.

5.5 Colors

It can also contribute to energy savings; for instance, lighter colors reflect more light.

5.6 Reflective Surfaces

These can be used to increase natural light in a room, minimizing the need for artificial lighting. Furthermore, smart home devices or "green gadgets" allow for remote control of heating and lighting, boosting overall energy efficiency. (Yun, R., Filip, P., & Lu, Y., 2010).

6. INDOOR AIR QUALITY

Indoor Air Quality (IAQ) refers to the quality of air within and around buildings, particularly in relation to the health and comfort of occupants. Sustainable design strategies for historic buildings focus on improving energy efficiency through measures such as retrofitting insulation, upgrading HVAC systems and implementing energy-efficient lighting solutions. Maximizing natural light and utilizing passive heating or cooling techniques, energy consumption can be further minimized. Moreover, clean air plays a vital role in supporting Sustainable Development Goal (SDG) 15, as air pollution adversely affects ecosystems and biodiversity, impacting plants, animals, and microorganisms. Maintaining clean air is essential for protecting these species and ensuring healthy ecosystems. (Tejani, A., 2021).

7. HEALTH ECO-SYSTEM DESIGN

During pandemic times, people are spending more time indoors, which raises several considerations. It's no longer just about creating comfortable spaces; it's essential to design healthy interiors that prioritize factors such as air quality, Temperature control, air circulation, lighting, and sound management.

Materials and products that release high levels of toxins play a significant role in indoor air pollution. For instance, furniture or equipment treated with harmful chemicals can release dangerous substances into the air. Designers must be diligent in selecting materials, prioritizing those with low emissions of VOCs (volatile organic compounds) and other pollutants to enhance indoor air quality. (Yun, R., Filip, P., & Lu, Y., 2010).

Plants are a fantastic way to improve air circulation and maintain fresh indoor air quality, as they function as natural air filters. Contrary to popular belief, carpets also positively impact air quality by trapping dust particles, germs, and allergens, retaining them until they are vacuumed. Moreover, carpets are effective sound insulators, absorbing sound vibrations and helping to reduce noise levels, which significantly enhances the well-being of building occupants. (Lantitsou, K. I., & Panagiotakis, G. D., 2017).

8. DURABILITY AND FLEXABILITY IN DESIGN

The duration of use or lifespan and durability of materials should be a key consideration in interior design planning to prevent the frequent discarding of products. This is particularly important for elements that undergo significant deterioration or degradation over time. The goal of design should be to create timeless spaces that endure over time.

As technology evolves rapidly, people increasingly seek changes in their environments, which must reflect these shifts. Interior designers should prioritize the flexibility of spaces, ensuring they can adapt to the changing needs of their users. The key to longevity lies in designing flexible spaces that promote timelessness by accusing quality rather than quantity, choosing timeless designs over fleeting trends, and valuing simplicity and functionality over unnecessary embellishments.

Innovation introduces numerous options for flexible design, such as adjustable walls, modular furniture suited for modern workplaces (with remote work becoming the norm), and customizable flooring. Investing in elements that are sturdy, durable, and easy to clean or replace can lead to cost savings and reduce the need for frequent renovations, making maintenance much easier as an added benefit. (Song, S. S., Wan, Q., & Wang, G., 2016).

9. SUSTAINABLE MATERIALS FOR AN ECO-FRIENDLY HOME

Interior Design

Sustainable materials are essential for achieving environmentally friendly historic preservation. Recycled and reclaimed materials provide a means to minimize the environmental impact of construction while preserving the character of historic buildings. Moreover, sustainable building materials with low embodied carbon can greatly reduce the overall environmental footprint of a project. Additionally, bio-based materials enhance sustainability by offering natural, renewable insulation options. (ResearchGate., n.d.).

- **Natural**

Artificial synthetic materials are frequently toxic or hazardous, as many do not biodegrade and can accumulate to dangerous levels in the environment. For example, wood can serve as a substitute for plastic, while hemp or organic cotton canvas can replace synthetic fabrics. (Song, S. S., Wan, Q., & Wang, G., 2016).

