

Uncovering Hidden Risks in Government Building Facade Maintenance: Insights from Jakarta's Alucobond Panel Projects

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ABSTRACT: This study explores the range of risks encountered during facade maintenance involving Alucobond panels at the headquarters of Badan Narkotika Nasional (BNN) in Jakarta, Indonesia. Recognizing the operational complexities posed by high-rise public buildings in tropical, high-humidity urban environments, a qualitative case study approach was applied to identify latent and site-specific hazards. Data were collected using open-ended questionnaires administered to six experienced facade maintenance professionals with direct involvement in projects at the BNN facility. The responses were analyzed thematically through an inductive–deductive process, with risk categories structured in accordance with ISO 31010. The study identified 28 distinct risks, including technical failures such as anchor degradation and undetected panel defects; occupational safety concerns such as inadequate use of personal protective equipment (PPE), including harnesses and helmets, and worker fatigue; as well as environmental, operational, and financial constraints that affect both maintenance performance and safety. The findings confirm that qualitative, practitioner-based methods are effective in surfacing contextual risks not captured by standardized checklists. The resulting risk inventory offers a foundation for more targeted mitigation strategies and contributes to the development of evidence-based maintenance protocols for public buildings operating in dense, climate-sensitive cities across Southeast Asia.

KEYWORDS: Facade maintenance, Alucobond panels, Risk identification, Qualitative method, Indonesia

I. INTRODUCTION

Maintaining public buildings is essential not only for preserving physical infrastructure but also for ensuring operational continuity, safety, and the sustainability of government services (Adeleye et al., 2024). Facades, being the most exposed and weather-sensitive components, play a pivotal role in protecting building interiors while contributing to architectural performance (Wang et al., 2022). In tropical and high-humidity environments like Jakarta, facade maintenance challenges are particularly acute, especially for high-rise government facilities using composite materials such as Alucobond panels. Failures in facade systems have led to serious safety incidents globally, emphasizing the need for proactive inspection and maintenance protocols. As Wu & Li notes, facade deterioration can result in falling objects, which have caused both injuries and fatalities, particularly in densely populated urban settings (Wu & Li, 2024). Consequently, facade maintenance must adopt rigorous risk assessment strategies that align with the safety standards of public buildings.

Recent research emphasizes the importance of structured inspection regimes and maintenance planning, especially for aging buildings or those under harsh environmental exposure. Madureira et al. proposed a three-step methodology—detailed inspection, post-inspection corrective actions, and long-term planning—to address facade vulnerabilities in urban buildings (Madureira et al., 2017). Yet, many studies focus more on structural or

material aspects rather than on operational and contextual risks that emerge during maintenance works. From a facility management perspective, facade maintenance is often constrained by limited access, funding uncertainties, and health and safety risks to workers. These issues are amplified in public buildings, where rigid bureaucracy and user presence further complicate execution. Athauda et al. highlight those occupational risks in facade work, especially under climate stressors, as a growing concern in urban public building projects (Athauda et al., 2023).

In the Indonesian context, maintenance of government buildings often suffers from underfunding, reactive approaches, and a lack of specialized knowledge among service providers. Despite the strategic role these facilities serve, maintenance practices are rarely informed by systematic risk management frameworks. Particularly for modern facade materials like Alucobond—which require specific handling, weatherproofing expertise, and elevation access protocols—the absence of proactive risk identification increases the probability of operational failures, financial overruns, and worker safety hazards.

Moreover, existing literature on risk management in building maintenance in Southeast Asia, especially from the perspective of service providers, remains scarce. Most academic attention is directed at design, construction, or client-side project management, leaving a critical knowledge gap in how risks manifest during routine or scheduled maintenance tasks. From a methodological standpoint,

international standards such as ISO 31000:2018 and ISO 31010:2019 offer comprehensive frameworks for risk identification, analysis, and treatment. However, these are rarely adapted in small to medium-scale maintenance operations in public sector projects. Identifying risks early—particularly using qualitative techniques such as open-ended interviews—can offer critical context-sensitive insights that are often lost in checklist-based approaches. As Chew and Gan (2022) suggest, facade inspection and maintenance should evolve to accommodate both environmental and operational complexity, especially in high-rise settings (Chew & Gan, 2022).

