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Identification of Dominant Risks in Public-Private Partnership (PPP) Projects in the Health Sector

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Abstract: *Public-Private Partnership (PPP) projects in the health sector have high complexity with various risks that can hinder project success. This study aims to identify the most relevant and significant risks in health sector PPP projects. The research method uses a quantitative approach with questionnaire surveys to four experts consisting of representatives from government and business entities experienced in hospital PPP projects. Data were analyzed using the Probability Impact Matrix (PIM) to determine risk significance levels based on probability of occurrence and impact. The results show eight dominant risks in high and very high categories. Very high category risks include JKN/Availability Payment and delays in JKN claim payments. High category risks include regional fiscal sustainability, shortage of healthy human resources, land risks, regulatory uncertainty, construction delays, and construction cost increases. These findings indicate that operational risks dominate health sector PPP projects, with high dependence on national health policies and local government fiscal capacity. This research provides practical contributions for stakeholders in designing more effective risk mitigation strategies for health sector PPP projects.*

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INTRODUCTION

Health infrastructure development is a fundamental pillar in achieving the Sustainable Development Goals (SDGs), particularly the third goal concerning good health and well-being. Government budget limitations pose a major challenge in meeting the continuously increasing health infrastructure needs. According to the Central Statistics Agency, the hospital bed ratio has only reached 1.3 per 1,000 population, still far from the World Health Organization (WHO) minimum standard of 3 per 1,000 population [1].

In addition to the hospital bed ratio, Indonesia faces substantial funding requirements for health infrastructure development. Hospital projects require high capital expenditure for construction, advanced medical equipment, and long-term operational sustainability. However, competing fiscal priorities and long-term budget sustainability constrain public funding capacity. This funding gap highlights the urgency of alternative financing schemes capable of mobilizing private capital to accelerate hospital infrastructure provision. [2],[6],[8].

To address these limitations, the government has adopted the Public-Private Partnership (PPP) scheme as an alternative financing mechanism for public infrastructure development. In the National Medium-Term Development Plan (RPJMN) 2025-2029, the

government targets a larger role for the involvement of the private sector in supporting social infrastructure development, including hospitals [2]. Based on the PPP Book 2025 published by the Ministry of National Development Planning/Bappenas, several hospital PPP projects are in the national pipeline, such as RSUD Wangaya (Bali), RSUD Kabanjahe (North Sumatra), RSUD Kanjuruhan (East Java), Unpad Teaching Hospital (West Java), and RSUD Inche Abdoel Moeis (East Kalimantan) [3].

However, there are a number of intricate obstacles to PPP implementation in the health sector. Studies show that hospital PPP projects have different risk complexities compared to conventional physical infrastructure projects [4]. These risks include service demand uncertainty, health regulatory complexity, political sensitivity, and difficulties in establishing service performance indicators. Hospitals are described as socio-technical systems embedded in complex policy and financing networks, making deep understanding of risk profiles critically important [5].

Various hospital PPP projects have shown significant implementation obstacles. These obstacles include patient volume uncertainty, limited managerial capacity of local governments, and gaps between clinical service needs and investment contract schemes. Unlike economic infrastructure projects with direct revenue from users, hospital PPP projects tend to depend on government financing through availability payment schemes that are highly sensitive to fiscal conditions [6].

Previous research shows that comprehensive risk identification is an important foundation in PPP project risk management [7]. Effective risk management must begin from the initial planning stage by systematically compiling risk registers. However, comprehensive studies on specific risk profiles for health sector PPP projects remain limited. Therefore, this study aims to identify and analyze the most relevant and significant risks in health sector PPP projects, focusing on hospital projects.

THEORITICAL FRAMEWORK

Public-Private Partnership (PPP) or Government and Business Entity Cooperation (KPBU) is an infrastructure provision mechanism through collaboration between public and private sectors to improve efficiency and financing of large-scale projects [8]. PPP projects are not isolated from the different risks that could impact the projects success

The methodical process of identifying, analyzing, evaluating, and responding to risks that may have impact on the accomplishment of project or organizational goals is known as risk management [9]. In large-scale infrastructure projects such as PPPs, risk management becomes essential due to high uncertainty resulting from the involvement of various stakeholders, long-term financing, and dynamic external conditions.

The Probability Impact Matrix (PIM) is one of the tools to assess risk levels [10]. PIM is a visual aid tool that maps risks based on two main parameters: the likelihood of risk occurrence and the level of impact on the project. In order to determine risk management priorities, this matrix divides risks into categories such as low, medium, high, or very high.

Previous research has identified various risks in health sector PPP projects, including construction, operational, economic, legal risks, and regulatory uncertainty [11]. However, there is still a dearth of specific research on identifying dominant risk in the context of hospital PPP projects, so this study is crucial to close that gap.