- **Renewable**

Many natural materials are non-renewable. Although some abundant non-renewable resources, such as iron and aluminum, can be recycled indefinitely, other materials used in products—like rare earth metals, lead, antimony, zinc, and silver—are in limited supply. Additionally, the mining and extraction processes for these metals demand substantial energy and can have detrimental effects on the environment.

- **Non-toxic and harmless**

It's important to consider not only the final material but also the production processes, which can often involve toxic chemicals. Be sure to understand the lifecycle of the materials you choose and avoid those produced through harmful methods.

10. EXAMPLES FOR SUSTAINABLE MATERIALS WHICH CAN BE USED IN INTERIOR DESIGN

10.1 Bamboo

Bamboo is a strong and durable material that outlasts many common materials used in homes. Its resistance to heat and humidity makes it ideal for use in kitchens and bathrooms. (ResearchGate., n.d.) According to Home Online, here are some unique home decor ideas to consider using bamboo: (Fig.1).

- Bamboo countertops
- Bamboo window screens
- Bamboo furniture pieces



Fig. 1: Using the Bamboo, interior design in partitions, flooring and ceiling. Generated by AI.

10.2 Reclaimed Wood

Reclaiming wood helps reduce the impact of deforestation and prevents the wood from ending up in landfills. There are numerous ways to utilize this material. According to Elmwood Reclaimed Timber, some options include: (Fig.2).

- Support beams.
- Wooden ceilings.
- Rich wood flooring. (Hamsik, P., & Kral, P., 2014.).

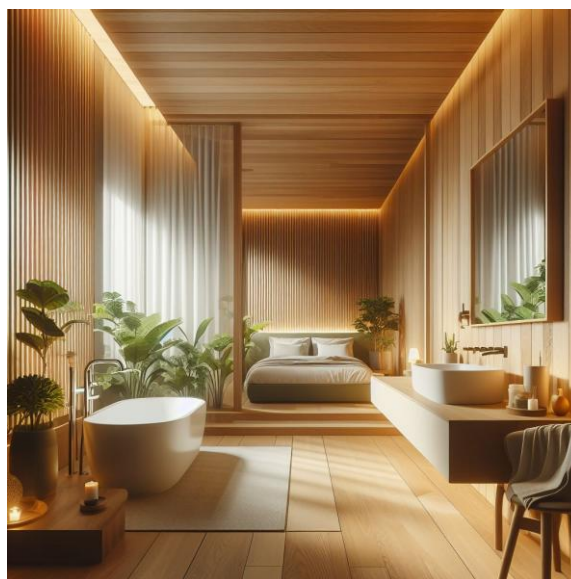


Fig. 2: Using reclaimed wood, interior design in bathrooms, flooring and ceiling. Generated by AI.

10.3 Natural Stones

Natural stones can bring a sense of nature into interior spaces and designs. Consider using stones like granite, slate, or sandstone, as they offer a variety of colors and sizes that can greatly enhance the design process. Additionally, natural stones are relatively easy to install. (ResearchGate., n.d.), (Fig.3).

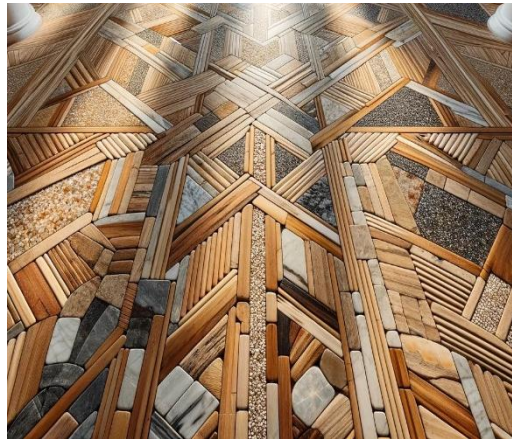


Fig. 3: Natural stones can be used with wood in floors to bring a sense of nature into interior spaces. Generated by AI.

