

Risk Occurrence and Stakeholder Responsibility in Government-Led Vertical Housing Projects: Evidence from Indonesia

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Abstract

Vertical housing construction projects are inherently complex due to the involvement of multiple stakeholders, dense urban environments, and strict performance requirements related to cost, schedule, and quality. In government-led housing programs, these complexities increase project exposure to various construction risks that may undermine project outcomes if not properly managed. This study investigates the occurrence of construction risks and the distribution of stakeholder responsibility in government-led vertical housing projects in Indonesia. The study is based on a structured questionnaire administered to eight purposively selected key informants with direct experience in five public vertical housing projects, namely Kemayoran Athletes' Vertical Housing, Pasar Rumpit Vertical Housing, Vertical Housing Project in the New Capital City (IKN), Kedaung Baru Vertical Housing, and Muhammadiyah University Vertical Housing. Data were analyzed using a descriptive approach to identify dominant risk categories and stakeholder involvement patterns. The results indicate that scope-related risks, schedule delays, and cost overruns are the most frequently occurring risks, with responsibility predominantly associated with project owners, contractors, and supervisory entities. The findings also reveal that unclear role delineation and fragmented coordination contribute to the persistence of these risks across project stages. In conclusion, construction risks in vertical housing projects are closely linked to stakeholder responsibility structures and coordination practices. The study recommends strengthening risk-based coordination mechanisms and improving structured communication among key stakeholders to support more effective risk mitigation and enhance project performance in government-led vertical housing development.

Keywords: Construction Risk, Stakeholder Responsibility, Vertical Housing Projects, Project Communication

INTRODUCTION

Vertical housing construction projects are inherently complex undertakings due to the simultaneous integration of technical, managerial, contractual, and social dimensions within spatially constrained environments. Residential multi-storey developments typically involve multiple stakeholders, fragmented supply chains, and strict performance requirements related

to cost, schedule, quality, and safety (Arditi & Gunaydin, 1997; Darko et al., 2018). These characteristics expose such projects to a wide spectrum of risks that may compromise project objectives if not adequately identified and managed.

Construction risk has long been conceptualized as a multidimensional phenomenon influenced by technical uncertainty, organizational arrangements, market dynamics, and human behavior (Ashley et al., 1988; Hastak & Shaked, 2000). Prior research consistently reports that scope ambiguity, design modifications, resource shortages, price escalation, schedule disruption, quality failures, and stakeholder disputes constitute dominant risk categories in construction projects (An & Chen, 2009; Gransberg & Shane, 2013). In vertical housing projects, these risks are further amplified by repetitive production processes, dense urban sites, and the involvement of public institutions that introduce additional regulatory and administrative complexity (Arditi & Gunaydin, 1997; Li et al., 2020).

To address such challenges, extensive research has developed analytical frameworks for construction risk identification, assessment, and mitigation. These range from multi-attribute decision models (Ashley et al., 1988) and fuzzy-based or system-dynamics approaches (Ford & Sterman, 1998; Jato-Espino et al., 2020), to expert aggregation and probabilistic techniques (Ebrahimnejad et al., 2019; Zayed et al., 2008). Empirical investigations across tunnels, irrigation dams, transportation infrastructure, and high-rise buildings consistently demonstrate that unmanaged or poorly coordinated risks are associated with cost overruns, schedule delays, quality degradation, and prolonged disputes (Chen & Li, 2011; Khazaeni et al., 2012; Fang et al., 2022).

Nevertheless, construction risk is not merely a technical or analytical issue. Human and organizational dimensions strongly shape how risks are perceived, interpreted, and acted upon during project execution. Albert et al. (2018) showed that contextual and cognitive conditions significantly affect hazard recognition and safety risk perception, thereby influencing decision quality in construction settings. Likewise, fragmented coordination and informal communication structures have been shown to exacerbate uncertainty and weaken collective risk response (Dainty et al., 2003; Gürçanlı & Müngen, 2024).