Both the World Bank and the Project Management Institute (PMI) state the effective PPP risk management hinges on allocating risks to the party best equipped to

manage and mitigate the cost- effectively. Inappropriate risk allocation, as noted by the World Bank, increases project coast and discourages private sector involvement, especially in availability payment – based projects. [7],[18]. Similarly, the PMBOK® Guide highlights that effective risk allocation improves project predictability, financial sustainability, and stakeholder confidence throughout the project life cycle [10], [12]. Therefore, identifying dominant risks is a critical prerequisite for designing effective risk allocation structures in health sector PPP projects.

RESEARCH METHODOLOGY

This research employs a quantitative framework grounded in expert judgment to identify dominant risks within health sector PPP projects. Figure 1 illustrates the research progression.

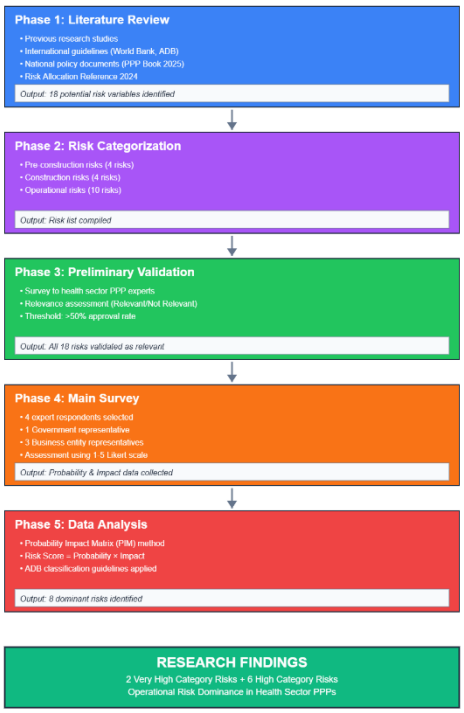

Figure 1. Research Flow Diagram

We began our investigation by conducting a thorough review of the literature, which included prior studies, technical recommendations from international organizations (World Bank, ADB), and domestic policy documents (PPP Book 2025, Risk Allocation Reference 2024). Through this review, we identified 18 potential risk variables, subsequently organized into three categories: pre-construction risks (4 variables) and operational risks (10 variables).

Following the literature synthesis, we validated the compiled risk inventory through preliminary expert consultation within the health sector PPP domain. Participants evaluated each risk as relevant when approval exceeded 50% among respondents.

Post validation, we conducted our primary survey with four carefully selected respondents: one government representative and three private sector representatives.

Selection criteria required: minimum one year PPP project experience, direct health sector PPP involvement, and demonstrated understanding of infrastructure project risk management.

Participants assessed each risk across two dimensions using 5 points on likert scales : probability (occurrence likelihood) and impact (project influence magnitude). We analyzed data using the Probability Impact Matrix (PIM) methodology per Project Management Institute standards [12]. Risk scores were calculated through the formula:

$$Risk\ Score\ (R) = Probability\ (P) x\ Impact\ (I)$$

Risk level classification followed the Asian Development Bank guidelines: Very Low (score 1-5), Low (score 6-9), Medium (score 10-14), High (score 15-19), and Very High (score 20-25) [13]. Risk of achieving high or very high classifications were designated as dominant risks warranting priority management attention.

RESULTS AND DISCUSSION

Respondent Profile

After validation, we conducted a primary survey with four selected experts; one senior government official and three private sector practitioners. The government respondent has over nine years of experience in PPP project planning and evaluation at a strategic level, including direct work on health sector PPP. Two private sector respondents have three to six years of experience in hospital PPP development and financial structuring. The third private sector respondent has more than nine years of experience in infrastructure PPP risk management and investment appraisal.

While the sample size is limited, the respondents' expertise, direct project involvement, and strategic roles support the validity and reliability of the Probability Impact Matrix (PIM) assessment. Expert-based risk assessment with a small but highly qualified group is widely accepted in PPP risk studies [4],[11],[16].

Preliminary Risk Validation

Initial survey findings demonstrated that all 18 literature-derived risks achieved relevance scores exceeding 0.50 (more than 50% of respondents considered them relevant). This result demonstrates that our risk inventory accurately captures the real-world circumstances that arise in the health sector. Regulatory uncertainty inadequate feasibility study documentation, financial close delays, all construction risks, and the majority of operational risks were among the risks that received unanimous approval (100% of respondents) included regulatory uncertainty, inadequacy of feasibility study documents, financial close delays, all construction risks, and most operational risks.

