

Qualitative analysis of stakeholder risks affecting the schedule performance of national road infrastructure projects in Indonesia

Dian Rani¹, Wisnu Isvara¹

¹*Department of Civil Engineering, Faculty of Engineering, University of Indonesia, Depok, Indonesia.*

ABSTRACT: *This study aims to analyze stakeholders and risks affecting time performance in national road infrastructure development projects in Indonesia. The research applies a mixed-method approach combining literature review, semi-structured interviews, expert validation, pilot surveys, and questionnaire distribution. The research stages include identification of national road development phases, stakeholder identification, stakeholder risk identification, probability and impact risk analysis, and preparation of a risk-based stakeholder engagement strategy. The findings indicate that the main stakeholders include the Project Management Unit (PMU), National Road Planning and Supervision Work Unit (P2JN), Commitment Making Officers (PPK), consultants, contractors, local governments, local communities, traditional leaders, and utility providers. The dominant risks affecting project time performance include land acquisition issues, lack of coordination among stakeholders, delays in utility relocation, and slow approval of design revisions.*

KEYWORDS - *Stakeholder, project risk, national roads, time performance, stakeholder engagement.*

I. INTRODUCTION AND LITERATURE REVIEW

The development of national road infrastructure in Indonesia plays a strategic role in supporting regional connectivity, economic growth, logistics distribution, and equitable development. As one of the largest infrastructure sectors funded by public expenditure, road construction projects are expected to achieve optimal project performance in terms of cost, quality, and time. However, in practice, many national road projects in Indonesia continue to experience delays during planning and construction stages. These delays are commonly caused not only by technical problems, but also by ineffective coordination among stakeholders involved throughout the project lifecycle.

In road infrastructure projects, stakeholders consist of various internal and external parties, including the Project Management Unit (PMU), Commitment Making Officers (PPK), consultants, contractors, local governments, utility providers, affected communities, and traditional leaders. Each stakeholder possesses different levels of influence, interest, authority, and responsibility, which may directly or indirectly affect project implementation. Previous studies indicate that inadequate stakeholder management often results in conflicts, communication breakdowns, delayed decision-making, land acquisition problems, utility relocation delays, and social resistance, all of which contribute significantly to project time overruns [4].

According to the Directorate General of Highways (Direktorat Jenderal Bina Marga), the feasibility study stage represents one of the most critical phases in road infrastructure development because most project uncertainties and risks originate during the early planning stage [2]. The guideline for feasibility studies explains that road projects with high complexity, significant uncertainty, extensive land acquisition, and strategic public investment require comprehensive feasibility assessments involving technical, environmental, social, economic, and institutional analyses. Furthermore, the SOP/UPM/DJBM-135 concerning the Preparation Procedure of Feasibility Study Documents emphasizes that the feasibility study process should systematically identify project risks, stakeholder involvement, utility conflicts, environmental constraints, and land acquisition issues before the project enters the detailed engineering design (DED) and construction stages [3].

Several previous studies have highlighted the importance of integrating stakeholder management and risk management in construction projects. Freeman (1984) stated that stakeholders are groups or individuals who can affect or are affected by project objectives, making stakeholder engagement an essential element in project success. Similarly, PMI (2021) emphasized that proactive stakeholder engagement and risk management significantly improve project performance and reduce project uncertainty. However, in many infrastructure projects, stakeholder management and risk management are still implemented separately, resulting in ineffective mitigation of stakeholder-related risks [6].

The impacts of ineffective stakeholder management can occur at multiple levels. At the micro level, projects may experience delays, design revisions, disputes, and construction interruptions. At the meso level, organizations may face reduced project performance, financial inefficiency, and reputational damage. At the macro level, delays in strategic infrastructure projects can reduce public service quality, disrupt economic connectivity, and decrease public trust in government infrastructure programs. Therefore, stakeholder-related risks

affecting the time performance of national road infrastructure projects.

This research aims to analyze stakeholders and stakeholder-related risks affecting the time performance of national road infrastructure projects in Indonesia. The study also aims to develop a risk-based stakeholder engagement framework by integrating stakeholder analysis and risk management approaches throughout the project lifecycle, particularly during the feasibility study stage.

The proposed framework is expected to provide two major contributions: (1) improving coordination, communication, and decision-making among project stakeholders; and (2) reducing project delays through early identification and mitigation of stakeholder-related risks. Ultimately, this research is expected to contribute to improving project time performance and strengthening the effectiveness of national road infrastructure development in Indonesia.

A. CONCEPT OF CONSTRUCTION IMPLEMENTATION STAGE IN NATIONAL ROAD DEVELOPMENT

National road infrastructure development in Indonesia consists of several major stages, namely the Feasibility Study (FS), Detail Engineering Design (DED), Procurement/Tender, and Construction Implementation stages. Each stage has different objectives, activities, stakeholders, and risk characteristics that influence project performance, particularly project time performance. Therefore, understanding the concepts and risks associated with each project stage is essential to support effective project management and stakeholder engagement (Republik Indonesia, 2022; Freeman, 1984; Olander & Landin, 2005).

Stakeholder management is defined as the process of identifying individuals, groups, or organizations that can influence or be influenced by project objectives (Freeman, 1984). In construction projects, stakeholders include project owners, government agencies, consultants, contractors, utility companies, local communities, non-government organizations, and regulators. Each stakeholder possesses different interests, authority, influence, and expectations, which can significantly

affect project performance.

Research by Olander and Landin (2005) demonstrated that stakeholder influence is one of the critical determinants of construction project success, particularly in projects involving large public infrastructure. Stakeholder conflicts and ineffective communication often result in disputes, design revisions, delays, and increased project complexity. Therefore, stakeholder engagement should be conducted systematically throughout the project lifecycle, beginning from the feasibility study stage.

No	Stakeholder	Main Role	Potential Risk
1	Project Management Unit (PMU)	Project coordination and control	Weak coordination
2	PPK	Contract and implementation control	Administrative delays
3	Consultant	Planning and supervision	Design revisions
4	Contractor	Construction implementation	Delayed execution
5	Local Government	Permit and regional coordination	Permit delays
6	Utility Providers	Utility relocation	Relocation conflicts
7	Local Community	Social acceptance	Social resistance
8	Traditional Leaders	Community influence	Community conflict

Fig. 2.1 Main Stakeholders in National Road Infrastructure Projects

According to the Project Management Institute (PMI, 2021), stakeholder management consists of several processes including stakeholder identification, stakeholder analysis, engagement planning, stakeholder communication, stakeholder monitoring, and stakeholder control. Effective stakeholder management contributes to improving project coordination, minimizing resistance, and enhancing project decision-making processes. ineffective communication

In this research, the stakeholder management framework was developed through a systematic literature review combined with expert validation involving practitioners from the Directorate General of Highways, consultants, contractors, and academics. The validation process was conducted to ensure that the identified stakeholder variables, stakeholder roles, and stakeholder-related risks were relevant to national road infrastructure projects in Indonesia.

