

Analysis of Electrical Inspection and Testing Implementation in Supporting Occupational Safety and Health at PT Cipta Pratama Inspeksi Indonesia

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Abstract: Electrical systems are essential infrastructures in industrial operations, but they also present significant occupational hazards such as electric shock, short circuits, equipment failure, and electrical fires. Inadequate electrical safety management may cause workplace accidents, operational disruption, and financial losses. Therefore, this study aims to analyze the implementation of electrical inspection and testing activities at PT Cipta Pratama Inspeksi Indonesia, particularly in administrative procedures, technical testing, reporting mechanisms, and documentation management within occupational safety practices. This study employed a descriptive qualitative approach. Data were collected through direct observation, documentation, and literature review, while data were analyzed using descriptive qualitative analysis involving data reduction, categorization, interpretation, and conclusion drawing. The findings show that electrical inspection and testing activities were implemented systematically through administrative verification, visual inspection, insulation resistance testing, grounding measurement, protective system verification, and structured reporting. These activities were conducted based on occupational electrical safety standards and supported by standardized operational procedures. The reporting and documentation systems also functioned as important mechanisms for accountability, regulatory compliance, and corrective action. This study implies that systematic electrical inspection should be integrated into Occupational Safety and Health Management Systems (OSHMS/SMK3) to strengthen workplace safety culture and industrial risk management. The originality of this study lies in its comprehensive analysis of electrical inspection implementation by integrating administrative preparation, technical testing, reporting, and documentation management within one analytical framework. Unlike previous studies that mainly focused on theoretical safety concepts or technical standards separately, this study provides empirical insight into the practical implementation of occupational electrical inspection systems in an Indonesian inspection service company.

Keywords: electrical inspection; occupational safety; electrical testing; industrial safety management; workplace electrical hazards.

INTRODUCTION

Electrical systems have become one of the most critical infrastructures in industrial operations, healthcare facilities, office buildings, and manufacturing sectors. Almost all modern work activities depend on electrical installations that operate safely and reliably.

However, electrical systems also pose significant occupational hazards, including electric shock, short circuits, equipment failure, explosions, and electrical fires. Electrical accidents continue to contribute substantially to occupational injuries and industrial fires worldwide. The International Labour Organization (ILO) reported that inadequate electrical safety management remains one of the major causes of workplace accidents and operational disruptions in industrial environments (International Labour Organization, 2013). In Indonesia, the Ministry of Manpower also emphasizes that non-compliant electrical installations are among the leading contributors to workplace hazards and fire incidents, particularly in industrial and healthcare sectors (Kementerian Ketenagakerjaan RI, 2015). Therefore, electrical inspection and testing activities are essential not only to fulfill regulatory obligations but also to prevent occupational accidents, protect company assets, ensure operational continuity, and support the implementation of Occupational Safety and Health (OSH) systems. The increasing dependence on electrical infrastructure in industrial operations makes electrical inspection systems highly relevant for further investigation, particularly regarding how inspection procedures are implemented in practice within industrial service companies.

Previous studies regarding occupational electrical safety can generally be categorized into three major groups. The first category focuses on electrical hazards and workplace accident prevention. Studies conducted by the International Labour Organization (2013), Hughes and Ferrett (2016), and Brauer (2016) explained that electrical hazards remain one of the most dangerous occupational risks because electrical accidents may lead to severe injuries, fatalities, and large-scale industrial losses. Other studies also highlighted that inadequate inspection systems, poor maintenance practices, and non-standard electrical installations significantly increase workplace accident risks. Although these studies successfully identified the importance of electrical hazard prevention, most of them primarily emphasized theoretical occupational safety concepts rather than analyzing practical electrical inspection implementation processes within inspection service companies.