Communication among project stakeholders has therefore emerged as a critical determinant of project performance in complex construction environments. Effective communication facilitates scope clarity, alignment of expectations, timely approvals, and coordinated responses to emerging problems (Chen et al., 2012; El-Sawalhi et al., 2020). Conversely, deficiencies in leadership communication, information transparency, and stakeholder engagement suppress feedback mechanisms, delay corrective actions, and intensify conflict, thereby increasing residual project risks (Alhaddad et al., 2023; Müller & Lecoeuvre, 2014).

Despite the breadth of this literature, most studies continue to treat construction risk management and project communication as parallel but weakly connected domains. Risk-oriented research prioritizes modeling accuracy, identification techniques, and quantitative assessment tools, whereas communication studies tend to focus on leadership behavior, information networks, or performance indicators without explicitly linking them to empirical risk occurrence dynamics (Ashley et al., 1988; El-Sawalhi et al., 2020). This fragmentation limits understanding of how risks actually materialize and persist within day-to-day project practices,

especially in government-led vertical housing projects that require coordination among multiple public and private actors.

Moreover, existing studies rarely examine how specific stakeholders are empirically associated with particular risk categories over the course of project implementation. While cooperative risk allocation frameworks emphasize aligning risk ownership with managerial capability (Gransberg & Shane, 2013), there remains limited empirical evidence on the distribution of stakeholder responsibility for construction risks in public sector residential developments. This gap is particularly relevant in developing-country contexts, where institutional capacity, regulatory complexity, and communication barriers further complicate project governance.

In response to these gaps, this study aims to analyze the occurrence of construction risks and the distribution of stakeholder responsibility in government-led vertical housing projects in Indonesia. Specifically, the objectives of this paper are to:

1. Identify dominant construction risk categories and examine how responsibility for these risks is distributed among key stakeholders during the development of public vertical housing projects; and
2. Provide an empirical foundation for integrating risk-based perspectives with communication-oriented strategies as an embedded mechanism for enhancing coordination, risk recognition, and project performance.

By positioning communication as an integral mechanism underpinning effective risk response rather than as an isolated variable, this study contributes empirical evidence to support more holistic approaches to managing complexity and uncertainty in vertical housing development.

METHOD

This study employs a descriptive research approach to examine the occurrence of project risks in government-led vertical housing development. Data were collected through a structured questionnaire administered to eight purposively selected key informants based on their professional involvement in vertical housing projects managed by the Ministry of Housing and Human Settlements (MHHS). The informants were chosen for their substantial experience in project management, supervision, contracting, governance, and internal control functions, with professional backgrounds ranging from 8 to more than 15 years. In addition to expert input, the study incorporates five vertical housing projects as case study contexts representing different implementation settings and project characteristics within MHHS programs.

The collected data were analyzed using descriptive statistical techniques by aggregating responses to identify the frequency and relative prominence of risk types across project phases. Two main analytical outputs were developed, namely a graphical representation of the annual occurrence of project risks and a distribution of stakeholder responsibilities across major risk categories. These visualizations were constructed by consolidating questionnaire responses, categorizing risks into predefined groups, and calculating proportional values to facilitate comparison, which are subsequently discussed in relation to project risk management and coordination practices in Section 3.

RESULTS AND DISCUSSION

Risk Occurrence in Government-Led Vertical Housing Projects

Government-led vertical housing projects are characterized by high public accountability, complex stakeholder configurations, and frequent interaction between technical execution and administrative decision-making (Arditi & Gunaydin, 1997; Darko et al., 2018). Consistent with the multiattribute nature of construction risk, the analysis groups recurring risks into scope, schedule, cost, quality, resource, and stakeholder-related categories (Ashley et al., 1988; Gransberg & Shane, 2013; Mohamed et al., 2021).