I. Feasibility Study (FS) Stage

The feasibility study (FS) is one of the most critical stages in national road infrastructure development because it determines the

overall feasibility of the proposed project from technical, economic, environmental, social, and institutional perspectives. The Directorate General of Highways explains that FS activities include the identification of transportation problems, development of alternative alignments, technical investigations, preliminary design preparation, economic analysis, and stakeholder consultations (Direktorat Jenderal Bina Marga, n.d.).

The SOP/UPM/DJBM-135 further explains that feasibility studies should include detailed assessments covering topography, geotechnical conditions, hydrology, traffic demand, environmental impacts, social impacts, land acquisition requirements, utility relocation needs, and project risks. These assessments are necessary to minimize uncertainty before the project enters the Detailed Engineering Design (DED) and procurement stages (Direktorat Jenderal Bina Marga, n.d.; Republik Indonesia, 2022).

II. Detail Engineering Design (DED) Stage

The Detail Engineering Design (DED) stage is an essential phase in national road infrastructure development because it translates the feasibility study results into detailed technical plans and construction specifications. The DED stage serves as the primary reference for project implementation, procurement, cost estimation, and quality control during construction activities (Direktorat Jenderal Bina Marga, 2018).

According to the Directorate General of Highways, DED activities include geometric road design, pavement design, structural calculations, drainage system planning, utility coordination, traffic engineering analysis, and preparation of technical specifications and construction drawings. The DED process must also consider technical standards, environmental sustainability, construction safety, and constructability aspects (Direktorat Jenderal Bina Marga, 2017; Direktorat Jenderal Bina Marga, 2021).

III. Procurement/Tender Stage

The Procurement/Tender stage is a crucial phase in national road infrastructure development because it determines the selection of contractors, consultants, suppliers, and service providers responsible for project implementation. This stage aims to ensure transparency, fairness, accountability,

efficiency, and the selection of competent project participants in accordance with government procurement regulations. Effective stakeholder coordination during the procurement stage is essential to minimize delays, contractual disputes, and project implementation risks (Republik Indonesia, 2021; FIDIC, 2017).

Procurement Several stakeholders are actively involved in the procurement/tender process, including procurement committees, Project Management Units (PMU), Pejabat Pembuat Komitmen (PPK), consultants, contractors, supervisory agencies, and government oversight institutions. Each stakeholder has specific roles and responsibilities related to procurement planning, bid evaluation, contract preparation, technical verification, and regulatory compliance (Kementerian PUPR, 2020; Republik Indonesia, 2021).

Furthermore, the procurement/tender stage also serves as a strategic mechanism to evaluate the technical, financial, and managerial capabilities of prospective contractors and consultants before project execution begins. In national road infrastructure projects, ineffective procurement processes may lead to cost overruns, poor construction quality, schedule delays, and conflicts among project stakeholders. Therefore, clear procurement planning, transparent bid evaluation procedures, and strong stakeholder communication are necessary to ensure that procurement objectives align with project performance targets and public accountability principles (World Bank, 2016; Kerzner, 2019).

IV. Construction Implementation Stage

The Construction Implementation stage involves various stakeholders responsible for executing, supervising, coordinating, and controlling physical construction activities in national road infrastructure projects. This stage requires strong stakeholder collaboration because project implementation directly affects project quality, construction safety, environmental performance, project costs, and project completion time (Soeharto, 1999; Ervianto, 2005).

The main stakeholders involved in the construction implementation stage generally include the Project Management Unit (PMU),

Pejabat Pembuat Komitmen (PPK), Satker Pelaksanaan Jalan Nasional, contractors, supervisory consultants, local governments, utility service providers, environmental agencies, local communities, and occupational safety management teams. Each stakeholder has different responsibilities related to construction execution, supervision, coordination, quality assurance, safety management, and environmental control (Direktorat Jenderal Bina Marga, 2018; Kementerian PUPR, 2021).

B. CONCEPT OF STAKEHOLDER RISK IN INFRASTRUCTURE PROJECTS

In construction project risk management, dominant risks are commonly determined using Probability and Impact Analysis based on Likert scale assessment. This method is widely applied to identify stakeholder-related risks that significantly affect project objectives, particularly project time performance. The assessment process in this research adopts the Probability and Impact Matrix approach recommended by the Project Management Body of Knowledge [4].

The probability assessment measures the likelihood of risk occurrence, while the impact assessment evaluates the severity of the consequences caused by the risk toward project implementation. The final risk value is obtained by multiplying the probability value and the impact value of each identified risk variable.

The risk value formula used in this study is expressed as follows:

$$Risk\ Value = Probability \times Impact$$

Scale	Category	Probability Value	Description
1	Very Low	0.10	Risk almost never occurs
2	Low	0.30	Risk rarely occurs
3	Medium	0.50	Risk occurs moderately
4	High	0.70	Risk is very likely to occur
5	Very High	0.90	Risk is almost certain to occur

Fig. 1.1 Probability Scale Assessment
 Source: PMBOK (2017)

The probability score represents the likelihood of risk occurrence, while the impact score reflects the severity of the consequences on project implementation. Risks with the highest scores are categorized as dominant risks because they possess the greatest potential to disrupt project performance.

Scale	Category	Impact Value	Description
1	Very Low	0.05	Very minor or negligible impact
2	Low	0.10	Minor tolerable impact
3	Moderate	0.20	Moderately significant impact
4	High	0.40	Major impact causing serious disruption
5	Very High	0.80	Extremely significant and destructive impact

Fig. 1.2 Impact Scale Assessment
 Source: PMBOK (2017)

In this research, respondents assessed each stakeholder-related risk using the probability and impact scales above. The collected responses were subsequently converted into numerical values according to the PMBOK probability-impact criteria. The average probability score and average impact score for each risk variable were then calculated to determine the final risk value. The risk category classification in this research was developed based on the Probability-Impact Matrix approach adapted from PMBOK (2017).

The final risk value was obtained by multiplying the probability value and the impact value of each identified stakeholder-related risk. Risks with values ranging from 0.01–0.05 were categorized as Very Low Risk because they possess minimal probability and negligible impact on project performance. Risk values between 0.06–0.10 were classified as Low Risk, indicating manageable risks with limited influence on project objectives. Furthermore, risks with values ranging from 0.11–0.20 were categorized as Moderate Risk because they may significantly affect project implementation and therefore require monitoring and mitigation efforts.

