Building Climatology and Thermal Comfort
Thermal Environments and Occupant (Comfort) Responses in Philippine Office Buildings

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Abstract

Studies of human responses to the indoor thermal environment in buildings have mostly been carried out in the temperate climates of developed countries. These studies have largely formed the basis of universally applied thermal comfort standards that inform the control of indoor environments. There is a need to examine thermal comfort in the context of tropical developing countries, first because of the concentration of world population and growth in these regions and secondly their effect on the consumption of scarce energy resources. To date, the Philippines is underrepresented in the thermal comfort literature.

This thesis investigates the indoor climate and occupant comfort responses in air-conditioned Philippine office buildings. The primary objective is to examine the applicability of the universal values for comfort temperatures recommended by international comfort standards in these office environments. While it is contended that satisfactory occupant thermal responses are integral to acceptable indoor thermal environments, thermal preferences and thermal expectations of building users are dependent on non-thermal factors such as demographics, context, environmental interactions, cognition, and conventions and practices of comfort. The research hypothesizes that the international standards (ASHRAE Standard 55: 1992 and ISO Standard 7726: 1993) are inadequate in taking these extended factors into account. An understanding of how comfort preferences in office environments evolved will impact on energy conservation issues that particularly relate to controlled indoor climates.

Data for this research was gathered through a field study which involved monitoring of indoor climatic conditions of a sample of office buildings and information solicited from office workers by way of survey questionnaires and interviews. It was found that the surveyed Philippine office buildings operated within a narrow temperature range and had bandwidths of temperatures that correspond to the lower spectrum of the comfort criteria set by the international standards. Occupant perception of the indoor thermal comfort in response to these conditions is one of acceptance, more so, of preference. An analysis of the impact of this preference on building energy consumption was examined using one office building as a case study.

The thesis concludes by discussing how responses to indoor conditions of buildings may only be tangentially related to comfort standards and have much more to do with expectations, conventions and practices of comfort. Implications of the understanding of the social and technical transformation of what people take to be normal and ordinary conditions of comfort provide insights on how the built environment and social institutions engender preferences. This recognition should stimulate debates on how future policies (in the form of building codes, engineering standards, etc.) developed in a holistic manner could reshape these preferences.