The second category of previous studies discusses electrical inspection standards, regulatory compliance, and technical testing systems. The Ministry of Manpower Regulation Number 12 of 2015 concerning Occupational Electrical Safety and the Indonesian General Electrical Installation Requirements (PUIL) emphasize that electrical installations must undergo periodic inspection and testing to ensure operational safety

(Kementerian Ketenagakerjaan RI, 2015; Badan Standardisasi Nasional, 2020). Previous studies conducted by Soares et al. (2019), Lingard et al. (2018), and Goetsch (2019) explained that electrical inspection systems involving insulation resistance testing, grounding measurements, protective system testing, and load analysis are essential in maintaining electrical reliability and safety performance. In addition, research related to Occupational Safety and Health Management Systems (OSHMS/SMK3) demonstrated that periodic inspection systems contribute significantly to organizational safety culture and regulatory compliance. Nevertheless, most previous studies focused more on regulatory frameworks and technical standards without comprehensively describing how electrical inspection procedures are operationally implemented from administrative preparation to reporting and certification processes.

The third category of studies focuses on occupational safety management, risk control systems, and industrial inspection services. Previous studies by Ridley (2008), Reese (2017), and Friend and Kohn (2018) emphasized that inspection activities function as preventive risk control mechanisms within industrial safety management systems. These studies explained that inspection systems help organizations identify hazards, evaluate operational risks, and improve workplace safety performance. Furthermore, studies related to industrial auditing and inspection management highlighted the importance of documentation systems, inspection reporting, and corrective action mechanisms in supporting organizational accountability and legal compliance. However, previous research still shows limited empirical discussion regarding the operational workflow of electrical inspection and testing services conducted by specialized inspection companies in Indonesia, particularly concerning administrative procedures, field testing implementation, reporting systems, and documentation handover processes. This gap indicates the need for further studies that comprehensively examine the practical implementation of electrical inspection and testing systems within occupational safety management contexts.

Based on these research gaps, this study aims to analyze the implementation of electrical inspection and testing activities at PT Cipta Pratama Inspeksi Indonesia. Specifically, this study examines inspection administrative procedures, technical testing activities, reporting mechanisms, and documentation systems related to occupational electrical safety inspections. This study is expected to provide empirical insights into how electrical inspection and testing systems are operationally implemented within industrial

inspection service companies and how these activities contribute to occupational safety management and regulatory compliance.

The main argument of this study is that systematic electrical inspection and testing activities contribute significantly to occupational hazard prevention, operational reliability, and the implementation of occupational safety management systems. Proper inspection procedures involving document verification, visual inspection, insulation testing, grounding measurement, and reporting mechanisms enable organizations to identify electrical hazards and implement corrective actions before accidents occur. Furthermore, organized inspection documentation and certification systems strengthen regulatory compliance and support industrial operational sustainability. Therefore, the better the implementation of electrical inspection and testing systems, the greater their contribution to workplace safety improvement, risk reduction, operational continuity, and the development of sustainable occupational safety culture in industrial environments.

RESEARCH METHOD

This study focused on the implementation of electrical inspection and testing activities conducted by PT Cipta Pratama Inspeksi Indonesia. The unit of analysis in this research was the occupational electrical inspection system implemented within industrial work environments, including administrative inspection procedures, technical testing activities, inspection reporting systems, and documentation handover processes. The study specifically examined how electrical inspection and testing activities were operationally carried out as part of occupational safety and health management systems. In addition, the research also observed the roles of inspection personnel, technical inspectors, and administrative staff involved in the implementation of electrical safety inspection services.

This study employed a descriptive qualitative research design because the research aimed to obtain a comprehensive understanding of the operational implementation of electrical inspection and testing systems in real industrial contexts. A qualitative approach was considered appropriate because it enables researchers to explore work processes, inspection mechanisms, organizational coordination, and occupational safety practices in depth. Furthermore, this design was selected because the study focused on describing factual implementation processes rather than statistically measuring relationships among variables. Through this approach, the researchers were able to analyze inspection activities

systematically from administrative preparation to technical inspection execution and reporting procedures.

The sources of data in this study consisted of primary and secondary data. Primary data were obtained directly from observations of electrical inspection and testing activities conducted at PT Cipta Pratama Inspeksi Indonesia. Secondary data were obtained from inspection documents, technical reports, electrical testing forms, occupational safety regulations, company operational procedures, literature references, and scientific publications related to electrical safety and industrial inspection systems. In addition, supporting information was collected from occupational safety standards, electrical installation regulations, and previous studies discussing electrical inspection management and workplace safety systems.

