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Implementation Analysis of Quality Control (QC) and Health, Safety, and Environment (HSE) Integration in the Pembangunan Bangunan Gedung dan Kawasan Kantor Kementerian Koordinator 4 IKN

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Abstract. Construction of government office buildings in Indonesia's New Capital City (IKN) requires effective quality and occupational safety management, yet these functions are often run separately, causing duplicated effort and weak coordination. This study analyzes the implementation of integrated Quality Control (QC) and Health, Safety, and Environment (HSE) systems in the Coordinating Ministry Office Complex Project (Kemenko 4) at IKN and evaluates their contribution to project performance. A quantitative descriptive case-study approach was applied, using questionnaires, interviews, field observations, and project documentation reviews, with data from 45 project personnel analyzed using descriptive statistics. The results show that QC–HSE integration was effectively implemented through joint inspections, integrated standard operating procedures, coordinated reporting, and strong management commitment, with mean indicator scores of 4.29–4.65. The integration improved construction quality, reduced safety risks, strengthened coordination, and minimized duplicated activities. QC–HSE integration therefore supports quality, safety, and sustainable construction management in large-scale government projects.

Keywords: construction project performance, health safety and environment, integrated management system, quality control, sustainable construction

1. Introduction

The construction sector is one of the largest contributors to national infrastructure development and economic growth. However, construction projects are also characterized by complex activities, multiple stakeholders, and significant occupational risks [1]. Quality failures and workplace accidents may result in cost overruns, project delays, and reputational damage [2]. Therefore, organizations increasingly seek

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management approaches capable of simultaneously improving quality performance and occupational safety.

Quality Control (QC) ensures that construction outputs comply with technical specifications, contractual requirements, and industry standards [1]. QC activities commonly include material inspections, testing, documentation reviews, and corrective actions. Health, Safety, and Environment (HSE) management focuses on accident prevention, worker well-being, and environmental protection [2]. It aims to reduce occupational injuries, improve worker health, and minimize environmental impacts arising from project activities, which requires hazard identification, risk assessment, safety training, and continuous monitoring [2]. Traditionally, these functions are implemented independently, creating duplication of effort and communication barriers [3].

Recent studies have highlighted the benefits of Integrated Management Systems (IMS), which combine quality, safety, and environmental management practices into a unified framework that merges the principles of ISO 9001, ISO 45001, and ISO 14001 [4]. Such integration improves organizational coordination, enhances compliance, and supports continuous improvement [5]. According to Zeng et al. [5], integrated systems reduce administrative duplication and improve organizational performance.

Previous research demonstrated that integrated management systems improve productivity, communication, and regulatory compliance [5], [6]. Douglas and Glen [7] found that organizations implementing integrated systems experienced better operational efficiency than those maintaining separate management structures. In the context of mitigation and structural recovery in regional development, strict hazard prevention methods such as Job Safety Analysis (JSA) have proven vital in high-risk zones, such as earthquake-reconstruction areas, where unforeseen physical variables demand immediate structural and safety adjustments [8]. These findings collectively support the relevance of QC–HSE integration in modern, large-scale construction projects to prevent overlapping operational functions while tightening site risk control.

Although IMS implementation has been widely studied, limited evidence exists regarding practical QC–HSE integration within large-scale government projects in Indonesia, particularly in IKN development projects. Therefore, this study investigates the implementation of QC–HSE integration in the Coordinating Ministry Office Complex Project (Kemenko 4) at IKN and its contribution to project performance.

2. Methods

This study employed a quantitative descriptive case-study approach. The research was conducted at the Coordinating Ministry Office Complex Project in IKN. Primary data were obtained through questionnaires distributed to project personnel, while secondary data were collected from project reports, inspection records, and safety documentation.

The questionnaire consisted of indicators related to management commitment, integrated procedures, inspections, reporting systems, communication effectiveness, and workforce awareness. Responses were measured using a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree). Data analysis was performed using descriptive statistical methods, including percentage distributions and mean score analysis. The results were interpreted to determine the effectiveness of QC–HSE integration within the project environment.

The operational workflow of the integration framework executed in this study is illustrated in Figure 1.

