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Article

Incorporating Curative Architecture Concepts into the Housing of the Future

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Abstract: Rapid urbanization is placing critical pressure on global public health. Currently, approximately 55% of the world's population lives in cities, and this figure is projected to reach 68% by 2050 (UN-Habitat, 2023). More than 4.2 billion urban dwellers already face inadequate housing conditions, lack of sanitation, and exposure to pollutants. According to the WHO, 91% of urban dwellers breathe polluted air, and many of the leading causes of death are related to poor urban design and unstable growth. Furthermore, nearly 970 million people worldwide live with mental disorders, largely aggravated by noisy, overcrowded, or unhealthy housing. In this context, curative architecture—also called therapeutic architecture—offers an innovative and interdisciplinary response. By integrating physical, mental, and social well-being into design, housing can be transformed into a tool for prevention and care. Empirical studies show that a lack of natural light, poor ventilation, and a lack of green spaces are associated with elevated levels of stress and depression. For example, research led by Evans et al. confirms that a lack of natural light is correlated with recurrent depressive symptoms. Conversely, environments with vegetation, acoustic control, and visual access to the outdoors improve mood, reduce blood pressure, and encourage physical activity. Current trends in smart and healthy housing incorporate these principles: automated climate control systems, multifunctional spaces, biocompatible materials, and biophilic design. In turn, curative architecture contributes to environmental sustainability: the building sector generates approximately 19% of global CO₂ emissions, and indoor pollution still causes 3.8 million deaths annually (WHO, 2023). Ultimately, rethinking housing design from a curative perspective is essential to addressing the health, sustainability, and social cohesion challenges that the cities of the future demand.

Keywords: curative architecture; housing of the future; architecture; health

1. Introduction

Summary

Incorporating curative architecture concepts into the housing of the future is an innovative approach that seeks to enhance human well-being through the design of living environments. This interdisciplinary field merges architectural principles with insights from health sciences, emphasizing how built spaces can positively impact physical, mental, and emotional health. With increasing urbanization and a growing recognition of the importance of mental health, the integration of curative architecture in future housing developments has garnered significant attention, making it a crucial area of exploration in contemporary architectural practice.

The principles of curative architecture focus on creating environments that promote healing and well-being by incorporating elements such as biophilic design, effective indoor climate management, and community engagement. These principles advocate for the integration of natural light, improved air quality, and sound acoustics to foster spaces that contribute to occupant health and productivity [1,2,3]. Moreover, curative architecture emphasizes the importance of social sustainability, encouraging

mixed use developments that foster community interaction and enhance residents' quality of life [4,5].

Despite its promising potential, the incorporation of curative architecture faces several challenges and criticisms. Initial costs associated with sustainable technologies can be prohibitive for developers, often hindering the implementation of innovative designs that prioritize wellness [6]. Additionally, the aesthetic and functional integration of renewable energy systems within existing urban frameworks poses significant design challenges. Ethical concerns, such as the concept of "energocracy," further complicate the discourse by highlighting the tension between technological innovation and cultural preservation [7,6].

Overall, the discourse surrounding curative architecture is vital as it navigates the intersection of technology, sustainability, and community needs, ultimately shaping the future of housing. Through careful consideration of diverse stakeholder perspectives and the challenges inherent in this approach, architects and urban planners can work towards creating healthier, more resilient living environments that prioritize well-being for all residents [1,8].

Historical Background

The concept of integrating curative architecture into housing has evolved significantly over time, reflecting a broader understanding of how built environments influence human wellbeing. The notion of "Healing Architecture" began gaining traction with the work of Frandsen et al. in 2009, which laid the theoretical groundwork by exploring how architectural elements can affect physical and psychological health [1]. This burgeoning field examines the interaction between architecture and the healing process, positing that specific design features can play a critical role in enhancing well-being, particularly in healthcare settings [9].

In parallel, the movement toward preserving cultural heritage within modern design has emphasized the importance of integrating historical elements into contemporary architecture. This approach promotes social sustainability by fostering a sense of community pride and connecting local history with modern construction practices [4]. Architectural trends in the past have often leaned towards isolation, with single family homes dominating the landscape. However, recent shifts have led to the development of mixed use communities that encourage social interaction and a sense of belonging among residents, showcasing a transformation in housing dynamics driven by demographic and economic changes [5].