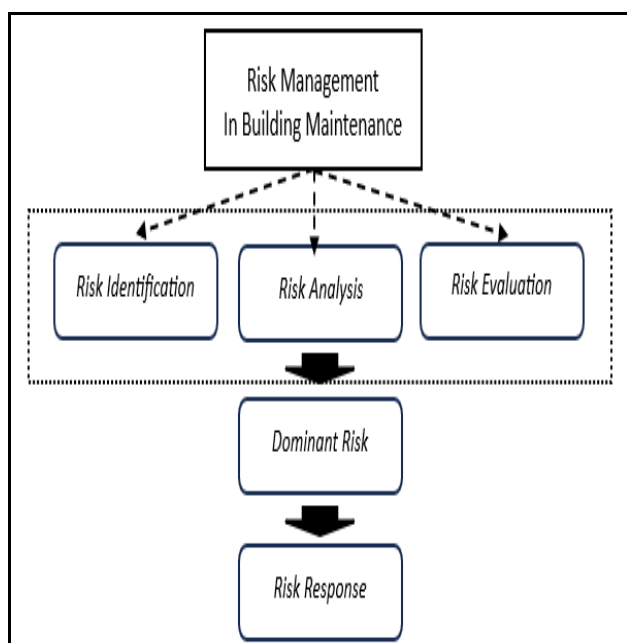


Figure 1. Conceptual Framework

This study aims to address these gaps by qualitatively identifying risks encountered during the maintenance of Alucobond facade panels at the headquarters of Badan Narkotika Nasional (BNN) in Jakarta. Using open-ended interviews with field professionals, the study develops an empirical list of risks categorized across technical, financial, environmental, occupational, and operational domains. The findings aim to provide a foundation for more effective risk mitigation planning and to support evidence-based decision-making in the maintenance of strategic public assets. The results are expected to benefit both practitioners and policymakers in shaping safer, more resilient maintenance practices for government buildings.

II. METHODOLOGY

This study applied a qualitative exploratory case study approach to identify potential risks encountered during the maintenance of Alucobond wall panels at the Badan Narkotika Nasional (BNN) building in Jakarta, Indonesia. Given the limited availability of credible scientific literature addressing specific risks in Alucobond panel maintenance,

especially within the Southeast Asian context, a qualitative design was deemed most appropriate for the initial phase of risk identification. The case study design enables a deep, contextualized understanding of operational phenomena and is widely used in construction management and facilities maintenance research (Yin, 2018).

Data collection was conducted through semi-structured interviews utilizing a written questionnaire instrument. The instrument included both background questions on respondent profiles and a central open-ended question designed to elicit in-depth, experience-based responses. The main question posed to participants was: “Based on your experience or knowledge, what are the potential risks faced by contractors during facade maintenance at the BNN building, particularly in maintaining Alucobond wall panels?” Open-ended questions have been strongly recommended in risk identification studies for their ability to surface detailed, contextual insights that are often missed in closed-format surveys or checklists (Joubert & Pretorius, 2020; Kassem & Hamzah, 2019; [ISO 31010, 2019]). The interviews were conducted with six respondents, each selected based on strict inclusion criteria. Participants were required to have a minimum of five years’ experience in facade or high-access building maintenance, hold relevant technical or safety certifications, and occupy supervisory roles such as project manager, senior technician, or site supervisor. These criteria ensured that the data collected reflected practical knowledge grounded in real-world operational settings. The interviews were conducted in Bahasa Indonesia, transcribed, and translated into English to facilitate structured analysis.

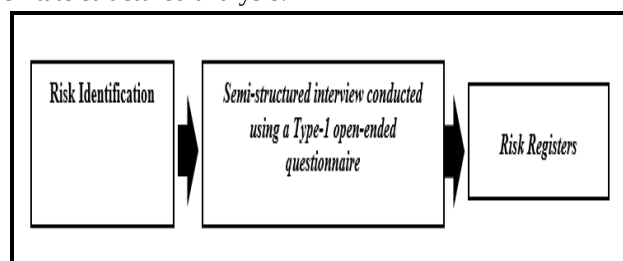


Figure 2. Method Diagram

The data analysis employed thematic content analysis following the six-step method proposed by Ebekozi et al. (2024). Interview responses were initially coded inductively to identify raw risk statements, then clustered into broader categories. A deductive framework based on ISO 31010 was also applied to structure the emerging risks into five main domains: technical, occupational safety and health (OSH), financial, environmental, and operational. The combination of inductive and deductive strategies enabled both discovery of novel risks and alignment with established risk typologies used in international standards (Cantelmi et al., 2021).

