



Analysis Factors Causing Delays in Construction Projects for Building Construction in the City of Bengkulu (A Conceptual Study Based on a Literature Review)

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Abstract

Construction project delays are common challenges in building development across Indonesian cities, including Kota Bengkulu, where infrastructure growth in education, government, and commercial sectors continues to increase. This study aims to conceptually identify potential factors causing delays in building construction projects in Kota Bengkulu based on literature findings from previous studies in various Indonesian cities and their relationship with local geographical, climatic, and seismic characteristics. A narrative literature review method was employed by analyzing national and international scientific publications related to construction project delay factors. The results classify delay factors into six aspects: planning and scheduling, project scope and documentation, organization/coordination/communication, resource availability, financial conditions, and external/environmental factors. The characteristics of Kota Bengkulu as a humid tropical region with high rainfall intensity throughout most of the year and an active seismic zone due to tectonic plate interaction along the Indian Ocean coast indicate potential risks, particularly related to environmental conditions and resource availability. This conceptual study provides an initial framework for understanding construction delay mechanisms in Kota Bengkulu; however, empirical research involving actual project data is required to validate the identified factors.

Keywords: Building Construction Projects, Causal Factors, Construction Delay, Kota Bengkulu, Literature Review.



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INTRODUCTION

The construction industry has become a fundamental component of global economic development and urban transformation, as infrastructure availability increasingly determines the capacity of cities to accommodate population growth, public services, and economic activities. The increasing complexity of construction projects has encouraged researchers and practitioners to focus on project performance management, particularly in controlling the three primary success indicators: time, cost, and quality. However, achieving these indicators simultaneously remains challenging because construction projects are exposed to various uncertainties originating from technical, managerial, financial, environmental, and organizational aspects. Construction delays represent one of the most frequently encountered problems in the global construction sector because they can disrupt project schedules, increase expenditure, reduce productivity, and create conflicts among project stakeholders (Sanni-Anibire et al., 2022). The persistent occurrence of delays demonstrates that effective schedule management requires a comprehensive understanding of the factors influencing project execution rather than merely relying on conventional planning approaches.

Previous studies have indicated that construction delays are multidimensional phenomena influenced by interactions among internal project factors and external conditions surrounding the construction environment. A systematic review of construction office building delays identified that inadequate planning, ineffective project management, financial limitations, design-related issues, and coordination failures represent recurring causes affecting project completion performance (Aldammak et al., 2025). Similar findings were reported in Indonesian construction projects, where delays were associated with contractor performance, material procurement problems, changes in project requirements, labor productivity, and weaknesses in supervision mechanisms (Jamal & Ian, 2025).

Research conducted in different regional contexts has also demonstrated that the dominant causes of delays vary according to geographical conditions, project characteristics, and institutional practices, indicating that delay analysis requires contextual evaluation rather than universal assumptions (Rauzana & Dharma, 2022). This variation highlights the importance of developing location-specific conceptual frameworks that consider both general construction management factors and regional characteristics influencing project implementation.

Kota Bengkulu, as the capital city of Bengkulu Province, has experienced continuous growth in building infrastructure development, including government buildings, educational facilities, commercial structures, and residential projects. This development requires construction projects to be implemented efficiently by maintaining balance among schedule performance, cost control, and quality achievement. Nevertheless, building construction projects in Kota Bengkulu remain vulnerable to delays, which may subsequently contribute to cost escalation, inefficient resource utilization, and reduced project performance (Jamal & Ian, 2025). Previous research in Kota Bengkulu has shown that construction projects experience challenges related to time overrun and cost overrun due to interconnected factors involving planning, financial management, and implementation processes (Trianshy et al., 2022). Furthermore, studies on construction performance evaluation in Bengkulu emphasize that systematic monitoring and early identification of project deviations are essential approaches for improving schedule control and minimizing delay risks (Agustiawan et al., 2026).

