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CHALLENGES IN INTEGRATING GREEN BUILDINGS INTO EVERYDAY LIFE

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ABSTRACT

In recent decades, problems related to climate change, pollution and resource depletion have become increasingly urgent. Green architecture, also known as green buildings or sustainable construction, is an innovative response to these challenges. In this paper, the concept of green buildings, their benefits, and main characteristics, as well as their role in promoting a sustainable future for architecture and the environment will be explored.

Integrating the green buildings into everyday life is an important challenge, but also an extremely necessary one in the context of climate change and concern for environmental sustainability. Green buildings are structures designed to be more environmentally friendly and generate less impact on natural resources. Despite their obvious benefits, however, there are some significant challenges that need to be overcome to promote their integration into everyday life.

While these challenges exist, efforts to integrate green buildings into everyday life are still essential to ensure a more sustainable and greener future for future generations. Over time, as technology advances, awareness grows, and regulations improve, these challenges are expected to be overcome and green buildings to become a regular part of the urban landscape.

KEYWORDS: green buildings, sustainability, environment, quality of life

1. Introduction

In recent decades, an increasingly present theme in urban development is sustainability. An innovative and promising approach to achieving this goal is green or green buildings. In essence, the green buildings are designed and constructed in such a way as to minimize negative environmental impacts and provide significant social and economic benefits. From improving air quality to resource efficiency, these structures are becoming increasingly popular in major cities around the world.

The green buildings are thought of from a holistic perspective, considering all aspects, from design and construction to operation and demolition [2].

The green building concept is based on four fundamental principles: efficiency, utility, durability, and comfort. By following these four principles, green buildings contribute to protecting the environment, saving resources, and improving the quality of life of occupants and the communities in which they are located (Fig. 1) [5].

Fig. 1. *Fundamental principles for green buildings* [5]

2. Materials and technologies recommended and used in green buildings

Green buildings, also known as green or sustainable buildings, are constructions designed to be energy efficient and environmentally friendly. These buildings use a variety of specific materials and technologies to reduce environmental impact and promote sustainable resource use [1].

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Here are some materials and technologies recommended and used in green buildings:

• Effective thermal insulation: Materials such as polyurethane foam, mineral wool, cellulose, and mineral wool can reduce heating and cooling requirements, thereby minimizing energy consumption (Fig. 2) [9].

Fig. 2. *Insulating materials* [9]

• Geothermal systems use natural energy thermal from the earth for heating and cooling, being a sustainable and energy-efficient option (Fig. 3) [19].

Fig. 3. *Geothermal heat pumps* [19]

• Solar panels and photovoltaic cells: Green buildings can be equipped with solar panels to generate electricity or hot water. PV cell technology can be integrated into roofs, windows, or walls to maximize energy efficiency (Fig. 4) [12].

Fig. 4. *Solar panels and photovoltaic cells* [12]

• Green roofs: The systems green roofs involve planting vegetation on building roofs, which helps reduce district heating, improve air quality, and manage stormwater (Fig. 5) [11].

Fig. 5. *Green roofs* [11]

• Rainwater collection systems: These systems collect rainwater for use in irrigation, toilets, and other non-drinking needs, thus helping to save water (Fig. 6) [4].

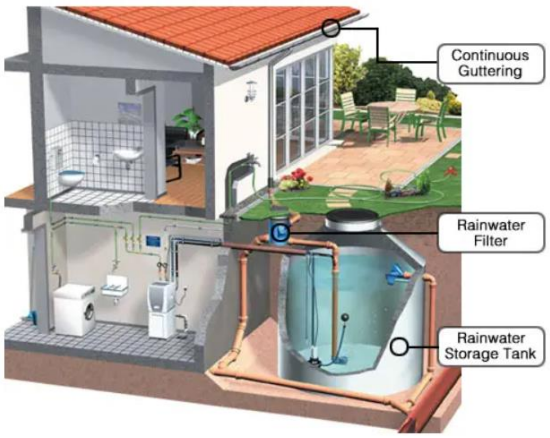

Fig. 6. *Rainwater collection system* [4]

• Recycled and renewable materials: Using recycled materials, such as recycled wood or metal, and renewable materials, such as bamboo or hemp, help reduce environmental impact [2].

• Efficient lighting systems: Use LED lights or other energy-efficient lighting systems help reduce electricity consumption (Fig. 7) [18].

Fig. 7. *Efficient lighting systems* [18]

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• Natural ventilation: Building design allow adequate natural ventilation reduces the need for air-conditioning systems.