Probability Impact Matrix Analysis

PIM analysis results for 18 risks showed the distribution as seen in Table 1

Table 1. Health Sector PPP Project Risk Level Summary

Stage	Code	Risk Description	Average Impact	Average Probability	Risk Score	Category	Ranking
Operational	C3	JKN / Availability	5.00	4.33	21.65	Very High	1

Stage	Code	Risk Description	Average Impact	Average Probability	Risk Score	Category	Ranking
		Payment					
Operational	C4	Delay in JKN claim payment	4.67	4.33	20.22	Very High	2
Operational	C10	Regional fiscal sustainability	5.00	3.67	18.35	High	3
Construction	B2	Construction cos increase	4.67	3.67	17.14	High	4
Preparation	A1	Land Risk	4.50	3.50	15.75	High	5
Preparation	A2	Health regulatory uncertainty	4.00	4.00	16.00	High	6
Construction	B1	Construction delay	4.33	3.67	15.89	High	7
Operational	C6	Health workforce shortage	4.67	3.33	15.55	High	8

We found eight dominant risks in the high and very high classifications out of the eighteen risks that were evaluated. Six risks with scores between 15 and 19 were in the high category, and two risks with scores above 20 were in the very high category.

Discussion of Dominant Risks

Very High Category Risks

JKN/Availability Payment (C3) emerges as the paramount risk, scoring 21.65. Uncertainty surrounding availability payments and JKN claims represents a fundamental concern given its direct influence on project cash flow. Within hospital frameworks, operational revenues depend substantially on the National Health Insurance (JKN) system administered by BPJS Kesehatan. Payment delays or uncertainties can severely disrupt hospital operational sustainability [14].

Delay in JKN Claim Payment (C4) ranks second with a score of 20.22. Delayed claim settlements from BPJS Kesehatan directly pressure hospital cash flow and can disrupt operational capability to fulfill obligations to suppliers, health workers, and facility maintenance. Within the PPP project context, payment delays can jeopardize business entities' creditor payment capabilities, potentially triggering contract renegotiation or even project failures.

Government guarantees play a crucial role in mitigating the very high operational and regulatory risk identified in this study, particularly those related to JKN payment uncertainty and the availability of payment mechanisms. Instruments such as guarantees provided by PT. Penjaminan Infrastruktur Indonesia (PT.PII) can reduce perceived default risk, enhance project bankability, and increase investor confidence. By transferring specific government-related risks to a credible guarantor, private sector exposure to policy and payment uncertainty can be substantially reduced [7],[17],[19],[20].

High Category Risks

Regional Fiscal Sustainability (C10) scoring 18.35 reflects concerns regarding limited government fiscal capacity to support long term PPP project payments. Under availability payment arrangements, governments must execute periodic payments to business entities throughout concession periods typically spanning 25-30 years. Regional fiscal constraints, particularly in areas with restricted own source revenues, can threaten payment sustainability and overall project continuity [15].

Regional fiscal capacity plays a critical role in the sustainability of Availability Payment (AP) schemes in hospital PPP projects. Local governments with limited fiscal space face higher risks of delayed or reduced AP obligations. These risks increase during economic downturns of shifts in budget priorities. Over long concession periods, fiscal stress can heighten the probability of payment default. This may result in contract renegotiation or reliance on central government support mechanisms. Such conditions significantly elevate financial risk perceptions among private investors and lenders [6],[13],[19].

A construction Cost Increase (B2) score of 17.14 presents significant concerns during the construction phase. Material price volatility, design modifications, and field condition uncertainties constitute primary cost escalation drivers. For hospital PPP projects requiring elevated technical specifications meeting health standards, this risk substantially impacts project financial viability.

Land and Permit Risk (A1) can delay the overall project timelines. Land acquisition processes frequently encounter complex technical and social obstacles, including ambiguous land ownership status, community opposition, and bureaucratic procedures.

Health Regulatory Uncertainty (A2) can create uncertainty for investors. Such regulatory instability elevates risk perceptions, potentially affecting investment decisions and project financing structures.

Construction Delay (B1) not only generates additional costs but also postpones operational commencements and revenue generation. Health Workforce Shortage (C6) can diminish service quality and hospital utilization, which in turn affects revenue and healthcare facility reputation.

Operational Risk Dominance

An important finding from this research is the dominance of operational risks in health sector PPP project risk profiles. Of 8 dominant risks, 4 risks (50%) are in the operational stage. This indicates that the main challenge of hospital PPP projects is not only in the preparation and construction stages but precisely in long-term operational sustainability.

This operational risk dominance differs from risk patterns in economic infrastructure PPP projects such as toll roads or power plants, where construction risks are generally more dominant. This discrepancy reflects distinctive features of the health sector

that are heavily influence by : Nasional health policies (JKN system, INA-CBGs rates), local government fiscal capacity, health workforce availability and quality, and dynamic patterns of health service demand [16].

Practical Implications

Our dominant risk identification results yield several important practical implications. Government authorities need to strengthen policy framework, reducing uncertainty, particularly regarding JKN payment system stability and long-term fiscal support guarantees. Guarantees from PT Penjaminan Infrastruktur Indonesia (PT PII) become vital instruments for mitigating government payment risks [17].