The geographical and climatological characteristics of Kota Bengkulu represent important contextual factors that may influence the occurrence of construction delays in building projects. Kota Bengkulu is located on the western coast of Sumatra facing the Indian Ocean and has a tropical humid climate characterized by relatively high rainfall intensity and a prolonged wet season period throughout the year (Pemerintah Kota Bengkulu, n.d.). These climatic conditions potentially affect construction productivity, particularly for activities involving earthworks, structural works, material transportation, and other outdoor operations that require stable environmental conditions. Weather-related disruptions have been identified as external factors capable of reducing working efficiency, altering construction methods, and extending project completion periods when adequate mitigation strategies are not implemented (Sanni-Anibire et al., 2022). Furthermore, Kota Bengkulu is situated in a seismically active area influenced by tectonic interactions, requiring the implementation of earthquake-resistant construction standards that may increase the complexity of structural planning, design detailing, and supervision processes. The combination of environmental uncertainty and technical requirements indicates that construction delay analysis in Kota Bengkulu requires consideration of both general project management factors and location-specific conditions.

Previous studies across different regions in Indonesia have identified various factors contributing to construction delays, although the dominant factors differ according to project characteristics and regional circumstances. Research on building construction projects in Kabupaten Badung found that delays were associated with inadequate planning, limited resources, and coordination problems among project stakeholders (Lestari et al., 2022). Studies conducted in Kota Balikpapan revealed that contractor performance, material management, financial constraints, and supervision effectiveness significantly influenced construction schedule performance (Putra et al., 2023). Similar findings were reported in building projects in Maluku Tengah, where delays were related to scheduling problems, resource availability, and managerial weaknesses during project implementation (Huwae et al., 2024). Research on airport facilities and laboratory rehabilitation projects further demonstrated that delays emerge from complex interactions between technical limitations, administrative procedures, procurement issues, and stakeholder coordination mechanisms (Dadiara et al., 2024; Fadlullah et al., 2025). However, most previous studies have primarily focused on identifying dominant factors within specific project cases, resulting in limited conceptual integration of delay factors across different construction environments. Recent systematic literature studies have emphasized the necessity of synthesizing construction delay factors from various studies to establish a more comprehensive understanding of delay mechanisms, particularly for building construction projects (Ilham & Khiyana, 2026).

The limited availability of studies specifically examining the causes of building construction delays in Kota Bengkulu creates an important research gap that requires further investigation. Previous research in Bengkulu has mainly examined cost overrun, time overrun, and project performance control aspects, while a comprehensive conceptual analysis focusing on delay-causing factors in building

construction projects remains limited (Trianshy et al., 2022). This study is positioned as a conceptual literature-based investigation that identifies, classifies, and synthesizes delay factors derived from previous research findings and contextualizes their relevance to building construction projects in Kota Bengkulu. The research aims to provide a theoretical foundation for understanding potential delay mechanisms and to support the development of future empirical studies through the formulation of relevant variables and conceptual relationships. The contribution of this study lies in expanding construction delay literature by integrating general project management factors with regional characteristics, while providing practical insights for project stakeholders in developing preventive strategies to improve construction schedule performance in Kota Bengkulu.

RESEARCH METHODS

This study employs a non-empirical research design using a conceptual literature review approach with a narrative descriptive framework. The research does not involve experimental activities, primary data collection, or system implementation, but focuses on developing a conceptual model of factors causing delays in building construction projects by synthesizing findings from previous studies. The conceptual framework is constructed by identifying recurring delay factors reported in construction management literature, including managerial, financial, technical, resource, contractual, and external environmental factors, which are subsequently contextualized based on the characteristics of building construction projects in Kota Bengkulu. Previous studies regarding construction delays in Indonesia have demonstrated that delay factors are multidimensional and require integration from various project perspectives to obtain a comprehensive understanding (Jamal & Ian, 2025). The literature sources consist of national and international journal articles, construction management books, and official regional information related to the geographical and climatological conditions of Kota Bengkulu. The selection process involves identifying relevant keywords related to construction delays, building projects, time overrun, and construction risk factors, followed by screening literature based on topic relevance, publication period, and contribution to the development of the conceptual framework. The extracted factors are then classified and synthesized into several categories to establish a conceptual relationship between general construction delay factors and potential location-specific influences in Kota Bengkulu.