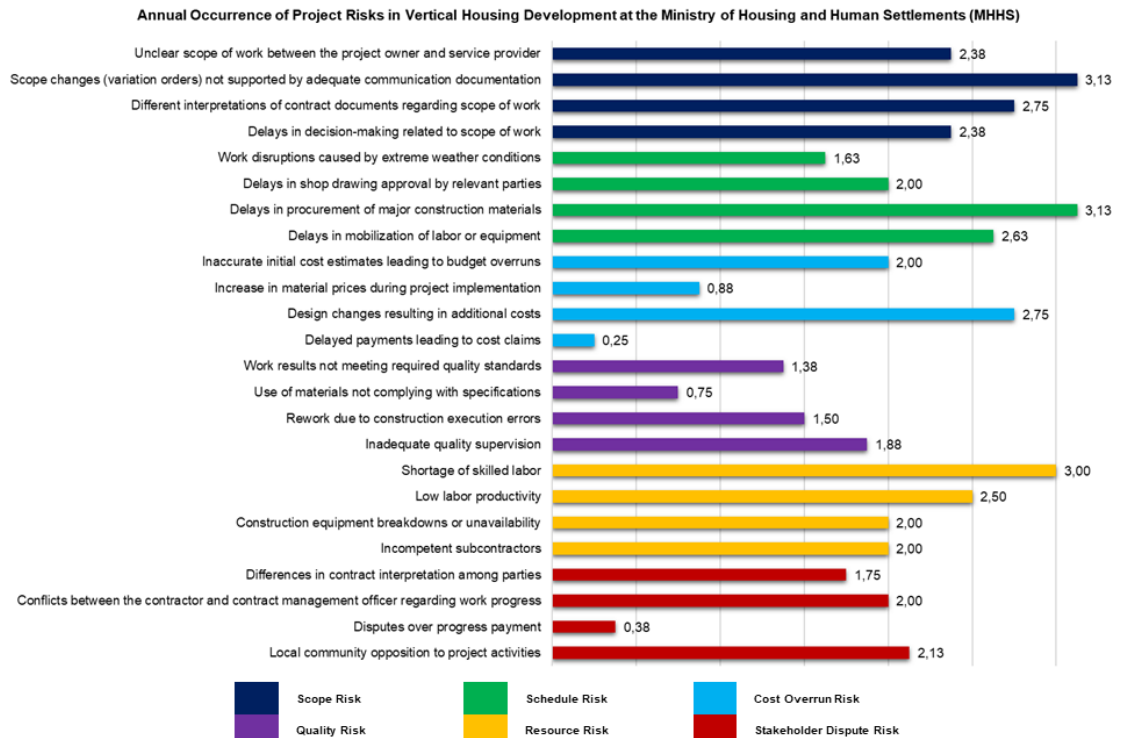


Figure 1. Annual Occurrence of Project Risks in Government-Led Vertical Housing Projects

As shown in Figure 1, scope-related risks dominate, reflecting persistent ambiguity in work boundaries, documentation of variation orders, and contract interpretation (Ashley et al., 1988; Gransberg & Shane, 2013; Wang et al., 2000). Schedule-related risks also recur frequently, particularly delays associated with approval processes, procurement, mobilization, and weather effects, confirming the sensitivity of building projects to coordination readiness and contextual conditions (Khazaeni et al., 2012; Zhao et al., 2014; Kim & Lee, 2015; Kim & Lee, 2014).

Cost-related risks—such as inaccurate initial estimates, material price escalation, and additional costs due to design changes—are closely intertwined with scope and schedule risks (Mohamed et al., 2021; Zayed et al., 2008; Kim & Reinschmidt, 2009; Hastak & Shaked, 2000).

Quality-related risks emerge at moderate levels, reflecting deficiencies in material compliance and execution control, which are influenced by both management discipline and human factors (Mohamed et al., 2021; Zhao et al., 2014; Albert et al., 2018; Zou et al., 2017).

