UNIVERSITI TEKNOLOGI MARA

THE DOCTORAL RESEARCH ABSTRACTS

Volume: 5, Issue 5 May 2014

FIFTH ISSUE

INSTITUTE of GRADUATE STUDIES

Leading You To Greater Heights, Degree by Degree

IPSis Biannual Publication

5

Name :
Shahab Kariminia

Title
Outdoor Thermal Comfort Of Open Urban Squares In Moderate And Dry Climate

Faculty :
Architecture, Planning & Surveying

Supervisor :
Associate Prof. Dr. Sabarinah Bt Sheikh Ahmad (MS)
Associate Prof. Dr. Megawati Bt Omar (CS)

The recent inadvertent development of urban areas alongside the global climate change has highlighted the predominant role of urban climate in the quality of residents' life. Affected by landscape attributions, anthropogenic heat and urban geometry, the urban climate strongly correlates with outdoor thermal comfort and building's energy programme. A climate-responsive urban planning ameliorates thermal stress and enhances the social and economic activities accommodated by the cities. Influenced by outdoor thermal comfort, repeated human presence at open urban spaces is a gauge of urban design success. Nevertheless, the available literature studies have mostly addressed either indoor comfort or the energy budget of urban canyons or parks but not much is published on outdoor thermal comfort in the temperate and dry climate of the Middle East. This study aims to present the results of a quantitative empirical outdoor thermal comfort study at two urban squares with focus on the visitors' thermal sensations. Explicitly, the objectives of this study are to predict outdoor thermal comfort; to examine the effects of built environments on the public thermal sensation and to propose modification strategies. The study areas are located in downtown Isfahan, Iran (51°41' E, 32°37' N, 1590 m elevation) in a temperate and dry zone. Based on different environmental elements, four separate locations were monitored across each square in the winter of 2009 and summer of 2010, measuring meteorological data and surveying the visitors' thermal sensations. The influences of form, geometry and vegetation on thermal conditions of the squares were also investigated through computer simulations by ENVI-met software. Microclimatic parameters varied across the square with regards to the environment properties. Based on Physiological Equivalent Temperature index, thermal comfort range, neutral and preferred temperatures were established for the both extreme conditions in this climatic and human zone. The range was much wider than those derived by previous studies in different climatic zones. Adaptation aspects were found to be decisively affecting thermal sensations. Outdoor thermal comfort imperceptibly depended on demographics. Although the simulations showed that thermal comfort was difficult to reach passively in such extreme climate, a combination of strategies such as appropriate orientation, aspect ratio, plan ratio, size, galleries and use of vegetation made the improvement possible. These strategies included. Meanwhile, aspect ratio and size were observed to be the most effective strategies. The study outlined design recommendations which will assist designers and city planners to provide more sustainable and comfortable outdoor urban spaces for both residents and visitors.