Strategic Decision-Making under Uncertainty in Railway Megaprojects: A Systematic Literature Review

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ABSTRACT

Railway megaprojects involve long planning periods, large investments and many organisations, which make strategic decisions difficult when conditions change. This study reviews how uncertainty is understood and managed in railway megaprojects, with specific attention to governance and Southeast Asia. Searches were conducted in Scopus and Dimensions for studies published from 2000 to 2025. The two databases produced 189 records. After duplicate removal, title and abstract screening, full-text assessment and quality appraisal, 65 studies were included in the final synthesis. The analysis identified five themes: multidimensional and dynamic uncertainty; governance, institutions and strategic decision structures; stakeholder participation, conflict and legitimacy; appraisal biases, lock-in and performance consequences; and adaptive management and decision-support strategies. The findings show that uncertainty is not limited to technical risk. Political and regulatory conditions, financing, institutional arrangements, stakeholder relationships and appraisal practices also shape strategic decisions. Studies commonly respond through adaptive governance, risk modelling, scenario analysis, stakeholder engagement, monitoring and risk allocation. Only nine included studies focused on Southeast Asia, seven of which examined Indonesia. The review therefore shows a need for broader country-specific and comparative evidence on strategic railway decision-making across Southeast Asia.

Keywords: Railway Megaprojects; Strategic Decision-Making; Uncertainty; Governance; Stakeholder Engagement; Southeast Asia

INTRODUCTION

Railway megaprojects are large, capital-intensive and politically visible projects that can support national development, regional integration and urban mobility. Their scale also makes them difficult to plan and deliver. Cost growth, delay, governance problems and uncertain long-term outcomes are common concerns in the megaproject literature (Priemus & Van Wee, 2013; Flyvbjerg, 2007; Giezen, 2012).

The wider Malaysian mobility literature situates rail investment alongside transit-oriented development, walking and cycling, and shared transport initiatives (Mohamad et al., 2021; Ahadi et al., 2021; Norazlan et al.,

2021). Related smart-city studies examine human, economic and environmental dimensions of urban development (Mun Chye et al., 2022; Pajilani et al., 2022; Salleh et al., 2022). These studies provide context for the development objectives surrounding railway investment rather than direct evidence on strategic decisions in railway megaprojects.

One main challenge is strategic decision-making under uncertainty. Uncertainty may arise from political change, regulation, stakeholder conflict, financial exposure, technical complexity, incomplete information and changing project objectives. These conditions can make early assumptions less useful as the project develops (Peda & Vinnari, 2022; Ward, 2022; Giezen, 2012).

Additional background literature examines governance paradoxes, boardroom decision-making and the relationship between governance, value creation and value distribution in megaprojects (Arena & Molloy, 2010; Pelham & Duffield, 2018; Gil & Fu, 2021). Cultural and political perspectives on client decision-making further broaden this discussion (Siva, 2013). Work on redundancy, resilience and adaptivity, together with research on rail megaproject scope, provides complementary perspectives on decisions made under changing conditions (Priemus et al., 2013; Gharehbaghi et al., 2023).

Uncertainty is also linked to the way information is produced and used. Project approval may be affected by optimistic forecasts or strategic presentation of costs, benefits and risks (Flyvbjerg, 2007). More recent work also shows that the relationship between optimism bias and transport cost overrun depends on the wider institutional and organisational setting (Chen et al., 2023).

Governance and stakeholder relationships add another layer to the decision process. Major transport projects involve public agencies, contractors, financiers, consultants and affected communities with different interests and levels of influence. When information is incomplete and interests conflict, participation and governance arrangements can affect both the quality and acceptance of strategic decisions (Erkul et al., 2016).

Malaysian rapid-transit research also highlights early stakeholder engagement as a means of improving communication and managing project risks (Baharuddin et al., 2021). Other Malaysian studies examine contractor perspectives on railway construction delays and the use of Building Information Modelling to address railway project management issues (Majid et al., 2025; Molarn et al., 2024). These sources provide supplementary background to the review.

Southeast Asia deserves specific attention because railway projects in the region are developed under different political, financial and institutional arrangements. Previous research has shown that domestic politics can influence the progress of Chinese-supported railway projects in countries such as Malaysia and Indonesia (Lim et al., 2021). However, this does not show how widely such evidence is represented in the systematic railway megaproject literature.

Further regional background includes governance research on the Sino–Thai railway, political conditions and stakeholder engagement in Malaysia's East Coast Rail Link, and governance of the South Sumatra LRT (Bunnak et al., 2024; Mohammad & Bing, 2025; Rumapea et al., 2024). These contextual references are distinct from the 65 studies retained through the database screening process and do not change the regional counts reported in the synthesis.

Existing studies examine risk, governance, stakeholder engagement and project performance from different perspectives, but the evidence on strategic decision-making remains dispersed. This systematic literature review therefore brings these studies together to examine how uncertainty is conceptualised, what factors shape strategic decisions, how uncertainty is managed, and what gaps remain, particularly in Southeast Asia.

This review is guided by four research questions; RQ1**:** How has uncertainty been conceptualised in railway megaprojects?; RQ2: What factors influence strategic decision-making under uncertainty in railway megaprojects?; RQ3**:** What strategies have been adopted to manage uncertainty in railway megaprojects?; and RQ4: What research gaps remain, particularly within the Southeast Asian context?

METHODOLOGY

This study used a systematic literature review to examine strategic decision-making under uncertainty in railway megaprojects. The review followed the PRISMA 2020 reporting guidance (Page et al., 2021) and established systematic review principles (Tranfield et al., 2003; Snyder, 2019). The review process covered database searching, screening, quality appraisal, data extraction and thematic synthesis.

Database Search and Search Strategy

The final database searches were completed on 2 November 2026. Two indexed databases were used: Scopus and Dimensions. The search covered publications from 2000 to 2025. In Scopus, the search was run in the title, abstract and keyword fields. In Dimensions, the search was run in the title and abstract fields. The same three concept blocks were used in both databases: railway context, megaproject context, and decision-making or uncertainty context.

Scopus search string: ("railway*" OR "rail transport*" OR "high-speed rail*" OR "high speed rail*" OR "urban rail*" OR "mass rapid transit" OR MRT OR LRT) AND ("megaproject*" OR "mega project*" OR "large-scale infrastructure*" OR "major infrastructure project*") AND ("strategic decision-making" OR "strategic decision making" OR "decision-making" OR "decision making" OR uncertainty OR governance OR "stakeholder engagement" OR "risk management")

Dimensions search string: ("railway" OR "rail transport" OR "high-speed rail" OR "high speed rail" OR "urban rail" OR "mass rapid transit" OR MRT OR LRT) AND ("megaproject" OR "megaprojects" OR "mega project" OR "mega projects" OR "large-scale infrastructure" OR "major infrastructure project" OR "major infrastructure projects") AND ("strategic decision-making" OR "strategic decision making" OR "decision-making" OR "decision making" OR uncertainty OR governance OR "stakeholder engagement" OR "risk management")

The refined Scopus search returned 117 records. After limiting the year to 2000-2025, the number fell to 96. Articles, conference papers, book chapters and reviews were retained, while conference reviews, a retracted record and a book were removed. The English-language filter produced 89 records for export. The Dimensions search returned 142 records. The year filter reduced this to 104. Articles, proceedings articles and chapters were retained, while preprints and a monograph were removed, leaving 100 records. Dimensions did not provide a language filter in the search interface used, so language eligibility was checked during screening.

