**ANALISIS KENYAMANAN TERMAL PADA GEDUNG OLAHRAGA BADMINTON UNIVERSITAS MALIKUSSALEH**


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## ABSTRAK


Gedung Olahraga Badminton Universitas Malikussaleh beroperasi di iklim tropis lembap Lhokseumawe dengan suhu rata-rata 35°C dan kelembapan hingga 85%, berpotensi menciptakan kondisi termal yang tidak nyaman pada fasilitas yang mengandalkan ventilasi alami. Penelitian ini bertujuan menganalisis kenyamanan termal eksisting, persepsi subjektif pengguna, serta mengidentifikasi variabel yang paling berpengaruh terhadap suhu udara dalam gedung. Penelitian menggunakan pendekatan kuantitatif melalui pengukuran langsung (in-situ measurement) dan survei kuesioner terhadap parameter suhu udara, kelembapan, kecepatan angin, suhu bola (*globe temperature*), suhu permukaan dinding, radiasi matahari, dan $CO_2$. Evaluasi mengacu pada metode *adaptive comfort* ASHRAE 55-2020, didukung analisis korelasi Pearson serta regresi linear sederhana dan berganda. Hasil menunjukkan suhu rata-rata dalam bangunan sebesar 28,67°C dengan puncak 35,10°C pada pukul 13.00 WIB. Kondisi nyaman hanya tercapai pada pukul 00.00–09.00 dan setelah pukul 17.00, dengan ketidaknyamanan puncak $\Delta T = 6,88$°C, jauh melampaui batas toleransi 2,5°C. Secara subjektif, 72% responden menilai ruangan terasa agak panas hingga panas dengan ambang kenyamanan di bawah 30°C. Kelembapan dalam bangunan ($R^2 = 0,908$) dan suhu permukaan dinding luar ($R^2 = 0,905$) terbukti sebagai variabel paling dominan. Diperlukan perbaikan desain pasif berupa peningkatan insulasi termal, penambahan shading device, dan optimalisasi ventilasi silang.



**Kata kunci**: Kenyamanan termal, ventilasi alami, *adaptive comfort*, gedung olahraga, iklim tropis.

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## *ABSTRACT*


*The Malikussaleh University Badminton Sports Hall operates in the humid tropical climate of Lhokseumawe with an average temperature of 35°C and humidity of up to 85%, potentially creating uncomfortable thermal conditions in facilities that rely on natural ventilation. This study aims to analyze existing thermal comfort, subjective user perceptions, and identify the variables that most influence indoor air temperature. The study used a quantitative approach through direct measurements (in-situ measurement) and questionnaire surveys of parameters such as air temperature, humidity, wind speed, globe temperature, wall surface temperature, solar radiation, and $CO_2$. The evaluation refers to the ASHRAE 55-2020 adaptive comfort method, supported by Pearson correlation analysis and simple and multiple linear regression. The results show an average temperature in the sports hall of 28.67°C with a peak of 35.10°C at 1:00 PM WIB. Comfortable conditions were only achieved between 12:00 AM and 9:00 AM and after 5:00 PM, with a peak discomfort $\Delta T$ of 6.88°C, far exceeding the 2.5°C tolerance limit. Subjectively, 72% of respondents rated the room as slightly hot to hot, with a comfort threshold below 30°C. Building humidity ($R^2 = 0.908$) and exterior wall surface temperature ($R^2 = 0.905$) were found to be the most dominant variables. Passive design improvements are needed, including increased thermal insulation, additional shading devices, and optimized cross-ventilation.*



***Keywords**: Thermal comfort, natural ventilation, adaptive comfort, sports buildings, tropical climate.*