Data collection techniques in this study included observation, documentation, and literature review. Observations were conducted directly during inspection and testing activities to examine administrative preparation processes, electrical installation inspections, insulation resistance testing, grounding measurements, and reporting procedures. Documentation techniques were used to collect supporting information related to inspection reports, testing records, technical documentation, and work procedures implemented by the company. Meanwhile, literature review techniques were conducted by examining books, scientific journals, occupational safety regulations, and electrical installation standards relevant to the research topic. Observation sheets and documentation records were also utilized as research instruments to ensure systematic and organized data collection processes.

The collected data were analyzed using descriptive qualitative analysis techniques. The analysis process involved several stages, namely data reduction, data categorization, data presentation, interpretation, and conclusion drawing. During the data reduction stage, the researchers selected relevant information related to electrical inspection implementation and occupational safety systems. The data were then categorized according to major themes, including administrative inspection procedures, technical testing activities, reporting systems, and documentation management. Furthermore, the researchers interpreted the findings by comparing empirical practices with occupational safety regulations, electrical installation standards, and findings from previous studies. Finally, conclusions were formulated to provide a comprehensive understanding of the

implementation of electrical inspection and testing systems at PT Cipta Pratama Inspeksi Indonesia and their contribution to occupational safety and health management.

RESULT

Administrative Preparation and Inspection Documentation System

The findings of this study indicate that the electrical inspection process at PT Cipta Pratama Inspeksi Indonesia begins with administrative preparation and documentation verification activities. Before field inspection activities are conducted, inspectors verify client documents, electrical installation permits, technical specifications, inspection requests, and operational feasibility documents. Administrative preparation also includes scheduling inspection activities, preparing testing equipment, and ensuring that inspection forms and technical documents are available before field implementation. The study found that administrative verification plays an important role in ensuring that inspection activities can be conducted systematically and in accordance with occupational electrical safety regulations.



Figure 1. Administrative Preparation and Documentation Activities

The figure above shows the administrative preparation activities conducted before inspection implementation. The inspection team prepares technical documents and reporting files before submission to the labor authorities. This process demonstrates that documentation management is considered an important component of inspection implementation.

Based on the findings, several patterns were identified. First, inspection activities consistently begin with document verification to ensure compliance with technical and

legal requirements. Second, inspection scheduling is coordinated systematically between administrative staff and technical inspectors. Third, inspection documentation forms are standardized to facilitate reporting and data recording processes. Fourth, inspection preparation activities also involve ensuring equipment readiness and personnel coordination before field implementation. These patterns indicate that administrative preparation functions as a preventive mechanism to minimize technical errors and operational delays during inspection activities.

The findings imply that administrative preparation systems significantly support the effectiveness of occupational electrical inspection activities. Proper documentation verification helps ensure that inspected installations comply with safety standards and legal regulations before technical testing is performed. Furthermore, systematic administrative preparation contributes to operational efficiency, inspection accuracy, and accountability within occupational safety management systems.

Electrical Inspection and Technical Testing Activities

The results of this study show that electrical inspection and testing activities at PT Cipta Pratama Inspeksi Indonesia are conducted systematically according to occupational electrical safety standards and technical inspection procedures. The inspection process includes visual inspection of electrical installations, insulation resistance testing, grounding resistance measurement, cable condition inspection, protective device verification, and electrical load testing. Inspectors utilize standardized testing equipment to ensure measurement accuracy and operational reliability during inspection activities.



Figure 2. Electrical Inspection Activities at PT Dean Shoes



Figure 3. Electrical Inspection at Prodia Karawang

The figures above demonstrate the implementation of field inspection and technical testing activities conducted by inspectors during occupational electrical safety inspections. Inspection personnel conduct direct testing to evaluate the safety and operational feasibility of electrical installations in industrial and healthcare facilities.

Several important patterns emerged from the findings. First, visual inspection activities are always conducted before technical measurements to identify visible installation defects or unsafe conditions. Second, grounding and insulation resistance measurements are consistently performed as critical indicators of electrical safety performance. Third, inspection activities involve the use of calibrated testing instruments to maintain measurement validity and reliability. Fourth, inspectors follow standardized operational procedures during testing activities to ensure safety and compliance with occupational electrical regulations. These patterns indicate that inspection activities prioritize both technical accuracy and occupational safety principles during field operations.