The analytical procedure in this study is conducted through qualitative synthesis and conceptual analysis rather than statistical testing or experimental validation. The review process involves comparing findings from previous studies conducted in different Indonesian regions to identify similarities, differences, and dominant patterns of delay-causing factors across various construction contexts. Research from different locations indicates that although delay factors such as poor planning, resource constraints, financial problems, and coordination failures frequently appear, their significance may vary depending on regional conditions and project characteristics (Rauzana & Dharma, 2022). The conceptual analysis further incorporates environmental considerations, including rainfall conditions and geographical characteristics of Kota Bengkulu, to evaluate their potential relationship with construction schedule disruption. Previous research has shown that regional characteristics influence construction performance because external conditions may interact with internal project management factors during implementation (Sanni-Anibire et al., 2022). The validation of the conceptual framework is conducted through cross-reference analysis among selected literature sources to ensure consistency of identified factors, while the evaluation criteria are based on the frequency of factor occurrence, relevance to building construction projects, and applicability to the Kota Bengkulu construction environment. The resulting framework is expected to serve as a theoretical basis for future empirical research involving field surveys, statistical modelling, or quantitative validation of construction delay factors.

RESULTS AND DISCUSSION

Geographical and Environmental Characteristics of Kota Bengkulu as Contextual Factors Affecting Construction Delays

Kota Bengkulu possesses geographical and environmental characteristics that provide an important contextual basis for understanding potential delays in building construction projects. As the capital city of Bengkulu Province, the region has experienced continuous infrastructure development involving government buildings, educational facilities, commercial structures, and residential projects. The implementation of construction activities in specific locations is influenced not only by internal

project management capabilities but also by external conditions associated with the physical environment. Previous studies in construction management have emphasized that environmental factors represent an important category of external risks that may affect project schedule stability when interacting with technical and managerial limitations (Sanni-Anibire et al., 2022). This perspective indicates that regional characteristics should be incorporated into the conceptual analysis of construction delay factors rather than being treated as independent variables outside project management considerations. Understanding the environmental context of Kota Bengkulu therefore provides an essential foundation for identifying potential risks affecting building construction performance.

From a geographical perspective, Kota Bengkulu is located on the western coastal area of Sumatra Island and directly faces the Indian Ocean, with relatively flat topographical conditions dominated by areas with slope gradients between 0–15% (Pemerintah Kota Bengkulu, n.d.). These geographical characteristics may influence construction implementation, particularly regarding site preparation, construction methods, and environmental risk management during project execution. Coastal areas generally possess specific conditions that may affect material durability, drainage management, and construction site control during building activities. Although relatively flat terrain may support easier mobilization and construction operations, environmental exposure remains a potential challenge when adequate preventive planning is not implemented. Previous construction delay studies have demonstrated that site-related conditions and external environmental factors may act as triggering factors that intensify internal project problems, particularly when planning and risk management practices are insufficient (Rauzana & Dharma, 2022). Therefore, the geographical characteristics of Kota Bengkulu represent a contextual element that should be considered when developing a conceptual framework for construction delay analysis.

The climatic condition of Kota Bengkulu represents one of the environmental factors that has a strong conceptual relationship with construction schedule performance. The city has a tropical humid climate characterized by relatively high rainfall intensity, with monthly rainfall ranging from approximately 200–600 mm and rainfall occurrences reaching 10–21 days per month (Pemerintah Kota Bengkulu, n.d.). High rainfall intensity may reduce effective working periods, particularly for construction activities that depend on stable weather conditions, such as earthworks, structural works, concrete activities, and external building operations. Weather-related disruptions have been recognized as one of the major external challenges in construction projects because unpredictable environmental conditions may reduce labor productivity, limit equipment utilization, and require schedule modifications (Sanni-Anibire et al., 2022). These conditions indicate that construction scheduling strategies in Kota Bengkulu require adaptation to local climatic patterns to minimize potential disruptions. The integration of climate considerations into project planning becomes particularly relevant for building projects where outdoor activities represent a significant proportion of the construction process.