Extremely detailed feasibility analyses are necessary for private sector organizations, especially when it comes to local government payment capabilities and JKN system revenue projections. Prioritizing ways to mitigate construction risks through well-defined contractual agreements and skilled contractor selection is also necessary. Financing institutions need consideration of distinct risk profiles in the health sector within financing arrangements, such as sufficient guarantee specifications and strict operational performance monitoring systems.

CONCLUSION

This investigation successfully identified eight major risks associated with PPP projects in the health sector: six high-category risks and two very high-category risks. Examples of very high category risks include JKN/Availability Payment uncertainties and JKN claim payment delays. High-category risks include regional fiscal sustainability, growing construction costs, land-related problems, regulatory uncertainty, construction delays, and health worker shortages.

Another noteworthy finding is the dominance of operational risk in hospital PPP project risk profiles, which shows a strong dependence on both national health policies and local government funding. This risk pattern differs greatly from economic infrastructure PPP projects, necessitating the use of specialized risk management techniques.

Future studies should think about increasing the number and diversity of respondents to improve the validity of the results, comparing different hospital PPP projects to comprehend variations in risk profiles, and creating risk allocation and mitigation frameworks for the healthcare industry.

Establish contingency funds or escrow accounts to ensure timely JKN claim and availability payments in hospital PPP projects. These measures reduce cash flow uncertainty, boost private sector confidence, and support project sustainability.

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REFERENCES

1. Central Statistics Organization. Indonesia Health Statistics 2023. Jakarta: BPS, 2023.
2. Bappenas. National Medium-Term Development Plan 2025-2029. Jakarta: Ministry of National Development Planning/Bappenas, 2025.

3. Bappenas. PPP Book 2025: Infrastructure Projects Plan. Jakarta: Ministry of National Development Planning/Bappenas, 2025.
4. Mazher, K.M., Chan, A.P.C., Zahoor, H., Khan, M.I., and Ameyaw, E.E. "Fuzzy Logic-Based Risk Allocation Framework for PPP Infrastructure Projects." Journal of Infrastructure Systems 28, no. 1 (2022): 1-14.
5. Visconti, R.M., Morea, D., and Pellegrini, R. "Public-Private Partnerships in the Health Sector: Risk Allocation and Financing Issues." Journal of Public Budgeting, Accounting & Financial Management 31, no. 4 (2019): 563-586.
6. Asian Development Bank. Public-Private Partnership Monitor: Indonesia. Manila: ADB, 2020.
7. World Bank. Guidance on Risk Allocation for PPPs. Washington D.C.: World Bank Group, 2023.
8. Delmon, J. Public-Private Partnership Projects in Infrastructure: An Essential Guide for Policy Makers. Cambridge: Cambridge University Press, 2021.
9. ISO. ISO 31000:2018 -- Risk Management Guidelines. Geneva: International Organization for Standardization, 2018.
10. Project Management Institute. A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Seventh Edition. Pennsylvania: PMI, 2021.
11. Zhang, X., Wang, Y., and Liu, J. "Risk Allocation Framework for Healthcare PPP Projects: Evidence from China." International Journal of Project Management 40, no. 3 (2022): 207-219.
12. Project Management Institute. PMI Standard for Risk Management in Portfolios, Programs, and Projects. Pennsylvania: PMI, 2021.
13. Asian Development Bank. PPP Risk Allocation and Mitigation Strategies. Manila: ADB, 2021.
14. BPJS Kesehatan. Report on Program Management and Financial Report of Social Health Insurance 2022. Jakarta: BPJS Kesehatan, 2022.
15. Ministry of Finance RI. Risk Allocation Reference for Public-Private Partnership Projects. Jakarta: Ministry of Finance RI, 2024.
16. Liu, J., Wang, Y., and Zhang, X. "Risk Sharing in PPP Healthcare Projects: A Fuzzy Logic Approach." Automation in Construction 146 (2023): 104668.
17. PT Penjaminan Infrastruktur Indonesia. Guidelines for Risk Allocation in PPP Projects. Jakarta: PT PII, 2022.
18. OECD. *Public-Private Partnerships and Infrastructure Governance*. Paris: OECD Publishing, 2020.
19. HM Treasury. *Managing Fiscal Commitments from Public-Private Partnerships*. London, 2022.
20. World Bank. *Hospital PPP Reference Guide*. Washington D.C.: World Bank Group, 2021.
21. Yescombe, E.R. *Public-Private Partnerships in Healthcare*. Oxford: Elsevier, 2018.
22. Grimsey, D., & Lewis, M.K. *Public Private Partnerships: The Worldwide Revolution*. Cheltenham: Edward Elgar, 2004.