Eligibility Criteria and Screening

Studies were included when they met four conditions. First, the study focused on a railway or rail transport megaproject, a major railway infrastructure project, or a comparative transport study with a substantive railway case from which rail-specific evidence could be extracted. Second, the study examined at least one issue related to uncertainty, risk, strategic decision-making, governance, stakeholder engagement, financing, appraisal, cost or schedule performance, or strategic project management. Third, the study provided empirical, conceptual or review-based evidence relevant to the research questions. Fourth, the full text had to be available in English for final assessment.

Studies were excluded when railway projects were only mentioned in passing, when the focus was purely technical or environmental without a clear link to strategic decision-making or uncertainty management, or when the study did not provide evidence relevant to the research questions. Non-English full texts were also excluded. Records for which a full text could not be retrieved were reported separately as reports not retrieved rather than being treated as full-text exclusions.

The two database exports contained 189 records in total: 89 from Scopus and 100 from Dimensions. Duplicates were identified first by DOI and then by normalised title matching. This removed 56 duplicates and left 133 unique records for title and abstract screening. Forty-seven records were excluded at this stage. Full text was sought for 86 records. Sixteen reports could not be retrieved in full text. Seventy full texts were

assessed for eligibility. Five were excluded after full-text assessment: four did not have a sufficiently direct focus on strategic decision-making or uncertainty management, and one had a non-English full text. This left 65 studies for the final synthesis.

Quality Appraisal

The methodological and reporting quality of the 65 included studies was assessed using the Quality Assessment with Diverse Studies (QuADS) tool (Harrison et al., 2021). QuADS was selected because the final evidence base contained different study designs, including qualitative case studies, quantitative studies, mixed-method studies, modelling studies and reviews. The tool contains 13 criteria. Each criterion was scored from 0 to 3, giving a maximum score of 39. Item-level scores, total scores and percentages were recorded for each study. The scores were used to compare the strength of the evidence and were not used as an automatic exclusion rule. For document-based and review studies, criteria related to participants, sampling and data collection were interpreted in relation to the selected cases, documents, datasets or literature corpus.

Data Extraction and Thematic Coding

Data were extracted into a structured matrix. The fields included author and year, country or project, study design, method, key findings, quality score, regional group and contribution to the research questions. Studies from Southeast Asia were coded separately from studies in other regions so that the regional evidence could be examined directly. Appendix A summarises the country or project, method, key finding and QuADS score for all 65 included studies.

The analysis used a structured thematic synthesis based on the approach described by Thomas and Harden (2008). The extracted findings were first coded using short descriptive codes. Similar codes were then compared across studies and grouped into higher-order themes. A study could contribute to more than one theme when its findings covered several issues. A dominant theme was used only to organise the evidence and did not restrict how a study could be used in the synthesis. The coding process produced five analytical themes: (1) multidimensional and dynamic uncertainty; (2) governance, institutions and strategic decision structures; (3) stakeholder participation, conflict and legitimacy; (4) appraisal biases, lock-in and performance consequences; and (5) adaptive management and decision-support strategies. These same theme labels are used in the Results section and summary table.

PRISMA Study Selection

Figure 1 summarises the study selection process. The final PRISMA flow distinguishes records removed as duplicates, records excluded during title and abstract screening, reports that could not be retrieved, and reports excluded after full-text assessment.

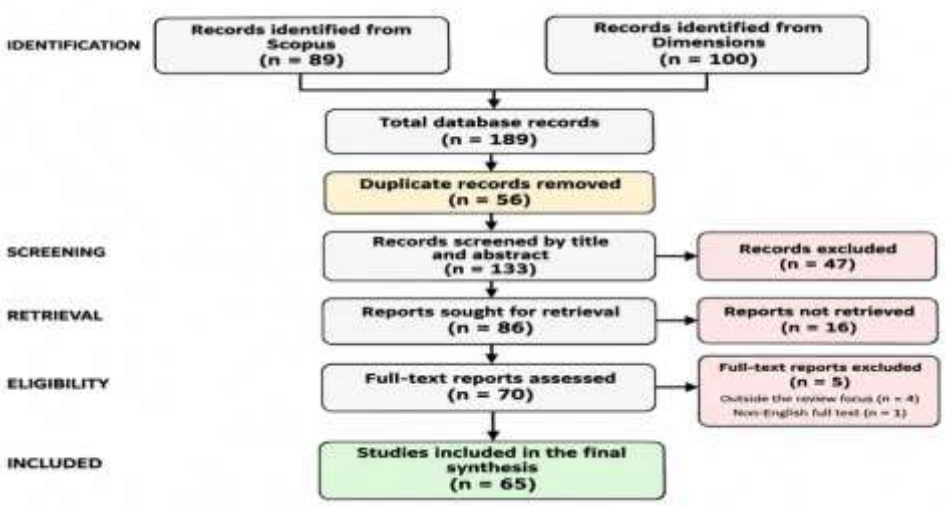

Figure 1: PRISMA 2020 study selection flow

RESULTS AND DISCUSSION

Sixty-five studies were retained for the final synthesis. The coding produced five analytical themes. A study could contribute to more than one theme, so the theme counts overlap. The themes were: multidimensional and dynamic uncertainty (26 studies); governance, institutions and strategic decision structures (35 studies); stakeholder participation, conflict and legitimacy (24 studies); appraisal biases, lock-in and performance consequences (15 studies); and adaptive management and decision-support strategies (44 studies). Nine of the 65 studies focused on Southeast Asia. The results below use these five themes and then examine the Southeast Asian evidence separately.

Multidimensional and Dynamic Uncertainty

The first theme shows that uncertainty in railway megaprojects is not limited to technical risk. The studies describe uncertainty as a combination of political, regulatory, financial, technical, social, environmental and contextual conditions. These conditions can also change during the project life cycle. For example, Hudalah et al. (2022) show how political culture, governance style and state intervention shaped risk and uncertainty in Indonesian megaproject planning. Gharehbaghi et al. (2020) similarly identify overlapping engineering, economic, social and environmental complexity in major rail projects.

