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Multi-Criteria Selection of Façade Systems Based on Sustainability

Criteria

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10 Abstract

11 The environmental and economic impacts of alternative façade systems have been widely
12 investigated in previous studies. However, sustainable design requires reconciliation between
13 economic, environmental and social impacts; the three pillars of a sustainable system, and
14 selection of façade only based on environmental impacts may not always provide a
15 sustainable solution. Through a case study, this paper presents a systematic methodology for
16 selection of the façade system for a building by accounting the social, economic, and
17 environmental impacts of the decision. A comprehensive list of sustainability criteria for
18 selection of façade systems is presented and discussed in detail. The selected sustainability
19 criteria are then applied to identify the most sustainable facade system, among five different
20 alternatives including double brickwork, aluminium composite panel, ceramic cladding,
21 Autoclaved Aerated Concrete (AAC) panels and concrete blocks, to replace the existing worn
22 façade of an actual building. Delphi technique, a method of eliciting and refining group
23 judgments, is used to identify applicable sustainability criteria and their relative pair-wise
24 importance scores, while AHP is used to identify the global relative importance weights for
25 different sustainability criteria and rank different alternative façade systems.

26 **Keywords:** Façade material selection, Analytic Hierarchy Process (AHP), Sustainability,
27 Decision-making

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