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Optimal Construction Using Multi-Criteria Decision-Making Methods

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Abstract : The necessity and complexity of the decision-making process and the interference of the various factors to make decisions and consider all the relevant factors in a problem are very obvious nowadays. Hence, researchers show their interest in multi-criteria decision-making methods. In this research, the Analytical Hierarchy Process (AHP), Simple Additive Weighting (SAW), and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) methods of multi-criteria decision-making have been used to solve the problem of optimal construction systems. Systems being evaluated in this problem include; Light Steel Frames (LSF), a case study of designs by Zhang Hong studio in the Southeast University of Nanjing, Insulating Concrete Form (ICF), Ordinary Construction System (OCS), and Prefabricated Concrete System (PRCS) as another case study designs in Zhang Hong studio in the Southeast University of Nanjing. Crowdsourcing was done by using a questionnaire at the sample level (200 people). Questionnaires were distributed among experts, university centers, and conferences. According to the results of the research, the use of different methods of decision-making led to relatively the same results. In this way, with the use of all three multi-criteria decision-making methods mentioned above, the Prefabricated Concrete System (PRCS) was in the first rank, and the Light Steel Frame (LSF) system ranked second. Also, the Prefabricated Concrete System (PRCS), in terms of performance standards and economics, was ranked first, and the Light Steel Frame (LSF) system was allocated the first rank in terms of environmental standards.

Keywords : multi-criteria decision making, AHP, SAW, TOPSIS
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