Several studies also distinguish between measurable risk and forms of uncertainty that are harder to define. Chapman (2016) separates complexity created by project decisions from complexity arising from the wider project context. Balakina et al. (2022) and Bykadorov and Kibalov (2024) treat major railway investment decisions as choices made under broad or radical uncertainty, where future conditions cannot be reduced to a single probability. In Vietnam, Nguyen et al. (2024) show that cost and schedule risks are linked to land clearance, design changes, resource constraints, contractor capability and project finance. These findings show how different risks can interact rather than occur separately.

The evidence also shows that uncertainty may require adjustment during delivery. Mahitthiburin et al. (2024) found that improvisation became part of the response to uncertainty in a railway modernisation project, although the public-sector setting limited how far improvisation could be used. Esposito and Terlizzi (2024) also show that changing institutional and conflict conditions require capacity to adjust decisions over time. These studies support a view of uncertainty as dynamic rather than fixed at the planning stage.

This theme answers RQ1. In the reviewed studies, uncertainty is conceptualised as multidimensional, contextual and changing over time. It includes calculable risks, but also ambiguity, institutional change, political conditions and interactions between different types of risk.

Governance, Institutions and Strategic Decision Structures

The second theme shows that strategic decisions are strongly shaped by governance arrangements. Newlove-Eriksson (2020) found that fragmented public-private governance can weaken accountability in major urban rail interchanges. Deng et al. (2021) show that power asymmetry can reduce governance performance, while greater power sharing supports better collaboration. Esposito et al. (2021) also demonstrate that formal institutions and the way actors use them can influence the direction and performance of a railway megaproject.

Decision structures also depend on how authority and resources are divided between organisations and levels of government. Chen and Xu (2010) describe the shift from central control to multi-level partnerships in the financing of the Wuhan-Guangzhou High-Speed Rail. Zhang et al. (2025) similarly show that intercity railway decisions in China involve both top-down and bottom-up bargaining. In the Jakarta-Bandung High-Speed Railway, Talitha (2025) found that exceptional planning arrangements accelerated development but also reduced local participation and created longer-term governance concerns.

Financing and delivery arrangements are another part of this theme. Siemiatycki (2006) found that a public-private partnership in a Vancouver rapid-rail project did not automatically improve accountability, innovation or cost control. Darvish et al. (2006) also show that value for money in PPP projects depends on balanced

interests and appropriate risk allocation. In Indonesia, Syarif (2025) shows how political support, state financing and adaptive political strategies were used to deal with regulatory and investment uncertainty in the Jakarta-Bandung project.

Taken together, these studies show that strategic decisions are not made outside the institutional setting. Governance structure, accountability, financing, contracts, political priorities and organisational capacity influence which risks receive attention and who has the authority to respond to them.

Stakeholder Participation, Conflict and Legitimacy

The third theme focuses on the role of stakeholders in project decisions. Wu et al. (2020) found that public participation is more effective when project authorities actively seek public input and identify critical stakeholder concerns. Nik-Bakht and El-Diraby (2020) show that community discussion networks change as urban rail projects develop, which means stakeholder influence is not static. Stakeholder engagement therefore affects both information available to decision-makers and the legitimacy of the decisions made.

Conflict also changes the decision environment. Malk (2023) shows how competition and conflict affected the planning of the Rail Baltic terminal in Tallinn. Ariemma and Burnside-Lawry (2016) describe how resistance networks around the Lyon-Turin railway created new channels for public involvement. Esposito et al. (2023) found that the design of participatory institutions influenced whether public participation could contribute meaningfully to decision-making or became constrained by structural barriers.

The studies also point to differences between expert knowledge and local knowledge. Dudley and Banister (2018) show that contested expertise can make major infrastructure decisions more difficult, particularly when evidence is used to support competing narratives. Durrant (2015) similarly argues that greater dialogue between expert and local knowledge can improve trust in technical decisions. These findings show that stakeholder issues are not only about communication. They involve power, trust, competing interpretations and the ability of different groups to influence the project.

Appraisal Biases, Lock-in and Performance Consequences

The fourth theme links decision processes with later project performance. Ronnle (2017a) found that benefit analyses used in the Swedish high-speed rail project had weaknesses such as double counting, inconsistent methods and limited comparability. A related study by Ronnle (2017b) found that project leadership could also use selected benefits opportunistically when conventional appraisal results were unfavourable. These examples show how appraisal can become part of the political decision process rather than a neutral technical exercise.

Other studies show how early assumptions can become difficult to reverse. Peters (2010) reports optimistic expectations, cost growth and limits in public review in the Berlin Tiergarten Tunnel project. Dotti (2018) links optimism bias and strategic misrepresentation with path dependency and lock-in in a Brussels rail project. Hetemi et al. (2017) also show how scope decisions and path dependence can contribute to lock-in and cost overrun in high-speed rail projects.

Project capability and coordination can produce similar consequences. Han et al. (2009) identified weak owner capability, route changes, agency conflict, delivery arrangements, scheduling problems and redesign as major causes of delay in the Korea Train Express project. The evidence therefore connects cost and schedule problems with the way decisions are framed, appraised and maintained over time, not only with external events.

Themes 2, 3 and 4 together answer RQ2. Strategic decision-making is influenced by governance and institutional structures, financing and contracting arrangements, power and organisational capacity, political interests, stakeholder participation and conflict, the use of expert knowledge, and the quality of project appraisal. Bias, selective use of information and lock-in can further affect how these decisions develop.

Adaptive Management and Decision-Support Strategies

The fifth theme covers the main strategies used to manage uncertainty. The evidence does not point to one single method. Instead, the studies use a mix of analytical, governance and stakeholder-based approaches. Davies et al. (2014), for example, show how Crossrail created different points in the project life cycle where innovation could be introduced and shared. Eriksson and Kadefors (2017) also recommend routines that support adaptation and organisational learning in large rail projects.

Several studies use formal decision-support tools. Xue and Xiang (2020) applied a Bayesian network to identify social-risk relationships in high-speed rail planning. Norouzi and Namin (2019) used fuzzy multi-criteria methods to prioritise risks in a railway megaproject, while Guo et al. (2022) combined DEMATEL and IF-ANP to examine dynamic interactions among risks. Scenario and systems approaches were also used to compare alternatives under uncertain future conditions (Pyataev, 2022; Balakina et al., 2022). These methods are useful where decision-makers need to compare interacting risks rather than assess each risk separately.

Other studies place more emphasis on governance and participation. Mottee et al. (2020b) show the need to follow social impacts beyond the initial assessment stage. Esposito et al. (2023) identify participatory arrangements as a way to manage conflict, while Liu (2021) highlights early stakeholder engagement, context awareness and balanced appraisal in the Hong Kong high-speed rail case. In Vietnam, Nguyen et al. (2024) combine expert input, survey evidence and Monte Carlo simulation to identify risk priorities for cost and schedule management.

