

Thermal Comfort Challenges for Indoor Workers: A Study of Summer's Impact on Physiology and Cognition

I Kadek Candra Parmana Wiguna

Graduate Study Program of Industrial Engineering and Management, Department of Industrial Engineering, Faculty of Engineering, Diponegoro University, Semarang 50275, Indonesia
parmanawiguna@students.undip.ac.id

Wiwik Budiawan

Department of Industrial Engineering, Diponegoro University, Semarang 50275, Indonesia
wiwikbudiawan@ft.undip.ac.id

Kristian Dwi Kurnia

Graduate Study Program of Industrial Engineering and Management, Department of Industrial Engineering, Faculty of Engineering, Diponegoro University, Semarang 50275, Indonesia
kristiandwikurnia@students.undip.ac.id

Abstract

In Japan, thermal comfort is a key factor in ensuring the satisfaction of occupants in indoor spaces, particularly in areas that experience hot summer seasons. Occupant satisfaction almost people spend more 80%. Office workers spend lots of time, that workers dedicated for their jobs is in-creasing worldwide, frequently surpassing the usual 40 hours per week. A critical indicator is the indoor environmental quality (IEQ), which is quite essential to maintain occupants' well-being, affects the comfort and productivity of workers in an office building. The purpose of this study is identification the key environmental factors negatively affecting workers physical, psychological well-being by measuring body temperature, thermal conditions, and performance cognitive. This research used PMV/PPD, Griffith's methods, human heat load, and several statistically data of correlation. The measurement result of comfort zone temperature in this study is $25.38 \pm 3.11^{\circ}\text{C}$ which can be used as a benchmark in maintaining ideal thermal comfort conditions, distribution range of human heat load results is -50 to $+50 \text{ W/m}^2$, average PMV is 1.322 with a PPD value of 50.34% and environmental condition significant correlation to cognitive or physiological condition. Comfort zone temperature in this study compared to research in similar climate has a similar range of 24.30°C and 27.20°C . Conclusions of this study is crucial to ensure a comfortable working environment for employees in factories because can impacts to personal performance workers.

Keywords: Thermal comfort; cognitive performance; physiological condition, office workers.