Moreover, the revival of local housing traditions, alongside innovations, illustrates a balanced synthesis between tradition and contemporary design. This trend often involves reintroducing pre-industrial building solutions that resonate with the local climate and landscape, aiming to create hybrid living environments that respect the architectural legacy of the past while incorporating modern advancements [7]. This dialogue between old and new reflects a growing awareness of architecture's role in promoting mental and emotional health, as well as the environmental responsibility of the built environment.

Principles of Curative Architecture

Curative architecture, also referred to as therapeutic architecture, encompasses a set of design principles aimed at enhancing the physical, mental, and emotional well-being of individuals through the built environment. Central to this concept are the principles of durability, utility, and beauty, which serve as a framework for creating spaces that promote healing and well-being [2].

Biophilic Design

Biophilic design emphasizes the integration of natural elements into architectural settings, enhancing the connection between occupants and nature. This can be achieved through the incorporation of indoor plants, natural views, and green spaces, which contribute to improved air

quality and provide therapeutic benefits [10]. Additionally, the use of natural light and effective ventilation systems can create a more pleasant and health promoting environment [11].

Healing Architecture

The term "Healing Architecture" integrates theoretical approaches and scientific foundations, emphasizing the impact of various architectural components on individual well-being [1]. This field gained traction with the publication of "Helendarkitektur" by Frandsen et al. in 2009, which laid the groundwork for understanding how architecture can serve as a non-medical intervention that influences health outcomes. Evidence Based Design is a crucial element in this context, highlighting specific architectural features that support healing processes [1].

2. Methods

Key Components of Curative Architecture

Air Quality and Indoor Climate

A fundamental aspect of curative architecture is the creation of a good indoor climate, which includes proper ventilation and air quality management. Ensuring clean air is vital for preventing respiratory issues and enhancing cognitive function [3]. Techniques such as diffuse ventilation, which minimizes drafts and noise, are recommended to achieve optimal air quality. Temperature control also plays a significant role; maintaining a stable, comfortable temperature enhances patient comfort and productivity [3].

Acoustic Environment

Acoustics significantly influence well-being, as poor sound environments can increase stress levels and reduce focus [3]. Investing in acoustic ceilings and wall panels is essential to creating a comfortable acoustic environment that fosters concentration and relaxation.

Color Psychology

Colors used in architectural design can have profound psychological effects, influencing mood and stress levels [12]. For instance, blue and green hues are known for their calming properties, making them ideal for spaces where tranquility and focus are paramount.

Community Engagement

Involving community stakeholders in the design process is crucial for creating spaces that reflect the needs and aspirations of users. Engaging with these individuals enhances trust and ensures that the architectural solutions developed are equitable and sustainable, ultimately benefiting societal well-being [4].

By combining these principles—focused on healing environments, effective indoor climate management, sound acoustics, and a deep connection to nature—curative architecture aims to foster settings that promote health, happiness, and productivity in the housing of the future.

3. Results and Discussion

Case Studies

Overview of Applications

The incorporation of curative architecture concepts into future housing developments is demonstrated through various case studies that showcase innovative applications of sustainable design principles across North America. These projects emphasize the role of architecture in

promoting community well-being and resource efficiency, contributing to the shaping of a circular economy [13].

Residential Case Studies

River Park Residential Complex

One notable example is the River Park Residential Complex, which illustrates the evolution of housing dynamics towards schemes that balance individual autonomy with community engagement. This development integrates diverse housing typologies within a carefully planned environment, focusing on the relationship between location, landscape, and the preferences of modern inhabitants. By fostering a sense of community and encouraging coexistence, this project reflects a shift in housing models to meet evolving demographic and economic needs [5].

Residential Park Lozen

Similar to River Park, the Residential Park Lozen highlights the importance of flexibility in housing design. This complex incorporates intergenerational housing features that cater to varying lifestyles and encourage community interaction. By focusing on shared spaces and promoting social connectivity, the project exemplifies how architecture can enhance the quality of life for its residents while addressing contemporary living challenges [14].

Commercial Case Studies

Insulation Products Applications

In commercial settings, case studies have shown the successful application of insulation products that enhance resource efficiency while contributing to occupant health and safety. These case studies reveal the diverse functionalities of insulation materials and their role in improving the overall sustainability of building projects.

They demonstrate how such products not only meet energy efficiency standards but also support the wellbeing of occupants through better thermal comfort and reduced energy consumption [13].

Architectural Principles in Practice

Throughout these case studies, universal principles of good architecture—durability, utility, and beauty—are emphasized as essential components in the design process. Good sustainable architecture not only adheres to these principles but also prioritizes the use of natural and non toxic materials, integrates landscaping into the built environment, and frames views of greenery, thereby enhancing the overall aesthetic and functionality of spaces [2,15].

