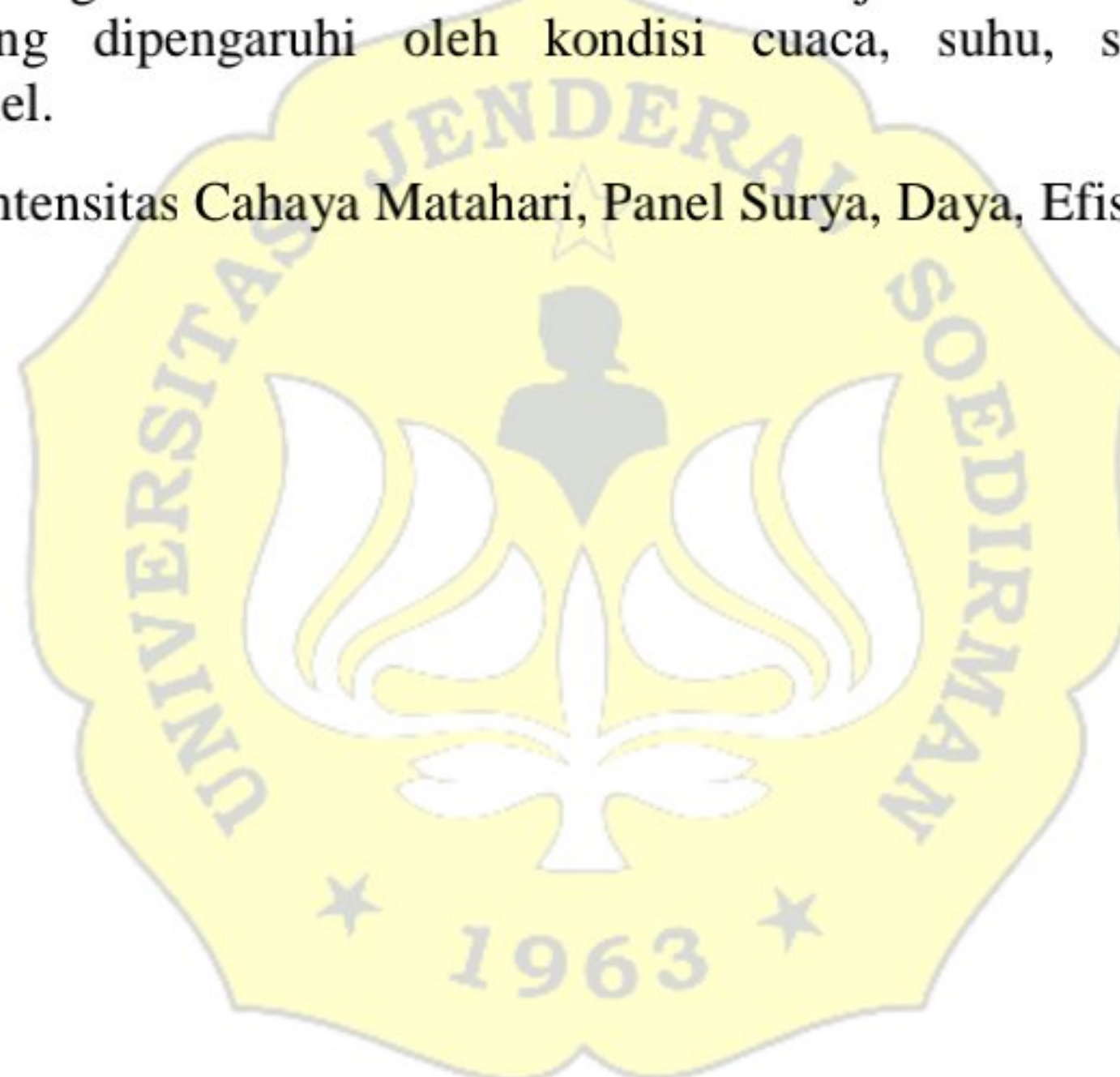


ABSTRAK

Indonesia memiliki potensi energi surya yang besar karena letaknya di daerah tropis. Pemanfaatan energi surya melalui panel *fotovoltaik (PV)* dapat menjadi salah satu solusi penyediaan energi terbarukan. Penelitian ini bertujuan untuk menganalisis hubungan antara intensitas cahaya matahari dengan keluaran daya panel surya, serta menentukan waktu paling efektif dalam menghasilkan daya maksimum. Data primer diperoleh dari hasil pengukuran tegangan, arus, dan daya panel surya setiap satu jam pada pukul 08.00–14.00, sedangkan data sekunder berupa *Global Horizontal Irradiance (GHI)* diperoleh dari BMKG. Daya tertinggi tercatat sebesar 132,33 W pada pukul 09.00 di minggu ketiga dengan kondisi cuaca cerah, sedangkan daya terendah sebesar 32,50 W terjadi pada pukul 08.00 di minggu kedua dengan kondisi berawan. Waktu paling efektif dalam penyerapan cahaya matahari untuk menghasilkan daya maksimum adalah pada rentang pukul 09.00–11.00. Efisiensi panel surya yang digunakan diperoleh sebesar 20%. Perbandingan dengan data sekunder BMKG menunjukkan adanya selisih yang signifikan, yang dipengaruhi oleh kondisi cuaca, suhu, serta kebersihan permukaan panel.

Kata Kunci: Intensitas Cahaya Matahari, Panel Surya, Daya, Efisiensi, Iradiasi.



ABSTRACT

Indonesia has significant solar energy potential due to its tropical location. The utilization of solar energy through photovoltaic (PV) panels can serve as one of the solutions for renewable energy supply. This study aims to analyze the relationship between solar irradiance and the power output of solar panels, as well as to determine the most effective time to generate maximum power. Primary data were obtained from hourly measurements of voltage, current, and power of the solar panels between 08:00 and 14:00, while secondary data in the form of Global Horizontal Irradiance (GHI) were obtained from BMKG. The highest recorded power output was 132.33 W at 09:00 during the third week under clear weather conditions, while the lowest value of 32.50 W occurred at 08:00 during the second week under cloudy conditions. The most effective time for solar energy absorption to generate maximum power was between 09:00 and 11:00. The efficiency of the solar panel used was calculated at 20%. Comparison with BMKG's data showed significant discrepancies, which were influenced by weather conditions, temperature, and the cleanliness of the panel surface.

Keywords: *Solar Irradiance, Solar Panel, Power, Efficiency, Irradiance.*