10.4 Glass

Glass is commonly used for windows in homes, allowing natural light to enter, which can reduce HVAC usage and, consequently, energy consumption. However, glass has many other applications, including kitchen countertops and divider walls. It is recyclable, and when it eventually reaches landfills, it does not harm the environment.

10.5 Recycled Aluminum

Recycled aluminum helps reduce carbon emissions, pollution, and overall energy use while enhancing the aesthetic appeal of a home. It adds a modern touch to interior frame for a staircase, and it can also be used to create tiles for bathrooms. (Fig.4).

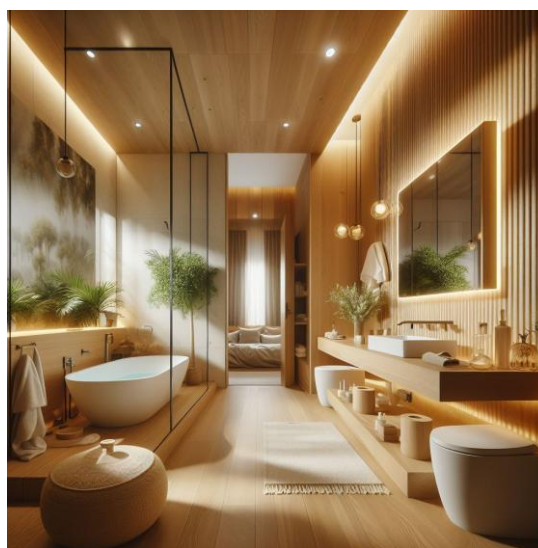


Fig. 4: Recycled Aluminum can be used as frames as shower cabinets in interior design. Generated by AI.

10.6 Repurposed Items

Many everyday household items can be repurposed to decorate your space. For instance, old boots can serve as unique planters. If you have a collection of old denim jeans, you can transform them into curtains. An SFGATE article on how to make curtains from denim jeans can provide helpful guidance. The more items you repurpose, the less waste will end up in landfills.

10.7 Organic Linen

"Organic" refers to plants grown without the use of pesticides or synthetic fertilizers. Linen is considered eco-friendly because it is durable and biodegradable. Organic linen can be utilized for soft furnishings and curtains. Additionally, this material offers benefits such as being anti-static and odor-resistant. (Fig.5, 6).



Fig. 5: Organic linen can be used as tents in interior and exterior design. Generated by AI.



Fig. 6: Organic linen can be used as furniture and curtains fabrics interior design. Generated by AI.

10.8 Brick

Bricks are excellent for both interior and exterior design. They have a long lifecycle, are energy-efficient, and are recyclable. Bricks can be used to create stunning walls, giving your home a more rustic aesthetic.

10.9 Recycled Plastic

Recycled plastic presents a variety of opportunities for both interior and exterior design, repurposing this non-biodegradable material. Polyethylene, known for its heaviness and density, can be molded into strong and durable furniture. Furthermore, its consistent color throughout the material enhances its fading resistance, guaranteeing a long-lasting appearance.

10.10 Jute Fibers

Jute is an affordable natural fiber that can add an earthy tone and texture to any room in various forms. Jute is an excellent choice for an eco-friendly home, particularly in the form of woven rugs that are both durable and attractive. Additionally, jute serves as an effective heat insulator, enhancing the functionality of rugs made from this fiber. (Fig.7, 8).



Fig. 7: Jute Fibers is a natural fiber that can add an earthy tone and texture to any room. Generated by AI.



Fig. 8: Jute Fibers is a natural sustainable fiber that that can be used in interior design.

10.11 Corian

Corian is a material made of plastic, its main source is bauxite and made up of acrylic polymer and alumina trihydrate. Although it is mainly used for surfaces, counters, tables in fast food restaurants, and bathrooms, it has not traditionally consider as an eco-friendly material. However, there are many positive aspects to be considered. Corian is durable, also exceeding the durability of many natural materials used in comparable applications. Its longevity allows it to outlast many alternatives, and it can be re-cut, reshaped, and reused, Furthermore, Corian has a very low percentage of volatile organic compounds (VOCs), which is safe for the usage in kitchens cabinets and sufcaes and other surfaces. Its nonporous characteristic also helps prevent the growth of mold and bacteria. (The Sustainable Living Guide. n.d.).