To enhance the rigor and trustworthiness of the study, the research adopted quality assurance techniques as outlined by Ahmed (2024). These included credibility strategies such as

purposive sampling and member checking, dependability through documentation of coding decisions (audit trails), transferability via rich descriptions of the case setting, and confirmability through triangulation with supporting documentation such as site logs and maintenance reports (Cruz-Roveda, 2022). The output of this methodological process was a preliminary list of context-specific risks that may affect the contractor’s operations during facade maintenance work, which will serve as a foundation for future risk analysis and mitigation strategies.

III.RESULT AND DISCUSSION

This study identified 28 risk items associated with the maintenance of Alucobond wall panels at the Badan Narkotika Nasional (BNN) building in Jakarta, based on open-ended interviews with six experienced practitioners. The risks span technical, safety, environmental, operational, and financial dimensions, reflecting the complex nature of facade maintenance in public-sector buildings.

Technical risks such as damaged anchor points, incorrect tool use, unstable work platforms, and undetected panel defects were consistently mentioned. These findings align with Eschenasy (2022), who emphasized that facade failures often originate from concealed or aging mechanical faults. Respondents also reported cases where prior repair records were unavailable, complicating inspections and increasing the likelihood of rework. Occupational safety risks dominated the interviews. Practitioners highlighted improper use of rope access systems, inadequately secured safety harnesses, and insufficient PPE. Fatigue from extended shifts and deadline pressure was cited as a frequent cause of human error. These concerns echo the findings of Athauda et al. (2023), who noted that façade maintenance work—especially at elevation—poses high exposure to physical and psychological hazards (Athauda et al., 2023). Environmental risks also emerged prominently. Respondents cited frequent interruptions due to rain and wind, poor air quality, and challenges in managing construction waste. Such issues are consistent with Madureira et al. (2017), who argued that maintenance planning must integrate climate and site-specific pollution risks to improve facade durability and worker safety (Madureira et al., 2017). Operational challenges included restricted work hours due to building occupancy, weak internal coordination with facility managers, and delays caused by unclear authority over maintenance decisions. These risks are common in government buildings, where multi-stakeholder involvement can hinder responsiveness and increase exposure to scheduling and safety lapses. Similar challenges were reported by Umeokafor et al. (2023) in their study of public projects in developing countries (Umeokafor et al., 2023). Financial risks, although less visible, were described as highly influential. Delayed payments, underestimated budgets, and high equipment costs were reported to cause

project delays or pressure teams into unsafe acceleration of tasks. These observations are supported by Khodabakhshian et al. (2023), who demonstrated that insufficient maintenance funding often leads to reactive practices that compromise both asset quality and worker safety (Khodabakhshian et al., 2023).

Importantly, the qualitative, open-ended approach adopted in this study proved valuable in surfacing latent and site-specific risks that may not be identified through standardized checklists. The thematic insights gained from practitioner narratives emphasize the importance of field-based knowledge in early-stage risk mapping. This approach aligns with recommendations by Cantelmi et al. (2021), who noted that qualitative assessments are critical for understanding nuanced risk contexts in infrastructure maintenance (Cantelmi et al., 2021).

In summary, the risks identified in this study reflect both systemic issues (such as budget uncertainty and access limitations) and site-specific operational concerns. The findings highlight the need for integrated planning that considers technical readiness, worker protection, environmental constraints, and institutional coordination. These insights provide a valuable foundation for future efforts in risk quantification, mitigation design, and policy development for facade maintenance in government buildings.

CONCLUSIONS

This study has identified a comprehensive set of 28 risks associated with the maintenance of Alucobond wall panels at the BNN building in Jakarta, using a qualitative, practitioner-driven approach based on open-ended interviews. The findings highlight the multifaceted nature of facade maintenance risks—spanning technical failures, occupational safety concerns, environmental challenges, operational inefficiencies, and financial pressures.

Among the key insights is the strong interrelation between technical and safety risks, where issues such as faulty anchoring or inadequate supervision directly elevate the likelihood of accidents. The study also confirms that contextual risks—such as weather, limited site access, and communication breakdowns—are not secondary concerns but integral factors that must be addressed in any effective risk mitigation strategy.

The qualitative methodology used in this research has proven effective in surfacing latent and site-specific hazards that may not be captured through conventional risk checklists. By engaging experienced professionals through open-ended questions, this study provides a grounded, field-informed risk inventory that reflects the realities of facade maintenance in high-rise public buildings.

Practically, the results offer a useful reference for contractors, facility managers, and policymakers in Indonesia and similar contexts. The identified risks can

serve as the basis for structured risk assessment tools, development of safety protocols, and improved coordination mechanisms in facade maintenance projects. Future research should expand on this work by conducting quantitative risk evaluations and exploring mitigation strategies tailored to each risk domain.

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