

# Safety Compliance, Quality Control, And Contractor Performance in Selected MEPFS Engineering Firms: Inputs for a Risk Mitigation Plan

Ramil L. Borres

*Eulogio “Amang” Rodriguez Institute of Science and Technology – Manila*

[borres.ramil2020@gmail.com](mailto:borres.ramil2020@gmail.com)

Date Submitted:

**July 6, 2026**

Date Accepted:

**July 6, 2026**

Date Published:

**July 7, 2026**

DOI:

**10.5281/zenodo.21242873**

## ABSTRACT

This study determined the extent of safety compliance, quality control, and contractor performance in selected Mechanical, Electrical, Plumbing, Fire Protection, and Sanitary (MEPFS) engineering firms as inputs for a Risk Mitigation Plan. It assessed safety compliance in terms of occupational safety standards, PPE policies, safety training, incident reporting, emergency preparedness, safety audits, government and environmental safety regulations, and employee awareness and safety culture. It also evaluated quality control through material testing, inspection and supervision, compliance with engineering specifications, documentation, defect management, quality assurance, client satisfaction, and continuous improvement. Contractor performance was examined in terms of

timeliness, cost control, workforce competency, responsiveness to change orders, and communication with stakeholders. The study employed a descriptive-correlational research design using a quantitative approach. The respondents consisted of 427 management personnel, staff, and clients from selected MEPFS engineering firms in Metro Manila and Region IV. Data were gathered through a researcher-made questionnaire and analyzed using percentage, weighted mean, Analysis of Variance, Pearson Product-Moment Correlation, and regression analysis. Findings revealed that safety compliance and quality control were assessed as Evident, while contractor performance was rated Very Good. Significant differences were found in selected areas of safety compliance and quality control, while most contractor performance dimensions showed no significant differences. Significant positive relationships existed among safety compliance, quality control, and contractor performance. The proposed Risk Mitigation Plan was found highly suitable, acceptable, and feasible for strengthening safety, improving quality, reducing risks, and enhancing contractor performance in the participating firms and supporting overall more reliable project delivery outcomes.

**Keywords:** *Safety Compliance, Quality Control, Contractor Performance, MEPFS Engineering Firms, Occupational Safety, Quality Assurance, Risk Mitigation Plan*

## INTRODUCTION

The construction industry plays a vital role in national development because it supports infrastructure growth, employment generation, and economic productivity. Within this industry, Mechanical, Electrical, Plumbing, Fire Protection, and Sanitary (MEPFS) engineering firms perform highly specialized functions that ensure the safety, functionality, and efficiency of buildings and infrastructure

projects. These firms are directly involved in installation, testing, commissioning, repair, and maintenance activities that require strict technical accuracy, safety compliance, and quality assurance.

MEPFS works are exposed to various occupational and operational risks, including electrical hazards, mechanical failures, fire-related risks, poor workmanship, material defects, project delays, and coordination problems. Because these systems are interconnected, any weakness in safety practices, quality control procedures, or contractor performance may affect the overall success of a project. Thus, the proper implementation of occupational safety standards, personal protective equipment policies, safety training, inspection procedures, documentation, corrective action, and project monitoring is necessary to reduce risks and improve project outcomes.

In the Philippine construction setting, existing laws and standards require firms and contractors to promote safe working conditions, ensure compliance with technical specifications, and maintain quality project delivery. However, despite these regulations, many engineering firms still encounter challenges such as inconsistent safety implementation, inadequate monitoring, delayed corrective actions, rework, cost concerns, and weak coordination among project stakeholders. These issues may negatively affect productivity, client satisfaction, and overall contractor performance.

This study focused on selected MEPFS engineering firms in Metro Manila and Region IV to assess the extent of safety compliance, level of quality control, and level of contractor performance as perceived by management personnel, staff, and clients. It also examined the differences in their assessments, the relationships among the major variables, and the problems encountered in safety, quality, and performance practices.

The findings of the study served as the basis for developing a proposed Risk Mitigation Plan aimed at strengthening safety compliance, improving quality control systems, reducing operational risks, and enhancing contractor performance in selected MEPFS engineering firms.

## METHODS

### Research Design

This study employed a descriptive-correlational research design using a quantitative approach. The descriptive part was used to determine the extent of safety compliance, level of quality control, and contractor performance of selected MEPFS engineering firms. The correlational part was used to examine the relationship among safety compliance, quality control, and contractor performance. Data were gathered through a structured survey questionnaire and analyzed using appropriate statistical tools.

### Research Locale

The study was conducted among selected Mechanical, Electrical, Plumbing, Fire Protection, and Sanitary engineering firms located in the National Capital Region and Region IV-A. To maintain confidentiality, the participating firms were coded as Company A to Company O. The study was conducted during Academic Year 2025–2026, from October 17, 2025 to May 21, 2026.