10.12 Environmentally Finishes and Paints

The selection of paint, varnish, and raw materials plays a crucial role in sustainability. Many paints contain VOCs (volatile organic compounds) that evaporate at room temperature, lingering for weeks and potentially polluting both indoor and outdoor air, which can lead to serious health problems, as highlighted by Green America. Additionally, many finishes contain biocides, fungicides, and pigments that can harm the environment. To minimize your ecological impact, consider using these environmentally friendly finishes:

- Non-toxic paint.
- Finishes with "low VOCs".
- Low-biocide paints.
- Milk paint.
- Water-based paints, stains, and sealants.
- Latex paint.



Fig. 9 Using LED light represent a sustainable and energy-efficient lighting system. Generated by AI.

11. ECO-FRIENDLY LIGHTING SOLUTIONS

Interior designers can thoughtfully integrate green design into your home's lighting. The atmosphere of a space is influenced not only by furniture but also by various elements, including lighting.

LED light bulbs represent a sustainable and energy-efficient choice for the future. Environmental protection agencies report that LED bulbs use at least 75% less energy than traditional bulbs and last up to 25 times longer. Using LED bulbs in pendant lights and lamps not only improves aesthetics but also provides significant cost savings. (Fig.9).

11.1 Examine Your Light Fixtures For Heat Loss

While a home's doorways and windows aren't the main contributors to heat loss, recessed ceiling lights can allow heat to escape through the attic and out of the house. Regularly inspecting these fixtures and adding extra insulation around them can help maintain heat. Furthermore, using energy-efficient "green" light bulbs can also aid in saving both energy and money.

12. INTERIOR DESIGN AESTHETICS FOR ECO-FRIENDLY WAY

For eco-friendly interior design, several design aesthetics provide environmental benefits while creating visually appealing spaces, all adhering to the principles of "Less is More." Minimalism focuses on organizing and simplifying by using fewer items, which reduces manufacturing and minimizes negative environmental impacts.

Scandinavian design exemplifies this minimalist approach, emphasizing the use of raw, organic materials. It embraces a bare essentials philosophy by minimizing the use of non-renewable resources and selecting natural materials like organic cotton, linen, and hemp for bed sheets and upholstery. Additionally, incorporating small area rugs made from jute fibers can help reduce the reliance on processed synthetic materials.

Building a sustainable home demands attention to detail and a thorough understanding of eco-friendly practices. Understanding what it means to be "green" is just the initial step in lowering your home's carbon footprint. This approach not only benefits the planet but can also result in energy savings and reduced repair costs over time.

13. ADAPTIVE REUSE OF A TRAIN CARRIAGE TO A RESIDENTIAL HOUSE USING SUSTAINABLE MATERIALS FOR LOW INCOME USERS

I would like to share the experience of the students of interior architecture department in faculty of Art and Design, The British University in Egypt, in fundamentals of interior design module, which I'm the module leader, the project of the adaptive reuse of a train carriage to a residential house using sustainable materials for low-income users. The students' results were very impressive and here are two examples:

1st Example:

Student name: Salemah Mohamed

Student ID: 207486

L4 year 2

The Project Concept: Merging between Using the concept of the origami and the Sustainable materials which is the main purpose of the project, (Fig. 10, 11, 12, 13, 14).