4. Conclusions

Future of Housing

The future of housing is increasingly shaped by the intersection of technological innovation, urbanization, and evolving societal needs. As more people migrate to urban areas—projected to reach 68% of the global population by 2050 [16]—the demand for diverse and sustainable housing solutions is growing. This urban influx brings both opportunities and challenges, necessitating a rethinking of traditional housing models.

Smart Homes and Technology Integration

The integration of smart technologies into residential design is revolutionizing the concept of home. Smart homes utilize automation and connectivity to enhance convenience, comfort, security, and energy efficiency. These technologies allow residents to control various aspects of their living

environment through WiFi and Bluetooth connections, streamlining household routines [16,17]. As the accessibility of smart devices increases, they are becoming an integral part of contemporary living, shaping the expectations for future housing designs.

Multifamily Housing Trends

Demographic shifts are driving the rise of multifamily housing, particularly in urban settings. Younger generations, such as Millennials and Generation Z, are increasingly favoring compact living spaces that foster community engagement while promoting efficient land use. Developments like Residential Park Lozen and River Park Residential Complex illustrate how modern housing can balance individual privacy with communal living, thereby enhancing social interaction and reducing social isolation [5,18]. This trend not only meets the needs of young professionals but also contributes to the overall security and sustainability of urban living environments.

Sustainable and Resilient Design

The principles of sustainability are vital in the future of housing, emphasizing durability, adaptability, and environmental impact. Architects and builders are increasingly focusing on using renewable materials and designing homes that require minimal maintenance, which can lower long term costs and promote energy efficiency [15,4]. Moreover, strategic building placement is crucial to avoid suburban sprawl, which exacerbates environmental challenges like air pollution and increased transportation emissions [19]. By embracing sustainable architecture, future housing developments can enhance the quality of life for residents while mitigating adverse environmental effects.

Community Engagement and Social Sustainability

Engaging communities in the housing design process is essential for fostering social sustainability. Involving residents ensures that housing solutions are tailored to their needs, promoting a sense of ownership and responsibility toward their living environment [4]. By prioritizing local engagement, architects can better address issues such as air quality and resource distribution, creating healthier and more equitable urban spaces.

Criticism and Challenges

Incorporating curative architecture concepts into future housing designs faces several criticisms and challenges that are both practical and philosophical. One major challenge is the initial cost of installing renewable energy systems, which can be significant despite the long-term benefits of reduced energy bills and environmental impacts [6]. The upfront investment often discourages stakeholders from pursuing innovative designs that emphasize sustainability and wellness.

Aesthetic and Functional Integration

Another obstacle involves the limited space available for integrating renewable energy systems and other curative architectural elements. Architects must balance the incorporation of technologies such as solar panels or wind turbines with maintaining the aesthetic and functional integrity of the building [6]. This requires careful planning and collaboration between architects and engineers, leading to potential design conflicts that may compromise the intended health benefits.

Ethical Considerations

The concept of "energocracy," which prioritizes energy production and technological intervention over cultural and environmental considerations, poses an ethical dilemma [7]. This approach can lead to short sighted decisions that overlook the long term impacts on both the landscape and the community. As such, the tension between conservation and sustainability creates a paradox where efforts to innovate may inadvertently compromise cultural values and heritage [7].

Diverse Stakeholder Perspectives

While contemporary literature often focuses on patientcentric perspectives in design, the professional-planning viewpoint remains underexplored. Addressing the dissonance between user needs and planning decisions is essential for achieving well-informed outcomes in renovations and new constructions [1]. However, the need for more comprehensive dialogue among various stakeholders—including architects, planners, and community members—often complicates the implementation of curative design principles.

Quantifying Well-Being

Measuring the effectiveness of curative architecture in improving well-being presents a significant challenge. A narrow focus on specific architectural aspects may not capture the broader understanding of well-being that encompasses various health considerations [8,20]. Striking a balance between quantitative and qualitative indicators while avoiding "silo thinking" is crucial for developing strategies that enhance overall user experience without sacrificing other important health metrics [20].

Balancing Innovation and Tradition

Moreover, the contrast between innovative design and traditional architectural values, such as those expressed in the principle of wabisabi, reveals a deeper philosophical conflict. This perspective advocates for simplicity and respect for natural forms, positioning technological advancements and aesthetic considerations as potentially antagonistic [21]. Reconciling these differing viewpoints remains a fundamental challenge as the architectural community navigates the complexities of modern design within the framework of curative architecture.

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