### Sampling Technique

The respondents of the study were management personnel, staff, and clients of the selected MEPFS engineering firms. Using Slovin's formula and purposive sampling, 427 respondents were selected from a total population of 732. The sample consisted of 89 management personnel, 231 staff, and 107 clients.

Table 1. *Population and Sample of the Study*

<b>Respondents</b>	<b>Sample</b>
Management Personnel	89
Staff	231
Clients	107
<b>Total</b>	<b>427</b>

---

## RESULTS AND DISCUSSION

### 1. Extent of Safety Compliance

The findings revealed that the extent of safety compliance in selected MEPFS engineering firms was assessed as *Evident*, with an overall composite weighted mean of 4.05. Among the indicators, adherence to occupational safety standards obtained the highest composite mean of 4.07, while emergency preparedness and response planning obtained the lowest composite mean of 4.03, both interpreted as Evident. This means that safety practices are generally implemented in the firms, but emergency preparedness, audits, and safety culture may still be strengthened.

### 2. Level of Quality Control

The level of quality control was likewise assessed as *Evident*. The results indicate that the firms generally observe material testing and verification, inspection and supervision protocols, compliance with design and engineering specifications, documentation and record-keeping, defect management, quality assurance planning, client satisfaction, and continuous improvement mechanisms. This implies that quality control practices are present in the selected firms; however, consistency in documentation, inspection, and corrective action must be further improved.

### 3. Level of Contractor Performance

The level of contractor performance was rated *Very Good*, with an overall composite weighted mean of 4.04. Workforce competency and productivity, and communication and coordination with project stakeholders both obtained the highest composite mean of 4.12. Timeliness and schedule adherence, and cost control and budget compliance obtained the lowest composite mean of 3.98, but were still interpreted as Very Good. This shows that contractors perform well, especially in workforce capability and stakeholder coordination, but project scheduling and budget control still require closer monitoring.

### 4. Significant Difference in the Assessments of the Three Groups of Respondents

The test of significant difference showed that management, staff, and clients differed significantly in selected areas of safety compliance, particularly adherence to occupational safety standards, PPE policies, incident and accident reporting procedures, government and environmental safety regulations, and employee awareness and safety culture. However, no significant differences were found in safety training, emergency preparedness, and safety audits. For quality control, significant differences were found in material testing and verification, documentation and record-keeping accuracy, quality assurance planning and monitoring, and continuous improvement and feedback mechanism. Meanwhile, no significant differences were found in inspection and supervision, compliance with design specifications, defect management, and client satisfaction. This means that the three groups had varying perceptions in some areas, especially those related to monitoring, documentation, and improvement systems.

### 5. Significant Relationship among Safety Compliance, Quality Control, and Contractor Performance

The findings revealed significant positive relationships among safety compliance, quality control, and contractor performance. Quality control and contractor performance had the strongest relationship with an *r-value* of 0.74, followed by safety compliance and quality control with  $r = 0.68$ , and safety compliance and contractor performance with  $r = 0.61$ . All relationships were significant at  $p < .001$ . Regression analysis further showed that safety compliance and quality control significantly predicted contractor performance, with an  $R^2$  value of 0.62, meaning that 62% of the variation in contractor performance was explained by the two variables.

## 6. Problems Encountered

The respondents encountered problems in safety compliance, quality control, and contractor performance. In safety compliance, the major problems included insufficient or improper use of PPE, inconsistent implementation of safety standards, and irregular safety audits. In quality control, the concerns included inconsistent inspection practices, delayed material testing, and delayed corrective actions. In contractor performance, the problems centered on project delays, weak communication and coordination, and poor cost forecasting and budget control. These findings show the need for stronger monitoring, clearer accountability, and more consistent implementation of safety and quality systems.

## 7. Proposed Inputs to the Risk Mitigation Plan

Based on the findings, a *Safety, Quality, and Performance Risk Mitigation Plan* was proposed. The plan includes strategies to strengthen occupational safety standards, improve PPE implementation, sustain safety training, enhance incident reporting, reinforce emergency preparedness, regularize safety audits, improve material testing, ensure consistent inspection and supervision, strengthen documentation, promote timely corrective action, and enhance communication and coordination among stakeholders. The plan provides a structured guide for reducing operational risks and improving project delivery in MEPFS engineering firms.

## 8. Suitability, Acceptability, and Feasibility of the Proposed Risk Mitigation Plan

The proposed Risk Mitigation Plan was assessed as *Highly Suitable*, *Highly Acceptable*, and *Highly Feasible*. The suitability obtained an overall composite mean of 4.32, acceptability obtained 4.33, and feasibility obtained 4.28. These results indicate that the proposed plan is relevant, practical, and implementable for the selected MEPFS engineering firms. It may serve as a useful framework for strengthening safety compliance, improving quality control, reducing risks, and enhancing contractor performance.