The findings suggest that systematic inspection and testing activities contribute significantly to occupational hazard prevention and operational reliability. Through inspection activities, potential electrical hazards such as grounding failures, damaged cables, overload conditions, and insulation problems can be identified before causing accidents or operational disruptions. Therefore, technical testing systems function as preventive safety control mechanisms within industrial occupational safety management systems.

Inspection Reporting and Documentation Handover System

The findings further reveal that inspection activities at PT Cipta Pratama Inspeksi Indonesia are followed by structured reporting and documentation handover procedures. After technical inspections are completed, inspectors prepare inspection reports containing testing results, measurement data, identified hazards, compliance evaluations, and recommendations for corrective actions. The reports are then reviewed administratively before being submitted to clients as official inspection documentation.



Figure 4. Inspection Documentation Preparation Process



Figure 5. Inspection Material and Documentation Activities

The figures above illustrate the reporting and documentation processes conducted after inspection activities are completed. Inspection results are systematically documented to support accountability, regulatory compliance, and corrective action implementation.

Several patterns were identified from the reporting process. First, inspection reports consistently contain technical findings and recommendations for hazard correction. Second, documentation systems are standardized to facilitate data recording and future inspection references. Third, inspection reports function not only as technical records but also as legal and administrative evidence of electrical safety compliance. Fourth, documentation handover activities involve coordination between inspection personnel and client representatives to ensure that corrective actions can be implemented appropriately. These patterns demonstrate that reporting systems are essential components of occupational safety inspection management.

The findings imply that reporting and documentation systems contribute significantly to organizational accountability and occupational safety improvement. Inspection reports provide important information regarding the operational condition of electrical installations and enable organizations to implement corrective actions before accidents occur. Furthermore, documentation systems strengthen compliance with occupational safety regulations and support the sustainability of industrial operational systems. Therefore, inspection reporting activities function not only as administrative requirements but also as strategic safety management tools in industrial environments.

DISCUSSION

The findings of this study demonstrate that the implementation of electrical inspection and testing activities at PT Cipta Pratama Inspeksi Indonesia has been conducted systematically through integrated administrative preparation, technical testing procedures, and structured reporting systems. The study revealed that inspection activities involve several important stages, including document verification, visual inspection, insulation resistance testing, grounding measurement, electrical load analysis, reporting preparation, and documentation handover processes. In addition, inspection activities were performed according to occupational electrical safety standards and supported by standardized operational procedures. These findings indicate that electrical inspection systems function

not only as technical testing activities but also as preventive occupational safety management mechanisms within industrial environments.

The implementation of systematic electrical inspection procedures found in this study may occur because occupational electrical hazards have high-risk characteristics that can potentially cause severe workplace accidents, operational disruptions, and industrial losses. Therefore, inspection systems are designed to identify potential hazards before accidents occur. Administrative preparation processes ensure that inspected installations comply with technical and legal requirements before field testing activities begin. Meanwhile, technical inspection activities such as grounding measurements, insulation testing, and protective system verification help detect unsafe electrical conditions that may not be visible during routine operational activities. The reporting and documentation systems further strengthen accountability and ensure that identified hazards can be followed up through corrective actions. Thus, the effectiveness of electrical inspection activities appears to be strongly influenced by organizational coordination, technical standardization, and regulatory compliance within occupational safety management systems.

The findings of this study are consistent with previous studies discussing occupational electrical safety and industrial inspection systems. Hughes and Ferrett (2016) explained that systematic inspection and preventive maintenance activities are essential for reducing workplace accident risks caused by electrical hazards. Similarly, Reese (2008) emphasized that occupational safety inspection systems function as preventive risk control mechanisms within industrial organizations. The findings also support Lingard et al. (2011), who highlighted that occupational safety performance is closely associated with the implementation of structured inspection and monitoring systems. Furthermore, the results are in line with the International Labour Organization (2013), which emphasized the importance of electrical inspection activities in preventing occupational electrical accidents and maintaining operational reliability. However, unlike previous studies that mainly focused on theoretical occupational safety concepts or technical standards, this study provides a more comprehensive empirical description of how electrical inspection and testing activities are operationally implemented within an Indonesian inspection service company. Therefore, the novelty of this study lies in its integrated analysis of administrative preparation, technical testing, reporting systems, and documentation handover processes within occupational electrical inspection management.

