INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY STUDIES IN ARCHITECTURE AND CULTURAL HERITAGE

VOLUME 5, ISSUE 1, 2022, 328 – 342.

Sustainable architecture, obstacles to its application in developing countries, and its moving towards technological societies

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Abstract

Sustainable building practices are now a requirement, not a choice. Because of the environmental problems we face, such as rising carbon emissions, global warming, and a lack of non-renewable energy. Sustainable architecture uses recycled materials in sustainable design strategies to reduce landfill space, pollution, and carbon emissions. And low energy use. These tactics require skills. Adopting the recycling of raw materials and the use of renewable energy sources requires technological and financial support, as well as skilled labor, both of which are not available or difficult to achieve in developing countries. In addition to the high initial financial expenses for sustainable construction projects when importing these technologies is attempted and due to the training of the workforce in traditional construction techniques and previous knowledge of prices, considering traditional structures is more appropriate for these countries. This makes the use of sustainable design as a broad strategy difficult in these countries. It is not just an iconic building in these countries. This study examines the main obstacles facing developing countries in applying the sustainable architecture approach. What are the reasons for the technologically and materially advanced countries' approach to sustainable architecture? And development strategies through which sustainable architecture can become a general approach in developing countries.

Keywords: *principles of sustainability, challenges, Economics, Sustainable architecture*.

INTRODUCTION

Sustainable design attempts to reduce the negative environmental consequences of buildings by using energy, materials, and the ecosystem wisely and effectively(Ismaael et al. 2022). When creating the built environment, sustainable architecture takes an energy- and conservation-conscious approach(Anon n.d.-d). The goal of ecological design or sustainable development is to ensure that decisions made today do not restrict opportunities for future generations. Sustainable design aims to create new buildings with lower energy consumption and maintain energy efficiency over the course of a building's life. Architects use a range of negative and active approaches to reduce the energy requirements of buildings and enhance their ability to generate or absorb power. using nearby natural resources and having an impact on aspects linked to energy When taking into account sunshine, solar heat gains, and ventilation, site analysis is required(Almatarneh 2013). Over time, several passive architectural solutions have been developed(Anon n.d.-e). Examples of such urban planning strategies include the building-to-street height ratio, window size and orientation, and building orientation. Passive solar building design allows buildings to use solar energy efficiently without requiring active solar technology like photovoltaics or hot solar panels. Although it could require additional ventilation to remove contaminated interior air, a well-insulated building is an essential and cost-effective component of an effective ventilation, heating, and air conditioning system (HVAC). Heating systems are an essential part of sustainable building design in cold climates since they are frequently one of the structure's major individual energy consumers(Wieser et al. 2021). One of the most important solar panels helps convert active solar components, such as solar photovoltaic panels, into sustainable electricity for all purposes. Solar water heating is an effective and affordable way to heat the water in the residence. Small wind turbines in sustainable design must consider many factors in addition to power production. When pricing wind turbines according to the quantity of power they generate, smaller wind systems are frequently more costly than larger ones. Air-source heat pumps are less expensive than conventional heat pump systems. environmentally friendly building techniques Sustainable building materials include bamboo, one of the strongest and fastest-growing trees, and wood, linoleum, sheep wool, concrete, blown-glass insulation (high-performance, heavy-duty concrete), paper foil panels, ground rock, mud, linen, sisal, cannabis, expanded clay granules, wood fiber slabs, coconut, and locally quarried stone and rock. The paper made from forest wood is fully recyclable and replicates all the forest wood variations that were eliminated throughout the industrialization process. In ecologically friendly construction, recycled building materials like recovered wood and reclaimed copper are commonly used(UNEP, IEA, and Global ABC 2020). Reducing the use of new materials affects energy consumption (the energy required to produce new materials in a similar way. Sustainable architects usually strive to repair old buildings to fit modern needs in order to avoid creating unnecessary structures. When historic buildings are demolished, any good wood is always recovered, repaired, and sold as flooring. using new materials to reduce the requirement for new commodities. But in addition to the expense of rethinking and returning to conventional building procedures, most of these options need technology approaches that could not be available in many nations(Lami and Mecca 2021).