## CONCLUSION

Based on the findings of the study, it is concluded that the selected MEPFS engineering firms generally demonstrate favorable practices in safety compliance, quality control, and contractor performance. Safety compliance was evident in terms of occupational safety standards, PPE policies, safety training, incident reporting, emergency preparedness, safety audits, regulatory compliance, and employee safety culture. Likewise, quality control was evident through material testing, inspection and supervision, compliance with engineering specifications, documentation, defect management, quality assurance, client satisfaction, and continuous improvement practices. Contractor performance was also rated very good, particularly in timeliness, cost control, workforce competency, responsiveness to change orders, and communication with project stakeholders.

The study further concludes that there were significant differences in the assessments of the respondent groups in selected areas of safety compliance and quality control, while their views on most aspects of contractor performance were generally similar. Moreover, safety compliance, quality control, and contractor performance were found to be significantly and positively related, indicating that stronger safety and quality practices contribute to better contractor performance. However, the firms still encountered problems such as improper PPE use, inconsistent safety implementation, delayed testing and corrective actions, project delays, weak coordination, and poor cost control. Thus, the proposed Risk Mitigation Plan was found highly suitable, acceptable, and feasible, and may be adopted to strengthen safety systems, improve quality control, reduce operational risks, and enhance contractor performance in selected MEPFS engineering firms.

## References

- Afework, A., Tamene, A., & Tafa, A. (2024). Compliance with standard occupational health and safety measures and associated factors among small-scale metal industry workers in Central Ethiopia. *Risk Management and Healthcare Policy*, 17, 399–409. <https://doi.org/10.2147/RMHP.S444747>
- Ajmal, M., Isha, A. S. N., Nordin, S. M., & Al-Mekhlafi, A. B. A. (2022). Safety-management practices and the occurrence of occupational accidents: Assessing the mediating role of safety compliance. *Sustainability*, 14(8), Article 4569. <https://doi.org/10.3390/su14084569>
- Al-Bayati, A. J., Renner, A. T., Listello, M. P., & Mohamed, M. (2023). PPE non-compliance among construction workers: An assessment of contributing factors utilizing fuzzy theory. *Journal of Safety Research*, 85, 242–253. <https://doi.org/10.1016/j.jsr.2023.02.007>
- Ammad, S., Alaloul, W. S., Saad, S., & Qureshi, A. H. (2021). Personal protective equipment use in construction projects: A systematic review and Smart PLS approach. *Ain Shams Engineering Journal*, 12(4), 3495–3507. <https://doi.org/10.1016/j.asej.2021.04.001>
- Department of Labor and Employment. (2018). *Department Order No. 198-18: Implementing rules and regulations of Republic Act No. 11058*. Republic of the Philippines.
- Hollnagel, E. (2014). *Safety-I and Safety-II: The past and future of safety management*. Ashgate Publishing.
- International Organization for Standardization. (2015). *ISO 9001:2015 quality management systems—Requirements*. <https://www.iso.org/standard/62085.html>
- Manoharan, K., Dissanayake, P., Pathirana, C., Deegahawature, D., & Silva, R. (2024). Assessing the performance and productivity of labor in building construction projects through the application of work-based training practices. *Construction Innovation*, 24(2), 558–583. <https://doi.org/10.1108/CI-03-2022-0056>
- Mohammadi, A., Tavakolan, M., & Khosravi, Y. (2018). Factors influencing safety performance on construction projects: A review. *Safety Science*, 109, 382–397. <https://doi.org/10.1016/j.ssci.2018.06.017>
- Muñoz-La Rivera, F., Mora-Serrano, J., & Oñate, E. (2021). Factors influencing safety on construction projects: Types and categories. *International Journal of Environmental Research and Public Health*, 18(20), Article 10884. <https://doi.org/10.3390/ijerph182010884>
- Republic Act No. 11058. (2018). *An act strengthening compliance with occupational safety and health standards and providing penalties for violations thereof*. Official Gazette of the Republic of the Philippines.
- Republic Act No. 9514. (2008). *Revised Fire Code of the Philippines of 2008*. Official Gazette of the Republic of the Philippines.
- Teece, D. J. (2007). Explicating dynamic capabilities: The nature and microfoundations of enterprise performance. *Strategic Management Journal*, 28(13), 1319–1350. <https://doi.org/10.1002/smj.640>
- Zolfani, S. H., Bazrafshan, R., Akaberi, P., Yazdani, M., & Ecer, F. (2021). Combining the suitability-feasibility-acceptability strategy with the MCDM approach. *Facta Universitatis, Series: Mechanical Engineering*, 19(3), 579–600. <https://doi.org/10.22190/FUME210310042Z>