• Use of low-emission materials chemicals: The green buildings seek to use materials with low emissions of volatile chemicals (VOCs) to ensure better indoor air quality.

• Green certifications: green buildings can seek to obtain green certifications such as LEED (Leadership in Energy and Environmental Design) or BREEAM (Building Research Establishment Environmental Assessment Method) certifications to demonstrate commitment to sustainability and environmental performance.

These are just a few examples of materials and technologies used in the green buildings. The field of sustainable construction is constantly evolving, and research and innovation continue to bring new solutions and options for environmentally friendly buildings.

3. Challenges and opportunities

The integration of the green buildings in everyday life brings challenges, but also remarkable opportunities for protecting the environment, improving the quality of life, and promoting sustainable development.

Challenges regarding the integration of green buildings in everyday life:

• High initial costs: In general, building a green building may involve higher upfront costs than traditional buildings. Higher upfront investments can discourage developers from adopting sustainable solutions, even if they prove to be more economical and energy efficient in the long run.

• Public awareness and education: The integration of green buildings requires increased public awareness of the importance of protecting the environment and the benefits of sustainable buildings. Education in this direction can lead people to support and demand the development of the green buildings.

• Inappropriate regulations and policies: Laws and Building regulations are not always environmentally friendly enough, which can make it difficult for green buildings to develop. Government policies must support and stimulate the adoption of sustainable construction practices.

• Resistance to change: In many cases, building developers and owners may be resistant to adopting new technologies and methods needed to transform traditional buildings into green buildings. It may be caused by lack of information or knowledge to make such changes.

• Implementing new technologies: Integration green buildings often involve the use of innovative technologies and materials, which can be difficult to obtain or implement, especially in regions with limited resources.

• Life cycle of buildings: It is important to ensure that the green buildings are durable and can withstand time. Proper management of the building, as well as of the materials and techniques used in its construction, are essential to ensure that sustainable benefits are realized in the long term.

• Energy efficiency: green buildings must be designed to be more energy efficient, but sometimes there may be difficulties in achieving this goal due to the structural restrictions or high costs of green technologies.

• Urban influence: Integrating green buildings in the urban context may involve adjusting infrastructure, transport, and other aspects of cities, which can be logistically and financially challenging.

Opportunities for integrating green buildings into everyday life:

• Positive impact on the environment: Buildings Green can contribute significantly to reducing the carbon footprint, conserving energy, and sustainably using natural resources.

• Long-term savings: Although costs Can initially be higher, green buildings offer significant energy and maintenance savings in the long term, leading to increased financial efficiency.

• Improving Quality of Life: Using Eco-friendly materials and smart design can improve indoor air quality, providing a healthier working and living environment.

• Competitive advantages: Properties with Ecological certification can attract more customers and tenants, due to the growing concern for sustainability and environmental protection.

• Innovation and economic development: The development and deployment of green technologies can generate new business opportunities and jobs in sustainability.

• Attraction for investors: Investing in Green buildings can become more attractive to investors as they reflect an environmentally oriented vision for the future.

• Health benefits: Using Energy efficiency, as well as the use of environmentally friendly materials, can help reduce indoor pollution and thus improve the health of green building occupants.

• Encouraging technological innovation: The development of green buildings stimulates research and innovation in sustainable technologies, having a positive impact on society.

Overcoming challenges requires a collaborative effort between developers, governments, research institutions and the community to implement policies and support measures that encourage and facilitate the development of these buildings.

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4. Advantages and disadvantages of green buildings

Advantages of green buildings:

• Energy efficiency: green buildings use energy-efficient systems and technologies such as solar panels, superior thermal insulation, geothermal, LEDs, sensor lighting systems, etc. This leads to significant savings on utility bills.

• Resource efficiency: Buildings Greens reduce water consumption and use sustainable and recyclable materials, which reduces the impact on natural resources.

• Indoor Air Quality: The Design and the materials used in green buildings help reduce toxic emissions and improve indoor air quality, leading to a healthier environment for occupants.

• Low effect on the environment: Green building has less impact on the environment as it reduces carbon emissions and helps protect ecosystems.

• Certifications and recognition: Green buildings can earn special certifications and recognition, such as LEED (Leadership in Energy and Environmental Design), which can enhance property value and bring tax benefits.

Disadvantages of green buildings:

• Higher upfront costs: Construction and the design of green buildings can involve higher costs compared to traditional buildings. The initial investment can be a disadvantage for developers or owners with limited budgets.