RESEARCH FRAMEWORK

Since sustainable architecture is a new concept that deals with the pursuit of perfection, it has attracted the attention of many architects. They usually highlight the achievements of industrialized countries in their attempt to use sustainable design principles. Although a great deal of contributions have been made to the implementation of sustainable architecture, its practices are still fragmented and not integrated (Guo et al. 2022). The application of these concepts represents a problem because of how architects understand them and because such a system is implemented without sufficient consideration of suitability to regional conditions. The process of putting these concepts into practice is similar to the method followed by technologically and materially advanced countries or that developed with the dominance of modernity. It has affected the consciousness and style of most architects, causing the collapse of traditions and the disappearance of identities. And perhaps more importantly, it can conflict with ideas that are truly recognized as sustainable. These practices and methods must be modified to achieve the desired comfort. They can also demand different environmental solutions due to different climatic conditions(Malek and Grierson 2016). A significant change in style and material practices, or even a reversal of what was previously acceptable, may result from this adaptation. In terms of form, many local architects embrace method more as forms and expressions than as ideas and meanings. They often directly adopt imported, non-regional architectural concepts without considering how these concepts relate directly to their location, its natural characteristics, and its regional customs. Therefore, what began as an attempt to build a built environment that respects biological and environmental elements and a means of conserving energy in the West may only lead to the importation of an architectural style devoid of regional characteristics as a result of importing ideas from changing environments that are not compatible with the environments that import these ideas(Abood, Ahad, and Khamis 2020) .Moreover, importing concepts and materials raises project start-up costs, hindering the adoption of sustainable architectural concepts in developing countries. And returning to traditional design by using skilled labor to create these types of buildings at a price known to them previously. But issues related to sustainability can be explored primarily from a technical and economic perspective However, challenges of sustainability It can be discussed mainly at the economic level and technical. In this context, a series of questions were raised to understand the reasons and obstacles to applying sustainable architecture in developing countries and limiting them to technological societies or those with financial solvency, as follows.

1 .What are the tenets of sustainable architecture?

2 .What barriers exist for the use of sustainable architecture in poor nations?

3 .Why is sustainable architecture found in technologically and financially advanced cultures, and what is the evidence for this?

4 .How can the practice of sustainable architecture become more mainstream in poor nations?

These inquiries help to clarify the causes behind the poor implementation of sustainable design in developing nations and offer some solutions for turning sustainable architecture into a general strategy rather than an iconic action in those countries.

SUSTAINABLE ARCHITECTURE

The best possible use of all available resources and capacities, whether they be human, material, or natural, is what is meant by sustainability. It is ecologically and architecturally balanced to guarantee continuation without sacrificing the advantages for future generations. Sustainability was defined at the International Conference on Development and Environment as "fulfilling current needs without compromising the ability of future generations to meet their own needs." Design that is sustainable benefits the environment, the economy, and society (Anon n.d.-c). An ecosystem can thrive when eco-design principles are used, which facilitate the effective use of resources and lessen the adverse effects of development and building activities. Utilizing renewable and natural resources guarantees that resource levels stay consistent and helps halt environmental damage (Lami and Mecca 2021). Sustainable materials selection and usage, such as the handling and distribution of wood, are necessary to prevent environmental damage and to guarantee that these materials are utilized responsibly. Steel has a larger proportion of recyclable components and better recycling characteristics than wood, making it the favored option when choosing sustainable resources. Air and water pollution, energy consumption, trash production, and habitat destruction all decrease with the use of less virgin resources. Utilizing recycled materials often results in the omission of important processing steps, which saves energy during the whole processing and manufacturing process. Sustainable design has been shown to contribute to the thriving of ecosystems by avoiding intervention with the environment and natural processes. Sustainable building materials, wind energy, and construction the materials used to make components can be recycled even if they are made of raw or recycled resources (Guo et al. 2022). Natural, renewable, local, energy-efficient, and non-toxic materials would be the perfect sustainable materials. Examples include "cut willow to stabilize slopes" and "rammed soil for a retaining wall." Recycled materials are made from recovered materials, scrap items, and other waste resources and are used as raw materials for sustainable building. Effective sustainable design has the potential to address several economic issues. Buildings with a high asset value are those that utilize sustainable design to create sustainable structures. Ensuring that the building is kept clean throughout its operational life cycle is one aspect of effective building maintenance that contributes to the provision of a high-quality environment. Buildings with sustainable architecture are guaranteed to be designed by the guidelines for maintaining high-quality interior environments (Ali 2012). To fully reap the benefits of utilizing sustainable building materials, it is imperative to thoroughly examine their spatial effect before beginning construction. Because of this, implementing sustainable design is contingent upon how significant an influence it may have. A sustainable building may guarantee its occupants' high comfort levels and the purity of its air and water by carefully selecting sustainable construction materials. regulates ventilation, ensuring that occupants breathe clean indoor air, and pollution prevention measures, which guarantee that pollutants entering the building are kept under control. The implementation of sustainable technology results in systems that are water efficient due to the significant savings in energy and water usage(Ali 2012).