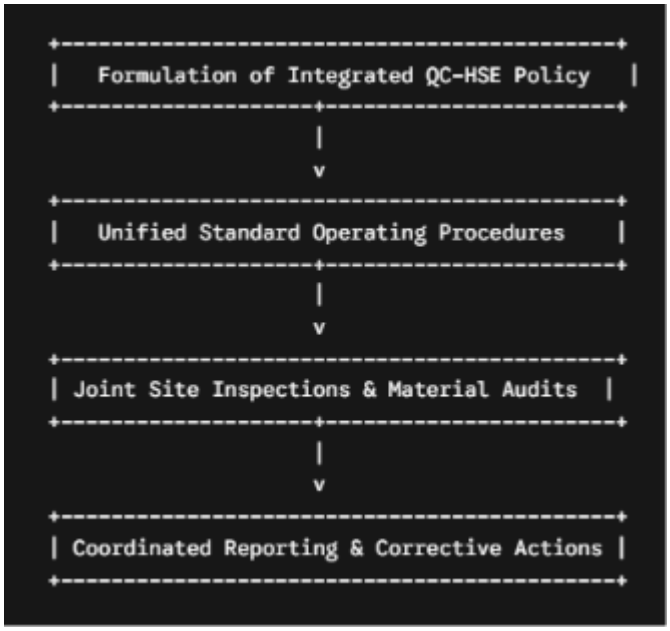


Figure 1. Conceptual framework of the integrated QC–HSE implementation process in large-scale infrastructure.

3. Results and Discussion

The findings reveal that QC–HSE integration has been effectively implemented throughout the project. The quantitative evaluation metrics derived from the distributed questionnaires (N = 45 respondents) are summarized in Table 1.

Table 1. Evaluation of mean response scores for QC–HSE integration indicators

No.	Integration Indicators	Mean Score	Compliance Level
1.	Management Commitment	4.65	Very High
2.	Integrated Standard Operating Procedures (SOPs)	4.42	High
3.	Joint Inspections and Field Testing	4.58	Very High
4.	Coordinated Reporting System	4.35	High
5.	Stakeholder Communication Effectiveness	4.48	High
6.	Workforce Hazard Awareness	4.29	High

Management commitment emerged as one of the strongest factors supporting integration (Mean = 4.65). Project leaders actively participated in inspections, safety meetings, and quality reviews, reinforcing organizational commitment to continuous improvement [6].

Integrated Standard Operating Procedures (SOPs) were developed to align quality requirements with safety obligations. This integration reduced duplication of activities and improved coordination among departments. Similar findings were reported by Santos et al. [9], who observed that integrated systems streamline operational processes and improve organizational effectiveness.

Joint inspections represented another important aspect of implementation. Rather than conducting separate inspections, QC and HSE teams collaborated to evaluate construction activities simultaneously. This approach improved efficiency and enabled early identification of quality defects and safety hazards.

Communication was enhanced through shared reporting systems and regular coordination meetings. Employees reported improved understanding of both quality requirements and safety procedures. Effective communication has been recognized as a critical factor in project success by several researchers [10], [11], [12].

The integration also contributed to stronger safety culture development. Workers demonstrated greater awareness of hazard controls and quality standards. Consistent training programs and management support played an important role in maintaining compliance and improving behavioral safety.

From an operational perspective, integrated documentation systems improved information accessibility and reduced administrative workload. Records related to inspections, non-conformities, corrective actions, and safety incidents were maintained through a coordinated process. Consequently, decision-making became faster and more accurate.

The findings suggest that QC–HSE integration contributes significantly to sustainable project delivery. By aligning quality and safety objectives, organizations can optimize resources, reduce risks, and improve overall project performance. These results are consistent with previous studies highlighting the positive impact of integrated management systems on construction outcomes [5], [7], [9].

4. Conclusion

The implementation of QC–HSE integration in the Coordinating Ministry Office Complex Project demonstrates the effectiveness of combining quality and safety management practices into a unified framework. Integrated procedures, management commitment, joint inspections, coordinated reporting systems, and continuous monitoring contribute positively to project performance. The study concludes that QC–HSE integration enhances quality assurance, strengthens workplace safety, improves communication, reduces administrative duplication, and supports sustainable construction management. Future projects are encouraged to adopt similar integration strategies to achieve higher levels of organizational performance and project success.

Declaration of AI and AI-assisted Technologies in the Writing Process

During the preparation of this work the author(s) used [Google Translate] in order to [Translate from Indonesian to English]. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

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