This theme answers RQ3. The main strategies are adaptive governance, scenario and systems analysis, quantitative risk modelling, risk prioritisation and allocation, stakeholder engagement, participatory governance, organisational learning and continuous monitoring. The studies generally support combining these approaches rather than relying on a single technical tool.

Southeast Asia Evidence and Research Gaps

Nine studies in the final set focused on Southeast Asia. Seven examined Indonesia, one examined Laos and one examined Vietnam. The Indonesian evidence is strongly concentrated on the Jakarta-Bandung High-Speed Railway. Hudalah et al. (2022) examine state rescaling and governance under uncertainty, while Talitha (2025) focuses on exceptional planning arrangements and their governance effects. Setiawan et al. (2024) examine the strategic interests behind cooperation with China, and Syarif (2025) explains how political support and adaptive strategies were used to deal with regulatory and investment constraints.

Financial and accountability issues also appear in the Indonesian studies. Syahrul et al. (2025) discuss corruption, state responsibility and fiscal exposure in the Whoosh project, while Dewantara et al. (2025) focus on debt and long-term financing risks. Rohman (2025) places greater emphasis on governance and public participation. Together, these studies show that the Indonesian evidence is centred on political decision-making, financing, accountability and stakeholder inclusion.

The evidence outside Indonesia is much smaller. Suhardiman et al. (2021) show how centralised decision-making and relations between levels of government shaped compensation and implementation in the Laos-China Railway. Nguyen et al. (2024) provide quantitative evidence on cost and schedule risks in Vietnamese urban rail projects. No eligible study in the final set represented Malaysia, Thailand, Singapore, the Philippines, Cambodia, Myanmar, Brunei or Timor-Leste. This refers only to the evidence captured by the present review and should not be interpreted as proof that no relevant research exists in these countries.

This regional pattern answers RQ4. The main gap is not simply a lack of Southeast Asian studies, but the concentration of the available evidence in one country and a small number of projects. More country-specific and comparative research is needed to explain how strategic decisions change across different political, financial and institutional settings in Southeast Asia.

Table 1: Summary of Analytical Themes Identified in the Review

Theme	Main Issues	Representative Studies	Interpretation
Multidimensional and dynamic uncertainty (26 studies)	Political and regulatory uncertainty; financial and economic risk; technical and operational complexity; social and environmental risk; ambiguity and changing context	Hudalah et al. (2022); Gharehbaghi et al. (2020); Balakina et al. (2022); Nguyen et al. (2024)	Uncertainty is multidimensional, interconnected and can change across the project life cycle.
Governance, institutions and strategic decision structures (35 studies)	Accountability; multi-level governance; contracts and PPPs; financing; power; institutional capacity; political priorities	Newlove-Eriksson (2020); Deng et al. (2021); Esposito et al. (2021); Talitha (2025)	Strategic decisions depend on how authority, resources, risks and responsibilities are organised.
Stakeholder participation, conflict and legitimacy (24 studies)	Public participation; stakeholder networks; conflict and resistance; expert and local knowledge; trust; narratives	Wu et al. (2020); Dudley and Banister (2018); Esposito et al. (2023); Durrant (2015)	Stakeholders influence the information, legitimacy and political acceptability of project decisions.
Appraisal biases, lock-in and performance consequences (15 studies)	Appraisal limitations; optimism; strategic use of information; path dependence; lock-in; cost and schedule escalation	Ronnle (2017a); Peters (2010); Dotti (2018); Hetemi et al. (2017)	Decision and appraisal weaknesses can turn uncertainty into difficult-to-reverse commitments and poor performance.
Adaptive management and decision-support strategies (44 studies)	Adaptive governance; scenario analysis; risk modelling; risk prioritisation; participation; learning; monitoring	Davies et al. (2014); Xue and Xiang (2020); Guo et al. (2022); Nguyen et al. (2024)	Managing uncertainty requires a mix of analytical tools, governance mechanisms and continuous adjustment.

Cross-Theme Synthesis

The five themes are closely connected. Uncertainty enters a project through political, financial, technical, social and wider contextual conditions, but its effect depends on the way the project is governed. Governance arrangements determine who has decision authority, how risks are allocated and how information is used. Stakeholder relationships can then either support the decision process or increase conflict when participation, trust and accountability are weak.

The review also shows that some performance problems are created by the decision process itself. Weak appraisal, optimistic assumptions, selective information and lock-in can make it harder to adjust when conditions change. Cost and schedule problems should therefore not be treated only as technical failures. They can also reflect earlier governance and appraisal choices.

Across the studies, the strongest response is an adaptive approach. Analytical tools help identify and compare risks, but they work best when they are supported by clear governance, stakeholder engagement, monitoring and organisational learning. The combined evidence therefore presents strategic decision-making under uncertainty as an ongoing process of assessment, negotiation and adjustment rather than a one-time choice made at the start of a railway megaproject.

Theoretical And Practical Implications

The findings have three main theoretical implications. First, uncertainty in railway megaprojects is better understood as a changing combination of political, financial, technical, social and institutional conditions rather than as a single measurable risk. Studies on ambiguous risk, scenario change and interacting risk factors support this broader view (Alberti, 2020; Balakina et al., 2022; Guo et al., 2022). Second, governance is part of the decision problem itself. Accountability, power, financing, contracts and relations between levels of government influence which risks are recognised and how responses are chosen (Newlove-Eriksson, 2020; Deng et al., 2021; Talitha, 2025). Third, some project problems develop from the decision process, especially when appraisal is weak, information is used selectively or early choices become difficult to reverse (Ronnle, 2017a, 2017b; Dotti, 2018; Hetemi et al., 2017).

The practical implication is that uncertainty should be managed throughout the project rather than treated as a one-time assessment at the planning stage. Project sponsors need clear decision authority, transparent accountability and realistic allocation of financial and contractual risks. Stakeholder concerns should be identified early and followed as the project develops. Analytical tools can support this process, but they should be combined with governance and monitoring. The reviewed studies show useful examples of Bayesian and fuzzy risk modelling, scenario analysis, risk prioritisation, participatory arrangements and continuous follow-up (Xue & Xiang, 2020; Norouzi & Namin, 2019; Mottee et al., 2020b; Nguyen et al., 2024).

For Southeast Asia, the practical lesson is more specific. The included studies show that political support, regulatory conditions, financing arrangements and accountability can become closely linked in railway decisions. Evidence from Indonesia, Laos and Vietnam shows the need to examine these factors together rather than transfer assumptions directly from other regions (Hudalah et al., 2022; Suhardiman et al., 2021; Nguyen et al., 2024; Syarif, 2025).