GENERAL PRINCIPLES OF SUSTAINABILITY

Sustainable architecture is based on three basic ideas: human design, building life cycle design, resource economics,

- **CONSERVE ENERGY AND WATER**

Environmental conservation, site climate analysis, and use of local materials can be achieved through thoughtful and informed planning.

- **LIFE CYCLE OF THE BUILDING**

There are three phases to the building process: pre-construction when long-lasting, low maintenance recycled materials are employed. phase of construction. which excludes the use of organic materials; and the post-construction stage, which involves the reuse of already-built infrastructure and structures.

- **HUMAN DESIGN**

includes site planning, urban planning, and the preservation of all already accessible topography natural resources, i.e. using methods to lower the need for energy and water while maintaining health and enhancing human comfort. A building's technology, envelope, and design all have an impact on its carbon footprint (Wafi 2021). Architects may design more ecologically friendly structures with the aid of these six sustainable design concepts.

1- Use Low-Impact Building Materials.

Using ecologically friendly building materials can help contractors successfully limit pollution caused by construction. Reusing newspapers as a source of material lowers landfill pollution, and cellulose insulation is a low-impact choice. To lessen flammability and pest incursion, borates are added to paper during manufacture. The community's health and the environment are preserved by this process, which also inhibits the formation of mold. Contractors may employ more recycled materials in the project, which will lessen its carbon effect. However, environmental engineers frequently employ disassembly as a method to gather used materials. The resources that were previously unavailable are now affordable, and by recycling them into new projects, their sustainability may be enhanced.

2 -Add cool surfaces.

A novel approach to roofing is the use of reflecting or light-colored materials to minimize solar heat absorption. The heating, ventilation, and air conditioning (HVAC) systems in homes emit around 441 million tons of sustainable gas emissions every year. Architects may lower the energy required for air conditioning by preventing overheating. Cool roofs that reflect sunlight rather than absorb it help buildings stay colder. by allowing the energy to be reflected before it hits the earth. They might aid in avoiding surface warming. The building's sustainability is greatly increased by the surface technology.

3- Install Renewable Energy Systems.

To lessen the carbon footprint of residential structures, architects can also include solar, wind, and geothermal technology. To lessen a building's reliance on the conventional grid, solar panels can be mounted on the roof. By vibrating free electrons and absorbing solar light, photovoltaic (PV) technology generates energy without emitting any emissions. Construction professionals may be able to boost the structure's sustainability by including a basic wind turbine. Many places with high wind speeds may have people obtaining all of their energy from sources that emit no emissions. To lessen HVAC pollution, geothermal heat pumps can also be deployed.

4 .Installing a system for collecting rainwater.

Enhancing freshwater conservation initiatives is another environmentally beneficial building technique. Rainwater harvesting systems lessen the reliance of residents on municipal water supply. Rainwater is collected in barrels to power their operation. Water is sent directly to the irrigation system or filter via the barrel construction. After rainwater is passed through a purifier, residents may use it for drinking, bathing, and dishwashing. Architects can also integrate rain gutters and slopes to divert runoff from a home's foundation and into the rainwater collection system. Construction experts can use technology to lower moisture levels in the building process, safeguarding materials over time, when combined with efficient management tactics. may cut down on waste by extending the life of the construction and minimizing damage. Moreover, building moisture management systems and rain collection equipment are helpful.

5 .Engage in Modular Conduction Practices.

Architects may also make a project more sustainable by using modular construction. Building takes place in the factories in addition to the construction site. On-site assembly of a modular home is done by professionals. This building approach is more ecologically friendly since it employs recycled materials and minimizes material waste. As multiple projects are constructed concurrently, less heavy machinery is needed, which also lowers emissions. Ultimately, builders can lower energy waste by installing a tighter exterior seal(Anon n.d.-a).

6 -Installing smart devices.

Experts in construction can also add smart devices to increase a home's energy efficiency. A homeowner's smartphone receives data straight from the cameras and thermometers included into smart ovens. Through less needing to open the oven, the feature lowers heat loss. Additionally, to lower HVAC emissions, they can install smart thermostats. Through a connection to the home management system, the technology modifies inside temperatures based on population and weather. These gadgets progressively lower the building's energy costs and carbon footprint. More and more, designs for public buildings are using sustainable architectural solutions. Cost is often a top concern for civil construction designers, but bear in mind that spending more money up front on sustainable.

