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Factor Analysis for Development of Construction Period Calculation Model in Apartment House Remodeling

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Abstract

The main reason why remodeling construction is preferred over reconstruction in Korea is due to the relatively shorter time period, low waste generation, and resource savings compared to reconstruction. In addition, considering that the temporary housing period is usually 2 years, shortening the period is a very important consideration in urban and residential environment improvement projects. However, predicting a remodeling construction period is based only on the experience of the construction company. Remodeling committees do not have the required data for predicting such periods. Furthermore, there are only a few related studies on remodeling construction periods. Therefore, the purpose of this study is to analyze the factors affecting the period of remodeling construction so that it can be calculated at the initial stage which is the committee and the cooperative establishment phase. A comparative analysis between new apartment construction projects and remodeling construction projects is conducted. Both literature review and expert interviews are performed to derive the factors for a construction period calculation model. In this study, the factors that should be considered when calculating the period of remodeling construction are summarized and are verified by experts. The factor analysis carried out in this study can be used to estimate the remodeling construction period in the future.

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Keywords: Factor analysis; Apartment house remodeling; Remodeling construction duration calculation model.

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1. Introduction

1.1. Background

Apartments are the most popular housing type in Korea. Recently, as the age of these apartment units has increased, there has been a growing social concern about whether these units should be remodeled or rebuilt. Remodeling construction is attracting attention as a way to improve old-age apartment complex due to its relatively shorter time period, low waste generation, and resource savings compared to reconstruction [1].

Design development, which is an important variable in remodeling projects, can be changed according to the demand of owners. Construction costs, construction period, and other variables change dynamically as the design changes, and the entire process of remodeling changes correspondingly. In the case of changing the design plan from 2 bays to 3 bays by removing load bearing walls, the project period and project cost determined by multiple design factors will vary widely. Considering that the temporary housing period is basically two years, it is obvious that the construction period in remodeling construction is a very important variable [2]. However, there is currently no data or accurate tools that can estimate the construction period at the strategic planning stage (the committee and the cooperative establishment phase). As the project period is determined mostly based on the knowledge and experience of the builder, there is no tool available to review a proposed construction duration.

Although the actual construction period varies with the situations of the site and the resources, public institutions have conventionally made efforts to calculate the required construction period of new constructions and manage the construction period consistently. Similarly, because an apartment house remodeling project has a similar process flow to that of a new construction, it can be assumed that the required construction period can be estimated based on a new construction.

Therefore, we perform a factor analysis for developing a remodeling construction duration calculation model that can roughly determine the project duration of a remodeling project based on the business condition at the initial stage. Moreover, we conduct a literature review and expert interviews on the variables that affect the construction period by each type of work, and derive a formula for the duration calculation model of an apartment house remodeling construction. It will be useful to develop a remodeling construction duration calculation model that can be used for strategic decision making by remodeling business stakeholders.

1.2. Purpose and methodology

Remodeling construction duration refers to the roughly calculated construction period of remodeling construction and is limited to the period from relocation to completion. This study focused on remodeling construction with accompanying vertical expansion, because most of the remodeling works that are currently being discussed and implemented include vertical extension.

In this research, the factors influencing the construction duration are in the critical path (CP) of the remodeling works. First, the required period calculation system for public institutions is analyzed in terms of the common parameters and differences between a new construction work breakdown structure (WBS) and a remodeling construction WBS. In addition, we analyze the factors affecting the remodeling construction period based on the business condition by work type through expert interviews and review of previous studies.

2. Literature review

2.1. Previous research

Traditionally, in the construction industry, studies on the calculation of the construction period have been made regularly. Most research is focused on the development of statistical models with performance data. Proverbs et al. [3] estimated the maximum and minimum construction periods for each construction method by collecting performance data on and conducting expert surveys of construction companies in France, Germany, and the UK. Kwon and Lee [4] determined the factors affecting the duration of a high school facility construction and developed a model for