Main Plan

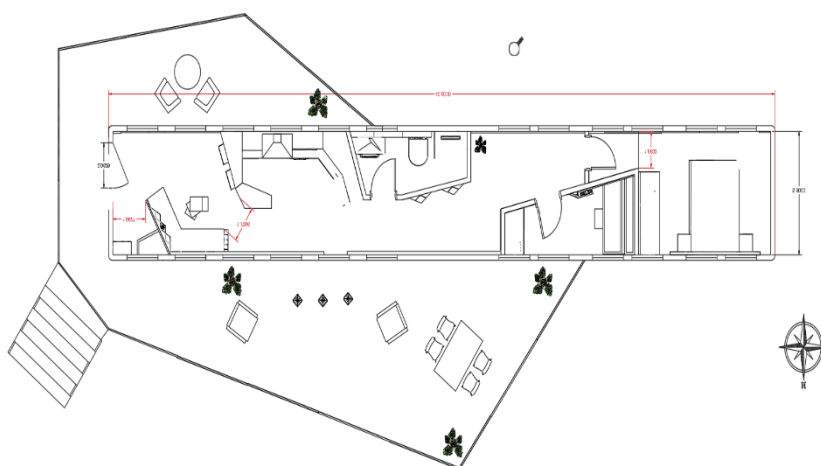


Fig. 10 The plan design depends on the straight line in a deconstructive way with the concept of the origami.

3D INTERIOR SHOTS

Living area:

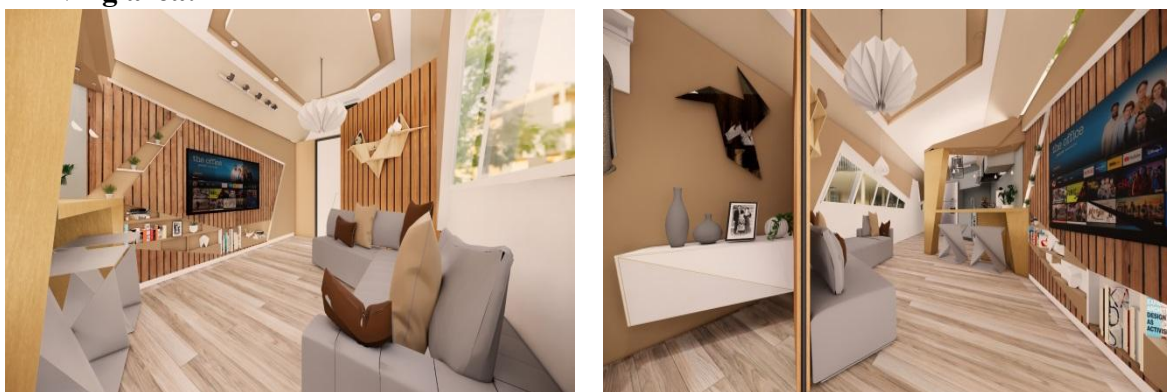


Fig. 11, 12 The living designed by using straight lines in a conceptual way inspired by the origami also using pieces of furniture and shelves using origami design, also the design depends on sustainable

3D EXTERIOR SHOTS

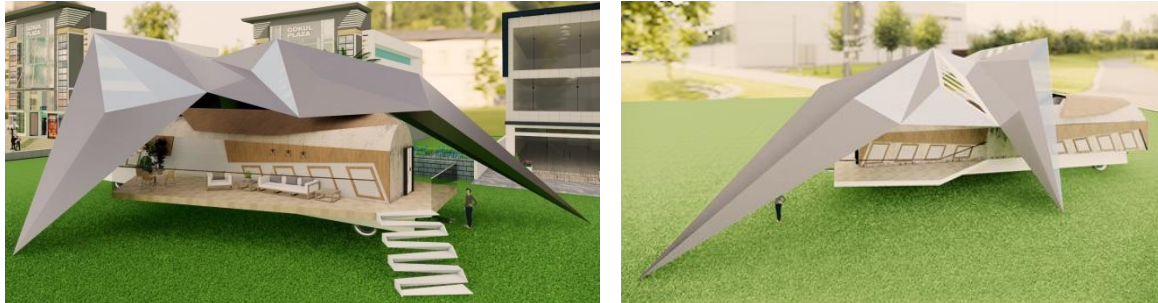


Fig. 13, 14 using the Origami design in the exterior shots for designing tent.

