RISK ASSESSMENT AND ALLOCATION IN INDONESIA'S LOCAL GOVERNMENT AVAILABILITY-PAYMENT PPPs

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Abstract

Developing nations face severe infrastructure deficits exacerbated by fiscal constraints, making Public-Private Partnerships (PPPs) a crucial financing mechanism. The Availability-Payment (AP) model is preferred for socially essential projects as it transfers demand risk to the public sector. However, implementing AP-PPPs at the sub-national level in developing economies like Indonesia presents distinct challenges, starkly evidenced by a high local failure rate. This study addresses a critical gap by systematically identifying risks and analyzing allocation preferences for local government AP-PPPs in Indonesia. Employing a sequential mixed-methods approach, a narrative review distilled 39 risk factors, which were then assessed through a survey of national PPP experts. The analysis reveals a risk profile dominated by institutional failures, with 59% of risks rated as high or extreme severity. A systemic diagnosis structures these risks into a causal hierarchy of four thematic groupings: a root-cause cluster of governance and institutional crises, its manifestation in planning and preparation failures, the inherent vulnerabilities of the AP scheme, and a derivative cluster of operational consequences. The allocation pattern uncovers a core paradox: while the optimal allocation of 83% of extreme risks to the public sector adheres to standard principles, it simultaneously creates a high probability of failure by burdening the institutionally weakest party. The significantly lower risk transfer to the private sector (33.3%), compared to national benchmarks, signals a systemic incapacity for risk sharing, rooted in project unbankability driven by local governance deficits. Therefore, the findings function primarily as a diagnostic instrument, issuing an unequivocal policy imperative: the fundamental prerequisite for viable local AP-PPPs is not contract refinement, but the urgent strengthening of local government governance and core competencies.

Keywords: Public-Private Partnership (PPP); Availability-Payment; Local Government; Risk; Allocation; Indonesia.

1. INTRODUCTION

Infrastructure constitutes the foundational backbone for sustainable economic and social advancement, facilitating trade, expanding access to essential services, and enhancing national productivity and competitiveness (Adeniyi et al., 2024). However, developing nations confront substantial infrastructure deficits, with global financing requirements estimated at USD 22.5 trillion to bridge the existing gap and meet new demand between 2016 and 2030 (Rillo & Ali, 2018). Severe fiscal constraints exacerbate this challenge, as governments contend with high budget deficits and rising debt-to-Gross Domestic Product ratios, limiting their capacity to allocate sufficient resources to capital-intensive infrastructure projects with long payback periods (Mofokeng et al., 2024). Consequently, Public-Private Partnerships (PPPs) have been increasingly adopted as a strategic financing mechanism to address the infrastructure financing gap, leveraging private-sector capital and expertise amid constrained public budgets (Mofokeng et al., 2024).

PPPs signify a significant departure from traditional government procurement towards an integrated approach that distributes responsibility, financing, and risk to the private sector, harnessing its efficiency and resources while ensuring that the government retains strategic control and oversight to safeguard public interests (Ramadhani et al., 2025). Evidence suggests that PPPs can deliver infrastructure more efficiently than conventional methods, while fostering innovation, enhancing connectivity, and generating shared economic value (Tan & Taeihagh, 2020). Their success hinges critically on effective risk management to align incentives, ensure Value for Money (VfM), and assess project bankability (Grimsey & Lewis, 2004).

The principle of optimal risk allocation is operationalized through various PPP contractual and payment models. Contractual models such as Build-Operate-Transfer (BOT) and Design-Build-Finance-Operate (DBFO) define the scope and transfer of asset ownership and operational responsibilities. These are often paired with user-pay mechanisms, where the private partner bears substantial demand and revenue risk, making them suitable for projects with predictable revenue streams (Rasheed et al., 2022). However, for essential public infrastructure where social equity precludes cost recovery through user charges, the Availability Payment (AP) mechanism has emerged as a critical alternative. In AP models, the private partner is compensated based on the infrastructure's availability and performance against predefined standards, rather than usage levels, thereby insulating the private sector from demand volatility (Ikhsanti et al., 2025; Rasheed et al., 2022).

