

KAJIAN KENYAMANAN TERMAL LUAR RUANG BERDASARKAN KONDISI IKLIM MIKRO DI KAWASAN KAMPUS UGM

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Intisari

Kenyamanan termal luar ruang berpengaruh terhadap produktivitas dan frekuensi aktivitas individu di luar ruang. Kawasan Kampus UGM terletak di Kawasan Aglomerasi Perkotaan Yogyakarta. Aktivitas sosial-ekonomi, industri, dan transportasi berjalan masif, menunjukkan aktivitas kota. Kondisi tersebut dapat mempengaruhi kondisi iklim mikro di Kawasan Kampus UGM. Tujuan penelitian yaitu: 1). Mengetahui kondisi iklim mikro, 2). Mengetahui kondisi kenyamanan termal luar ruang, dan 3). Mengetahui hubungan antara iklim mikro dan kenyamanan termal luar ruang.

Perhitungan kenyamanan termal luar ruang menggunakan persamaan THI (*Temperature Humidity Index*) dan OTC (*Outdoor Thermal Comfort*). Nilai THI menggunakan 2 parameter yaitu suhu udara dan kelembapan udara. OTC menggunakan 6 parameter yaitu suhu udara, kelembapan udara, intensitas radiasi matahari, dan kecepatan angin, aktivitas, dan jenis pakaian. Pengukuran intensitas radiasi matahari, suhu udara, dan kelembapan udara dilakukan secara otomatis menggunakan *Automatic Weather Station* (AWS) dan *Thermal Humidity USB Data Logger*. Pengukuran kecepatan angin dilakukan dengan cara *moving observation* menggunakan *digital anemometer*.

Kawasan Kampus UGM memiliki dua tipe *Local Climate Zones* (LCZ) yaitu LCZ 5 *Open Midrise* dan LCZ 6 *Open Lowrise*. Lima sampel blok urban yang terbentuk di kedua LCZ mewakili lingkungan termal untuk identifikasi iklim mikro. Hasil pengukuran iklim mikro selama tujuh hari di semua lokasi menunjukkan pola dan nilai yang hampir sama. Namun, secara umum LCZ 5 *Open Midrise* lebih nyaman digunakan untuk beraktivitas di luar ruang jika dibandingkan dengan LCZ 6 *Open Lowrise*. Hal tersebut disebabkan karena perbedaan proporsi tutupan lahan di kedua LCZ. Proporsi tutupan lahan di LCZ 5 *Open Midrise* terdiri atas 20,45% bangunan, 38,85% vegetasi, 7,89% jalan paving blok, dan 4,25% jalan aspal dari total luas. Sedangkan di LCZ 6 *Open Lowrise* proporsi tutupan lahannya terdiri atas 21,67% bangunan, 23,36% vegetasi, 1,38% jalan paving blok, dan 15,54% jalan aspal. Suhu udara, kelembapan udara, dan suhu radiasi memiliki hubungan yang signifikan dengan hasil perhitungan kenyamanan luar ruang karena memiliki nilai Sig. (2-tailed) < 0,05. Sementara kecepatan angin tidak memiliki hubungan yang signifikan karena memiliki nilai Sig. (2-tailed) > 0,05.

Kata Kunci: LCZ, Kenyamanan Termal Luar Ruang, Iklim Mikro, THI, OTC

***OUTDOOR THERMAL COMFORT STUDY
BASED ON MICRO-CLIMATE CONDITION
IN UGM CAMPUS AREA***

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Abstract

Outdoor thermal comfort affects the productivity and frequency of individual outdoor activities. UGM Campus Area is located in the Yogyakarta Urban Agglomeration Region. Socio-economic, industrial and transportation activities are massive which show urban activities. These conditions can affect the micro-climatic conditions in the UGM Campus Area. The research objectives are 1). Knowing the microclimatic conditions, 2). Knowing the outdoor thermal comfort conditions, and 3). Knowing the relationship between microclimate and outdoor thermal comfort.

Calculation of outdoor thermal comfort using the equation THI (Temperature Humidity Index) and OTC (Outdoor Thermal Comfort). THI uses 2 parameters namely air temperature and humidity. OTC uses 6 parameters namely air temperature, humidity, intensity of solar radiation, and wind speed, activity, and type of clothing. Measurements of solar radiation intensity, air temperature, and humidity are carried out automatically using the Automatic Weather Station (AWS) and USB Humidity Thermal Data Logger. Measurement of wind speed were performed by moving observation using a digital anemometer.

The UGM campus area has two types of Local Climate Zones (LCZ), namely LCZ 5 Open Midrise and LCZ 6 Open Lowrise. Five samples of urban blocks formed in the second LCZ can represent the thermal environment for microclimate identification. The results of microclimate measurements for seven days at all locations showed almost the same patterns and values. However, in general, LCZ 5 Open Midrise is more comfortable to use for outdoor activities when compared to LCZ 6 Open Lowrise. This is due to the difference in the proportion of land cover in the two LCZs. The proportion of land cover in LCZ 5 Open Midrise consists of 20.45% buildings, 38.85% vegetation, 7.89% paving block roads, and 4.25% asphalt roads of the total area. Whereas in LCZ 6 Open Lowrise the proportion of land cover consists of 21.67% buildings, 23.36% vegetation, 1.38% paving block roads, and 15.54% asphalt roads. Air temperature, air humidity, and radiation temperature have a significant relationship with the calculation of outdoor comfort because they have a Sig. (2-tailed) < 0.05. Meanwhile, wind speed does not have a significant relationship because it has a Sig value. (2-tailed) > 0.05.

Keywords: LCZ, Outdoor thermal comfort, micro-climate, THI, OTC