Risks with values between 0.21–0.40 were classified as High Risk due to their substantial potential to disrupt project performance, particularly project time targets. Meanwhile, risks with values ranging from 0.41–0.72 were categorized as Very High Risk because they possess both high occurrence probability and severe impact, making them the highest priority for risk mitigation and stakeholder engagement strategies during the feasibility study and project implementation stages.

For example, if the dominant stakeholder risk variable “Land Acquisition Delay” obtained a probability scale value of 4 (0.70) and an impact scale value of 5 (0.80), then the risk value is calculated as follows:

$$Risk\ Value = 0.70 \times 0.80 = 0.56$$

The resulting value of 0.56 indicates a Very High Risk category because the risk possesses both a high occurrence probability and a significant impact on project time performance.

No	Dominant Risk	Probability			Risk Category
		Value	Impact Value	Risk Value	
1	Land acquisition delay	0.70	0.80	0.56	Very High
2	Utility relocation delay	0.70	0.80	0.56	Very High
3	Design changes and revisions	0.70	0.40	0.28	High
4	Weak stakeholder coordination	0.70	0.40	0.28	High
5	Environmental permit delay	0.50	0.40	0.20	Moderate

Fig. 1.3 Table Example of Dominant Stakeholder Risk Values

Source : PMBOK (2017)

The process of determining dominant stakeholder risks in this study was initiated through literature review, project document review, field observations, and expert interviews involving practitioners, consultants, contractors, and academics. Subsequently, content and construct validation were conducted to ensure that all identified risk variables were relevant and applicable to national road infrastructure projects in Indonesia.

After expert validation, questionnaires were distributed to respondents involved in national road infrastructure projects. The collected data were analyzed using Probability-Impact Analysis to rank stakeholder risks based on their risk values. Risks with the highest scores were categorized as dominant risks and prioritized for mitigation planning.

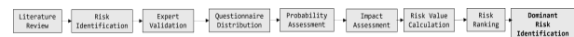


Fig. 1.4 Risk Identification Process

According to PMBOK (2017), risks with the highest probability-impact scores should become the primary focus of risk mitigation planning because they possess the greatest potential to disrupt project objectives. Therefore, dominant stakeholder risks identified in this research become the basis for developing risk-based stakeholder engagement strategies aimed at improving project time performance in national road infrastructure projects.

C. CONCEPT OF RISK MANAGEMENT FOR PROJECT TIME PERFORMANCE

Risk management is a systematic process consisting of risk identification, risk analysis, risk response planning, risk monitoring, and risk control. In construction projects, risk management aims to minimize uncertainties that may negatively affect project objectives, particularly project completion time.

The process of achieving risk evaluation in this research was initiated by identifying potential risks from previous literature, regulations, project reports, and expert opinions. Subsequently, content and construct validation were conducted by experts consisting of practitioners and academics to verify the suitability of the identified variables. After validation, pilot surveys were distributed to ensure questionnaire reliability and clarity before conducting the main survey.

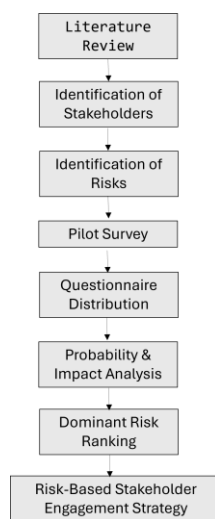


Fig. 1.5 Research Framework for Stakeholder Risk Analysis

D. CONCEPT OF RISK-BASED STAKEHOLDER ENGAGEMENT

Risk-based stakeholder engagement is an approach that integrates stakeholder management and risk management into a unified project management framework [6]. This approach focuses on identifying stakeholders who possess significant influence on project risks and developing engagement strategies

based on risk priority and stakeholder characteristics. Effective stakeholder engagement enables project organizations to anticipate conflicts, improve communication quality, and strengthen collaborative decision-making processes throughout the project lifecycle [3].

The integration of stakeholder analysis and risk management enables project managers to identify critical stakeholders, evaluate stakeholder-related risks, and develop mitigation strategies through communication, coordination, negotiation, and collaboration mechanisms (Yang et al., 2009). This approach is particularly important in national road infrastructure projects because project implementation involves multiple institutions, affected communities, utility providers, and government authorities [4]

Previous studies have shown that inadequate stakeholder engagement frequently contributes to project delays, cost overruns, disputes, and reduced project performance in infrastructure development projects [8]. In large-scale public infrastructure projects, stakeholder-related risks often emerge from differences in stakeholder interests, limited transparency, poor communication, and weak institutional coordination [10]. Therefore, stakeholder engagement should not only focus on communication activities but also on proactive risk mitigation strategies aimed at reducing uncertainty and increasing stakeholder commitment to project objectives [12] (Ward & Chapman, 2003).

According to the Association for Project Management [9], stakeholder engagement is considered a critical success factor because stakeholders possess the ability to influence project outcomes either positively or negatively. Furthermore, early stakeholder involvement during the feasibility study stage significantly improves project acceptance, minimizes resistance from affected communities, and enhances the effectiveness of project implementation strategies [11]. Consequently, integrating stakeholder management with risk management becomes essential for improving project time performance and supporting the successful delivery of national road infrastructure projects.

Table 2.5 Stakeholder Engagement Strategies Based on Risk Level

Risk Level	Stakeholder Engagement Strategy
Low Risk	Routine communication
Medium Risk	Coordination meetings
High Risk	Intensive stakeholder involvement
Very High Risk	Direct negotiation and mitigation planning

Research indicates that risk-based stakeholder engagement contributes significantly to reducing project delays, minimizing social conflicts, improving inter-agency coordination, and enhancing project decision-making effectiveness. Therefore, the integration of stakeholder management and risk management during the feasibility study stage is considered essential for improving the time performance of national road infrastructure projects in Indonesia.

II. METHODOLOGY

This research employed a mixed-method approach combining qualitative and quantitative methods to analyze stakeholder-related risks affecting the time performance of national road infrastructure projects in Indonesia. The study integrated literature review, archival analysis, expert validation, pilot surveys, questionnaire distribution, and risk analysis using the Probability–Impact Matrix approach adapted from the Project Management Body of Knowledge (PMBOK) framework. The mixed-method approach was selected because stakeholder risks in infrastructure projects involve both qualitative aspects such as stakeholder influence, coordination, and social interaction, as well as quantitative aspects related to risk probability and impact assessment (Creswell & Creswell, 2018; PMI, 2017).

The research process was conducted systematically through several stages, beginning with the identification of national road infrastructure development stages and stakeholder identification based on regulations, previous studies, and institutional documents issued by the Ministry of Public Works and Housing (PUPR). Subsequently, stakeholder-related

risk variables were identified through literature review and semi-structured interviews with experts involved in national road projects. The identified variables were then validated using expert judgment and pilot surveys before conducting the main questionnaire survey. The final stage involved risk analysis using probability and impact assessment to determine dominant stakeholder risks affecting project time performance.

