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The Roof as an Environmental Assessment Tool: the computational Equation of Thermal Comfort based on Fanger Scale

ABSTRACT

Purpose – Is to identify the effect of the design variables of roofs on the thermal comfort field according to the Fanger Scale, in order to determine the computational mathematical design relationship of the effect of the design variable on the amount of change in the ratio of the thermal comfort field according to the Fanger Scale.

Design/methodology/approach – A simulation study model was designed according to administrative buildings standards. Then, five roof variables were determined with its values to be simulated using design builder software as an approach to study its effect on thermal comfort according to Fanger scale and its computational mathematical relationship.

Findings - The results indicated that the design of pergolas is one of the biggest elements that have a positive impact on thermal comfort, followed by the roof cantilever, the plantings, the inclination of the roof, and then the thermal insulation. Based on the simulation model and the mathematical base of Simple Linear Regression, computational equations were found out for the most influential design variables based on the computational form "Change in PPD Fanger = Constant 1 + Constant 2 x Roof Variable", as the research determined the values of the constants in typical equation for the top three design variables.

Originality/value – It is a base for calculating the roof variables and its impact on thermal comfort as a roof base design standard.