OBSTACLES TO IMPLEMENTING SUSTAINABLE ARCHITECTURAL PRACTICES

In developing nations, attaining sustainable development is hampered by a number of factors due to the diverse architectural, economic, political, and social settings that exist today. These factors include:

- **ARCHITECTURAL OBSTACLES**

-Initial investment.

When thinking about a sustainable construction, an initial investment is necessary. It is frequently rather high, depending on the objective and the quantity of methods and fixes that must be used. The cost may be higher depending on how much green technology is included into the construction because there aren't enough resources to develop a sustainable structure. The overall money saved over time as well as the initial cost of sustainable building should thus be included.

-Choose the right technology for each type of building.

One drawback is that it might be somewhat challenging to find the appropriate technology for every structure. Since every property is different and situated in a unique place, some strategies could be more advantageous.

-Finding Sustainable Materials.

Sustainable building materials might be hard to come by, in addition to technology. It is not always available everywhere in the world, can be expensive to transport, and takes a long time. Getting hold of additional materials—like the technology needed—in addition to those needed to create the structure could be challenging.

-Longer Time to Construct.

Building sustainable architecture requires time. Considerable planning and design work is done prior to construction. Sustainable building can take three years or longer since environmental factors need to be taken into account (Anon n.d.-b).

-Difficulty to control Air Temperature.

In sustainable buildings, it is typically challenging to regulate the air temperature. Since these structures are fueled by solar energy, they have air conditioning, which is managed from a single central zone. The basic objective of sustainable buildings is undermined since they cannot be used in hot regions due to the lack of integrated ventilation systems. Consequently, it may be challenging to regulate the temperature in your house.(Yousuf 2011).

-location.

Another disadvantage of sustainable construction is finding the ideal site. The primary cause is climate change. For sustainable structures, it would not be a good idea to build where there are few sunny days since ultimately the energy will run out. Energy from the sun is maximized in sustainable structures. Variations in temperature and surroundings might make certain strategies less effective than others.

- **SOCIAL OBSTACLES**

A dread of all new and inventive innovations, coupled with a lack of faith in everything new, is what stands in the way of sustainable growth. Furthermore, both people and society as a whole require behavioral adjustments.

-Finding People with Expertise..

Another disadvantage is that the topic of sustainable architecture is still relatively new, with an increasing number of innovations occurring in recent years. There aren't many experts or professionals available to assist in solving these issues as a result. lack of professional experience.

- **REGULATORY OBSTACLES**

The absence of parties, organizational structures that define and coordinate responsibilities, and effective means of participation are the reasons behind the distinction between central and regional governments.

- **ECONOMIC OBSTACLES**

This is because both urban and rural regions are experiencing rising rates of poverty and a lack of employment possibilities (Ismaael et al. 2022).

ECONOMIC ASSESSMENT

Project managers must gain access to the project in order to meet all design requirements and arrive at the required design. The cost of implementing the design is determined by taking into account the site's current conditions, including its soil, energy efficiency requirements, and the use of a wide variety of environmentally friendly materials. By fulfilling the criteria of the sustainable building evaluation standard, the project managers must assess the project. When implementing new technology or sustainability metrics, the initial cost of sustainability is calculated differently for every project, and this can have a significant impact. The equipment required to offer lower energy usage might result in a significant upfront cost increase. additionally lowering the indirect cost by raising the price of a particular building component, such separating the building's outside. As a result, the building's internal heat load is decreased, lowering the cooling systems' necessary capacity and, ultimately, the cost of the necessary cooling system equipment(Ismaael et al. 2022). One approach that is frequently used to assess economic performance is life cycle costing (LCC). As dependability, serviceability, and maintenance are reflected in continuous expenses and are factors that most designers consider instinctively when selecting design concepts, components, and materials, LCC seeks to quantify this balance. (or a product within a structure) and does so at different times. Costs for acquisition, maintenance, usage, and, if required, disposal are included in these expenses. The expenses at a certain moment in time are then represented as comparable costs. When designing, such as in the case of an electric hot water system and a solar hot water system, providing information for evaluating many alternatives is quite useful. Identifying relevant cost items for each option, defining the goals and constraints that apply to the problem, choosing viable solutions, determining the amounts and timing of relevant cash flows, and finally computing the life cycle costs using a discounting technique are the main steps in carrying out an LCC analysis. To evaluate the building's overall feasibility (Williamson, Radford, and Bennetts 2004).