• New Technology and Materials: Implementation Eco-friendly technologies and materials may require additional learning and adaptation for architects, engineers, and builders.

• Location limitations: Some technologies greens may be more effective in certain geographies than others. Thus, some regions may find it difficult to adopt certain environmentally friendly solutions.

• Maintenance and operating costs: Some green technologies require special maintenance and, in some cases, higher operating costs in the long run.

• Life cycle of materials: Even if green buildings use recyclable and sustainable materials; their production and transport can still have a negative impact on the environment.

5. Notable examples of green buildings

Today, the green buildings are becoming increasingly popular in construction as they promote energy efficiency and environmental sustainability.

Here are some examples of green buildings:

• The Edge - Amsterdam, Netherlands: It was named "the smartest building in the world" due to its extensive use of IoT (Internet of Things) technology. The building automatically adjusts its lighting, heating, and cooling system to ensure maximum energy efficiency (Fig. 8) [10].

Fig. 8. *The Edge - Amsterdam, Netherlands* [10]

• One Angel Square - Manchester, Sea United Kingdom: The headquarters of Co-operative Group is one of the most sustainable office buildings in the world. It has a double glass façade for thermal insulation and a cogeneration system that uses the energy produced for heating and cooling (Fig. 9) [15].

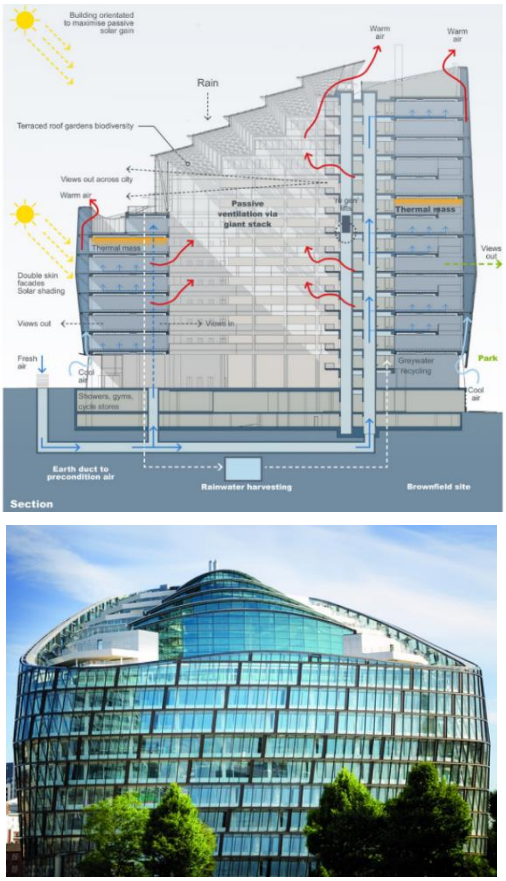

Fig. 9. *One Angel Square - Manchester, Sea United Kingdom* [15]

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• Pixel Building - Melbourne, Australia: Australia's first office building with a maximum score of six Green Star stars. It has green roofs, rainwater collection systems and integrated solar panels for power generation (Fig. 10) [14].

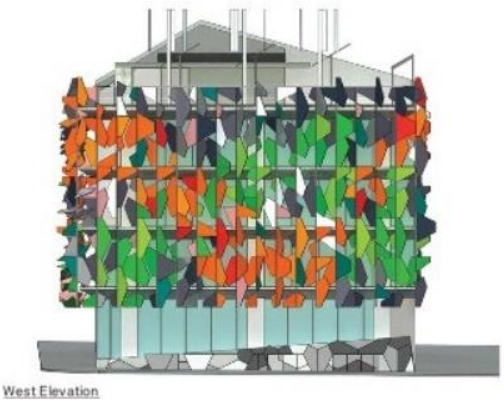

Fig. 10. *Pixel Building - Melbourne, Australia* [14]

• The Bullitt Center - Seattle, SUA: An outstanding example of a net-zero energy building using solar panels and advanced energy efficiency technologies. It focuses on environmentally friendly and sustainable materials (Fig. 11) [16].