This study focused on national road infrastructure projects implemented under the Directorate General of Highways, Ministry of Public Works and Housing (PUPR), Indonesia. The unit of analysis consisted of stakeholders involved in the Feasibility Study (FS), Detailed Engineering Design (DED), Tendering, and Construction Implementation stages. Respondents involved in this research included project managers, Commitment Making Officers (PPK), consultants, contractors, supervision consultants, and practitioners experienced in national road infrastructure projects. Purposive sampling was applied because the selected respondents possessed direct experience and knowledge related to stakeholder coordination and project risk management (Sugiyono, 2019).

The research instrument used in this study was a structured questionnaire developed from validated stakeholder-related risk variables. The questionnaire consisted of two main sections: respondent characteristics and stakeholder risk assessment. The stakeholder risk assessment used a Likert scale based on probability and impact criteria adopted from PMBOK (2017). Respondents were asked to evaluate the likelihood of risk occurrence and the impact of each risk variable on project time performance.

Prior to the main survey, validity and reliability testing were conducted to ensure the quality of the research instrument. Construct and content validation were carried out through expert judgment involving academics and infrastructure practitioners. Subsequently, a pilot survey involving 33 respondents was conducted to evaluate questionnaire clarity and consistency. The reliability analysis used Cronbach’s Alpha coefficient, where a value greater than 0.70 indicates acceptable reliability (Hair et al., 2019). The results showed that the questionnaire achieved a Cronbach’s Alpha value of 0.989, indicating that the instrument was highly reliable for further analysis.

The collected data were analyzed using descriptive statistical analysis and Probability–Impact Analysis. The probability score and impact score of each stakeholder-related risk variable were multiplied to obtain the final risk value. The formula used in this research is expressed as follows:

$$\text{Risk Value} = \text{Probability} \times \text{Impact}$$

The resulting risk values were categorized into Very Low, Low, Moderate, High, and Very High Risk categories based on the Probability–Impact Matrix adapted from PMBOK (2017). Risks with the highest values were classified as dominant stakeholder risks affecting project time performance and became the basis for developing risk-based stakeholder engagement strategies.

Table 3.1 Research Methodology Stages

No	Research Stage	Method	Output
1	Literature Review	Journal review, regulations, project documents	Identification of project stages, stakeholders, and stakeholder risks
2	Archive Analysis	Analysis of SOP, regulations, and project reports	Validation of national road development stages
3	Stakeholder Identification	Literature review and interviews	List of stakeholders involved in each project stage
4	Risk Identification	Literature review and expert interviews	Initial stakeholder-related risk variables
5	Expert Validation	Expert judgment	Validated stakeholder and risk variables
6	Pilot Survey	Questionnaire testing	Reliability and validity testing
7	Main Survey	Questionnaire distribution	Probability and impact assessment data

No	Research Stage	Method	Output
8	Risk Analysis	Probability–Impact Matrix	Dominant stakeholder risks
9	Strategy Development	Stakeholder risk evaluation	Risk-based stakeholder engagement framework

The methodological framework developed in this study integrates stakeholder analysis and risk management approaches to evaluate stakeholder-related risks throughout the lifecycle of national road infrastructure projects. The integration of qualitative validation and quantitative risk analysis enabled this research to identify dominant stakeholder risks comprehensively and develop stakeholder engagement strategies aimed at improving project time performance in Indonesia.

Additional methodological procedures were conducted to strengthen the validity and credibility of the research findings. Semi-structured interviews were performed with experts from government institutions, consultants, contractors, and academics involved in national road infrastructure projects. The interviews aimed to validate the relevance of stakeholder classifications, stakeholder responsibilities, and stakeholder-related risk variables identified from previous literature and project documents. According to Yin (2018), semi-structured interviews are appropriate for exploratory infrastructure research because they enable researchers to obtain detailed insights regarding project implementation complexities and stakeholder interactions.

The expert validation process involved five experts with professional experience in national road infrastructure development under the Ministry of Public Works and Housing (PUPR). The experts were selected based on their involvement in project planning, procurement, design, supervision, and construction implementation activities. Expert judgment was applied to evaluate the clarity, relevance, and applicability of stakeholder risk variables before the pilot survey stage. This approach is consistent with the recommendation of Sekaran and

Bougie (2016), who stated that expert validation is essential to improve construct validity in questionnaire-based research.

Following expert validation, a pilot survey was conducted to examine the consistency and reliability of the questionnaire instrument. The pilot survey involved 33 respondents representing project owners, consultants, contractors, and supervisory personnel involved in national road projects. The collected responses were analyzed using validity and reliability testing through Statistical Package for Social Sciences (SPSS). Validity testing was conducted using Pearson Product Moment correlation, where variables exceeding the r -table value were considered valid. Reliability testing used Cronbach's Alpha analysis, which measures internal consistency among questionnaire variables (Hair et al., 2019).

The questionnaire distribution process in the main survey used purposive sampling because the research required respondents with direct experience in national road infrastructure implementation and stakeholder coordination activities. Purposive sampling is commonly applied in construction management research to ensure that respondents possess relevant technical knowledge and professional experience related to project risks and stakeholder management (Sugiyono, 2019). The respondents consisted of personnel from PMU, PPK, consultants, contractors, supervision consultants, and local government institutions involved in national road projects in Indonesia.

The analysis of stakeholder risks was conducted using descriptive statistical analysis combined with the Probability-Impact Matrix approach recommended by PMBOK (2017). The probability score represented the likelihood of risk occurrence, while the impact score reflected the severity of the consequences toward project time performance. The average probability and impact values were calculated for each risk variable before determining the final risk value through multiplication. Risks with the highest scores were categorized as dominant risks because they possess the greatest potential to affect project implementation and completion time (PMI, 2017).

Furthermore, this research adopted a stakeholder-based risk management perspective by

integrating stakeholder analysis with project risk management concepts. According to Freeman (1984), stakeholders possess the ability to influence project objectives either positively or negatively, making stakeholder engagement a critical component of project success. The integration of stakeholder management and risk management in this research enabled the identification of stakeholders with significant influence on project delays, coordination problems, and decision-making processes throughout the project lifecycle.

To improve the trustworthiness of the research findings, triangulation techniques were also applied by comparing information obtained from literature reviews, project documents, expert interviews, and questionnaire results. Data triangulation helps minimize researcher bias and enhances the credibility of qualitative and quantitative findings in construction management research (Creswell & Creswell, 2018). Through this approach, the study was able to comprehensively evaluate stakeholder-related risks affecting the time performance of national road infrastructure projects in Indonesia.