Despite its theoretical advantages, implementing any PPP model, however, becomes markedly more complex at the sub-national level in developing economies. Local authorities face fundamental constraints, including limited access to local finance due to the low capital base of domestic financial institutions, technical capacity deficits within those institutions to assess and manage PPP contracts,

political instability, and a weak legal and regulatory framework (Bolomope et al., 2020; Casady & Peci, 2021). These systemic vulnerabilities create a high-risk environment for long-term partnerships.

Research on risk allocation in PPPs, however, has not adequately addressed the unique intersection of three critical dimensions: the AP model, sub-national (local government) implementation, and the institutional context of developing economies. The existing literature is predominantly derived from national-level studies, often focusing on user-pay models (Ameyaw & Chan, 2015; Babatunde et al., 2019; Osei-Kyei & Chan, 2017). Consequently, there is a significant gap in understanding the specific risk factors and optimal allocation preferences for AP-based PPPs implemented by local governments in developing economies. This study, therefore, addresses this gap by systematically identifying and evaluating risks and analyzing stakeholder preferences for their allocation in the context of local government AP-PPPs in Indonesia, where implementation challenges are starkly evident, with a local-level AP-PPP success rate of only 6% (Shodiqi et al., 2024). The research thereby aims to contribute theoretical and practical insights to AP-PPP governance at the sub-national level in developing economies.

2. LITERATURE REVIEW

2.1. The Availability Payment Model in PPP

Public-Private Partnerships are long-term contractual arrangements between the public and private sectors to deliver public infrastructure, in which risks, responsibilities, and rewards are strategically allocated (World Bank Group, 2017). This model reflects a paradigm shift towards integrated, performance-based approaches, consolidating design, construction, financing, operation, and maintenance into a single long-term contract (Meng & Harshaw, 2014; Zancan et al., 2024). The core logic of this integration is to transfer life-cycle cost (LCC) risk to the private sector, thereby creating a foundational incentive to reduce it as a pathway to achieving VfM (Regan et al., 2016; Shrestha et al., 2019).

Within this landscape, the payment mechanism is a critical design choice. For essential public infrastructure where full cost recovery through user charges is not feasible, the AP model has emerged as a predominant solution. Under the AP model, the private partner receives periodic payments from the public authority primarily based on the asset's availability for use and its compliance with stringent, predefined performance standards, rather than on actual usage levels (Ikhsanti et al., 2025; Nahdi et al., 2024). This structure transfers demand risk back to the public sector while retaining performance risk with the private sector through contractual payment deductions for non-availability or service failures (Rasheed et al., 2022).

The AP model intensifies the core PPP incentive for life-cycle optimization through its fixed payment structure. Because the concessionaire's revenue stream (covering capital investment, O&M costs, and return) is fixed and long-term, it directly internalizes the long-term consequences of its initial choices (Zhang & Kumaraswamy, 2001). Better upfront investments in design and construction reduce the partner's own future operational risks and costs, aligning its financial interest with the public goal of sustained asset performance.

The AP model is particularly suited for social infrastructure such as hospitals, schools, prisons, and government buildings, as well as for economic infrastructure with unpredictable or politically sensitive demand, such as certain toll roads or bridges. Its advantages include guaranteed asset availability, predictable long-term fiscal commitments for the government, and stable revenue streams that attract private finance. However, its success depends on sophisticated monitoring, balanced Key Performance Indicators, and a thorough assessment of long-term fiscal liabilities (Nahdi et al., 2024). Ultimately, the efficacy of the AP model is determined by the strength of the contract in aligning private financial incentives with unwavering public service outcomes over the long term.

