

Research on Function Identification and Decision-making Mechanisms of Existing Building Renovation Based on Architectural Programming Theory

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ABSTRACT

After thirty-year rapid urbanization, building stock in China has reached a tremendous quantity and hence related problems have risen over these years. Numbers of

existing buildings become obsolete or even abandoned. They have aging components and

may not fit required new uses, but some of them have historic and social values. The diversified value orientation and multiple stakeholders increase the difficulty of building

renovation. Due to the lack of sound regulations and scientific methods for decisionmaking,

some problems of identifying functions in renovation projects have occurred

over the past few years, such as biased pursuit of a single benefit, homogeneous and

repetitive reuse strategies, and so on. It requires a rational and scientific approach for

decision-making in the pre-design phase of complex renovation projects.

Architectural programming theory provides a scientific methodology system for

architects to cognize design objects, seek correct design problems and basis for complex

construction projects. Traditional architectural programming theory deals with universal construction projects. In response to irrational decisions on the function program of

renovation projects, the thesis introduces universal architectural programming theory into

the pre-design phase of existing building renovation. It is intended to structure an updated

framework of architectural programming in existing building renovation and to provide

corresponding methods for decision-making on renovation function programs.

The thesis first analyzes characteristics of architectural programming in renovation

projects from motivation, content, stakeholder participation and decision-making

mechanisms in architectural programming of renovation, identifies six distinguishing

features from new construction projects, and summarizes problems and concerns of

decision-making in the pre-design phase. For these characteristics and problems, it then

supplements three steps to the process of traditional architectural programming

framework, which are renovation information collection, function identification and

suitability evaluation of function and space, based on comparative case study in Italy and

China, to enhance the process and framework of renovation programming from

theoretical and practical perspectives. Next, it researches on the three supplemented steps.

Information collection step proposes a renovation information checklist from three levels of urban, building and user. Function identification step provides a decision-making

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approach to identify new functions for existing building renovation, based on theory and methods of multiple criteria decision analysis. As for the suitability evaluation of function and space, it provides corresponding evaluation methods with comprehensive use of distance measure, similarity measure and space syntax, in order to verify the decision on function programs, and to generate a scientific and rational renovation design proposals.

This research extends the architectural programming theory from universal construction projects to renovation projects of urban existing buildings, enhances the method system of traditional architectural programming theory, and provides corresponding process and methods for the pre-design phase of renovation practice, in

order to support effective decisions in existing building renovation in urban renewal.

Keywords: architectural programming; existing building renovation; spatial function identification; multiple criteria decision analysis; urban renewal