III. DISCUSSION

III.I Stages of National Road Infrastructure Development (RQ1)

The analysis for RQ1 was conducted using a qualitative approach through literature review, archive analysis, and expert validation using semi-structured interviews and questionnaires. The purpose of this research question was to identify and validate the stages involved in national road infrastructure development within the Directorate General of Highways, Ministry of PUPR.

The results of the archive analysis identified four main stages in the implementation of national road infrastructure development in Indonesia, namely:

1. Feasibility Study (FS) Stage
2. Tendering Stage
3. Detailed Engineering Design (DED) Stage
4. Construction Implementation Stage.

Table 3.1 Stages of National Road Infrastructure Development in Indonesia

No	Development Stage	Main Activities	Supporting Regulations and References
1	Feasibility Study (FS)	Project feasibility analysis, economic and technical assessment, traffic forecasting, environmental and social consideration	Directorate General of Highways (2026); Law No. 2 of 2022 concerning Roads
2	Tendering Stage	Procurement planning, contractor selection, bid evaluation, contract preparation	Presidential Regulation No. 12 of 2021; LKPP Regulation (2021); PUPR Procurement Standards
3	Detailed Engineering Design (DED) Stage	Geometric design, pavement design, preparation of technical drawings and specifications	Directorate General of Highways (2018, 2021, 2017)
4	Construction Implementation Stage	Site preparation, earthworks, pavement works, supervision, quality control, safety management	General Specifications of Bina Marga (2018); Construction Safety Management System (2021); FIDIC (2017)

The findings indicate that the national road development process in Indonesia follows a structured project lifecycle approach beginning from project

feasibility assessment to physical construction implementation. Each stage is supported by formal technical regulations and government standards issued by the Ministry of PUPR and related institutions.

3.1.1 Feasibility Study (FS) Stage

The Feasibility Study stage was identified as the initial phase in national road infrastructure development. This stage focuses on determining the technical, economic, environmental, and social feasibility of the proposed road project. The literature analysis revealed that feasibility studies are regulated through the Directorate General of Highways guidelines and Indonesian road legislation.

The findings suggest that the FS stage plays a significant role in minimizing project risks before implementation. Through feasibility analysis, the government can evaluate project benefits, budget requirements, land acquisition challenges, and environmental impacts before proceeding to the procurement and design stages.

3.1.2 Tendering Stage

The Tendering Stage represents the procurement phase where contractors and consultants are selected through government procurement mechanisms. Based on the literature review, this stage is governed by Presidential Regulation No. 12 of 2021 and LKPP procurement guidelines.

The results show that the tendering stage is essential to ensure transparency, competitiveness, and accountability in public infrastructure projects. The procurement process also determines the quality and capability of contractors involved in project implementation.

3.1.3 Detailed Engineering Design (DED) Stage

The DED stage involves the preparation of technical engineering documents including geometric road design, pavement structure design, technical specifications, and construction drawings. The analysis identified that this stage follows several technical standards issued by the Directorate General of Highways.

The findings demonstrate that the DED stage

serves as the technical foundation for construction activities. Inadequate design preparation may potentially lead to project delays, construction disputes, and cost overruns during implementation.

3.1.4 Construction Implementation Stage

The Construction Implementation Stage is the execution phase where physical construction activities are conducted in the field. This stage includes mobilization, earthworks, pavement works, supervision, quality assurance, occupational safety, and project control activities.

The results indicate that this stage is the most complex phase because it involves multiple stakeholders, technical coordination, environmental management, and construction safety implementation. Compliance with Bina Marga Specifications and Construction Safety Management Systems (SMKK) is considered critical to achieving project quality and safety objectives.

Table 3.2 Expert Validation Results for RQ1

No	Development Stage	Expert Validation Result	Conclusion
1	Feasibility Study (FS)	All experts agreed	Valid Stage
2	Tendering Stage	All experts agreed	Valid Stage
3	Detailed Engineering Design (DED)	All experts agreed	Valid Stage
4	Construction Implementation Stage	All experts agreed	Valid Stage

The expert validation results confirmed that all identified stages are considered valid and essential in the implementation process of national road infrastructure development in Indonesia.

III.II Stakeholder of National Road Infrastructure Development (RQ2)

RQ2 was conducted to identify the stakeholders involved in national road infrastructure development and to analyze their roles and responsibilities at each project stage. The analysis was carried out through literature review, archive analysis, expert validation, and semi-structured interviews.

The findings revealed that stakeholder

involvement in national road infrastructure projects consists of internal governmental institutions, consultants, contractors, financing institutions, local governments, local communities, traditional leaders, and utility service providers. The study also identified that stakeholder involvement varies depending on the project stage, namely the Feasibility Study (FS), Detailed Engineering Design (DED), Tendering, and Construction Implementation stages.

Table 3.3 Identified Stakeholders in National Road Infrastructure Development Based on Literature Review

No	Stakeholder	Literature Basis / References
1	Project Management Unit (PMU)	Law No. 2 of 2017 concerning Construction Services; Ministry of PUPR Regulation No. 16 of 2020; SOP/UPM/DJBM-135 Feasibility Study Procedure
2	National Road Planning and Supervision Work Unit (P2JN)	Ministry of PUPR (2020) regarding implementation and supervision of national road infrastructure
3	Directorate of Road and Bridge Development	Ministry of PUPR (2020) concerning technical implementation of national road and bridge development
4	Directorate of Road and Bridge System and Strategy	Ministry of PUPR (2020) concerning standards, systems, and road infrastructure management strategies
5	Commitment Making Officer (PPK)	Presidential Regulation No. 12 of 2021 concerning Government Procurement
6	Design Consultant	Law No. 2 of 2017 concerning Construction Services
7	Supervision Consultant	Ervianto (2005) regarding construction supervision roles
8	Contractor/Subcontractor	Soeharto (1999) regarding construction implementation responsibilities

No	Stakeholder	Literature Basis / References
9	Financing Institution	Yescombe (2014) regarding project financing and financial risk management
10	Provincial Government Officials	Law No. 23 of 2014 concerning Regional Government
11	Local Government Officials	Law No. 23 of 2014 concerning Regional Government
12	Traditional Leaders	Freeman (1984) stakeholder theory and social influence
13	Local Communities	Olander and Landin (2005) regarding stakeholder influence in construction projects
14	Telecommunication Utility Providers	Law No. 36 of 1999 concerning Telecommunications
15	Water and Sanitation Providers	Law No. 17 of 2019 concerning Water Resources
16	Gas and Fuel Providers	Law No. 22 of 2001 concerning Oil and Gas
17	Electricity Providers	Law No. 30 of 2009 concerning Electricity

The stakeholder identification process was validated by five experts involved in national road infrastructure projects. The validation results confirmed that all identified stakeholders have roles and responsibilities within at least one stage of project implementation.