The findings of this study imply that electrical inspection systems have broader significance beyond regulatory compliance and technical evaluation. From a social perspective, effective electrical inspection systems contribute to the protection of workers, industrial facilities, and public safety from electrical hazards. In industrial contexts, inspection systems help organizations maintain operational continuity, minimize downtime risks, and prevent financial losses caused by electrical failures or workplace accidents. Furthermore, the implementation of structured inspection systems reflects organizational commitment to occupational safety culture and sustainable risk management practices. These findings also strengthen the understanding that occupational safety systems should be integrated into daily operational management rather than treated merely as administrative obligations.

Despite the positive findings, this study also identified several limitations and operational challenges within electrical inspection implementation. One positive implication of the inspection system is the existence of standardized operational procedures that improve inspection consistency and technical reliability. However, the study also found that several inspected locations still showed minor deficiencies such as unclear cable labeling systems, grounding resistance values approaching maximum thresholds, and less organized electrical panels. These findings indicate that although inspection systems are functioning effectively, continuous monitoring and corrective maintenance are still required. Inadequate follow-up actions may reduce the effectiveness of inspection systems and increase long-term occupational safety risks. Therefore, sustainable inspection programs and regular maintenance activities remain necessary to ensure continuous electrical safety improvement.

Based on these findings, several practical implications and policy recommendations can be proposed. First, companies should strengthen periodic electrical inspection and preventive maintenance programs to ensure that electrical installations continuously comply with safety standards. Second, organizations should improve worker awareness and training regarding occupational electrical safety and hazard prevention. Third, inspection companies should continue enhancing inspector competencies, technical equipment calibration systems, and documentation management to maintain inspection quality and reliability. Fourth, government institutions and occupational safety regulators should strengthen supervision and enforcement related to occupational electrical safety compliance, particularly in high-risk industrial sectors. Finally, organizations should

integrate electrical inspection systems into broader Occupational Safety and Health Management Systems (OSHMS/SMK3) to create sustainable workplace safety cultures and improve industrial operational reliability.

CONCLUSION

This study concludes that the implementation of electrical inspection and testing activities at PT Cipta Pratama Inspeksi Indonesia has been conducted systematically through integrated administrative preparation, technical inspection procedures, and structured reporting systems. The findings demonstrate that inspection activities involve document verification, visual inspection, insulation resistance testing, grounding measurements, protective system verification, and documentation handover processes carried out according to occupational electrical safety standards. These inspection activities function as preventive safety control mechanisms that help identify potential electrical hazards before accidents, operational failures, or industrial losses occur. Furthermore, the implementation of organized inspection systems contributes to occupational safety improvement, operational reliability, regulatory compliance, and the development of workplace safety culture within industrial environments.

This study contributes to the scientific understanding of occupational electrical safety management by providing a comprehensive empirical description of how electrical inspection and testing systems are operationally implemented within an Indonesian inspection service company. Unlike previous studies that mainly focused on theoretical occupational safety concepts, regulatory frameworks, or technical standards separately, this study integrates administrative preparation systems, technical testing activities, reporting procedures, and documentation management within one analytical framework. Therefore, this study contributes to the development of occupational safety literature by emphasizing the importance of integrated inspection systems as preventive risk control mechanisms in industrial operational environments. In addition, this research provides practical insights for companies, inspectors, and policymakers regarding the implementation of systematic occupational electrical safety programs.

However, this study has several limitations. First, the study was conducted only within one inspection service company, which may limit the generalizability of the findings to other industrial sectors or organizations with different operational characteristics. Second, this study primarily used descriptive qualitative approaches and did not quantitatively measure the effectiveness of inspection systems in reducing workplace accidents or

operational failures. Third, the study focused mainly on inspection implementation processes and did not comprehensively evaluate long-term organizational safety performance after inspection activities were completed. Therefore, future studies are recommended to involve broader industrial sectors, apply mixed-method or quantitative approaches, and include measurable indicators such as accident reduction rates, operational reliability levels, safety compliance performance, and economic impacts of electrical inspection systems to provide more comprehensive analyses regarding occupational electrical safety management.

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