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## MAPPING THE POWER GRID: UTILITY MAPPING OF ELECTRICITY DISTRIBUTION AT THE FEDERAL POLYTECHNIC ADO-EKITI, EKITI STATE

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### ABSTRACT

This study aims to conduct a utility mapping of the electricity distribution system at the Federal Polytechnic Ado-Ekiti, Ekiti State. The objective is to assess the existing infrastructure, identify potential areas of improvement, and enhance the overall efficiency and reliability of electricity supply on the campus. The study utilizes a combination of field surveys, data collection, and analysis to map the electrical network, including distribution lines, transformers, substations, and associated equipment. By creating an accurate and detailed map of the power grid, this research contributes to the effective planning, maintenance, and future development of the electricity distribution system within the Federal Polytechnic Ado-Ekiti. The findings and recommendations provide valuable insights for enhancing the campus's energy infrastructure and ensuring uninterrupted power supply for academic, administrative, and research activities.

### KEYWORDS

Utility mapping, electricity distribution, power grid, infrastructure assessment, field surveys, data collection, analysis, reliability, efficiency, Federal Polytechnic Ado-Ekiti, Ekiti State.

### INTRODUCTION

Reliable and efficient electricity distribution is crucial for the smooth operation of educational institutions such as the Federal Polytechnic Ado-Ekiti in Ekiti State. To ensure uninterrupted power supply and improve the overall efficiency of the electrical infrastructure on campus, it is essential to conduct a comprehensive utility mapping of the electricity distribution system. This study aims to provide an accurate and detailed map of the power grid at the Federal Polytechnic Ado-Ekiti, facilitating effective planning, maintenance, and future development of the electrical network.

The introduction sets the context by emphasizing the importance of reliable electricity supply for academic, administrative, and research activities. It highlights the need for utility mapping to assess the existing infrastructure, identify potential areas of improvement, and enhance the overall efficiency and reliability of electricity distribution. The introduction also outlines the objectives of the study, which include creating a detailed map of the power grid, evaluating the condition of the infrastructure, and providing recommendations for improvement.

## METHOD

### Field Surveys:

The research begins with comprehensive field surveys to gather data on the existing electrical infrastructure. The surveys involve visiting various locations on the campus to identify distribution lines, transformers,

substations, and other relevant equipment. Data on the physical location, capacity, and condition of these components are collected using surveying tools and equipment.

### Data Collection:

In addition to the field surveys, data collection is conducted through interviews with relevant stakeholders, including facility managers, electrical engineers, and maintenance personnel. These interviews provide insights into the historical development of the electrical infrastructure, past maintenance practices, and any known issues or challenges.

### Data Analysis and Mapping:

The collected data from field surveys and interviews are compiled and analyzed to create a detailed map of the power grid. Geographical Information System (GIS) software is utilized to accurately map the distribution lines, transformers, substations, and other key components. The data analysis helps identify areas of congestion, potential points of failure, and opportunities for improvement in the electricity distribution system.

### Infrastructure Assessment:

The mapped power grid is assessed to evaluate the condition of the electrical infrastructure. This assessment involves reviewing the age, capacity, and

functionality of the distribution lines, transformers, and substations. Any signs of wear and tear, inadequate capacity, or outdated equipment are identified and recorded.

### Recommendations:

Based on the findings from the field surveys, data analysis, and infrastructure assessment, recommendations are developed to improve the electricity distribution system. These recommendations may include upgrading or replacing outdated equipment, enhancing the capacity of transformers or substations, implementing maintenance schedules, and improving safety measures.

The methodology employed in this study ensures a systematic approach to utility mapping of the electricity distribution system at the Federal Polytechnic Ado-Ekiti. By combining field surveys, data collection, analysis, and infrastructure assessment, the research aims to provide a comprehensive understanding of the power grid's current state and offer recommendations for enhancing its efficiency and reliability.

### RESULTS

The utility mapping of the electricity distribution system at the Federal Polytechnic Ado-Ekiti, Ekiti State revealed the following key findings:

### Comprehensive Power Grid Map:

The study successfully created a detailed and accurate map of the power grid on the campus. The map includes distribution lines, transformers, substations, and other relevant components. This map provides valuable information for understanding the layout of the electrical infrastructure.

### Infrastructure Assessment:

The assessment of the infrastructure highlighted several areas of concern. Some distribution lines were found to be overloaded, leading to voltage fluctuations and potential equipment failures. Additionally, a few transformers were operating at near maximum capacity, posing a risk of breakdowns. These findings indicate the need for infrastructure upgrades and capacity enhancements.

### Maintenance Practices:

The study revealed variations in maintenance practices across different parts of the power grid. While some areas had regular maintenance schedules and prompt repairs, others lacked proper maintenance, leading to increased downtime and inefficiencies. Consistent and proactive maintenance is necessary to ensure the reliability and longevity of the electrical infrastructure.

### DISCUSSION

The findings from the utility mapping and infrastructure assessment emphasize the importance of regular maintenance and infrastructure upgrades to enhance the reliability and efficiency of the power grid. The discussion focuses on the implications of the identified issues and their potential impact on the campus's operations. It also highlights the importance of balancing the electrical load, upgrading transformers, and implementing proactive maintenance practices.

Additionally, the discussion delves into the significance of uninterrupted power supply for academic, administrative, and research activities. It emphasizes the need for a reliable electricity distribution system to support the growing demands of the campus and create a conducive learning environment for students and faculty.

## CONCLUSION

In conclusion, the utility mapping of the electricity distribution system at the Federal Polytechnic Ado-Ekiti provides valuable insights into the current state of the power grid and its associated challenges. The study highlights the importance of infrastructure assessment, maintenance practices, and capacity enhancements to ensure reliable and efficient electricity supply on the campus.

Based on the findings, the following recommendations are proposed:

## Infrastructure Upgrades:

Upgrading overloaded distribution lines, transformers, and substations to meet the increasing electricity demands and prevent equipment failures.

## Load Balancing:

Implementing load balancing strategies to distribute the electrical load evenly across the distribution network, ensuring optimal performance and minimizing voltage fluctuations.

## Proactive Maintenance:

Developing and implementing a comprehensive maintenance schedule for regular inspections, repairs, and preventive maintenance of the electrical infrastructure to minimize downtime and enhance reliability.

## Capacity Enhancement:

Identifying areas where transformer capacity is near maximum and upgrading them to accommodate future growth and prevent potential breakdowns.

By implementing these recommendations, the Federal Polytechnic Ado-Ekiti can improve the reliability, efficiency, and resilience of its electricity distribution system, providing uninterrupted power supply for the campus's various activities. The study underscores the importance of utility mapping and ongoing monitoring

to identify and address infrastructure challenges promptly.

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