3.2.1 Stakeholder Involvement in the Feasibility Study (FS) Stage

The Feasibility Study stage focuses on preliminary project analysis, infrastructure needs assessment, project viability, environmental considerations, and initial coordination. The findings indicate that the main stakeholders involved in this stage are the PMU, P2JN Work Unit, Directorate of Road and Bridge System and Strategy, and Design Consultants.

Supporting stakeholders include local government officials, traditional leaders, local

communities, financing institutions, and utility service providers. Their involvement mainly relates to social acceptance, land issues, coordination of existing infrastructure, and early utility relocation planning.

Table 3.4 Stakeholders in the Feasibility Study Stage

Main Stakeholders	Main Responsibilities
PMU, P2JN, Directorate	Establish project objectives and development policies
Design Consultant	Conduct preliminary design, surveys, and feasibility analysis
Utility Providers	Coordinate utility networks and relocation requirements
Local Governments	Provide regional data and policy support
Traditional Leaders and Communities	Provide social acceptance and local perspectives

3.2.2 Stakeholder Involvement in the DED Stage

The DED stage focuses on preparing detailed technical designs, technical specifications, and project cost estimation documents. The findings show that the primary stakeholders involved in this stage are Design Consultants, PMU, P2JN, Directorate of Road and Bridge Development, and PPK.

Table 3.5 Stakeholders in the DED Stage

Main Stakeholders	Main Responsibilities
PMU, P2JN, PPK	Control and approve DED documents
Design Consultant	Prepare technical drawings, cost estimates, and specifications
Directorate	Provide technical standards and technical review
Local Governments	Provide local data and field conditions
Utility Providers	Coordinate technical utility relocation planning

The findings suggest that stakeholder coordination during the DED stage significantly affects design quality and constructability. Inadequate coordination may potentially result in design revisions, project delays, and increased construction costs during implementation.

3.2.3 Stakeholder Involvement in the Tendering Stage

The Tendering Stage focuses on contractor procurement and selection processes. The findings reveal that the key stakeholders involved are the PPK, P2JN Work Unit, PMU, contractors/subcontractors, and design consultants.

Table 3.6 Stakeholders in the Tendering Stage

Main Stakeholders	Main Responsibilities
PPK and P2JN	Prepare tender documents and procurement process
PMU	Ensure procurement compliance and transparency
Contractors/Subcontractors	Submit technical and financial proposals
Design Consultant	Provide technical clarification when necessary

The results indicate that the tendering stage plays an important role in ensuring transparency, accountability, and contractor competency. The quality of procurement processes influences project implementation performance and construction quality outcomes.

3.2.4 Stakeholder Involvement in the Construction Implementation Stage

The Construction Implementation Stage involves physical construction execution and field coordination activities. The findings indicate that contractors/subcontractors, supervision consultants, PPK, and P2JN are the primary stakeholders in this

stage.

External stakeholders such as local communities, traditional leaders, local governments, and utility providers also have significant influence on project continuity and construction progress.

Table 3.7 Stakeholders in the Construction Implementation Stage

Main Stakeholders	Main Responsibilities
Contractors/Subcontractors	Execute construction works and manage resources
Supervision Consultant	Monitor construction quality and progress
PPK and P2JN	Manage contracts and evaluate project progress
PMU and Directorate	Conduct project monitoring and evaluation
Local Communities and Traditional Leaders	Support project implementation and social coordination
Utility Providers	Relocate and coordinate utility networks

The findings demonstrate that the construction stage involves the highest level of stakeholder interaction because it directly affects local communities, public services, and utility systems. Effective coordination among stakeholders is therefore essential to minimize delays, disputes, and operational disruptions.

Table 3.8 Expert Validation Results of Stakeholder Identification

Project Stage	Validation Result
Feasibility Study (FS)	All stakeholders validated by experts
Detailed Engineering Design (DED)	All stakeholders validated by experts
Tendering Stage	All stakeholders

Project Stage	Validation Result
	validated by experts
Construction	All stakeholders
Implementation Stage	validated by experts

The expert validation results confirmed that all identified stakeholders have relevant roles and responsibilities within national road infrastructure development projects in Indonesia.

Government institutions such as PMU, P2JN, Directorate units, and PPK primarily function as project controllers, policy coordinators, and procurement managers. Consultants contribute through technical planning and supervision, while contractors focus on project execution and resource management.

In addition, external stakeholders such as local governments, traditional leaders, local communities, and utility providers have substantial influence on project continuity and implementation effectiveness. Their involvement becomes particularly important during land acquisition, utility relocation, and social coordination processes.

III.III Stakeholder Risks of National Road Infrastructure Development (RQ3) stakeholder risks

RQ3 was conducted to identify stakeholder-related risks that influence project time performance during national road infrastructure development. The analysis was performed through literature review, expert validation, pilot surveys, and descriptive analysis using stakeholder-based risk identification methods.

The results identified risks occurring in four project stages, namely the Feasibility Study (FS), Detailed Engineering Design (DED), Tendering, and Construction Implementation stages. The identified risks were associated with specific stakeholders involved in each project stage.

Table 3.9 Stakeholder Risks Affecting Time Performance in National Road Infrastructure Development

No	Project Stage	Risk Variable	Risk Code	Stakeholder
1	Feasibility Study (FS)	Land acquisition and social conflict	X.1.1.1	PPK, Provincial Government, Local Government, Traditional Leaders, Local Communities
2	Feasibility Study (FS)	Slow administrative process / bureaucratic complexity	X.1.1.2	PMU, Financing Institutions, Provincial Government, Local Government
3	Feasibility Study (FS)	Ineffective financial system	X.1.1.3	PMU, Directorate of Road and Bridge System and Strategy
4	Feasibility Study (FS)	Permit delays	X.1.1.4	Provincial Government, Local Government
5	Feasibility Study (FS)	Rejection from traditional leaders	X.1.1.5	Traditional Leaders
6	DED Stage	Design failure or design errors	X.1.2.1	Design Consultant
7	DED Stage	Delayed design revision approval	X.1.2.2	Design Consultant, PPK
8	DED Stage	High initial technology/project cost	X.1.2.3	PPK, Contractors/Subcontractors
9	DED Stage	Lack of stakeholder coordination	X.1.2.4	All Stakeholders (X.1-X.17)
10	Tendering Stage	Slow administrative process / bureaucratic complexity	X.1.3.1	PMU, Financing Institutions, Provincial Government, Local Government
11	Tendering Stage	Permit delays	X.1.3.3	Provincial Government, Local Government
12	Tendering Stage	Incompetent contractor/service provider	X.1.3.4	Contractors/Subcontractors

