System Reliability-based Optimization Method to Solve Unavailability of Electrical Energy

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ABSTRACT

Industrial systems require reliable components. The interactions among components affect the system reliability. In this study, the electrical power system Robustness is evaluated among its sensitivity to potential changes in the intrinsic parameters. Reliability represents a state indicator. In this work, highlights are made on the importance of Maintenance in Sustaining the QoS of a System. Service, Usage, and Consumers are the three components that can seriously harm the System Reliability and especially in a southern regions conditions where temperatures can simply, reach high values. First, a model is proposed after which a series of tests follow for validation. System’s Maintenance is a major factor that affects its Longevity within an acceptable Robustness. Therefore maintenance can be fatal to system operation. Maintenance means expected services with respect to recommended Usage and responding to Consumption Demand. For a given period t in time, the EN represents the indicator of the Electrical System Reliability.

KEYWORDS
Availability, Failures Measurability, Maintainability, Reliability, Simulations, System Robustness

1. INTRODUCTION

Electricity is a primary factor with a strategic importance to the development of organizations and an essential resource to the prosperity of industrialized societies. Human societies are currently and not much longer, more fragile increasingly pronounced compared to the energy vector. Energy demand is pervasive to all sectors. The interruption of the supply of power disrupts society, producing social and economic impacts on political strategies, economic behaviors the individuals’ lives (Zharkov, 2015).

The performance evaluation method is a methodology that suggests that the probability of failure of the system studied is uncertain, and by this fact, tries to determine the appropriate strategy to control the system. These strategies include the means of production, transport, service and the quality of the energy in terms of availability and continuity.

The evaluation techniques of performances force a use of four essential tools. They are corresponding to the expertise of the experienced technician and/or the expert, the Benchmarks (referenced state variables), the Simulation and finally a direct measurement of parameters.

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These techniques can be used, grouped or separately, to avoid an out-of-service. The electrical system cannot function with efficiency unless we consider all conditions and recommendations. The reliability of a system is extremely sensitive to the maintenance process and its components.

\[ \text{ENA} = \text{Demand} - \text{EIP} \]  

EIP represents \( s(t) \); the power generated at the time \( t \). This value does not include losses. \( \Delta t \) must be less than regular period load shedding.

The main interest in this paper is to reduce the unavailability by minimizing ENA.

Permanent Reliability (Availability) of the electrical system is dependent on the generation, transmission and distribution of electrical energy. Reliability should be a major concern of policy makers in this sector. The recommendations for improving availability, the system must ensure normal operation, limit the number of incidents by avoiding particularly large-scale of failures and reduce the consequences of these abnormal facts when they occur. The Figure 1 illustrates, clearly this mechanism. These requirements involve implementing preventive or responsive procedures in a coordinated way. This strategy concerns the primary parts, the hardware devices and the procedures with the relationship of all organizational levels. During the last two decades, the reliable operation of power systems was called into question by the frequent occurrence of blackouts in many different countries.

1.1. Nomenclature

Installed energy: \( IE \)
Energy Instantly Produced: \( EIP \)
Energy not available (KWh): \( ENA \)
Maximal power of the \( i^{th} \) load’s node (KW): \( P_i \)
An Empirical Result Analysis of Dynamic Weighted Live Migration Mechanism for Load Balancing in Cloud Computing
www.igi-global.com/article/an-empirical-result-analysis-of-dynamic-weighted-live-migration-mechanism-for-load-balancing-in-cloud-computing/186989?camid=4v1a

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