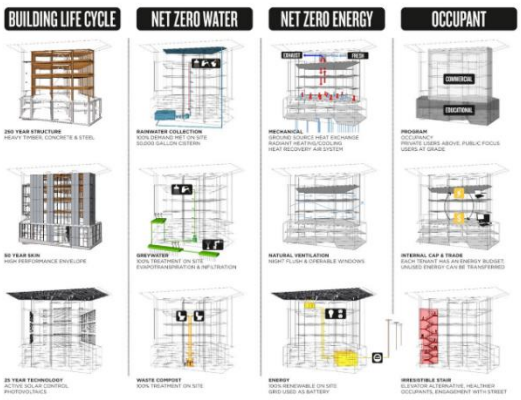

Fig. 11. *The Bullitt Center - Seattle, SUA* [16]

• Bahrain World Trade Center - Manama, Bahrain: This is an impressive building with integrated wind turbines, which contribute to the partial production of the energy needed by the building (Fig. 12) [13].

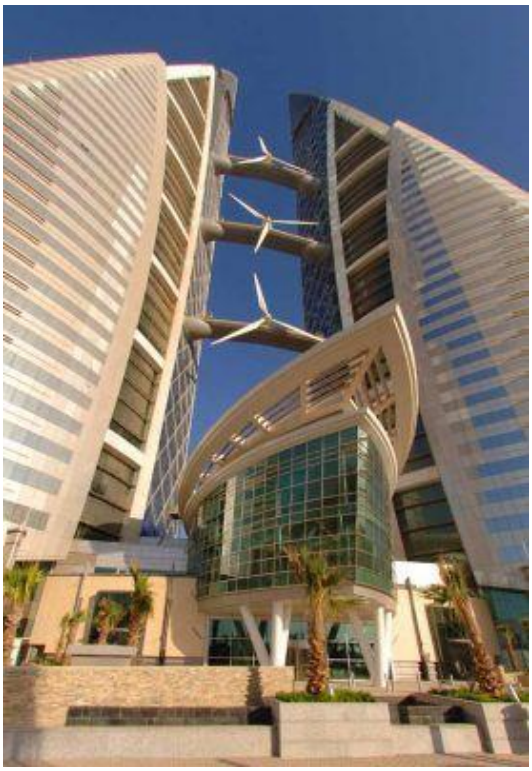

Fig. 12. *Bahrain World Trade Center – Manama, Bahrain* [13]

• Stuttgart City Library – Stuttgart, Germany: It was designed with a glass façade and natural ventilation system to maximize natural light and reduce electricity consumption (Fig. 13) [17].

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Fig. 13. *Stuttgart City Library – Stuttgart, Germany* [17]

• The Crystal - London, United Kingdom: A sustainability centre showcasing innovative technologies and solutions to make cities more sustainable. The building itself is an example of eco-friendly and energy-efficient design. (Fig. 14) [6].

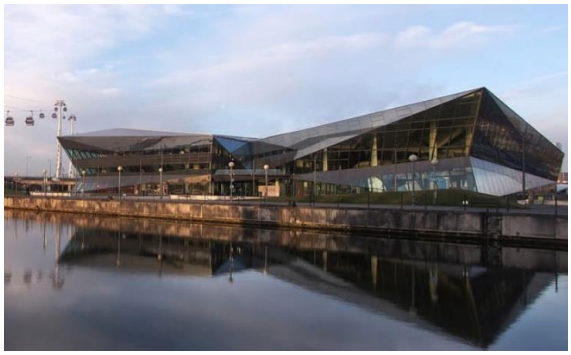

Fig. 14. *The Crystal - London, United Kingdom* [6]

In Romania, there is a significant increase in interest in the construction and certification of green buildings. These are some examples of notable green buildings in the country:

• Crystal Tower – Bucharest, a building in Romania BREEAM Certified at excellent level (Fig. 15) [7, 8].

Fig. 15. *Crystal Tower – Bucharest* [7, 8]

• residential complex WINGS Cluj Napoca: the first EDGE certified project in Romania (Fig. 16) [20].

Fig. 16. *Residential complex WINGS Cluj Napoca* [20]

• Residential complex SEASONS in Cluj Napoca: a spectacular concept of urban vertical forest (Fig. 17) [20].

Fig. 17. *Residential complex SEASONS Cluj Napoca* [20]

• City Business Centre, Timisoara: CBC is designed to ensure maximum comfort, efficiency, and access to all utilities (Fig. 18) [21].

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Fig. 18. *City Business Centre, Timisoara* [21]

The green building industry continues to develop and grow as concern for the environment and energy efficiency becomes an increasing priority.

6. Conclusions

Integrating green buildings into everyday life is an important but necessary challenge for sustainable urban development [3]. Through awareness, education, proper regulation and collaboration between the public and private sectors, these challenges can be overcome. Finally, green buildings can make a significant difference in quality of life and environmental protection, making our cities greener, healthier, and more resilient to climate change.

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