

ABSTRAK

ALFATH ARIESTIAN EKA PRAMUDHITA. Pemetaan Jumlah Pelanggan Per Gardu dengan Metode *Geofencing* Berbasis GIS untuk Evaluasi Nilai SAIDI dan SAIFI Pada PT PLN (Persero) ULP Barru. Dibimbing oleh Dr. RUMMI SIRAIT, S.T., M.T.

Gardu distribusi merupakan elemen krusial dalam sistem penyediaan energi listrik yang berperan sebagai titik akhir penyaluran daya ke pelanggan. Untuk mendukung efisiensi operasional dan perencanaan jaringan, diperlukan sistem pemetaan pelanggan yang akurat dan adaptif. Penelitian ini mengkaji penerapan metode *geofencing* berbasis *Geographic Information System* (GIS) sebagai pendekatan inovatif dalam menentukan wilayah cakupan gardu distribusi secara otomatis berdasarkan batas geografis. Melalui integrasi data spasial dan informasi pelanggan, metode ini memungkinkan pemetaan jumlah pelanggan secara *real-time* dan dinamis, serta mendukung analisis beban distribusi, evaluasi indeks keandalan seperti SAIDI (*System Average Interruption Duration Index*) dan SAIFI (*System Average Interruption Frequency Index*), hingga perencanaan ekspansi jaringan. Studi ini bertujuan untuk mengevaluasi efektivitas metode *geofencing* dalam meningkatkan kualitas pelayanan, mempercepat pengambilan keputusan, dan mengoptimalkan pengelolaan distribusi tenaga listrik di PLN ULP Barru secara lebih terstruktur dan berbasis data.

Kata kunci: pemetaan jumlah pelanggan, *geofencing*, GIS, SAIDI, SAIFI

ABSTRACT

ALFATH ARIESTIAN EKA PRAMUDHITA. *Mapping the Number of Customers in Each Substation Using the GIS-Based Geofencing Method to Evaluate SAIDI and SAIFI Value at PT PLN (Persero) ULP Barru. Supervised by Dr. RUMMI SIRAIT, S.T., M.T.*

Distribution substations serve as critical infrastructure in the delivery of electrical energy to end-users, necessitating precise mapping to support load management and network planning. This study explores the implementation of geofencing methods based on Geographic Information System (GIS) technology as a modern approach to automatically delineate service areas using defined geographical boundaries. The geofencing technique offers significant advantages in dynamically and real-time mapping the number of customers surrounding each substation, thereby enabling PLN ULP Barru to enhance service quality, streamline maintenance planning, and accelerate decision-making processes. By integrating spatial data with customer information, this mapping approach also facilitates load distribution analysis, evaluation of reliability indices such as SAIDI (System Average Interruption Duration Index) and SAIFI (System Average Interruption Frequency Index) and supports future network expansion planning. The objective of this paper is to assess the application of GIS-based geofencing in mapping customer distribution per substation and to evaluate its effectiveness in improving the operational structure of electricity distribution systems.

Keywords: *mapping number of customers, geofencing, GIS, SAIDI, SAIFI*