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**Research Paper**

# Risk Management on Schedule Performance in the Construction of Baros–Petir Provincial Road, Banten Province, Indonesia

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***Abstract***
*Construction projects, especially road infrastructures, are inherently prone to risks that can delay schedules and increase costs. This study analyzes dominant risks affecting schedule performance in the Baros–Petir road reconstruction project and develops effective risk response strategies. Using a mixed-methods approach—quantitative risk assessment with Probability Impact Matrix (PIM) and qualitative expert judgment from 3 key stakeholders and 30 project practitioners—this research identifies key risk factors, notably change orders and volume discrepancies between contract and actual field conditions, as critical threats to schedule adherence. Proposed mitigation includes dynamic rescheduling, rigorous monitoring, and contractual clauses for risk transfer. The results serve as a reference to improve risk handling frameworks in road construction projects for better time and cost control.*

***Keywords:*** *Risk Management, Schedule Performance, Construction Project, Change Order, Volume Discrepancy, Risk Response, Road Infrastructure*

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## I. Introduction

Road construction projects face significant uncertainties due to environmental, technical, and managerial complexities. One major challenge is the mismatch between contracted work volumes and actual site conditions, leading to cost overruns and schedule delays. This research focuses on identifying, analyzing, and managing such risks to optimize the schedule performance for the Baros–Petir Provincial Road project.

**Objective**
To provide insights into risk identification and analysis during the executuion of the Baros-Petir Road Construction Project, ensuring effective risk managementto meet project targets, particulary in terms of time performance.

**Research Qustions:**
1. What are the dominant risks impacting the execution of thr Baros-Petir road reconstruction project?
2. What strategies or responses can be implemented to manage these dominant risk effectively?

**Project Backrgound**
a. Banten Province is rapidly developig region, necessitating roust infrastructure.
b. Baros-Petir Road project is a reconstruction effort with:
- Total road length: 8.5 km, focusing on a 2.45 km section for the study.
- Funded by the Banten Provincial Budgeet (Rp. 17,448,885,000) for 2024 scheduled for completion in 180 days.
- The road servers as a vital connector, supporring local economies, tourism, and reducing traffice congestion.

**Importance of Risk Management**
a. Construction projects inhrently face risks affecting:
- Time (Schedule)

- Cost (Budget)
- Quality (Standards)

b. Effective risk management limits negative impacts, such as delays and cost overruns.

**Key Concepts and Technical Terms**

a. Construction Projects,

- Temporary, resource-bound, and unique undertakings aimed at delivering a specific outcome (e.g., building, road).
- Types: Building, Civil (e.g., roads), Industrial, Transportation, Specalized/Innovative.

b. Project Management,

- The structured approach to planning, organizieng, leading, and controlling project activities to meet objectives concerning time, cost, scope, and quality.
- Key areas (From PMBOK Guide): Integration, Scope, Time, Cost, Quality, Human Resources, Communicaiton, Risk, Procurement, Stakeholder Management.

c. Risk and Risk Management

- Risk: Uncertainty that, if it occurs, impacats project objectives negatively or positevely. Key measures: probability (likehood) and impact (consequence).
- Risk Management: Systematic identification, analysis, and handling of risks to minimize threats and maximize opportunities.

**Core Risk Management Process (Based on PMBOK)**

a. Planning Risk Management: Setting up risk strategies and methodologies.
b. Identifying Risks: Recognizing risks that could affect the project.
c. Performing Qualitative Risk Analysis: Prioritizing risks by probability and impact (often using a Probability Impact Matrix (PIM)),
d. Performing Quantitative Risk Analysis: Numerical/statistical analysis of risk effects (using, e.g., Monte Carlo Simulation)
e. Planning Risk Response: Developing strategies like avoid, transfer, mitigate, accept (for negative risks), or exploit, share, enhance (for positive risks).
f. Implementing Risk Response: Executing planned actions.
g. Monitoring Risk: Tracking, reviewing, and updating risk management activities

Technical Tools: Risk Brekdown Structure (RBS), Risk Register and SWOT Analysis.