2.2. Risk Management in PPP Implementation

Risks in PPPs are dynamic and evolve throughout the project life-cycle, influenced by external factors such as economic conditions, technological advancements, and regulatory changes (Babatunde et al., 2019). Consequently, a structured risk management process is imperative, commencing with comprehensive identification and proceeding to strategic allocation. The foundational principle governing this allocation is that each risk should be borne by the party best equipped to manage and control it, a critical determinant of PPP success as it directly underpins project viability and safeguards investor returns (Ameyaw & Chan, 2015; Demirel et al., 2022; Sastoque et al., 2016).

Translating this principle into practice requires evaluating parties against specific allocation criteria. Primary among these is control and management capability: the risk should reside with the party that possesses not only the greatest influence over its likelihood of occurrence through its decisions and actions but also the expertise, resources, and systems to mitigate its impact effectively should it materialize (Demirel et al., 2022; Shrestha et al., 2019; Tembo-Silungwe & Khatleli, 2017). Furthermore, information asymmetry plays a critical role, meaning risks are more efficiently managed by the party with superior information regarding their probability and potential consequences (Shrestha et al., 2019). Finally, any allocation must ensure incentive alignment, motivating the risk-bearing party to manage it diligently in the project's long-term interest (Shrestha et al., 2019).

2.3.   *The Distinctive Context of Local Governments in PPP Implementation*

Implementing PPPs at the sub-national level introduces distinctive challenges that fundamentally shape project viability**.** Local governments operate within a constrained ecosystem marked by significant institutional capacity deficits in the technical, financial, and long-term planning expertise required for complex project management (OECD, 2016; Ter-Minassian, 2020). This fragility is compounded by fiscal constraints, including a narrow own-source revenue base, high dependence on central transfers, and often restrictive debt and fiscal rules (Bao et al., 2024; Cibils & Ter-Minassian, 2015). Furthermore, the political environment is volatile, characterized by frequent leadership turnover, shifting local priorities, and interventionist tendencies that undermine long-term commitment (Hussain et al., 2025; Wang et al., 2021). The regulatory framework adds another layer of complexity, often characterized by legal ambiguities, inconsistent enforcement, and weak intergovernmental coordination (Bolomope et al., 2020; Casady & Peci, 2021). These constraints create a challenging ecosystem for long-term partnerships.

For AP-based PPPs specifically, this challenging ecosystem creates a particular tension. While the AP model theoretically offers a structured solution by removing demand uncertainty, its success becomes critically dependent on capacities, often weakest at the local level: precise long-term fiscal planning to structure a sound AP formula, unwavering budgetary commitment, and rigorous performance monitoring over decades. This issue creates a potential misalignment between the model's requirements and typical local government capabilities, a tension that forms the core investigative focus of this study.

3.   METHODOLOGY

To achieve the objectives, a sequential mixed-methods approach was adopted, comprising a narrative literature review to identify risk factors, followed by an analysis of stakeholder perceptions of their significance and allocation.

3.1.   *Narrative Review with a Systematic Approach*

A comprehensive inventory of risks was developed through a narrative literature review employing a systematic search and selection protocol. This approach was chosen over a full Systematic Literature Review (SLR) for two key reasons pertinent to this study's context. First, the research is exploratory and scoping in nature, aiming to build a broad inventory of risks from diverse thematic areas rather than to aggregate or statistically synthesize findings (as in a meta-analysis). Second, the academic literature on the specific intersection of local government, AP, and risk is nascent and fragmented, as confirmed by an initial scoping search.

3.1.1. Search Strategy and Document Selection

The review process unfolded in four sequential stages:

1. Scoping Search: An initial scoping search on Scopus in March 2024 using a targeted Boolean string:

("public private partnership" OR PPP) AND ("availability payment*" OR "availability-based payment") AND (risk*) AND ("local government*" OR "regional authority").

yielded minimal results, validating the research gap.