Main Ideas of the Project

Origami is the art of paper folding, which is often associated with Japanese culture. In modern usage, the word "origami" is used as an inclusive term for all folding practices, regardless of their culture of origin.

The main purpose of using origami is the way of folding furniture and using sustainable materials, with the advantage of the light weight and easy processing, are highly compatible with the concept of sustainable design, (Fig. 15, 16, 17, 18, 19).

2nd Example:

Student name: Afnan Ali

Student ID: 214207

L4 year 2

The Project Concept: Using the Biophilic designs as an inspiration in creating a sustainable interior design.

Main Plan

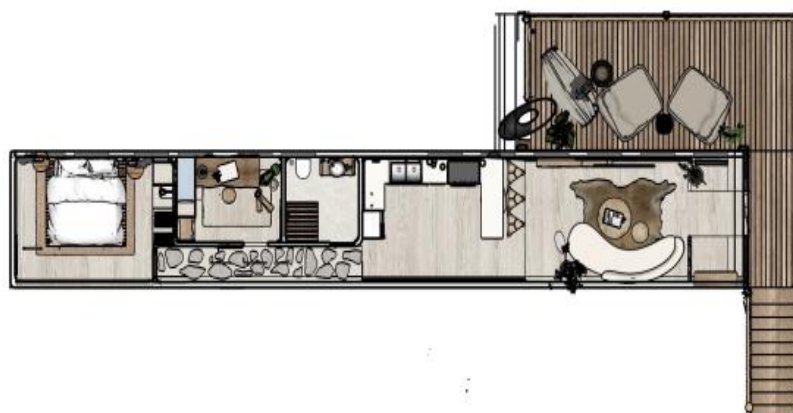


Fig. 15 The plan design is functional with the concept of the Biophilic design using sustainable flooring materials.

3D INTERIOR SHOTS:

Entrance area



Fig. 16, 17 The Biophilic design and concept is appearing clearly in the openings and furniture design.

Master bedroom and bathroom:



Fig. 18, 19 using sustainable materials like Jute fibers and organic linen also using plants.

MAIN IDEAS OF THE PROJECT:

The purpose is to make the human incorporated with nature increasingly. Creating a calming and relieving space with visual connection with nature through all it's materials sunlight, plants, air, wood and natural material. Biophilia is the best destination to connect with nature, reducing the stress enhance creativity and clarity of thought, improve our well-being and expedite healing. It's all about sustainable materials as they're coming from our real life and that what income.

14. CONCLUSIONS:

Sustainability has evolved from a niche consideration to a central trend in interior design, driven by practical experiences and a growing awareness of environmental issues alongside consumer demand for responsible practices. This study underscores that designing indoor spaces involves more than just artistic elements; the choice of materials is critical. A one-sided approach cannot yield optimal results unless we achieve the following:

1. By considering both aesthetics and materials comprehensively, we can create a more comfortable and healthier indoor environment for occupants.
2. Designers are increasingly prioritizing eco-friendly materials, energy-efficient solutions, and timeless aesthetics that minimize waste, reflecting real-world applications.
3. This approach enhances both the aesthetic and functional quality of spaces while fostering a deeper connection between occupants and their environment.

4. Embracing sustainability signifies a commitment to a healthier future, ensuring that interior design contributes positively to individual well-being and global sustainability efforts.
5. Implementing sustainability into university interior design curricula is essential to enhance awareness of sustainable practices among future designers.
6. Interior designers must stay updated on the latest sustainable materials and techniques to remain relevant in practice.
7. We must promote awareness and cultural engagement regarding sustainability, emphasizing that it is not just a trend but a fundamental necessity for the health of our planet.
8. Establishing a sustainable interior design industry is a long-term endeavor that requires dedicated effort and continuous improvement within firms.
9. We need to shift our mindset, transforming sustainability from a trend into standard practice. (10).

As sustainability continues to influence design choices, it paves the way for a more conscientious and innovative approach to creating spaces that are both beautiful and beneficial for the planet.

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