

Analysis of Seating Elements in Istanbul's Urban Open Spaces in Terms of Thermal Comfort and a Proposal for an Adobe-Based Hybrid Microclimate Model



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ABSTRACT

Seating elements used in urban open spaces play a significant role in user comfort, spatial utilization and public health. Today, these elements are predominantly manufactured from materials such as concrete, metal and wood, which can negatively affect user comfort, particularly during the summer months due to rising surface temperatures. This situation limits the use of open spaces, thereby affecting physical activity and social interaction. Increasing urbanization and the growing proportion of hard surfaces are making thermal comfort problems in open spaces more pronounced. This research aims to evaluate seating elements in urban open spaces in Istanbul in terms of thermal comfort and user behavior. A qualitative methodology was adopted; the current situation was examined through on-site observations and photographic analyses conducted in parks, squares and coastal areas of varying scales. Seating elements made from different materials were evaluated comparatively in terms of their relationship with sun and shade, usage intensity, spatial positioning and user preferences. The findings indicate that concrete and metal surfaces, particularly in areas exposed to direct sunlight, reduce users' bioclimatic comfort and limit the duration of their stay. Conversely, usage was more intensive in areas supported by shade, vegetation and natural ground surfaces. This highlights that the relationship between material selection and spatial design is a key factor in user behavior. In the second phase of the research, alternative design scenarios for adobe (earth-based) seating elements were developed using an AI-supported visual simulation method. The evaluations revealed that while the high thermal mass of adobe enables more balanced surface temperatures, its sensitivity to water may limit use after rainfall. To address this, a hybrid microclimate seating model is proposed, in which the seating surface is constructed from timber and a void is left between the load-bearing adobe mass and the timber surface to allow air circulation. This approach enhances usability by enabling faster drying while preserving the microclimate-regulating effect of adobe. The proposed model consists of adobe mass, a ventilated wooden seating surface, vegetative shading and permeable natural ground components, treating the seating element as a holistic system that improves the surrounding microclimate. It is anticipated that this hybrid model will enhance user comfort in densely populated cities such as Istanbul, extend open-space use, and contribute to public health.

KEY WORDS:

Adobe, urban open spaces, seating elements, thermal comfort, public health.