Table 1. Geographical and Environmental Characteristics of Kota Bengkulu Relevant to Building Construction Projects

Environmental Aspect	Characteristics of Kota Bengkulu	Potential Impact on Construction Projects
Geographic location	Coastal area facing the Indian Ocean	Higher exposure to environmental conditions and site risks
Topography	Relatively flat area with slope gradients of 0–15%	Influences site preparation and construction planning
Climate condition	Tropical humid climate with high rainfall intensity	Reduced productivity and disruption of outdoor activities
Seismic condition	Located in an active tectonic region	Additional structural planning and quality control requirements

In addition to climatic conditions, seismic characteristics represent another environmental aspect that may influence construction complexity in Kota Bengkulu. The region is located within an active tectonic area associated with the interaction between the Indo-Australian Plate and the Eurasian

Plate, resulting in considerable earthquake vulnerability. Earthquake risk does not necessarily generate direct construction delays during every project stage, but it may increase technical requirements related to structural design, approval procedures, and construction quality supervision. Building projects in earthquake-prone regions require more detailed structural planning and stricter implementation controls to ensure compliance with safety standards. Research on construction delays has indicated that technical changes and coordination problems among project stakeholders frequently contribute to extended project durations (Jamal & Ian, 2025). This condition positions seismic characteristics as a contextual factor that may indirectly influence project schedules through increased technical complexity and coordination requirements.

The synthesis of geographical and environmental characteristics indicates that external conditions in Kota Bengkulu should be understood as interacting factors rather than isolated sources of construction delays. High rainfall, coastal exposure, and seismic considerations may increase project risks when combined with inadequate planning, limited resources, or ineffective stakeholder coordination. Studies on construction delays have shown that project delays generally emerge from the interaction of multiple factors, where external conditions often amplify weaknesses in internal project management systems (Aldammak et al., 2025). A conceptual framework that integrates local environmental characteristics with general construction management factors provides a more comprehensive understanding compared with approaches that consider only universal delay factors. This approach allows the identification of delay risks that are more relevant to specific regional contexts. Such contextual analysis is particularly important for developing construction risk management strategies in areas with distinctive environmental conditions.

The analysis of Kota Bengkulu's geographical and environmental characteristics demonstrates that location-specific conditions have an important role in shaping potential delay risks in building construction projects. Climatic conditions, coastal geographical features, and seismic vulnerability represent external factors that should be considered during project planning, scheduling, and risk control processes. Although this study does not empirically measure the influence of each factor, the literature-based synthesis indicates that regional characteristics may determine the relevance and severity of construction delay factors within a particular project environment. The conceptual findings provide a foundation for future empirical investigations that may validate the relationship between identified factors and actual project performance in Kota Bengkulu. This regional perspective strengthens construction delay analysis by emphasizing the importance of integrating environmental context into construction management frameworks.

Classification and Synthesis of Construction Delay Factors Based on Previous Literature

Construction delays represent a multidimensional problem influenced by the interaction of managerial, technical, financial, resource, and external factors throughout the project lifecycle. The complexity of construction activities causes delays to emerge from interconnected problems rather than from a single dominant source. Previous construction management literature has established that delay analysis requires systematic classification to understand the relationship between contributing factors and project performance outcomes. Proboyo (1999) categorized construction delay factors into several fundamental aspects, including planning and scheduling, project scope and documentation, organizational coordination, resource preparation, and monitoring and control mechanisms. This classification remains relevant because recent studies continue to identify similar categories as dominant contributors to schedule overruns in building construction projects. The consistency of these findings indicates that construction delays are strongly associated with recurring management challenges that require comprehensive analytical approaches.

The planning and scheduling category represents one of the most frequently identified causes of construction delays because it determines the sequence, duration, and coordination of project activities. Inaccurate estimation of activity durations, insufficient consideration of project risks, and ineffective schedule monitoring may create cumulative delays that affect subsequent construction phases. Previous research has shown that planning deficiencies often interact with other delay factors, including material availability, labor productivity, and decision-making processes, resulting in more complex schedule disruptions (Jamal & Ian, 2025). Building construction projects are particularly vulnerable to planning-related delays because architectural, structural, and mechanical components require strong interdependency management. The quality of planning therefore influences not only the

initial project timeline but also the ability of project teams to respond to unexpected changes during implementation. Recent systematic investigations have confirmed that planning and scheduling problems remain among the most frequently reported causes of construction delays across various project environments (Aldammak et al., 2025).

