

**“ANALISA KEANDALAN SISTEM DISTRIBUSI 20 KV DI PT. PLN (PERSERO) AREA
UP3 SURABAYA UTARA MENGGUNAKAN METODE *SECTION TECHNIQUE* DAN
FAILURE MODE AND EFFECT ANALYSIS (FMEA)”**

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ABSTRAK

Sistem distribusi listrik 20 kV memiliki peranan penting dalam menjamin kontinuitas suplai listrik ke konsumen. Namun, gangguan yang terjadi pada jaringan distribusi dapat menurunkan tingkat keandalan sistem, terutama pada penyulang dengan beban tinggi. Penelitian ini bertujuan untuk menganalisis keandalan sistem distribusi listrik 20 kV di wilayah kerja PT. PLN UP3 Surabaya Utara, khususnya pada penyulang Wiratno dan penyulang Tuwowo. Metode yang akan digunakan dalam penelitian ini adalah *Section technique* untuk menghitung indeks keandalan seperti SAIDI, SAIFI, dan CAIDI, serta FMEA untuk mengidentifikasi potensi kegagalan, dampak, dan prioritas penanganannya. Data yang digunakan meliputi data gangguan, durasi pemadaman, jumlah pelanggan, serta konfigurasi jaringan kedua penyulang tersebut. Hasil dari penelitian ini, didapatkan nilai Indeks keandalan pada penyulang Tuwowo menggunakan metode *Section Technique*, nilai SAIFI sebesar 1,69540, SAIDI 3,42269, dan CAIDI 2,01880. Pada penyulang Wiratno, indeks keandalan SAIFI 1,83500, SAIDI 3,27693, dan CAIDI 1,78579. Menggunakan metode FMEA, pada penyulang Tuwowo didapatkan nilai Indeks keandalannya SAIFI sebesar 1,69240, SAIDI 3,42491, dan CAIDI 2,02370. Pada penyulang Wiratno nilai SAIFI sebesar 1,83200, SAIDI 3,27768, dan CAIDI 1,78913. Pada simulasi menggunakan software etap, didapatkan indeks keandalan penyulang Tuwowo, nilai SAIFI 1,6908, SAIDI 2,2114, dan CAIDI 1,308. Pada penyulang Wiratno, nilai SAIFI sebesar 1,8724, SAIDI 3,0342, dan CAIDI 1,620.

Kata kunci: FMEA, Keandalan, *Section technique*, Sistem Distribusi 20 kV, UP3 Surabaya Utara

**“RELIABILITY ANALYSIS OF THE 20 KV DISTRIBUTION SYSTEM AT PT. PLN
(PERSERO) UP3 SURABAYA UTARA USING SECTION TECHNIQUE AND FAILURE
MODE AND EFFECT ANALYSIS (FMEA)”**

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ABSTRACT

The 20 kV electricity distribution system plays an important role in ensuring the continuity of electricity supply to consumers. However, disturbances that occur in the distribution network can reduce the level of system reliability, especially in feeders with high loads. This study aims to analyze the reliability of the 20 kV electricity distribution system in the working area of PT. PLN UP3 North Surabaya, especially in the Wiratno and Tuwowo feeders. The method that will be used in this study is the Section technique to calculate reliability indices such as SAIDI, SAIFI, and CAIDI, as well as FMEA to identify potential failures, impacts, and handling priorities. The data used include disturbance data, blackout duration, number of customers, and network configuration of the two feeders. The results of this study, obtained the reliability index value on the Tuwowo feeder using the Section Technique method, the SAIFI value is 1.69540, SAIDI 3.42269, and CAIDI 2.01880. In the Wiratno feeder, the reliability index SAIFI is 1.83500, SAIDI is 3.27693, and CAIDI is 1.78579. Using the FMEA method, in the Tuwowo feeder, the reliability index values SAIFI are 1.69240, SAIDI is 3.42491, and CAIDI is 2.02370. In the Wiratno feeder, the SAIFI value is 1.83200, SAIDI is 3.27768, and CAIDI is 1.78913. In the simulation using etap software, the reliability index of the Tuwowo feeder is obtained, the SAIFI value is 1.6908, SAIDI is 2.2114, and CAIDI is 1.308. In the Wiratno feeder, the SAIFI value is 1.8724, SAIDI is 3.0342, and CAIDI is 1.620.

Keywords: FMEA, Reliability, Section technique, UP3 Surabaya Utara, 20 kV Distribution System