# ABSTRACT

The pursuit of sustainability in architecture and interior design has become central to mainstream discussion due to increasingly serious environmental problems. The development of the city is a dynamic process that requires constant change and renewal. The existence of old buildings with huge quantities and large areas in the city is an effective way for us to practice sustainable development. The renewal of old buildings not only improves energy consumption but also reduces the consumption of resources and energy to decrease adverse impacts on the environment.

Although some old buildings have been revitalized, most old building renewal projects in China have only focused on functional and aesthetic improvements. Additionally, most adaptive reuse of old buildings is focused on the building itself—that is, the objective dimension of aesthetics. Furthermore, some architecture looks the same in New York, Paris, New Delhi, and Tokyo, and such international architecture is equally inappropriate wherever it is built. Design needs innovative elements to result in an energetic building. Although innovation design has been explored in the field of architecture and interior design, most buildings are based solely on an individual's motivation to realize his or her own innovative design ideas.

Therefore, the design of old building renewal requires a combination of sustainability and innovation. The purpose of this study is to build a theoretical model of innovative design for the adaptive reuse of old buildings. The Major Research Question of this paper is to comprehensively classify the typology of the adaptive reuse of old buildings from the perspective of sustainable and innovative design and explore sustainable and creative directions in future design.

To address this issue, old building renewal must first be explored not only by conducting a literature review but also using an experimental comparison method. The result shows that old building renewal is more effective than constructing new buildings. Second, based on this premise, four types of innovative design for the adaptive reuse of old buildings are summarized through many cases by analyzing their similarities and differences which including functional, aesthetic, technological, and locational innovation. Then, evaluation part combines the four innovative types and the adaptSTAR model to establish the criterions and verify the type with the most influence—that is, the technological innovation that is consistent with the previous result, above mentioned are basic research. The key criteria for each type of innovation are obtained as well. In the last case study, this part combines with the previous theoretical analysis using an art studio as a prototype to explore the application of the innovative design of adaptive reuse of old buildings in practice—this is the applied research. Through the basic research in Chapter 4-6 and applied research in Chapter 7 to get knowledge innovation. This study is founded upon the knowledge base of innovative design for adaptive reuse of old buildings.

The originality of this research lies in our use of a mixed methodology to examine various subjects, including architecture, interior design, ecology, innovation, psychology, Kansei engineering, Extenics, economic, and other theoretical bases to explore the knowledge theory of innovative design for adaptive reuse of old buildings in public space. Additionally, concerning the knowledge innovation model in management, this study tries to find an innovation model in architecture and interior design field among these four types: this can be called the TFAL model (technological, functional, aesthetic and locational innovation). The TFAL model is proposed as a knowledge innovation model.

The novelty of this paper is that old buildings renewal is classified comprehensively from the perspective of the typology of innovative design and form the TFAL model, which contribute to knowledge science. What's more, Extenic analysis method is used to tentatively analyze the objects of interior design innovation to find out the corresponding transformation strategy. Although it is a beginning step, this method of applying Extenics to practical engineering is a new exploration in interior design.

The possibilities of this paper will act as a useful reference for both environmental design academics and practitioners

that are interested in sustainable and innovative design field. Not only lies in the guiding designers to make critical design decisions that will contribute to the sustainable environment development and construct the new buildings with greater adaptive reuse potential, but also teach designers to replace short term thinking by an integrated view on people's quality of life on a long-term scale.

**Keywords**: Adaptive reuse; Innovative design; Old building typology; Sustainability; Creativity.