N	Project Stage	Risk Variable	Risk Code	Stakeholder
13	Tendering Stage	Lack of stakeholder coordination	X.1.3.5	All Stakeholders (X.1–X.17)
14	Construction Stage	Lack of stakeholder coordination	X.1.4.1	All Stakeholders (X.1–X.17)
15	Construction Stage	Delayed design revision approval	X.1.4.2	PPK, Design Consultant
16	Construction Stage	Weak quality monitoring	X.1.4.3	Supervision Consultant
17	Construction Stage	Human resource shortages	X.1.4.4	Supervision Consultant, Contractors/Subcontractors
18	Construction Stage	Lack of field inspection	X.1.4.5	Supervision Consultant
19	Construction Stage	Incompetent contractor	X.1.4.6	Contractors/Subcontractors
20	Construction Stage	Community protest	X.1.4.7	Local Communities
21	Construction Stage	Delayed telecommunication relocation	X.1.4.8	Telecommunication Utility Providers
22	Construction Stage	Delayed water utility relocation	X.1.4.9	Water and Sanitation Providers
23	Construction Stage	Gas relocation risk	X.1.4.10	Gas and Fuel Providers
24	Construction Stage	Project electrical power outage	X.1.4.11	Electricity Providers

The literature review initially identified 51 stakeholder-related risk variables. After expert validation and pilot survey analysis, the number of validated risks was reduced to 41 variables considered relevant to time performance in national road infrastructure projects.

Table 3.10 Expert Validation Results of Stakeholder Risks

Validation Result	Description
Initial identified risks	51 risk variables
Validated risks	41 risk variables
Validation method	Expert validation and pilot survey
Number of experts	5 experts
Pilot survey respondents	33 respondents

The validation process confirmed that all validated risk variables are relevant to stakeholder influence on project time performance.

In the Feasibility Study stage, social conflict, land acquisition problems, and bureaucratic delays were identified as critical risks affecting project initiation. These findings demonstrate the importance of early stakeholder engagement and government coordination during project preparation.

The DED stage is dominated by technical planning risks such as design errors, delayed design approvals, and insufficient coordination among stakeholders. This suggests that technical communication and collaborative planning are essential to minimize redesign and implementation delays.

During the Tendering Stage, procurement administration and contractor competency become the primary concerns. Ineffective procurement systems may result in selecting contractors with inadequate technical capabilities, which subsequently affects construction performance.

The Construction Implementation stage presents the most complex stakeholder risks due to the involvement of multiple external parties, including utility providers and local communities. Coordination failures, utility relocation delays, contractor incompetence, and community protests were identified as the major contributors to project delays.

III.IV Dominant Stakeholder risks of National Road Infrastructure Development (RQ4)

RQ4 was conducted to analyze the dominant

stakeholder risks affecting project time performance at each project stage. The analysis was performed using questionnaire surveys distributed to 33 respondents involved in national road infrastructure projects, followed by qualitative and quantitative analysis using risk assessment methods and SPSS validation.

The risk analysis used frequency and impact assessment to determine the overall risk level. The risk value was calculated using the multiplication between frequency and impact scores

Table 3.15 Respondent Characteristics

Category	Percentage
Male	78.8%
Female	21.2%
Bachelor Degree (S1)	45.5%
Diploma IV (D4)	12.1%
Master Degree (S2)	4.2%
Work Experience < 2 Years	12%
Work Experience 2–5 Years	10%
Work Experience 6–10 Years	21.2%
Work Experience 11–15 Years	9.1%

The respondent analysis indicates that most respondents were experienced professionals involved in national road infrastructure implementation projects.

Table 3.16 Reliability and Validity Test Results

Test Type	Result
Number of Respondents	33 respondents
Cronbach's Alpha	0.989

Test Type	Result
Reliability Level	Very Reliable
r Table Value	0.344
SPSS Result	Valid

The reliability test showed that the questionnaire instrument achieved a Cronbach's Alpha value of 0.989, indicating a very reliable instrument. Furthermore, all variables exceeded the r-table value of 0.344, confirming that the data were valid for further analysis.

3.4.1 Dominant Risks in the Feasibility Study (FS) Stage

The analysis identified 12 high-risk variables during the Feasibility Study stage. The dominant risks were related to land acquisition conflicts, bureaucratic delays, ineffective financial systems, permit delays, and rejection from traditional leaders

Table 3.17 Dominant Stakeholder Risks in the Feasibility Study Stage

No	Risk Variable	Risk Code	Stakeholder	Risk Level
1	Land acquisition and social conflict	X.1.1.1	Local Government Officials	High
2	Bureaucratic complexity	X.1.1.2	Provincial Government Officials	High
3	Bureaucratic complexity	X.1.1.2	Local Government Officials	High
4	Land acquisition and social conflict	X.1.1.1	Traditional Leaders	High
5	Ineffective financial system	X.1.1.3	Directorate of Road and Bridge System and Strategy	High
6	Permit delays	X.1.1.4	Local Government Officials	High
7	Rejection from traditional leaders	X.1.1.5	Traditional Leaders	High

The findings demonstrate that social and administrative risks are the dominant issues during project initiation. Land acquisition disputes and stakeholder resistance significantly influence project preparation time.

3.4.2 Dominant Risks in the DED Stage

The DED stage identified one dominant high-risk variable related to technical planning failure.

Table 4.18 Dominant Stakeholder Risks in the DED Stage

No	Risk Variable	Risk Code	Stakeholder	Risk Level
1	Design failure or design errors	X.1.2.1	Design Consultant	High

The results indicate that design quality and technical planning accuracy are critical factors influencing implementation performance during the construction phase.

3.4.3 Dominant Risks in the Tendering Stage

The Tendering Stage identified six dominant high-risk variables. The highest-ranked risks were associated with coordination failure, contractor competency, bureaucratic complexity, and permit delays.

Table 4.19 Dominant Stakeholder Risks in the Tendering Stage

No	Risk Variable	Risk Code	Stakeholder	Risk Level
1	Lack of stakeholder coordination	X.1.3.5	All Stakeholders	High
2	Incompetent contractor/service provider	X.1.3.4	Contractors/Subcontractors	High
3	Permit delays	X.1.3.3	Local Government Officials	High
4	Permit delays	X.1.3.3	Provincial Government Officials	High
5	Bureaucratic complexity	X.1.3.1	PMU	High

The findings reveal that procurement and coordination processes significantly affect project

readiness and contractor mobilization.

3.4.4 Dominant Risks in the Construction Implementation Stage

The Construction Implementation stage recorded the highest number of dominant stakeholder risks, with 15 high-risk variables identified.

