Optimizing Utility Pole Inspections Using the BOCR Methodology

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Highlights

- Utilizes the BOCR methodology to optimize utility pole inspection scheduling.
- Evaluates three alternatives to balance efficiency, costs, and regulatory compliance.
- Focuses on operational consistency, resource optimization, and workload distribution.
- Recommends a workload-balancing strategy for both short-term and long-term benefits.
- Provides actionable insights for utilities facing similar regulatory challenges.

Abstract

Duquesne Light Company (DLC) serves over 600,000 customers in Western Pennsylvania and must adhere to a 12-year regulatory utility pole inspection cycle. Using the Benefits-Opportunities-Costs-Risks (BOCR) methodology, we evaluated three scheduling alternatives: minimizing drive time, balancing workloads, and grid-based scheduling. Our analysis identifies workload balancing as the optimal strategy, providing a balance between operational efficiency, resource utilization, and compliance. This paper outlines the methodology, strategic criteria, and recommendations to enhance utility operations and regulatory adherence.

Keywords

Utility pole inspections, BOCR, regulatory compliance, resource optimization, scheduling.

Introduction

Utility companies like Duquesne Light Company (DLC) face the dual challenge of ensuring operational efficiency while meeting stringent regulatory requirements. The 12-year utility pole inspection mandate necessitates a structured, cost-effective, and scalable approach to scheduling. This study applies the BOCR methodology to develop and evaluate strategic alternatives for DLC's inspection processes, focusing on achieving a balance between efficiency, compliance, and long-term resource optimization.

Literature Review

Previous studies have demonstrated the efficacy of the BOCR framework in decision-making scenarios requiring multi-criteria analysis (Saaty, 2008). Applications of AHP and BOCR methodologies in resource scheduling and optimization have proven valuable for utilities and infrastructure management (Mu & Pereyra-Rojas, 2018). Additionally, research on workload balancing highlights its importance in maintaining operational consistency and reducing resource strain (Keeney & Raiffa, 1993). This study builds on these insights to address the unique challenges of utility pole inspections.

Hypotheses/Objectives

The primary objective of this study is to develop a scheduling plan that satisfies regulatory compliance while optimizing operational efficiency. We hypothesize that the BOCR methodology can effectively evaluate and identify the optimal alternative for achieving these goals.

Research Design/Methodology

The study employs the BOCR framework to analyze three scheduling alternatives. Data inputs include operational costs, travel distances, inspection coverage, and resource availability. The methodology involves calculating the benefits, opportunities, costs, and risks associated with each alternative. This analysis was conducted using expert judgments and historical data from DLC's operations. Consistency indices were verified to ensure the validity of the decision matrices.

Results/Model Analysis

The analysis revealed that workload balancing outperforms the other alternatives in addressing both short-term and long-term needs. This approach ensures equitable resource distribution across service centers, reduces travel distances, and enhances regulatory compliance. The benefits, opportunities, costs, and risks were quantified and validated through sensitivity analysis to confirm the robustness of the results.

Conclusions

This study demonstrates the effectiveness of the BOCR methodology in optimizing utility pole inspections for regulatory compliance. The workload-balancing strategy emerges as a practical solution that aligns with DLC's operational goals and regulatory mandates. Future research will explore the integration of advanced technologies, such as GIS and machine learning, to further refine scheduling processes.

Limitations

Key limitations of this study include reliance on historical data, which may not fully capture emerging trends, and the subjective nature of expert judgments. Further validation through real-world implementation is necessary to confirm the model's efficacy.

Key References

Saaty, T. L. (2008). Decision-making with the analytic hierarchy process. International Journal of Services Sciences, 1(1), 83-98.

Keeney, R. L., & Raiffa, H. (1993). Decisions with Multiple Objectives: Preferences and Value Trade-Offs. Cambridge University Press.