Resource-related risks, including labor shortages, productivity issues, and equipment constraints, further reinforce the importance of operational readiness and logistics integration in residential construction (Jin et al., 2021; Lawson et al., 2014; Yildiz et al., 2014; Arditi & Gunaydin, 1997). Finally, stakeholder-related risks—such as disputes over payments and conflicts between project actors—highlight the interactional nature of risk in public housing, where misalignment of expectations and ineffective information exchange may escalate minor issues into formal disputes (Gransberg & Shane, 2013; Wang et al., 2000; El-Sawalhi et al., 2020; Dainty et al., 2003; Alhaddad et al., 2023; Zhou et al., 2023; Gürcanli & Mungen, 2024).

Stakeholder Responsibilities across Project Risk Categories

Clarifying responsibility is critical in multi-actor construction environments because unclear allocation weakens accountability and intensifies disputes (Ashley et al., 1988; Gransberg & Shane, 2013; Wang et al., 2000). As illustrated in Figure 2, responsibilities for managing risks are distributed across governance and operational layers rather than concentrated in a single party.

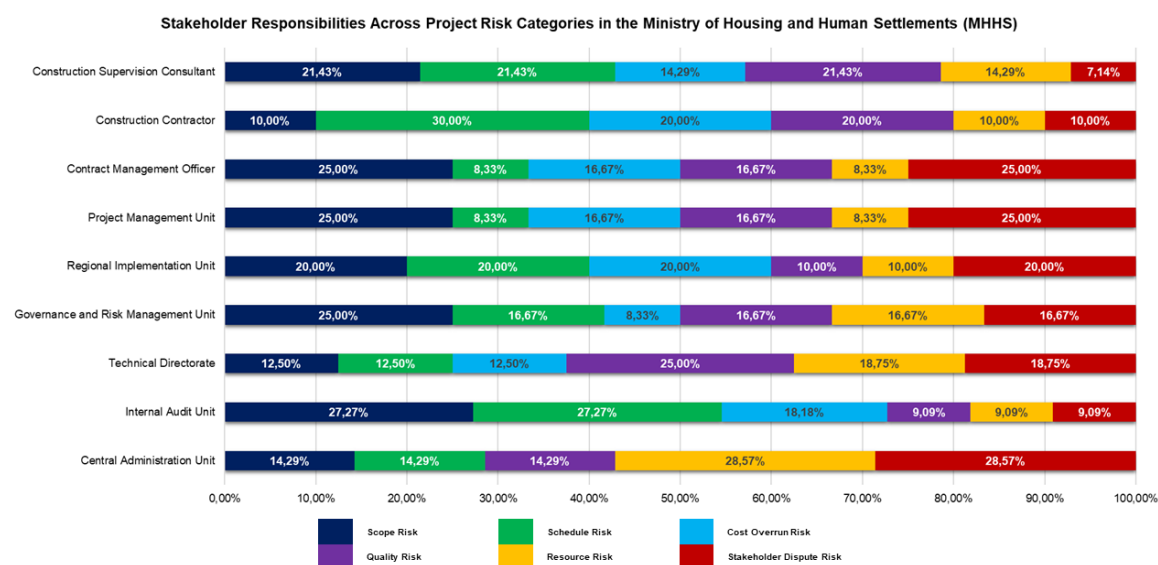


Figure 2. Stakeholder Responsibilities across Project Risk Categories in Government-Led Vertical Housing Projects

Scope-related risks are primarily associated with governance and approval actors who control contract interpretation, documentation, and authorization processes (Gransberg & Shane, 2013; Wang et al., 2000; Ashley et al., 1988). Schedule risks span planning, approvals, and field execution, confirming that delays in vertical housing are rarely controlled unilaterally

by contractors and must be managed through cross-actor coordination (Kim & Lee, 2014; Khazaeni et al., 2012; Kim & Lee, 2015; Zhao et al., 2014; Ford & Sterman, 1998).

Cost risks are jointly borne by governance actors responsible for budgeting and approval decisions and implementing parties responsible for procurement and productivity, reflecting the interdependence between financial control and operational execution (Mohamed et al., 2021; Zayed et al., 2008; Kim & Reinschmidt, 2009; An & Chen, 2009; Hastak & Shaked, 2000). Quality risks are closely associated with on-site implementers and supervisors, but are also shaped by human and cognitive factors that influence performance (Arditi & Gunaydin, 1997; Mohamed et al., 2021; Albert et al., 2018; Zou et al., 2017).