2. Thematic Streams: To comprehensively capture the dispersed literature, the search strategy was organized into three complementary thematic streams: (A) General PPP Risks, (B) PPP Risks in a Sub-national context, and (C) the AP mechanism. Searches for each stream were executed on Scopus and Google Scholar (2015-2025), prioritizing studies from Indonesia and similar developing economies for contextual relevance.

3. Screening: The retrieved records underwent a three-phase screening (title, abstract, and full text) against explicit inclusion and exclusion criteria. Inclusion Criteria: Empirical or conceptual work focusing on PPP risk identification/analysis, relevant to at least one thematic stream in a developing or local government context. Exclusion Criteria: (i) focused solely on user-pay/concession models without transferable insights to the AP mechanism; (ii) covered only technical-engineering risks; or (iii) provided insufficient detail

Final Document Pool: From the screened literature, 16 seminal articles were selected for in-depth analysis. The sample size was determined by applying the selection criteria until **thematic saturation** was achieved, the point at which new articles no longer provided novel risk factors for the developing analysis. To anchor the analysis in the Indonesian context, the Risk Allocation Reference Book (IIGF, 2022) was incorporated as a key policy document, yielding a final core set of **17 documents** for analysis.

3.1.2. Systematic Content Analysis

A systematic content analysis was performed on the 17 core documents. All verbatim mentions of risk factors were extracted and compiled into a master list. This list was consolidated by merging synonymous or overlapping items to eliminate redundancy, yielding a final set of 39 unique risk factors relevant to AP-PPPs in local government contexts. These factors were organized into three analytical categories: (1) Project Operational Risks, (2) Local Government Governance and Institutional Risks, and (3) External Risks. This categorization is analytically purposeful, designed to isolate the critical interface between the AP scheme's requirements and the local governance context. The complete inventory is presented in Table 1 and forms the core content for developing the subsequent survey instrument.

TABLE 1 - RISK FACTORS FOR LOCAL GOVERNMENT AP PPPs

No	Risk Category and Risk Event	A	B	C	D	E	F	G	I	J	K	L	M	N	O	P	Q
A.	**PROJECT OPERATIONAL RISKS**																
1	**Planning and Preparation Phase**																
1.1	Inadequate Feasibility Study and Planning								*				*				
1.2	Land Acquisition Delays or Failures	*		*		*	*	*			*		*	*	*		
1.3	Delays in Permitting and Prerequisite Approvals	*		*		*		*	*	*	*	*	*	*	*		*
1.4	Failure to Establish the Business Entity/SPV	*						*									
1.5	Unclear Output Specification and Service Level Indicators	*		*							*						
1.6	Procurement Process Failures						*	*				*		*	*	*	*
1.7	Design and PPP Contract Negotiation Challenges						*	*		*	*	*	*	*		*	*
1.8	Difficulty in Securing Central Government Guarantees							*									
1.9	Uncertainty in Government Support	*												*			
1.10	Inadequate Fiscal Capacity	*															
1.11	Business Entity's Failure to Achieve Financial Close	*					*	*	*	*	*	*	*	*	*		*
2	**Construction Phase**																
2.1	Design Errors	*		*		*	*				*		*			*	*
2.2	Unforeseen Site Conditions	*		*		*		*				*	*			*	*
2.3	Work Accidents	*						*					*				
2.4	Construction Delays	*		*			*	*		*	*	*		*	*	*	*
2.5	Construction Cost Overruns	*		*	*		*	*		*	*				*	*	*
2.6	Post-Contract Scope Changes	*						*					*	*		*	
2.7	Social Conflict	*				*	*	*		*	*	*	*			*	*
3	**Operation and Maintenance Phase**																
3.1	Non-Achievement of Service Level Agreement (SLA)	*		*				*			*		*			*	*
3.2	Operation and Maintenance (O&M) Cost Increases	*	*	*	*		*	*			*	*			*		*
3.3	Inadequate Management and Monitoring Performance	*		*			*			*							
3.4	Unavailability of Supporting Utilities	*		*			*				*			*			*
3.5	Scarcity/Price Increase of Operational Materials	*		*	*											*	
3.6	Poor Asset Condition at Handover	*		*													
4	**Availability Payment (AP) and Handover Phase**																
4.1	AP Formula & Quantum Estimation Errors			*			*										
4.2	Flaws in the AP Adjustment Mechanism	*		*													
4.3	AP Payment Delays	*	*		*								*			*	
4.4	Unreadiness/Ineffectiveness of the AP Management and Disbursement Unit	*															
B.	**REGIONAL GOVERNMENT GOVERNANCE AND INSTITUTIONAL RISKS**																
5.1	Limited Human Resource Capacity					*	*	*	*	*	*			*	*		
5.2	Absence/Ineffectiveness of a Dedicated PPP Unit							*									
5.3	Communication and Coordination Failures	*		*			*	*			*	*	*		*	*	*
5.4	Political Instability and Changes in Regional Leadership		*	*		*	*	*			*		*			*	
5.5	Immature Legal System/Framework			*			*		*	*	*	*	*	*		*	*
5.6	Corruption, Bribery, and Unethical Behavior						*				*	*	*	*	*	*	*
5.7	Government Intervention Not in Accordance with Contract						*	*			*			*	*		*
C.	**EXTERNAL RISKS**	*															
6.1	Central Government Regulation & Policy Changes	*	*			*		*			*		*	*	*	*	*
6.2	Macroeconomic Volatility (Exchange Rate, Inflation, Interest Rate)	*	*	*	*	*	*	*			*	*	*	*	*	*	*
6.3	Natural Disasters	*		*			*	*			*		*	*	*	*	*
6.4	Extraordinary Political & Economic Events	*			*			*					*		*	*	