ECONOMIC CHALLENGES

Several developing countries, notably those in the Middle East, experienced a spike in real estate investments as well as a boom in the development of cities and architecture, which were both associated with high but reasonably priced energy usage. Because of the high initial cost of new technology associated with cutting-edge sustainable designs, real estate investors are dubious about the practicality of putting such methods into effect. Due to this, the investors neglected the possibility of using alternative energy sources and paid little attention to the development and use of building methods that would significantly reduce energy waste(Williamson et al. 2004). Because of their high initial costs and lack of supporting industries and local knowledge, these technologies typically present maintenance and operating challenges for the projects using them, which goes against the core principles of sustainability and calls for the use of outsourcing and foreign consultants. Modernizing historic structures to comply with environmental regulations does carry some risk, though. Wasley identifies three primary risks: unclear and inability to establish, carry out, and uphold reasonable cost standards; challenges in determining and creating performance indicators; and inexperienced team members(Lami and Mecca 2021). Financial risks include things like losing tax benefits, having trouble estimating return on investment, unexpected, unique sustainability difficulties, ill-organized financial budgeting, and losing money. untrustworthy, failing to establish, put into practice, and uphold the proper cost requirements, challenging to identify and create performance metrics, and lacking expertise among team members. Financial risks include things like losing tax benefits, having trouble estimating return on investment, unexpected, unique sustainability difficulties, ill-organized financial budgeting, and losing money. Hazards associated with the market, insufficient understanding of energy efficiency in sustainable construction, low levels of education, difficulties in the supply chain, and hazards about the performance of sustainable buildings. These threats, together with the present world problems, provide challenges to sustainability in the areas of the economy, society, and environment. The topic is challenging and controversial because of the interrelationship between these three factors. However, the long-term benefits are unclear because traditional building practices usually consider them only in the short term, and the builder, developer, or owner might not be able to fully utilize them. Even after accounting for whole-life cost savings, developers and construction companies are still not lured to the long-term benefits of sustainable building. Last but not least is the intangible market worth. New types of building techniques are not welcomed by the traditional market, and the market for sustainable items has not expanded yet. Furthermore, processes related to sustainable building seldom show value sensitivity in the short term(Ariana 2016).

SUSTAINABLE ARCHITECTURE COUNTRIES

Implementing sustainable buildings is a difficult task in many countries, mostly due to technological and economic barriers. In addition to raising the initial cost of sustainable buildings, as a result, countries with access to this technology, financial resources and economic progress are also gaining the concept of sustainable architecture. Countries that try to import this technology also increase the time period for construction implementation as a result of importing these materials. In addition, many poor countries are making efforts to include some sustainable architectural components in their projects. Creating sustainable buildings is not a general strategy that fits one category. However, in those countries that do

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not have access to wealth or modern technologies, the sustainable building located on its grounds is considered a distinctive piece of architecture. It has been observed that the most developed nations, either monetarily or technologically, are attempting to use a sustainable strategy. The global distribution of sustainable buildings is depicted in Figure1(Almatarneh 2013). Most of the structures are owned by nations in Asia, Europe, and America, with a smaller number of nations in Africa and South America.