Complementary decision-support literature includes reference class forecasting for Hong Kong roadworks and a conceptual 5D-BIM governance framework for railway cost management (Flyvbjerg et al., 2016; Hussain et al., 2024). These approaches offer directions for considering forecasting and digital information within project governance; their effectiveness should be assessed in the specific railway context. Research published after the review's 2000–2025 eligibility window also addresses early-design complexity and cost escalation in railway megaprojects (Schön et al., 2026). It is cited here as subsequent context and is not part of the systematic synthesis.

A separate body of efficiency research examines Malaysian electrical and electronics firms, furniture manufacturing, transport manufacturing and Indonesian production, while an Omani banking study proposes a cost and profit efficiency framework (Fahmy-Abdullah et al., 2019; Hamdan et al., 2019; Jofree et al., 2021; Riyardi et al., 2022; Hashim & Fahmy-Abdullah, 2024; Al Asmi et al., 2024). These cross-sector studies may inform future thinking about resource-performance measurement, but they do not establish how railway megaproject governance or uncertainty affects project outcomes. Any transfer of their methods would require railway-specific inputs, outputs and validation.

Limitations

This review has several limitations. The search used two indexed databases, Scopus and Dimensions, and covered publications from 2000 to 2025. Relevant work indexed elsewhere may therefore have been missed. The final assessment was also limited to English full texts. Sixteen reports could not be retrieved, so the final evidence base may be affected by availability bias even though these records were reported separately in the PRISMA flow.

The included studies also differ in design, country, project stage and type of evidence. The review therefore identifies patterns across the literature rather than estimating a common effect size. QuADS provided a consistent structure for quality appraisal, but quality scoring and thematic coding still involve judgement. The Southeast Asian evidence is another limitation because seven of the nine regional studies concern Indonesia. The regional findings should therefore not be generalised to all Southeast Asian railway systems.

CONCLUSION

This review examined 65 studies on strategic decision-making under uncertainty in railway megaprojects. Five themes were identified: multidimensional and dynamic uncertainty; governance, institutions and strategic decision structures; stakeholder participation, conflict and legitimacy; appraisal biases, lock-in and performance consequences; and adaptive management and decision-support strategies.

The findings show that uncertainty is not only a technical project risk. Strategic decisions are also shaped by political and regulatory change, financing, governance arrangements, stakeholder relationships, appraisal practices and organisational capacity. These factors can interact and can change as the project develops. The reviewed studies therefore support adaptive approaches that combine analytical tools with clear governance, stakeholder engagement, monitoring, learning and risk allocation.

The Southeast Asian evidence remains narrow. Only nine included studies focused on the region and seven of them examined Indonesia. Future research should extend the evidence to more Southeast Asian countries and compare how different political, financial and institutional settings affect railway decisions under uncertainty. This would provide a stronger basis for understanding which governance and management approaches work across different regional contexts.

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APPENDIX A

Table A1: Characteristics and Quality Scores of the 65 Included Studies

Study	Country / Project	Method	Key Finding	QuADS
Newlove-Eriksson (2020)	UK & Sweden — London Crossrail (Stratford) and Stockholm City Line / Stockholm Station City	Comparative qualitative case study; process-tracing-inspired analysis using official documents, reports, policy material, prior research and news media.	Both cases show fragmented public–private governance that can weaken safety accountability; long project durations, staff turnover and loss of institutional memory further complicate accountability, indicating a need to strengthen governance alongside standard risk analysis.	76.9%
Ronnle (2017a)	Sweden — Swedish high-speed rail / National Negotiation on Housing and Infrastructure	Exploratory document-based case study of 57 benefit-analysis reports and associated documents, complemented by stakeholder discussions/presentations.	The study finds that the benefit analyses are insufficient as decision bases as they double-count benefits, disregard costs, are methodologically inconsistent and lack comparability.	74.4%
Davies et al. (2014)	United Kingdom — London Crossrail	Action research (2012–2014); interviews with 16 Crossrail managers plus follow-up interviews, project documents and trade press.	Crossrail identified four intervention windows for innovation—front-end bridging, procurement engagement, delivery-stage leveraging and back-end knowledge exchange—showing that innovation can be deliberately governed across the megaproject life cycle.	71.8%
Wu et al. (2020)	China & USA — Beijing–Shenyang HSR and California	Inductive comparative case study using secondary data.	Effective public participation requires lead agencies to actively solicit public comments and identify critical voices; stakeholder and uncertainty management	79.5%

	HSR		are central to megaproject success.	
Peters (2010)	Germany — Berlin Tiergarten Tunnel mega-project	Qualitative case study using extensive primary/secondary sources and 25 stakeholder interviews.	The bundled Berlin Tiergarten rail and road tunnels show how optimistic forecasts, prestige, cost overruns and limits of public review can shape megaproject decision-making.	74.4%
Li et al. (2021)	China — HSR-driven land development in Anhui Province	Deductive multi-case study of three cities; field investigation, interviews, participatory observations, policies, archives, spatial plans and quantitative material.	This study, therefore, argues that the top-down intervention critically affected the local development through large-scaled infrastructures driven land development while the opportunities and risks have coexisted.	76.9%
Mahitthiburi n et al. (2024)	Denmark — Danish Signalling Programme (ERTMS)	Qualitative case study; semi-structured interviews and project progress reports.	We find, however, that there is no pure improvised solution in public megaprojects due to the risk-averse nature of the project owner.	79.5%
Xue & Xiang (2020)	China — Chinese high-speed rail projects	Bayesian network analysis supported by case studies, expert interviews and expert grading.	The Bayesian model identifies key and sensitive social-risk factors and causal chains; the study recommends greater planning transparency, more democratic participation, stronger local-government voice and improved emergency-management mechanisms.	84.6%
Hetemi et al. (2020)	Spain — Madrid–Barcelona high-speed rail line	Longitudinal case study; social network analysis plus qualitative evidence from contract databases, semi-structured interviews, observations and audit/secondary documents.	Actors' behavior is affected by the project public institutional context, coupled with contractual commitments.	84.6%
Nik-Bakht & El-Diraby (2020)	USA & Canada — Central Corridor (Minneapolis), Atlanta Streetcar, Crosstown (Toronto), Woodward Ave LRT (Detroit)	Comparative case-based social and semantic network analysis of Twitter data across four LRT projects over two years.	Community discussion networks evolve as projects progress, with influential hub actors and changing subcommunities shaping issue diffusion; monitoring these networks can support more proactive stakeholder communication and decision-making.	82.1%
Chitti & Beria (2025)	Italy — Italian high-speed rail network	Historical planning and policy analysis across four phases of HSR development, including governance, financing, procurement and appraisal decisions.	Italian HSR development moved through four distinct planning phases marked by shifts in governance and planning philosophy, revealing recurring challenges associated with infrastructure-centred rail planning.	69.2%
te Boveldt et al. (2018)	Belgium — Proposed railway tunnel / Belgian railway bottleneck in Brussels	Competence-based Multi Criteria Analysis (COMCA) group decision framework applied to a real railway planning case.	It was found that, in terms of desirability among stakeholders, certain little-studied alternatives potentially surpass the alternatives which for many years were regarded as the most plausible options by the key players. Based on experiences	71.8%