The organizational and coordination dimension constitutes another critical category because construction projects involve multiple stakeholders with different roles, responsibilities, and decision-making processes. Ineffective communication between owners, consultants, and contractors may result in delayed approvals, unclear instructions, design conflicts, and inefficient problem resolution mechanisms. Studies conducted on construction projects in Indonesia have demonstrated that coordination weaknesses frequently contribute to schedule disruption because project information cannot be transferred effectively among involved parties (Lestari et al., 2022). Similar findings were reported in construction projects in Kota Balikpapan, where stakeholder coordination and project management practices were identified as important factors influencing project completion performance (Putra et al., 2023). These findings indicate that construction delays are influenced not only by physical constraints but also by organizational relationships and communication quality. Effective coordination systems are therefore essential components in reducing uncertainty and improving schedule reliability.

Resource availability and financial capacity represent interconnected factors that significantly influence construction project continuity. Construction activities require continuous availability of materials, skilled labor, equipment, and financial support to maintain productivity according to the planned schedule. Delays in material delivery, limited workforce capability, and inadequate equipment readiness may directly reduce construction productivity and extend project duration. Previous studies have identified resource limitations as recurring causes of delay because construction operations depend on synchronized resource allocation and supply chain management (Putra et al., 2023). Financial instability may further increase delay risks when contractor cash flow problems affect procurement processes, workforce payments, or operational continuity (Rizal et al., 2024). The classification of these factors provides an important basis for understanding that construction delays are produced through interactions between operational capability and financial sustainability.

Table 2. Classification of Construction Delay Factors Identified from Previous Literature

Delay Factor Category	Representative Causes	Supporting References
Planning and Scheduling	Unrealistic duration estimation, ineffective scheduling, inadequate risk consideration	Proboyo (1999); Jamal & Ian (2025)
Scope and Documentation	Design changes, incomplete drawings, unclear project requirements	Proboyo (1999); Jamal & Ian (2025)
Organization and Coordination	Poor communication, delayed decisions, stakeholder coordination problems	Assaf & Al-Hejji (2006); Lestari et al. (2022)
Resources	Material delivery delays, labor limitations, equipment constraints	Putra et al. (2023)
Financial Factors	Delayed payments, contractor cash flow problems	Rizal et al. (2024)
External Factors	Weather conditions, environmental risks, regulatory changes	Sanni-Anibire et al. (2022)

The classification presented in Table 2 demonstrates that construction delays consist of both general management-related factors and contextual external factors that may vary according to project location. The recurring appearance of planning, coordination, resource, and financial issues across different studies suggests that these factors represent fundamental challenges within construction project management. However, external factors such as weather conditions and environmental characteristics require additional consideration because their influence depends strongly on regional conditions. International research has confirmed that external uncertainties frequently interact with internal project weaknesses, increasing the likelihood of schedule disruption when mitigation strategies

are inadequate (Sanni-Anibire et al., 2022). In the context of Kota Bengkulu, environmental conditions such as high rainfall intensity and coastal exposure may strengthen the relevance of external delay factors when combined with resource and management constraints. This conceptual interpretation supports the need to adapt general delay classifications to specific regional construction environments.

The literature synthesis establishes a comprehensive conceptual foundation for analysing construction delays in building projects located in Kota Bengkulu. The identified categories demonstrate that delay mechanisms involve interconnected relationships between planning quality, organizational effectiveness, resource availability, financial stability, and environmental uncertainty. Previous studies have similarly emphasized that construction delay analysis should move beyond identifying individual causes and instead examine the interaction among multiple contributing factors within a project system (Rauzana & Dharma, 2022). The classification developed in this study provides a structured basis for determining which factors possess the greatest conceptual relevance for building construction projects in Kota Bengkulu. This framework does not represent empirical measurement but serves as an analytical model that can guide future field-based investigations and quantitative validation. The following section discusses the contextual relevance of these factors by relating the synthesized literature findings to the specific characteristics of Kota Bengkulu.