Table 3.20 Dominant Stakeholder Risks in the Construction Stage

No	Risk Variable	Risk Code	Stakeholder	Risk Level
1	Lack of stakeholder coordination	X.1.4.1	All Stakeholders	High
2	Delayed design revision approval	X.1.4.2	PPK	High
3	Delayed design revision approval	X.1.4.2	Design Consultant	High
4	Weak quality monitoring	X.1.4.3	Supervision Consultant	High
5	Human resource shortages	X.1.4.4	Supervision Consultant	High
6	Lack of field inspection	X.1.4.5	Supervision Consultant	High
7	Incompetent contractor	X.1.4.6	Contractors/Subcontractors	High
8	Delayed telecommunication relocation	X.1.4.8	Telecommunication Providers	High
9	Delayed water utility relocation	X.1.4.9	Water and Sanitation Providers	High
10	Gas relocation risk	X.1.4.10	Gas and Fuel Providers	High
11	Project electrical power outage	X.1.4.11	Electricity Providers	High

The results indicate that the implementation stage contains the most complex risks because it directly involves field execution, multi-stakeholder coordination, utility relocation, and construction

supervision activities.

Table 3.21 Summary of Dominant Risks by Project Stage

Project Stage	Number of High Risks	Dominant Risk Category
Feasibility Study (FS)	12 Variables	Social and administrative risks
DED Stage	1 Variable	Technical design risk
Tendering Stage	6 Variables	Procurement and coordination risks
Construction Stage	15 Variables	Coordination, supervision, contractor, and utility risks

The construction implementation stage was identified as the stage with the highest number of dominant stakeholder risks affecting project time performance.

IV. CONCLUSION

This study investigated stakeholder-related risks affecting time performance in national road infrastructure development implemented under the Ministry of Public Works and Housing (PUPR) in Indonesia. The study analyzed the stages of infrastructure development, stakeholder involvement, stakeholder-related risks, and dominant risks influencing project time performance.

Based on the results of Research Question 1 (RQ1), the study identified four main stages of national road infrastructure development, namely the Feasibility Study (FS), Detailed Engineering Design (DED), Tendering, and Construction Implementation stages. These stages form an integrated project lifecycle framework supported by technical regulations and institutional procedures issued by the Ministry of PUPR.

The findings from Research Question 2 (RQ2) revealed that national road infrastructure projects involve multiple stakeholders from governmental institutions, consultants, contractors, financing institutions, local governments, utility providers, traditional leaders, and local communities. Stakeholder involvement varies depending on the project stage and project requirements. Government agencies primarily function as coordinators and regulators, while consultants and contractors are responsible for

technical planning and implementation activities. External stakeholders such as local communities and utility providers also significantly influence project continuity and implementation effectiveness.

Research Question 3 (RQ3) identified various stakeholder-related risks affecting project time performance across all project stages. The risks include land acquisition conflicts, bureaucratic complexity, permit delays, design failures, weak coordination among stakeholders, contractor incompetence, insufficient supervision, utility relocation delays, and community resistance. The study confirmed that stakeholder risks are multidimensional and interconnected throughout the project lifecycle.

Furthermore, the findings from Research Question 4 (RQ4) demonstrated that dominant stakeholder risks differ in each project stage. The Feasibility Study stage is dominated by social and administrative risks, particularly land acquisition and bureaucratic delays. The DED stage is primarily affected by technical design risks. The Tendering Stage is dominated by procurement and coordination risks, while the Construction Implementation stage contains the highest number of dominant risks due to the complexity of field execution, stakeholder coordination, supervision activities, and utility relocation processes.

The study concludes that stakeholder management has a critical influence on the time performance of national road infrastructure projects in Indonesia. Effective stakeholder engagement, inter-institutional coordination, early risk identification, and integrated risk mitigation strategies are essential to minimize project delays and improve project implementation performance.

Overall, this research contributes to the development of stakeholder risk management knowledge in national road infrastructure projects and provides practical insights for policymakers, project managers, and infrastructure practitioners under the Ministry of PUPR in improving project governance, coordination, and implementation effectiveness.

REFERENCES

- [1] Direktorat Jenderal Bina Marga. (2021). *SOP/UPM/DJBM-135 tentang Prosedur Penyiapan Dokumen Studi Kelayakan (Feasibility Study atau FS) Pembangunan Jalan*. Jakarta: Kementerian Pekerjaan Umum dan Perumahan Rakyat.
- [2] Direktorat Jenderal Bina Marga. (2026). *Pedoman Studi Kelayakan Proyek Jalan*. Jakarta: Kementerian Pekerjaan Umum dan Perumahan Rakyat.
- [3] Freeman, R. E. (1984). *Strategic Management: A Stakeholder Approach*. Boston: Pitman Publishing.
- [4] Olander, S., & Landin, A. (2005). Evaluation of stakeholder influence in the implementation of construction projects. *International Journal of Project Management*, 23(4), 321–328.
- [5] Project Management Institute (PMI). (2017). *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* (6th ed.). Pennsylvania: Project Management Institute.
- [6] Project Management Institute (PMI). (2021). *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* (7th ed.). Pennsylvania: Project Management Institute.
- [7] Yang, J., Shen, G. Q., Ho, M., Drew, D., & Chan, A. (2009). Exploring critical success factors for stakeholder management in construction projects. *Journal of Civil Engineering and Management*, 15(4), 337–348. <https://doi.org/10.3846/1392-3730.2009.15.337-348>
- [8] Aaltonen, K., & Kujala, J. (2010). A project lifecycle perspective on stakeholder influence strategies in global projects. *Scandinavian Journal of Management*, 26(4), 381–397. <https://doi.org/10.1016/j.scaman.2010.09.001>
- [9] Association for Project Management (APM). (2019). *APM Body of Knowledge* (7th ed.). Buckinghamshire: Association for Project Management.
- [10] Bourne, L. (2015). *Stakeholder Relationship Management: A Maturity Model for Organisational Implementation* (2nd ed.). Surrey: Gower Publishing.
- [11] Eskerod, P., & Jepsen, A. L. (2013). *Project Stakeholder Management*. Surrey: Gower Publishing.
- [12] Ward, S., & Chapman, C. (2003). Transforming project risk management into project uncertainty management. *International Journal of Project Management*, 21(2), 97–105. [https://doi.org/10.1016/S0263-7863\(01\)00080-1](https://doi.org/10.1016/S0263-7863(01)00080-1)
- [13] Direktorat Jenderal Bina Marga. (2020). *Pedoman Perencanaan Teknis Jalan dan Detailed Engineering Design (DED) Jalan*. Jakarta: Kementerian Pekerjaan Umum dan Perumahan Rakyat.