			during the study,…	
Zhao et al. (2025)	China — Major railway engineering projects	Tripartite evolutionary game model with dynamic simulation of strategic choices among governance, demand-side and innovation-platform actors.	Tripartite strategy selection is shaped less by initial actor positions than by incentives and risks; subsidy levels, additional benefits and innovation-risk coefficients are the most influential parameters affecting supply–demand matching.	76.9%
Ogwang & Vanclay (2021)	Uganda — Malaba–Kampala section of East Africa Standard Gauge Railway (within four infrastructure cases)	Multi-case qualitative case study using document analysis, field observations, key-informant interviews and focus groups.	Chinese-financed infrastructure can produce development benefits, but weak transparency, debt concerns, social impacts and governance risks remain; stronger compliance with environmental, social, human-rights, benefit-sharing and resettlement standards is recommended.	79.5%
Novy & Peters (2013)	Germany — Stuttgart 21 railway station redevelopment megaproject	Qualitative case study using interviews and document analysis.	Stuttgart 21 reinforces concerns about transparency, public accountability, environmental impacts and cost overruns, while showing that rail megaproject conflicts are closely tied to competing urban-development visions and democratic decision processes.	76.9%
Esposito & Terlizzi (2024)	France & Italy — Lyon–Turin high-speed railway	In-depth case analysis using Pettigrew contextualism; 79 semi-structured interviews triangulated with legal texts, agreements, policy papers, press releases and third-party studies.	Our study shows that variations in performance (content) are determined by and determine variations in (1) the openness or closure of national institutional contexts to civil society stakeholders (inner context), (2) the intensity of supervision and control functions…	89.7%
Hudalah et al. (2022)	Indonesia — Jakarta–Bandung High-Speed Train (with Kertajati airport comparison)	Comparative illustrative case study; policy/legal documents, 51 semi-structured interviews, field observations and coding analysis.	The dynamics of political culture, governance style, and policy domain shed light on the pragmatic rediscovering of state activism to manage risk and uncertainty in Indonesia's multi-actor and multi-scale megaproject decision-making environment.	82.1%
Pyataev (2022)	Multi-country / urban rail evidence — New-build urban rail (metro/LRT) schemes	Conceptual/analytical review of published urban-rail performance evidence using the RAMP risk-management perspective.	Scenario-based system analysis allows large railway alternatives to be compared under uncertainty by weighting strategic, social and economic objectives across different future scenarios, capturing project-scale effects that conventional hierarchy methods may miss.	71.8%
Gharehbaghi et al. (2020)	Australia — Sydney Metro and Melbourne Metro Rail	Comparative case-study analysis of two mega rail projects, informed by a literature review and sustainable transportation infrastructure (STI) indicators.	Complexity in Sydney and Melbourne rail megaprojects arises from imbalances and overlaps among environmental, economic, social and engineering dimensions; treating the engineering dimension separately can improve planning and management of rail megaproject complexity.	69.2%
Sekasi et al.	USA — California High-Speed Rail	Critical realist case study using a Context–	Improving contractual design alone is insufficient; instead, outcomes are shaped	87.2%

(2025)	Project (CAHSRP)	Mechanism–Outcome framework; 13 semi-structured interviews plus extensive project documentation.	by the co-evolution of formal and informal mechanisms within complex institutional contexts.	
Deng et al. (2021)	China — urban rail transit projects in six cities	Questionnaire survey of 116 project professionals; structural equation modelling.	A higher level of power asymmetry was associated with lower hybrid governance performance. In contrast, a higher level of power sharing is associated with better hybrid governance performance.	76.9%
Chapman (2016)	United Kingdom — High Speed 2 (HS2) case application	Literature-based complexity framework with illustrative case-study application to HS2.	However departments have not examined the characteristics of complexity or made a distinction between complexity emanating from the decisions made by the project itself and the complexity emanating from its context, as they warrant different treatment. By way…	59.0%
Dudley & Banister (2018)	United Kingdom — High Speed Rail 2 (HS2), with comparison to trunk-roads policy	Comparative political/policy case analysis using the epistemic-communities framework.	Over time the contested nature of expertise can significantly inhibit the construction of effective narratives, either for or against the project, and also make decision-making more complex and problematic. Decision makers may also seek greater clarification through the…	66.7%
Hoque et al. (2025)	Bangladesh — Dhaka MRT Line-5 (Northern Route)	NLP-based thematic analysis using project documents, policy briefs, open sources and stakeholder consultations.	Results revealed critical barriers, such as financial constraints, environmental risks, public resistance, and outdated policies, while success factors included diversified funding, sustainability measures, stakeholder engagement, and advanced construction techniques. The study establishes a replicable guideline to inform decision-making…	64.1%
Esposito et al. (2021)	France & Italy — Lyon–Turin high-speed railway	Extended case study; 79 semi-structured interviews, archival analysis of about 2,000 pages of documents, and grounded/axial coding.	Megaproject performance is shaped by how actors use formal institutions and legal-administrative practices; project managers can actively shape institutional contexts and governance arrangements to align contested goals.	84.6%
Pagliara et al. (2025)	Italy — Bari–Naples high-speed rail corridor	Method-development study with case application to quantify/monetise stakeholder-engagement costs and benefits.	Stakeholder engagement generates identifiable monetary costs and benefits in the Bari–Naples HSR case, supporting its explicit inclusion in appraisal and major-project decision-making.	61.5%
Malk (2023)	Estonia — Rail Baltic terminal project, Tallinn	Case study using discourse analysis, planning documents, periodicals and in-depth expert interviews.	The study finds that the interlinked processes of megaproject planning and design competitions have inherent democratic deficiencies which can be counterproductive to benefitting the public realm.	79.5%