Resource-related risks are primarily operational but remain influenced by managerial decisions and production readiness, consistent with dynamic risk management perspectives (Jin et al., 2021; Ford & Sterman, 1998; Zhao et al., 2014; Hu et al., 2023). Stakeholder-related risks, including payment disputes and community resistance, are inherently shared because they arise at the interface between governance authority, contract administration, and execution performance (Gransberg & Shane, 2013; Wang et al., 2000; Dainty et al., 2003; El-Sawalhi et al., 2020; Alhaddad et al., 2023; Gürcanli & Müngen, 2024).

Implications of Risk Patterns and Stakeholder Roles in Vertical Housing Projects

The dominance of scope- and schedule-related risks confirms that ambiguity in requirements and delays in approvals remain central sources of uncertainty in government-led vertical housing projects (Ashley et al., 1988; Gransberg & Shane, 2013; Kim & Lee, 2015; Khazaeni et al., 2012). These risks propagate downstream into cost and quality problems, reinforcing the interdependent nature of construction risk (Mohamed et al., 2021; Zayed et al., 2008).

The distribution of responsibilities indicates that contractors and supervision consultants mainly address operational risks, while government units are more closely linked to scope governance and stakeholder management (Ashley et al., 1988; Ebrahimnejad et al., 2019). However, this dispersion also introduces coordination challenges, particularly when risks span multiple organizational boundaries and require shared interpretation (Dainty et al., 2003; Chen et al., 2012). Differences in risk perception, leadership behavior, and communication practices further shape how early warning signals are handled in hierarchical project environments (Albert et al., 2018; Zou et al., 2017; Alhaddad et al., 2023; Gürcanli & Müngen, 2024).

Taken together, the findings indicate that risk mitigation effectiveness depends not only on analytical tools—such as fuzzy logic, system dynamics, and expert aggregation (Ford & Sterman, 1998; Jato-Espino et al., 2020; Ebrahimnejad et al., 2019)—but also on how risk-related information is exchanged, interpreted, and acted upon across stakeholders. Strengthening coordination mechanisms and ensuring consistent information flow are therefore essential to reducing the persistence and recurrence of risks in public-sector vertical housing development.

CONCLUSION

This study provides a structured understanding of construction risk characteristics in government-led vertical housing projects by synthesizing empirical findings on risk occurrence and stakeholder distribution. The results confirm that risks related to scope changes, schedule delays, cost overruns, and quality deficiencies consistently dominate project execution and interact across technical, managerial, contractual, and external dimensions. These findings indicate that project performance is shaped not by isolated technical failures, but by cumulative and interconnected risk mechanisms embedded within project systems.

The analysis further reveals an uneven distribution of risk exposure among stakeholders, with the government as project owner retaining strategic and regulatory risks, while contractors and consultants predominantly carry operational and execution-related risks. This asymmetric configuration reflects the structural nature of public-sector housing delivery, where policy mandates, regulatory compliance, and funding accountability remain within public institutions, whereas private actors operationalize these objectives on site. This pattern supports prior observations that construction risk management in public projects must be approached as a multi-actor process rather than a contractor-centered responsibility (Ashley et al., 1988; Gransberg & Shane, 2013).

Finally, the study demonstrates that interactions among risks—rather than individual risk magnitude—play a decisive role in shaping overall project vulnerability. Schedule risks are shown to intensify cost and quality risks, while planning and design uncertainties propagate downstream into construction execution and contract administration. This aligns with system-oriented perspectives emphasizing feedback loops and dynamic risk interactions throughout the project lifecycle (Ford & Sterman, 1998; Fang et al., 2022). Consequently, static and fragmented risk management approaches are insufficient for vertical housing projects, underscoring the need for coordinated and adaptive risk governance frameworks in public-sector residential development.

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