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An Analytical Study of The Impact of Sculpture Art on Improving Energy Efficiency in Architectural Facades

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Abstract:

In response to global environmental and economic challenges, there is a growing interest in sustainable building techniques and innovative solutions to enhance the energy efficiency of buildings. In this context, sculpture emerges as a powerful design tool that can contribute to improving the energy efficiency of architectural facades, as sculpture goes beyond its traditional role in artistic expression to become part of technical solutions aimed at reducing energy consumption in buildings by improving natural ventilation, reducing thermal absorption, and enhancing the direction of natural light.

Research problem: Despite significant advances in sustainable building technologies and the growing interest in reducing energy consumption in buildings, there is still a need to explore new and innovative ways to improve the energy efficiency of architectural facades. Sculpture is one such area that has not been fully exploited to integrate artistic beauty and energy performance: How can sculpture become an effective design tool to improve the energy efficiency of architectural facades, and what are the most effective mechanisms and methods to achieve this goal?

Research Objectives: Studying the relationship between sculpture and energy efficiency in architectural facades. Exploring modern techniques and materials used in integrating sculpture with architectural design. Highlighting the environmental and economic benefits of using sculpture in improving the energy efficiency of architectural facades. Analyze the role of sculptural elements in improving the quality of the visual experience and human interaction with buildings.

Research Significance: To highlight how sculpture can be used as a design tool that combines aesthetics and functional efficiency in architectural facades. The research contributes to enhancing the integration between architectural arts and environmental engineering to develop more sustainable solutions in building design. The research provides practical examples from modern architecture that can serve as guiding models for future sustainable designs. The research provides a practical framework for the application of sculptural techniques in improving the thermal and environmental performance of buildings.

Research Hypotheses: Sculpture in architectural facades can play an effective role in reducing energy consumption and improving the thermal comfort of users. The use of modern technology in the design and implementation of sculptural elements in architectural facades increases their effectiveness in achieving energy sustainability goals. The application of sculpture in architectural facades can achieve a balance between aesthetics and energy efficiency, contributing to the development of sustainable and innovative buildings.

Research Methodology: - Descriptive and analytical approach: This consists of clarifying the basic principles of sculpture in architecture and its impact on the external form of the building, the concept of energy efficiency in architectural facades, the role of sculpture as a means of shading and improving thermal performance in architectural facades, and an analytical study of the impact of sculpture on energy efficiency and environmental performance in some contemporary architectural facades. - Applied approach: The practical aspect of the research.

Results: Integration between sculpture and architectural design contributes significantly to improving the energy efficiency of buildings. Architectural sculptural design can create innovative architectural environments that combine functional beauty and environmental effectiveness. Sculpture as a design element contributes to raising the aesthetic value of buildings while

maintaining energy efficiency, which contributes to achieving more holistic designs. Sculpture can provide sustainable solutions by reducing energy consumption in architectural facades by improving thermal comfort inside buildings, optimizing natural airflow, and enhancing natural light control.

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Energy Efficiency, Thermal Performance, Shading.

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