Mottee et al. (2020a)	Netherlands & Australia — Amsterdam North–South Metro and Sydney Parramatta Rail Link	Multi-method comparative case study: document analysis, about 30 semi-structured stakeholder interviews and an expert focus group.	By considering the assessment and management of social impacts in the planning and decision-making of two rail megaprojects (the North-South Metro line in Amsterdam, the Netherlands, and the Parramatta Rail Link in Sydney, Australia), we found that technical…	87.2%
Han et al. (2009)	South Korea — Korea Train Express (KTX)	In-depth case study using schedule/delay analysis and interviews with five key project managers.	Five major delay causes were identified in Korea's KTX: weak owner capabilities and strategy, route changes driven by agency conflict and public resistance, unsuitable delivery arrangements, inadequate scheduling tools and redesign/change orders.	76.9%
Dotti (2018)	Belgium — Watermael–Schuman–Josaphat rail junction, Brussels	Qualitative case study using a cognitive-evolutionary policy-knowledge framework and documentary/archival evidence.	The main causes were identified in the optimism bias, strategic misrepresentation, path dependency leading to lock-in and poor oversight; however, the 'survival' of these causes is still unclear. Based on the case of the new 'Watermael – Schuman…	82.1%
Darvish et al. (2006)	Australia — Sydney Airport Railway Link (plus Cross City Tunnel comparator)	Literature review plus comparative case-study analysis of two PPP projects.	It is concluded that protecting the public interests and allowing the private partners to gain reasonable return on their investments, are essential in achieving value for money in PPP projects. This can only be viable through optimal risk…	69.2%
Norouzi & Namin (2019)	Iran — Tehran–Rasht railway megaproject	Hybrid multi-criteria decision method: fuzzy Best-Worst Method (BWM) plus group fuzzy TOPSIS.	The identified and ranked risk factors help practitioners and academics to follow the subsequent steps of the risk management process of Iranian transportation megaprojects.	71.8%
De Vries (2008)	Netherlands & Belgium — HSR Antwerp–Rotterdam and Iron Rhine freight railway (plus Scheldt case)	Comparative case-study/policy analysis of three cross-border infrastructure projects.	The paper shows that cross-border projects encounter specific problems in all four areas, some of which could be ameliorated by more involvement by the European Union.	74.4%
Nekhoroshkov & Nekhoroshkov (2018)	Russia / Eurasian corridors — three large-scale railway infrastructure projects	Scenario and systems analysis; expert methods; sensitivity assessment across external-environment scenarios.	External political-economic scenarios affect railway infrastructure projects differently depending on project purpose; scenario and expert-based assessment can therefore support investment decisions and reduce uncertainty in international transport infrastructure.	71.8%
Hetemi et al. (2017)	Spain — portfolio of 20 High-Speed Rail projects	Data mining of HSR project/contract data plus exploratory interviews and case-study research.	Based on empirical data from 20 High Speed Rail (HSR) projects in Spain with multinational sets of actors, and anchored in the Management of Project (MoP) paradigm, the paper shows that a holistic perspective is essential for successful…	66.7%

Talitha (2025)	Indonesia — Jakarta–Bandung High-Speed Railway	Qualitative case study; 22 semi-structured elite interviews, document review, thematic coding with NVivo.	This paper posits the necessity of balancing the immediate advantages of expedited development with the long-term impacts on governance and regional development. Additionally, a more inclusive governance model and comprehensive planning procedures are crucial for mitigating adverse outcomes…	82.1%
Siemiatycki (2006)	Canada — Vancouver rapid-rail DBFO public–private partnership	Single-project case analysis of the PPP planning and delivery process using documentary/project evidence.	However, this article shows that in the case of a new rapid-rail development in Vancouver, Canada, the private-public-partnership method of project delivery has been largely incongruent with increased accountability while failing to drive technological innovation or limit cost…	59.0%
Mottee et al. (2020b)	Australia — Sydney South West Rail Link	Qualitative case study; site visits, document analysis and semi-structured interviews.	Using Western Sydney's politically-successful South West Rail Link as an example, we identified the practice challenges and governance barriers to applying ESIA and EIA follow-up across spatial scales.	79.5%
Zhang et al. (2025)	China — Yangtze River Delta and Pearl River Delta intercity railway projects	Comparative governance case analysis using the Territory–Place–Scale–Network (TPSN) framework and institutional/policy evidence.	This article underscores the importance of both top-down and bottom-up dynamics in regional development, unfolding how state spatial strategies are operationalised in a hybrid model of governance. This study contributes to the understanding of state space and intergovernmental…	66.7%
Balakina et al. (2022)	Russia — Kyzyl–Kuragino railway / Russia–Mongolia–China corridor	Comparative system-efficiency assessment; logical-heuristic and expert evaluation; strategic-game decision model under uncertainty.	Expert evaluation under radical uncertainty found the Urumqi connection option to dominate the alternative via Eren-Khoto across the applied decision criteria, illustrating how system assessment can guide strategic railway investment choices.	71.8%
Guo et al. (2022)	China — Chengdu–Chongqing Middle Line High-Speed Railway	Panel-data empirical study using DEMATEL and interference fuzzy ANP (IF-ANP).	The result of the case study shows that there are obvious interactions among risks and these interactions are dynamic.	79.5%
Romestant (2020)	France — three urban rail megaprojects	Three-year engaged research with a rail supplier; three case studies; Actor–Network Theory analytical approach.	Urban rail sustainability is shaped by heterogeneous stakeholder networks that include business, non-business and future collectives; stakeholders perform different roles as promoters, translators and targets in sustainability 'agencing'.	59.0%
Ariemma & Burnside-Lawry (2016)	Italy/France — Lyon–Turin High-Speed Railway / No TAV movement	Qualitative case study of communicative action, democratic participation and transnational resistance networks.	The emergence of transnational resistance networks such as the Forum Against Unnecessary and Imposed Mega Projects-spearheaded by members of the No TAV social movement, may provide new avenues for democratic participation and citizen engagement.	69.2%

Durrant (2015)	United Kingdom — High Speed 2 (HS2)	Discourse analysis of the dominant and alternative policy frames surrounding HS2.	Alternative frames established within civil society are also identified. The paper concludes that sensitivity to the framing of issues is important if there is to be greater dialogue between expert and local knowledge systems as a means of…	74.4%
Esposito et al. (2023)	Italy/France — Lyon–Turin High-Speed Railway	Comparative qualitative case study of the Italian Observatory and French Public Inquiry participatory venues.	Empirical evidence shows that the Italian case featured substantial structural barriers to effective democratic participation.	74.4%
Guo et al. (2014)	China & New Zealand — Yi-wan Railway and Northern Gateway Toll Road	Comparative case study; desktop review, participatory observation, risk workshop, stakeholder interviews and document analysis.	Comparative analysis shows that project governance provides a structured mechanism to identify and address risks as they occur.	76.9%
Carrai (2021)	Kenya & Ethiopia — Standard Gauge Railway and Ethiopia–Djibouti Railway	Comparative case study; document analysis and 62 semi-structured stakeholder interviews.	Chinese BRI railway governance adapts to host-country institutions rather than imposing a single model; this flexibility can generate different CSR outcomes but may also reinforce weak governance and undermine long-term sustainability.	82.1%
Eriksson & Kadefors (2017)	Sweden — major railway tunnel project	Longitudinal qualitative case study; three years of non-participant observation, informal conversations and formal interviews.	Availability and familiarity heuristics were found important, as well as coordination neglect — a general tendency to focus more on partitioning tasks than on coordination needs. Clients should develop meta-routines and meta-functions to support adaptation within, and learning…	71.8%
Esposito et al. (2022)	Italy/France — Lyon–Turin High-Speed Railway	Qualitative comparative case analysis of policy narratives and institutional settings using documentary and stakeholder evidence.	It is rather a non-linear process involving stakeholders with divergent interests and logics of action engaging in a battle over competing narratives to influence implementation outcomes. Institutional settings opened to opponents' voice in megaproject decision-making facilitate and streamline…	71.8%
Suhardiman et al. (2021)	Laos — Laos–China Railway	Qualitative governance case study using institutional/documentary analysis and field-based stakeholder evidence.	Taking Naxang village in Chomphet district, Luang Prabang province, in Laos as a case, the paper highlights: 1) how centralized compensation rules and procedures serve as a means for the central government to expand its power; 2) how…	74.4%
Ronnle (2017b)	Sweden — Swedish High-Speed Rail project	Qualitative case study; 13 interviews with politicians/public servants/consultant, supported by prior analysis of 57 benefit-analysis reports.	However, the project leadership still used the identified benefits opportunistically as a counterweight to the negative CBA results. Future research should consider how opportunism in alternative benefit analysis can be limited.	79.5%