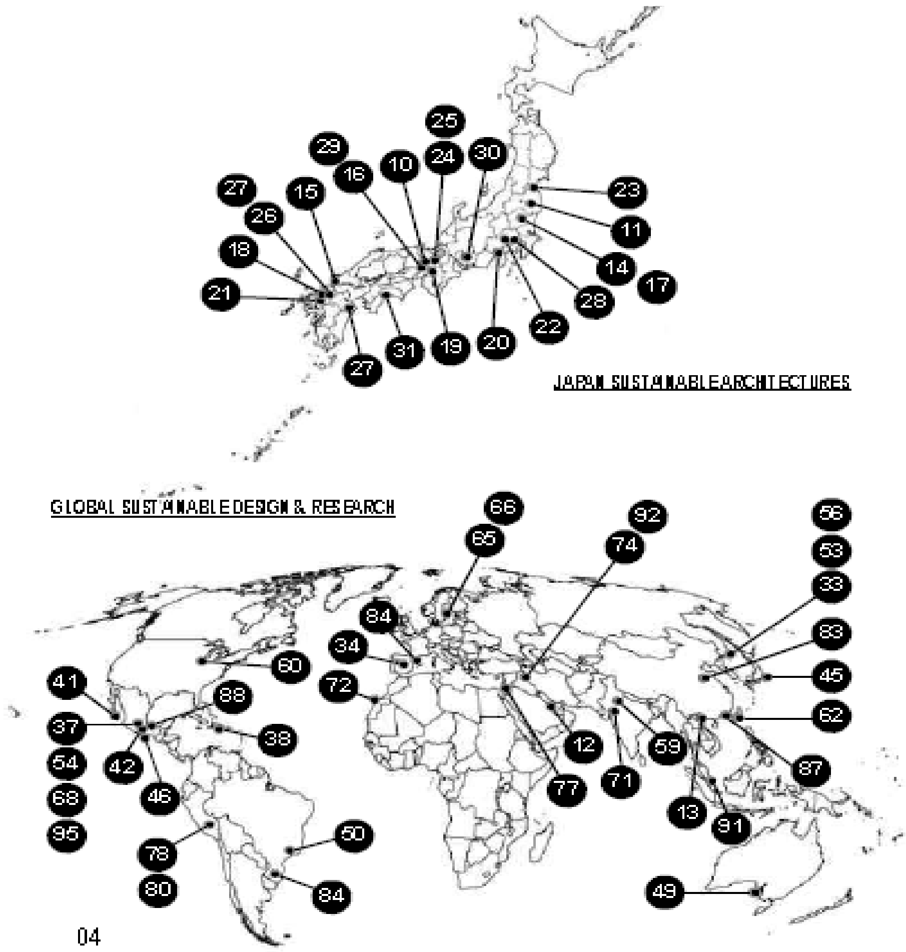

Figure 1: Distribution of sustainable buildings in Japan and the world's continents

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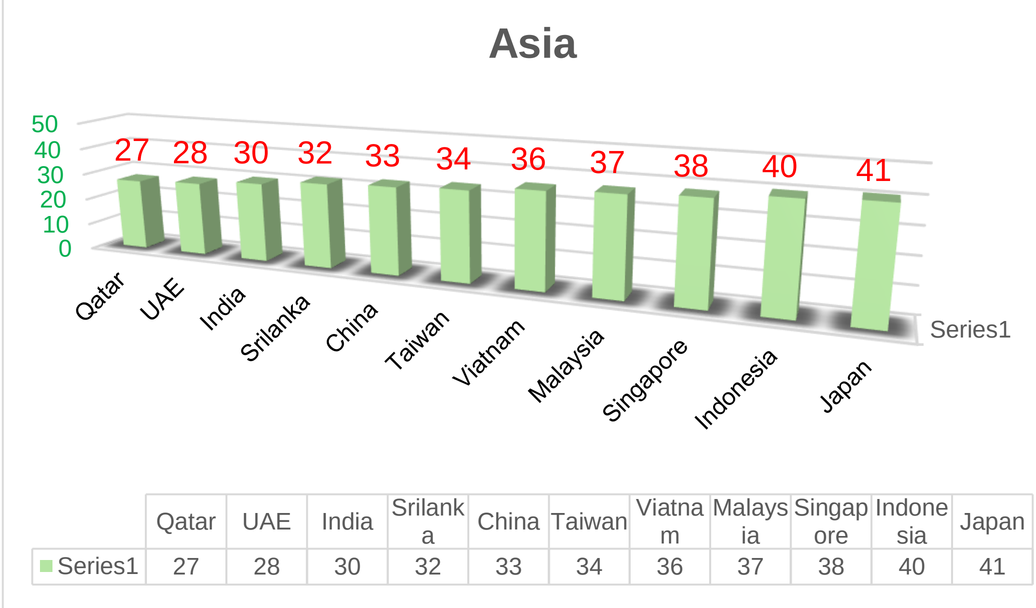
Table 1: Number of sustainable buildings.

