ABSTRACT

Electricity is a vital factor in supporting Japan's economic growth; however, after the Fukushima Daiichi incident in 2011, the country encountered major challenges in energy supply, which have significantly influenced electricity demand patterns. This study examines the demand trends of the Tokyo Electric Power Company (TEPCO), Japan's largest electricity provider, from 2017 to 2023, and projects future demand through 2026. To achieve this, the research applies a Monte Carlo simulation to evaluate probabilistic fluctuations in demand, along with autoregressive models AR(1)–AR(3) to analyze the dependence of electricity consumption on previous periods. The dataset consists of historical secondary data on electricity demand.

The results from one hundred simulation iterations show that electricity demand fluctuates but tends to rise toward the end of the observed period, with an average daily peak demand of 51.06 GWh. Forecasting based on one thousand iterations yields a prediction accuracy of 91.8% when compared to actual data. Projections for 2024–2026 indicate a continued upward trend, especially during the summer months, which is consistent with TEPCO reports and national electricity consumption forecasts. The autoregressive model tests confirm the significant role of prior periods, with both positive and negative lags capturing short-term adjustment effects in consumption patterns.

In conclusion, the Monte Carlo simulation effectively reflects the fluctuations in electricity demand, while the autoregressive models reinforce the evidence of temporal dependency. Together, these methods provide a comprehensive understanding of TEPCO's electricity demand dynamics within the broader context of Japan's evolving energy landscape.

Keywords: Demand, Electricity, Monte Carlo Simulation, Fukushima Incident, Energy Policy