Contextualization of Delay Factors for Building Construction Projects in Kota Bengkulu

The synthesis of construction delay factors from previous literature indicates that the relevance of each factor may differ depending on regional characteristics, project conditions, and implementation environments. The identification of delay factors for Kota Bengkulu requires an adjustment process that considers both general construction management issues and specific local conditions. This approach is important because factors frequently reported in other regions may not have identical levels of influence when applied to different geographical and operational contexts. Previous studies have demonstrated that construction delays are shaped by the interaction between internal project conditions and external environmental characteristics, resulting in different dominant risk patterns across locations (Rauzana & Dharma, 2022). The conceptual analysis conducted in this study positions Kota Bengkulu as a specific construction environment where general delay factors must be interpreted through regional characteristics. This contextualization process allows the development of a more relevant framework for understanding potential causes of building construction delays in the city.

Based on the literature synthesis, environmental conditions represent one of the factors with strong conceptual relevance to building construction projects in Kota Bengkulu. The city's high rainfall intensity and prolonged wet season may influence construction productivity, particularly for activities conducted in open areas such as foundation works, structural activities, and external building components. Weather conditions are categorized as external factors because they cannot be fully controlled by project stakeholders, although their impacts can be reduced through appropriate planning and mitigation strategies. Previous research has identified weather uncertainty as one of the factors that may disrupt construction schedules by reducing effective working time and affecting resource utilization (Sanni-Anibire et al., 2022). In the context of Kota Bengkulu, rainfall conditions may become more significant when project schedules do not incorporate sufficient time allowances or alternative work strategies. This indicates that environmental adaptation should become an integral component of construction planning rather than an additional consideration during project execution.

Resource availability is another factor considered relevant to construction projects in Kota Bengkulu because the continuity of construction activities depends on the reliability of material supply, labor availability, and equipment readiness. As a regional city located outside Indonesia's main construction supply centers, certain construction materials and specialized resources may require transportation from external regions. Delays in procurement processes or distribution interruptions may affect project schedules, particularly when materials are required for sequential construction activities. Research on construction projects in Indonesia has shown that material delivery problems and resource limitations frequently contribute to project delays because construction productivity depends on continuous resource availability (Putra et al., 2023). Similar conditions have been identified in various building construction projects where inadequate resource preparation resulted in reduced work efficiency and extended completion periods (Fadlullah et al., 2025). Therefore, resource management represents a critical aspect that should be integrated into delay risk assessment for building projects in Kota Bengkulu.

Table 3. Conceptual Relevance of Construction Delay Factors in Kota Bengkulu Building Projects

Delay Factor	Literature-Based Evidence	Relevance to Kota Bengkulu Context
Environmental Conditions	Weather uncertainty affects productivity and schedule stability	High rainfall may disrupt outdoor construction activities
Material and Resource Availability	Supply delays and resource limitations influence project duration	Dependence on external supply chains may increase procurement risks
Planning and Scheduling	Poor estimation and inadequate risk consideration contribute to delays	Project schedules need adjustment based on local conditions
Coordination and Communication	Weak stakeholder coordination affects decision-making processes	Important due to involvement of multiple construction parties
Financial Management	Cash flow problems may interrupt project continuity	Financial control is required to maintain resource availability

The factors presented in Table 3 demonstrate that delay risks in Kota Bengkulu consist of a combination of location-specific and general construction management factors. Environmental conditions and resource availability appear to have stronger contextual relevance because they are directly associated with regional characteristics and logistical conditions. However, managerial factors such as planning, coordination, and financial control remain important because they determine the capacity of project teams to respond to external uncertainties. Previous studies have emphasized that construction delays typically result from cumulative interactions among multiple factors rather than isolated problems originating from a single source (Aldammak et al., 2025). This perspective suggests that improving project performance requires integrated risk management approaches that address both internal capabilities and external constraints. The conceptual framework developed from this analysis positions local characteristics as complementary factors that influence the magnitude of common construction delay risks.

