Risk Factors and Control Measures in Construction Decoration and Renovation Project Management

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Abstract: This study addresses the persistent issues of quality, schedule delays, and safety hazards in construction decoration and renovation project management. Based on practical project management experience, it analyzes the specific manifestations of four core risk factors: material quality and supply, craftsmanship execution, design changes, and safety and environmental compliance. Corresponding control measures and their operational logic are summarized. By analyzing the mechanisms of risk formation and control pathways, this paper details the implementation of key measures: establishing a full-process material control mechanism, strengthening craftsmanship inspection and disclosure, standardizing change management procedures, and implementing dual controls for safety and environmental compliance. These measures provide a practical reference for enhancing decoration and renovation project management, reducing risk incidence, and achieving coordinated control over project quality, schedule, and safety.

1. Introduction

Risk control in construction decoration and renovation project management encompasses systematic management activities throughout the entire project lifecycle. This involves identifying potential risks—such as material quality issues, craftsmanship deviations, design changes, and safety/environmental non-compliance—and establishing robust mechanisms for material control, craftsmanship supervision, change standardization, and safety/environmental management. Proactive preventive, monitoring, and responsive measures are implemented to mitigate the impact of these risks on project quality, schedule, and cost, ensuring compliant and orderly project progress. The inherent complexity of decoration and renovation projects, involving numerous interdependent processes, makes them particularly susceptible to problems arising from materials, craftsmanship, and design. These issues can manifest as quality defects, schedule delays, and safety incidents, ultimately constraining overall project benefits. Therefore, in-depth analysis of risk factors and the exploration of scientifically sound control measures hold significant practical importance for standardizing project management processes, ensuring project success, and providing valuable references for industry peers managing similar projects.

2. Risk Factors in Construction Decoration and Renovation Project Management

2.1 Material Quality and Supply Delay Risks

Material quality presents significant challenges due to the diversity of decoration materials and often ambiguous quality grading. Some suppliers, seeking cost reductions, employ substandard practices such as using inferior adhesives in boards (leading to excessive formaldehyde emissions) or reducing eco-friendly additives in coatings (resulting in VOC levels exceeding national standards). Controlling the appearance quality of materials is also difficult; issues like color variations and dimensional deviations within a single batch of tiles, or insufficient plating thickness

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on hardware components leading to premature rusting, are common. Such defects not only compromise aesthetic outcomes but can also cause project acceptance delays, for instance, due to failed indoor environmental monitoring caused by excessive formaldehyde levels [1]. Supply chain vulnerabilities are particularly acute. Decoration materials often traverse multi-tiered supply chains, where disruptions at any stage—from raw material procurement and production to logistics—can halt supply. Frequent market price fluctuations, especially for raw materials like non-ferrous metals and timber, can prompt suppliers to demand price adjustments unilaterally. Without pre-agreed adjustment mechanisms, this easily leads to disputes. Logistically, material transport cycles are frequently extended beyond expectations due to weather, traffic restrictions, or regional logistics bottlenecks. Furthermore, the long production cycles of specialized materials can lead to suppliers failing to meet contractual delivery deadlines, causing work stoppages and disrupting the overall construction schedule.

2.2 Craftsmanship Standard Execution Deviation Risks

Craftsmanship deviation permeates the entire construction process due to the complexity and high interdependence of decoration and renovation tasks. During initial substrate preparation, failure to mesh and level walls according to specifications, where flatness deviations exceed 3mm, directly causes subsequent issues like wall coating cracks and hollow tile adhesion. In ceiling construction, improper keel spacing or inadequate fixation, deviating from design requirements, can lead to deformation or even collapse. During mid-stage finishing work, incorrect selection of techniques, such as using the "dry-laying method" instead of the required "wet-laying method" for bathroom wall tiles, compromises waterproofing and causes leaks. Similarly, neglecting the "one primer, two topcoats" process or insufficient drying intervals for wall coatings results in poor adhesion and sagging [2]. In later finishing stages, rough workmanship—such as gaps exceeding 2mm between door frames and walls or between tile joints, left untreated with appropriate trim—detracts from the overall aesthetic. Furthermore, construction personnel’s unfamiliarity with new techniques, leading them to rely on outdated methods, prevents the realization of new material advantages and causes quality defects. In pursuit of speed, some teams may also omit critical steps like tile soaking or coating sanding, exacerbating craftsmanship deviations.

2.3 Risks Arising from Frequent Design Changes

The root cause of frequent design changes often lies in inadequate initial design depth. Some design units fail to fully understand client requirements or neglect to integrate site-specific conditions, resulting in impractical schemes. Clients then request changes upon discovering discrepancies during construction. Client aesthetic preferences are also prone to shift mid-project, leading to requests for material substitutions (e.g., wall finishes) or adjustments to features (e.g., ceiling designs). Moreover, change requests are frequently made verbally rather than through standardized written procedures, resulting in unclear specifications and potential disputes later [3]. The cascading effects of changes are severe. Cost-wise, each change necessitates recalculating labor, material, and machinery expenses. If completed work requires rework, additional costs are incurred, leading to budget overruns. Schedule-wise, changes require replanning, remobilizing personnel and materials, and often await revised drawings from designers and re-approval from supervisors, causing significant delays. Resource waste is another critical issue; custom-processed materials rendered obsolete by changes must be scrapped, and invested labor and machinery costs become sunk losses. Changes also disrupt the sequencing of interdependent trade activities (e.g., conflicts between MEP rough-ins and wall finishing), requiring re-coordination and reducing overall construction efficiency.