<table>
<tr><td>continents</td><td>Number of sustainable buildings</td></tr>
<tr><td>1-Asia. Number of countries (11)</td><td>
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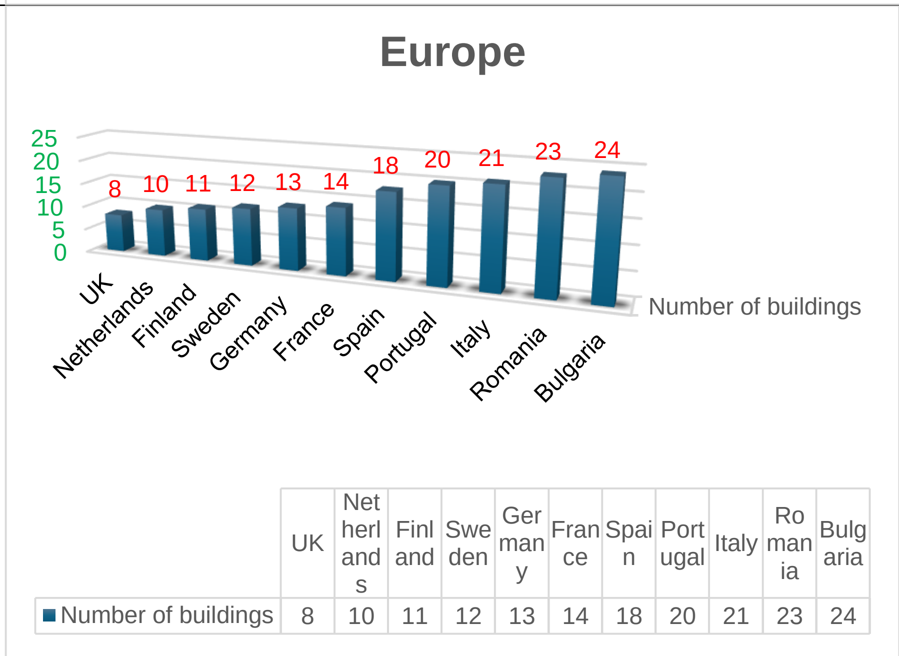
<tr><td>2-Europe. Number of countries (11)</td><td>
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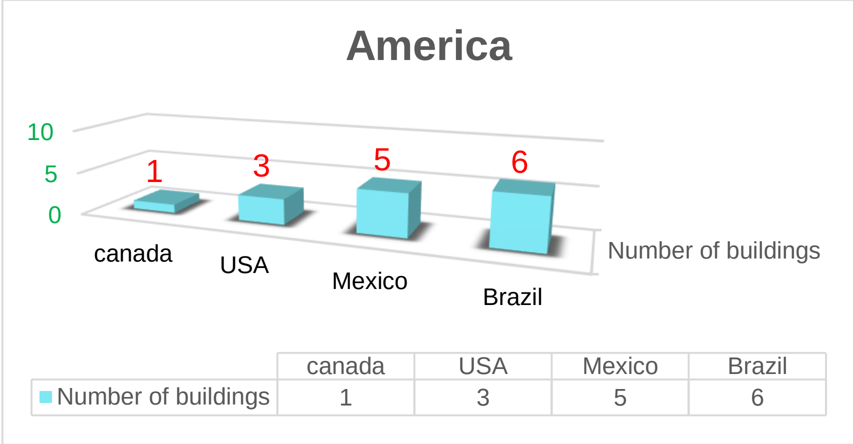
<tr><td>3-America. Number of countries (4)</td><td>
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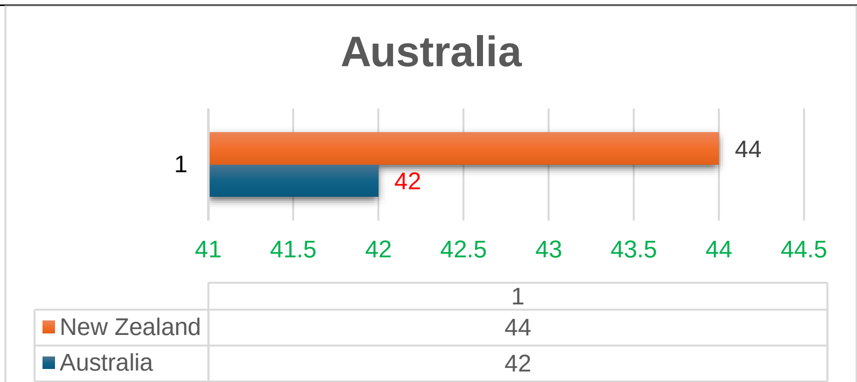
<tr><td>4-Australia Number of countries (2)</td><td>
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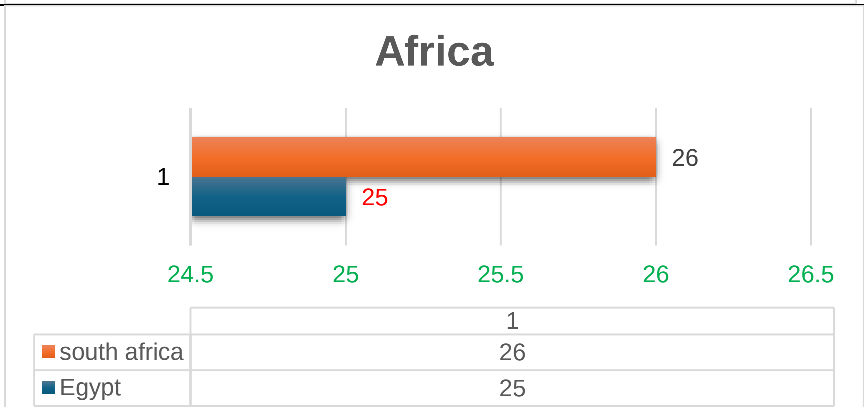
<tr><td>5-Africa. Number of countries (2)</td><td>
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Table (1). Shows the number of countries that aim to adopt sustainable architecture as a general strategy. There are 24 countries with about 550 sustainable buildings spread across the continents of Asia and Europe. There are no barriers to adopting a sustainable design approach because they are continents with high rates of technological and financial capabilities. Furthermore, four of the countries in the Americas have approximately fifteen sustainable structures. Australia is divided into two countries, each with about 86 sustainable structures. There are 51 sustainable buildings spread across two countries on the African continent. Compared to the total number of countries on other continents, fewer countries have buildings of sustainable design. The number of countries in the developing world is smaller compared to other developed continents, and the main obstacle is the lack of funding or technology to implement sustainable architectural methods. Regardless of some individual endeavors on that continent, these countries viewed them as individual and different endeavors and not a unified strategy.