Although environmental and resource-related factors demonstrate strong relevance in the Kota Bengkulu context, organizational and financial factors maintain significant importance because they represent fundamental elements of construction project control. Coordination problems between owners, consultants, and contractors may generate delays through slow decision-making, unclear responsibilities, and ineffective information exchange. Previous studies have identified communication and coordination failures as recurring causes of delays because construction projects require continuous collaboration among multiple stakeholders (Lestari et al., 2022). Financial limitations may also influence project continuity because delayed payments or inadequate cash flow management can reduce contractor capacity to maintain resources and productivity levels (Rizal et al., 2024). These findings indicate that location-specific risks should not replace conventional project management considerations but should be analyzed as interacting components within a broader delay framework. The relationship between general and contextual factors provides a more comprehensive explanation of potential delay mechanisms in Kota Bengkulu building projects.

The contextual analysis confirms that potential construction delays in Kota Bengkulu are influenced by the interaction between universal construction management challenges and regional environmental characteristics. Factors such as planning quality, coordination effectiveness, resource management, financial stability, rainfall conditions, and seismic considerations form an interconnected system that may affect project completion performance. Previous research on construction delays in Indonesia has shown that similar factors repeatedly emerge across different regions, although their relative importance changes according to local circumstances and project characteristics (Jamal & Ian, 2025). The conceptual identification presented in this study does not establish causal relationships through statistical testing but provides a structured interpretation of factors that require further empirical

verification. This framework contributes to construction management research by emphasizing the importance of incorporating regional characteristics into delay analysis models. The identified factors become a foundation for developing mitigation strategies and future quantitative studies focused specifically on building construction projects in Kota Bengkulu.

Implications of Construction Delays and Conceptual Strategies for Project Performance Improvement

Construction delays generate significant implications for overall project performance because time deviation is closely connected with cost efficiency, quality achievement, and stakeholder satisfaction. In construction management, project success is commonly evaluated through the ability to achieve planned objectives within the required time, cost, and quality constraints. Delays that extend the project completion period may increase indirect costs, reduce resource efficiency, and create additional financial burdens for project participants. Previous studies have demonstrated that time overruns frequently contribute to cost escalation because extended project durations require additional expenses for labor, equipment utilization, site management, and administrative activities (Rizal et al., 2024). These consequences indicate that delay management should not be considered only as a scheduling issue but also as an essential component of overall project performance control. The conceptual relationship between delay factors and project outcomes highlights the importance of preventive strategies during the planning and implementation stages.

The financial consequences of construction delays represent one of the most significant concerns because extended durations may affect both project owners and contractors. Additional operational costs, increased overhead expenses, and potential contractual penalties may occur when project completion exceeds the agreed schedule. Research on construction projects has identified that financial constraints and cost-related problems are often interconnected with delay occurrences because limited cash flow can disrupt procurement activities and reduce construction continuity (Rizal et al., 2024). In building construction projects, financial instability may also influence contractor performance by limiting the ability to maintain labor productivity and material availability. The relationship between time performance and financial performance indicates that effective delay prevention contributes directly to improving economic efficiency in construction projects. Therefore, financial monitoring and cost control mechanisms should be integrated with schedule management practices.

The impact of delays is also associated with potential reductions in construction quality and increased technical risks during project execution. When projects experience significant schedule pressure, contractors may attempt to accelerate remaining activities through additional resources or modified work approaches that may affect quality control processes. Construction management literature emphasizes that project acceleration without proper planning may create quality-related risks because sufficient inspection, supervision, and implementation procedures may be compromised (Widiasanti & Lenggogeni, 2013). In addition, delays caused by design changes, incomplete documentation, or coordination failures may generate rework activities that further increase project duration and resource consumption. Previous studies have identified design changes and weak project management practices as important contributors to construction delays because they create uncertainty throughout the implementation process (Jamal & Ian, 2025). These conditions demonstrate that delay prevention strategies should also consider quality assurance mechanisms rather than focusing only on schedule recovery.

