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学位の種類	博士(知識科学)
学位記番号	博知第 254 号
学位授与年月日	令和元年 9 月 24 日
論文題目	A Research on Knowledge Theory of Innovative Design for Adaptive Reuse of Old Buildings in Public Space
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論文の内容の要旨

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.

論文審査の結果の要旨

人工物による環境形成に係るデザイン分野において、サスティナビリティは国境を越えて共通に認識される今世紀の重点的研究課題である。特に、公共空間の設計では、工学と社会学の接点とされ、学際的な研究の必要性が指摘されている。長い文化の歴史がある中国においては、急激に進行する都市の発展の渦中で、安易に古い建築物が取り壊されることへの警鐘が鳴らされ、その対策として古い建築物の再利用という考え方とその手法が注目されている。デザインにおいては、人間目線での環境への質的価値について、より社会的に関心が高まっている。

本博士論文は、環境デザインをテーマに、古い建物の再利用による建築イノベーションと、その価値創出の方法について、知識科学を用いた方法論で、事例を評価・分析した研究である。人間が持つ印象を重視し、Semantic Differential Scale Method（SD法）を用いた感性評価により、新しい建築物と再利用による建築物の比較を行い、再利用によるデザインの特徴を抽出し、機能面・審美性・技術面・場所という主たる要因を革新性との関係で考察し、公共空間における建築物再利用のメリットを明らかにした点で優れている。技術と場所が創造性に寄与しているという示唆は、当該領域において重視すべき知見であり、建築リノベーション一般に有用である。得られた結果から、旧建築物再利用についての新しいデザイン理論を構築している。本研究の考察においては、デザイン知識の視点で革新的デザインの議論を重ねており、知識科学への貢献も明確に示されている。

また、中国における実践的なケーススタディにより、構築したデザイン理論を検証し、その妥当性を示しており、学術的にも、社会的にも意義があり、当該分野の学術に貢献するところが大きい。建物の再利用による環境デザインの需要は高く、この研究の成果が、将来的に国際社会で普及することが十分期待できる。

以上、本論文は、旧建築物を再利用した公共空間の環境デザインについて分析・考察したものであり、中国でのケーススタディも含め、学術的に貢献するところが大きい。よって博士（知識科学）の学位論文として十分価値あるものと認めた。