

Environmental Decision Making Model for Assessing On-Site Performances of Building Subcontractors

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Abstract : Buildings cause a variety of loads on the environment due to activities performed at each stage of the building life cycle. Construction is the first stage that affects both the natural and built environments at different steps of the process, which can be defined as transportation of materials within the construction site, formation and preparation of materials on-site and the application of materials to realize the building subsystems. All of these steps require the use of technology, which varies based on the facilities that contractors and subcontractors have. Hence, environmental consequences of the construction process should be tackled by focusing on construction technology options used in every step of the process. This paper presents an environmental decision-making model for assessing on-site performances of subcontractors based on the construction technology options which they can supply. First, construction technologies, which constitute information, tools and methods, are classified. Then, environmental performance criteria are set forth related to resource consumption, ecosystem quality, and human health issues. Finally, the model is developed based on the relationships between the construction technology components and the environmental performance criteria. The Fuzzy Analytical Hierarchy Process (FAHP) method is used for weighting the environmental performance criteria according to environmental priorities of decision-maker(s), while the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) method is used for ranking on-site environmental performances of subcontractors using quantitative data related to the construction technology components. Thus, the model aims to provide an insight to decision-maker(s) about the environmental consequences of the construction process and to provide an opportunity to improve the overall environmental performance of construction sites.

Keywords : construction process, construction technology, decision making, environmental performance, subcontractor

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