Table 4. Conceptual Strategies for Mitigating Construction Delay Risks in Kota Bengkulu

Delay Risk Factor	Potential Impact	Recommended Mitigation Strategy
High rainfall intensity	Reduced productivity and disruption of outdoor activities	Weather-based scheduling and allocation of sufficient time buffers
Material supply uncertainty	Work interruption due to delayed material availability	Early procurement planning and supply chain monitoring
Design changes and incomplete documents	Rework and extended project duration	Improved design coordination before construction execution

Stakeholder coordination problems	Delayed decisions and ineffective information flow	Strengthening communication and coordination mechanisms
Financial constraints	Reduced resource continuity and productivity	Regular cash flow monitoring and financial planning

The strategies presented in Table 4 indicate that delay control requires preventive approaches rather than corrective actions after problems occur. Weather-related risks can be reduced through adaptive scheduling, while resource-related risks require stronger procurement planning and supply chain coordination. Previous studies have shown that effective project control systems can improve time performance by identifying deviations early and enabling appropriate corrective actions (Agustiawan et al., 2026). The application of systematic monitoring approaches, including schedule evaluation and performance control methods, may support decision-making during project implementation. In the context of Kota Bengkulu, these strategies should be adjusted to local conditions, particularly regarding rainfall patterns, material distribution characteristics, and technical requirements associated with seismic considerations. The integration of local risk characteristics with established construction management practices provides a more suitable approach for improving project reliability.

The conceptual findings of this study indicate that construction delay management in Kota Bengkulu requires a comprehensive framework that integrates environmental, managerial, technical, and financial perspectives. Delay prevention cannot rely on controlling a single factor because construction performance is influenced by the interaction among multiple project variables. Previous studies have emphasized that successful construction management requires continuous monitoring, effective coordination, and proactive risk identification throughout the project lifecycle (Soviana et al., 2022). The literature-based framework developed in this research provides an initial conceptual foundation for understanding potential delay mechanisms in building construction projects without claiming empirical causal relationships. This approach contributes to construction management knowledge by adapting general delay theories to a specific regional context. Future empirical studies may utilize this framework to validate the significance of identified factors through field observations, surveys, or quantitative modelling approaches.

The overall discussion of construction delay implications demonstrates that improving project performance requires integration between risk identification, strategic planning, and effective control mechanisms. Building construction projects in Kota Bengkulu face potential risks arising from both common project management challenges and unique environmental characteristics of the region. The conceptual analysis suggests that proactive planning, improved stakeholder coordination, resource management, and location-based risk consideration are essential components for reducing schedule uncertainty. Although this study is limited to literature-based analysis, the findings provide a structured understanding of potential delay factors that may support future empirical investigations. The developed conceptual perspective strengthens the connection between construction management theory and regional project practices. This framework may serve as a reference for researchers and practitioners seeking to improve construction time performance in areas with similar environmental and operational conditions.

CONCLUSION

Based on the literature review analysis, the factors contributing to delays in building construction projects can generally be classified into six major aspects, namely planning and scheduling, project scope and documentation, organization/coordination/communication, resource availability, financial conditions, and external/environmental factors. These categories demonstrate that construction delays are multidimensional problems resulting from the interaction between internal project management issues and external conditions affecting project implementation. In relation to the characteristics of Kota Bengkulu, which has a tropical humid climate with high rainfall intensity throughout most of the year and is located within an active seismic zone, external/environmental factors and resource availability are considered to have particular conceptual relevance. However, managerial factors, including planning effectiveness, stakeholder coordination, and financial control, remain important because similar factors have been consistently identified in construction delay studies conducted in other Indonesian cities. The conceptual framework developed in this study highlights that construction delay risks in Kota Bengkulu should be understood through an integrated perspective that

combines general project management factors with regional characteristics. This approach provides a theoretical basis for identifying potential delay mechanisms in building construction projects within specific geographical contexts.

This study is limited to a conceptual literature-based analysis and does not involve empirical data obtained from actual building construction projects in Kota Bengkulu. Therefore, further research is recommended to conduct empirical investigations through methods such as questionnaire surveys, interviews, or field observations involving contractors, consultants, and project owners engaged in building construction activities in Kota Bengkulu. Empirical validation is required to measure the significance level, relative importance, and actual influence of each identified delay factor within the local construction environment. Future studies may also apply statistical modelling approaches to examine relationships among delay factors and project performance indicators. The findings of this study are expected to serve as an initial reference for developing more comprehensive empirical research and supporting construction stakeholders in formulating effective delay mitigation strategies. The integration of conceptual insights and empirical verification may contribute to improving construction schedule management and project performance in Kota Bengkulu and other regions with similar characteristics.

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