PROPOSALS FOR IMPROVING THE ECONOMICS OF SUSTAINABLE ARCHITECTURE IN DEVELOPING COUNTRIES.

- **ARCHITECTURE PROPOSALS**

- Governments incentivize investors to adopt sustainable construction practices and mainstream them by offering building incentives and lowering taxes on environmentally friendly buildings, therefore mitigating the initial high cost of these structures.
- To lower the requirement for expensive technology that drive up the cost of sustainable construction, use a passive building design strategy.
- Describe the eco-friendly construction materials that are accessible in each location and how sustainable structures may make use of them.
- To cut down on the time required on sustainable design and planning, each region should develop its own sustainable design norms and standards.
- Creating trash recycling techniques that may be applied to sustainable building, hence preventing the growth of landfills.
- Make use of locally available methods to reduce adverse effects on the environment. and encourage alternatives, restrict the use of non-renewable resources, and formalize the use of renewable resources.
- reevaluating the building process by utilizing environmentally benign and renewable materials that cohabit, support local ecosystems, and strengthen local and regional social networks.

- **SOCIAL PROPOSALS**

-Providing sustainable building implementation and dissemination support through the training of specialists and cadres in the field of sustainable architecture.

-Policies and incentives from both the public and commercial sectors aim to address labor shortages and lower building costs by introducing new technology and reskilling and upskilling workers.

- **ECONOMIC PROPOSALS**

- Encouraging governments and states to embrace the concept of sustainable architecture by enacting laws and policies that will lessen regulatory barriers between investors and governments and facilitate sustainable development.
- To cut beginning expenses, identify the technologies that are available in each location and restrict the import of those that are not.

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CONCLUSION

Sustainable design uses energy, materials, and the ecosystem as a whole sparingly and efficiently in an effort to lessen the harmful effects of buildings on the environment. However, to achieve this goal, unique technologies are needed to reduce energy consumption and recycle waste in order to obtain raw materials, which can then be used to reduce landfills and harmful effects on the environment. It is a major barrier for developing countries that lack the technology, financial capacity, or skilled labor to recover or implement this technology, raising the initial cost and economics of sustainable construction. In addition to the lack of trained workers. And the fear of the lack of an effective impact on the application of sustainable architecture and thinking and continuity in traditional architecture as the main factor is the availability of knowledge and manpower that master this type of construction and the economics of construction are known in advance. Countries that do not possess this knowledge must therefore seek a special approach to increase sustainable architecture and make it a top priority, including the use of steel buildings designed by architects. Develop standards, descriptions and codes that provide knowledge for implementing sustainable architecture. Encouraging countries and governments to implement sustainable architecture approaches.

RECOMMEDATIONS

1 -Promoting awareness and education: establishing community awareness programs and training engineers and architects on the principles of sustainable architecture.

2 -Supportive legislation: developing policies and laws that encourage sustainable construction and provide incentives for green projects.

3-Appropriate technology: using building techniques appropriate to local conditions and available resources.

4 -Climatic design: Designing buildings to suit climatic conditions to reduce the need for energy for heating and cooling.

5-Local materials: Encourage the use of local and sustainable materials to reduce costs and support local economies.

6 -International cooperation: benefiting from international experiences and technologies and exchanging knowledge in the field of sustainable architecture.

7 -Innovation and research: Encouraging research and innovation in the field of sustainable architecture to develop new solutions that suit local needs.

8. Encouraging the use of local and renewable materials: The use of locally available materials that can be obtained easily and at a low cost should be encouraged. In addition, the use of renewable materials such as wood from sustainable agriculture should be considered.

ACKNOWLEDGEMENTS

I would like to thank all the people who had he1ped me to accomplish this research in order to reach the results which will have a great benefit to all the architects interested in this field.

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