**Methodology & Structure**

a. Literature review covering project and risk management theories, standars (PMBOK, ISO 31000), Indonesian government regulations, and relevant prior studies.
b. Data Collection: Combination of surveys, inverviewas with experts, and document studi for identifying and assessing risks.
c. Analysis Techniques:

- Risk Identification (expert judgement, brainstorming),
- Risk assessment using qualitative (like scale, probability-impact-impact matrices) and quantitative (simulation, EMV) methods.

d. Focus on the construction phase and technical/civil engineering risks-excluding political risks and others outside scope.

Key respondents comprised three experts from owner, consultant, and contractor organizations and 30 field practitioners with substantial project experience.

## II. Results and Discussion

**A. Risk Identification and Assessment**

Fifty-five validated risk variables were assessed. The highest impact risks on schedule performance were:

- **Change orders during construction (X45):** Frequency 0.79, Impact 0.40, resulting in a high-risk score (0.31).
- **Discrepancies in work volume between contracts and field conditions (X47):** Frequency 0.75, Impact 0.45, high-risk score (0.34).

These risks carry the potential for significant schedule disruption and cost inflation

**B. Root Causes**

- Incomplete or inaccurate topographical and geotechnical surveys.
- Design deficiencies and frequent design revisions.
- Changes in scope due to unforeseen field conditions, such as increased drainage requirements.
- Inefficient communication and coordination among project stakeholders

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**D. Impact on Project Schedule**

- Extended durations due to additional work scope and rework.
- Delay in critical path activities.
- Increased likelihood of resource conflicts and project disruptions.
- Potential contractual disputes resulting from scope and volume changes

**Risk Response Strategies**

| Response Type | Description | Examples from the Study |
|---|---|---|
| **Avoid (Preventive Actions)** | Conduct detailed site investigations and conservative design to prevent scope changes. | Early hydrological studies and use of advanced surveying (LiDAR, drones). |
| **Mitigate (Minimize Impact)** | Implement dynamic scheduling (rolling wave planning), buffer time allocation, and continuous schedule monitoring. | Use of time contingency in schedule, regular progress evaluations, specialized task force. |
| **Transfer (Shift Risk)** | Formulate contracts that include change order clauses, liquidated damages for delays, and engage insurance policies. | Use of unit price contracts, subcontracting specialized tasks, construction all-risk insurance. |
| **Accept (Manage Residual Risk)** | Acknowledge as inherent risk within manageable limits and maintain planned contingency and open communication. | Replanning and flexible resource allocation when risks materialize without avoidance options. |

**Practical Implementations and Recommendations**

- Clearly define and formalize change order procedures to control and document scope changes.
- Invest in comprehensive pre-construction site data collection and involving multidisciplinary teams early.
- Develop contractual terms that allow risk sharing and clarity on cost/time implications of scope changes.
- Employ continuous risk monitoring integrated with schedule control tools to enable early corrective actions.
- Foster communication channels among owner, contractors, and consultants to ensure transparent risk handling.

## III. Conclusion

The study highlights that change orders and volume discrepancies are dominant risks adversely affecting schedule and cost. Systematic risk management through avoidance, mitigation, transfer, and acceptance methods optimizes project delivery performance. Incorporating these findings into road construction management can significantly reduce unforeseen delays and financial impacts, enhancing public infrastructure development outcomes.

## References

[Selected references based on thesis citations]


- Project Management Institute (PMBOK 6th Edition, 2017)
- Sari, D.F., & Suryani, F. (2018). Health and safety risk management in oil and gas construction. IKRA-ITH Journal.
- Ikhsan, Suhardi, D. (2022). Risk analysis in Kediri-Tulungagung toll road construction. Engineering Seminar.
- Sandhyavitri, A., Zulfiqar, M. (2019). Risk analysis in Pekanbaru-Dumai toll road construction. Civil Engineering Journal.


This journal synthesis consolidates the comprehensive risk assessment, ranking, and responses discussed in the thesis, framed with academic rigor and structured for publication or use in professional risk management practice. If you want, I can help elaborate specific sections or create visual aids like risk matrices or response tables.