2.4 On-site Safety and Environmental Compliance Risks

Construction sites harbor widespread safety hazards. Electrical safety is paramount: unauthorized wiring, lack of conduit protection, missing or faulty Ground Fault Circuit Interrupters (GFCIs) in distribution boxes, and continued use of power tools with damaged insulation significantly increase electrocution risks. Fall protection during high-altitude work (e.g., ceiling installation, exterior cladding) is often inadequate due to workers not using safety harnesses or improperly erected scaffolding. Fire safety management is frequently chaotic, characterized by improper storage of flammables, insufficient fire extinguishers, and poor worker awareness (e.g., on-site smoking), elevating fire risks [4]. Environmental compliance issues are equally concerning. Failure to employ dust suppression methods (wet-cutting, dust collection equipment) during operations like stone cutting or wall grinding leads to excessive airborne dust, endangering worker health and risking regulatory penalties. Exhaust gases from painting operations, released without proper treatment (e.g., activated carbon adsorption), violate ambient air quality standards. Construction waste not segregated (into recyclable, hazardous, general) and improperly stored or dumped breaches environmental regulations, incurring fines and cleanup costs.

3. Risk Control Measures in Construction Decoration and Renovation Project Management

3.1 Establish a Full-Process Material Control Mechanism

Implement multi-dimensional supplier vetting, evaluating qualifications, past performance, and production capacity. Shortlist at least three potential suppliers, conduct on-site inspections of facilities and quality control processes, and select partners through a comprehensive scoring system to avoid unqualified or low-quality vendors [5]. Execute detailed contracts explicitly defining material standards, delivery schedules, price adjustment clauses, and penalties for delays, ensuring clear accountability. Enforce rigorous incoming inspection: upon delivery, the project team and supervision unit jointly inspect materials. Samples are tested per standards (e.g., 3 samples per coating batch for VOC, 5 tiles per batch for dimensions). Materials only enter storage upon receipt of passing test reports. Conduct 100% inspection for visual defects. Immediately reject non-conforming materials and demand prompt replacement. Establish a supply chain early-warning system: designate personnel to track production progress and cross-check supply plans against site needs 15 days in advance. Activate contingency supplier plans immediately if production delays or logistics bottlenecks arise, ensuring timely delivery and preventing work stoppages.

3.2 Strengthen Craftsmanship Disclosure and Process Inspection

Implement tiered craftsmanship disclosure. Before construction, the technical lead conducts a general briefing to the construction team outlining project-wide standards and quality requirements. Team leaders then brief operators on sub-process specifics using drawings and mock-ups to demonstrate key points. Operators sign off post-briefing to confirm understanding [6]. Institute a "Daily Inspection + Key Process Hold Point" system. Quality inspectors perform daily checks using checklists, employing tools (rulers for wall flatness, feeler gauges for grout width). Document deviations photographically, issue rectification notices specifying responsible personnel and deadlines. Key processes require formal sign-off by the technical lead and supervising engineer before proceeding, preventing the accumulation of defects [7]. Enforce rectification closure: inspectors verify corrections before closing out issues. For recurring problems, conduct root cause analysis meetings, adjust work methods, and re-brief personnel to prevent recurrence and enhance craftsmanship accuracy.

3.3 Standardize Design Change Management Process

Mandate a formal change application system. Owners or designers must submit a written "Design Change Application Form" detailing the change scope, justification, and including marked-up drawings (original vs. revised). Verbal changes are prohibited. The contractor's project lead must acknowledge receipt to prevent ambiguity-related disputes [8]. Conduct mandatory change impact assessment. Upon receiving an application, the technical department completes an assessment within 3 working days: Identify affected tasks and estimate schedule impacts; Calculate costs (material loss, new materials, labor, potential rework); Produce a "Change Impact Assessment Report." For major impacts, convene the owner, designer, and supervisor for joint resolution. Implement strict approval and execution protocols. Approved changes trigger immediate (within 24 hours) updates to drawings and budgets, re-briefing of crews, plan adjustments, and material coordination. Assign personnel to monitor change implementation, ensuring adherence and preventing confusion with original plans. Conduct post-change reviews: Compare actual schedule/cost impacts against estimates, analyze deviations, gather field feedback, and refine change management procedures to minimize unnecessary future changes.

3.4 Implement Dual Control for Safety and Environmental Compliance

Deliver targeted site safety training focused on decoration-specific hazards: electrical safety, fall protection, fire prevention. Post-training assessment and certification are mandatory. Enhance on-site safety oversight: Daily pre-task safety talks by safety officers; Prominent safety signage; Regular inspections of tool insulation and scaffold stability. Immediate work stoppage and correction for hazards found. Ensure adequate firefighting equipment; Segregate flammable materials in ventilated storage; Enforce strict no-smoking policy [9]. Prioritize environmental compliance: Source green materials (low-VOC coatings, eco-friendly boards) and verify environmental test reports upon delivery. Employ dust suppression (wet methods, dust collectors) during cutting/grinding. Use exhaust fans and activated carbon adsorption for paint fume control during application. Implement strict waste segregation (recyclable, hazardous, general) with daily removal to designated sites. Conduct weekly on-site air quality tests by certified agencies to ensure dust/VOC compliance and avoid penalties.

4. Conclusion

This study demonstrates that risks in construction decoration and renovation project management primarily manifest in four areas: materials, craftsmanship, design, and safety/environment. Material risks stem from quality control failures and supply chain instability. Craftsmanship risks arise from execution deviations and inadequate supervision. Design change risks result from insufficient initial design depth and non-standardized procedures. Safety and environmental risks are driven by insufficient control measures. Effective mitigation requires targeted countermeasures: a full-process material control mechanism ensures quality and timeliness; enhanced craftsmanship disclosure and inspection reduce deviations; standardized change management minimizes cost and schedule impacts; dual safety and environmental controls prevent compliance breaches. These four interconnected measures form a cohesive risk prevention and control system, significantly enhancing project management effectiveness and efficiency.

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