Bykadorov & Kibalov (2024)	Russia — Barentskomur and North Siberian Railway (Severosib)	Neosystems/system analysis; logical-heuristic assessment, expert survey and decision-theory criteria/software support.	Neosystems and expert technologies can treat uncertainty as a source of future opportunities rather than only probabilistic risk, expanding decision support for complex railway investment alternatives.	84.6%
Nguyen et al. (2024)	Vietnam — Hanoi and Ho Chi Minh City urban rail / HCMC Metro 2 modelling context	Mixed methods: five expert semi-interviews, questionnaire survey of 132 professionals, and Monte Carlo simulation.	Findings: The results show that 30 risk variables are categorized into seven main groups which have significant impacts on both project time and cost.	87.2%
Wang (2022)	China — HSR station areas including Shenzhen, Lanzhou and Yongcheng	Multi-case qualitative research using document/planning analysis, fieldwork and case-based analysis of actors, interdependencies and decision rounds.	The current Chinese institutions obstruct the integrated development of HSR station areas and fail to create a common understanding of spatial development and ways to achieve value capture. Chinese HSR station areas should pay more attention to the…	69.2%
Liu (2021)	Hong Kong — Guangzhou–Shenzhen–Hong Kong Express Rail Link (Hong Kong section)	Critical literature review with project case-study/resonance-test analysis.	The Hong Kong XRL case highlights the importance of megaproject drivers, context awareness, early stakeholder engagement and balancing cost–time–quality considerations in planning and appraisal decisions.	69.2%
Weber & Schmidt (2025)	Germany — Stuttgart 21 railway/urban development megaproject	Qualitative longitudinal case study; documentary analysis, longitudinal financial/risk mapping and secondary evidence.	Stuttgart 21 demonstrates how technical, political, environmental and financial risks interact with funding choices, governance and stakeholder management; longitudinal risk mitigation is necessary as project conditions evolve.	74.4%
Setiawan et al. (2024)	Indonesia — Jakarta–Bandung High-Speed Rail	Qualitative case study using government policies, official statements, document analysis and expert/secondary analyses under a national-interest framework.	The project serves as a linchpin for Indonesia's infrastructure-driven development agenda under President Joko Widodo, embodying ambitions of modernization and economic growth. The findings reveal a complex interplay of domestic infrastructure needs, regional strategic considerations, and aspirations for…	82.1%
Syahrul et al. (2025)	Indonesia — Jakarta–Bandung High-Speed Rail (Whoosh)	Normative-empirical legal research; doctrinal analysis, published case facts, descriptive qualitative analysis and law-and-economics assessment.	The study argues that corruption-related accountability and constitutional oversight of state-owned enterprises must operate together; fiscal rescue or restructuring should be accompanied by anti-corruption enforcement and safeguards for state finances.	66.7%
Rohman (2025)	Indonesia — MRT Jakarta (with Trans-Java and international comparators)	Systematic literature review and international case comparison; content analysis, narrative synthesis and comparative analysis.	Transparent, accountable governance that involves communities from the outset can enhance public acceptance and project sustainability.	82.1%

CHEN & XU (2010)	China — Wuhan–Guangzhou High-Speed Rail	Institutional/governance case analysis of infrastructure-investment restructuring and inter-scalar state–market partnerships.	However, the scaling down and scaling out processes have not led to the total retreat of the central state, nor the relaxation of state control. Our main argument is that the state investment regime has now shifted from…	59.0%
Xie (2022)	China / international literature — urban rail transit PPP research	Bibliometric/literature review of 217 papers using Excel and CiteSpace keyword, cluster and trend analyses.	Nowadays, the research of PPP-Transportation Engineering mainly focuses on the construction of risk management systems, performance evaluation systems, subsidy scheme decision systems, and operation mode selection methods for the whole life cycle of urban rail projects. This paper…	84.6%
Dewantara et al. (2025)	Indonesia — Jakarta–Bandung HSR / KCIC	Qualitative descriptive case study using secondary government, academic and media sources framed by dependency/debt-trap theory.	Although the KCIC has potential benefits for connectivity and investment attraction, significant cost overruns and reliance on long-term foreign loans may expose Indonesia to fiscal risks similar to those experienced by Sri Lanka.	74.4%
Kathuri (2025)	Kenya — Mombasa–Nairobi Standard Gauge Railway	Descriptive survey mixed-method design; questionnaire, semi-structured interviews, policy documents and secondary sources; 30 participants.	Kenya's SGR improved transport performance but unresolved governance issues remain; stronger stakeholder engagement, transparent project finance and continuous evaluation are recommended to improve accountability and long-term project value.	87.2%
Alberti (2020)	Brazil, Uruguay & Colombia — Ferroanel São Paulo, Central Railway of Uruguay, Bogotá Metro Line 1	Multiple-case risk assessment using Fuzzy Set Theory and expert/decision-maker judgements across STEEP risk dimensions.	By applying FST to this set of MTPs, which includes projects developed in different institutional contexts, this paper shows that ill-defined construction risks are especially important in megaprojects in Latin America. Consequently, it also reveals that risk assessment…	82.1%
Syarif (2025)	Indonesia — Jakarta–Bandung High-Speed Rail	Comparative case study using interviews, secondary sources, process tracing and comparative methods (HSR versus mineral-processing investment).	Using Indonesia as a case study, this article argues that the success of Chinese investments is best explained through a combination of commercial rationale, strategic collaboration and adaptive political tactics.	79.5%

Note. QuADS = Quality Assessment with Diverse Studies; maximum score = 39. Percentages are reported to one decimal place.