Note: Column codes (A-P) correspond to the references listed below.

A	(IIGF, 2022)	E	(Ameyaw & Chan, 2015)	I	(Yang et al., 2020)	M	(Osei-Kyei & Chan, 2017)
B	(Narbaev et al., 2025)	F	(Babatunde et al., 2019)	J	(Sastoque et al., 2016)	N	(Jokar et al., 2021)
C	(Hatmoko & Susanti, 2017)	G	(Sondang S. et al., 2017)	K	(Fatima et al., 2024)	O	(Kukah et al., 2023)
D	(Rasheed et al., 2024)	H	(Wang et al., 2020)	L	(Sy et al., 2016)	P	(Suhendra & Satrio, 2020)

3.2. Data Collection Method

A questionnaire survey was conducted to measure risk levels and gather perceptions on the optimal allocation of the identified risks.

3.2.1. Questionnaire Design

The instrument comprised three sections: (A) respondent demographics and professional profile; (B) assessment of each risk's likelihood (1= "very rare"; 5 = "almost certain") and consequence (1 = "insignificant"; 5 = "catastrophic"), both on 5-point Likert scales; and (C) perception of optimal risk allocation (1 = "entirely to the government"; 5 = "entirely to the private sector"). A five-point Likert scale was selected for its balance between response discrimination and ease of use. This scale length has been commonly adopted in PPP risk research (Osei-Kyei & Chan, 2017; Roumboutsos & Anagnostopoulos, 2008) and is considered suitable for capturing expert judgments in infrastructure contexts.

3.2.2. Sampling Strategy and Data Collection

The target population comprised Indonesian PPP experts from key institutions within the AP-PPP ecosystem: central government officials (from the Ministry of National Development Planning/Bappenas, Ministry of Finance, and Ministry of Public Works and Housing), local government practitioners from Madiun (successful case) and Bandung (failed case), IIGF (risk-finance perspective), and academic researchers specializing in Indonesian PPPs. Given the specialized and inherently limited population of experts with direct experience in local government AP-PPPs, a purposive, expert-based sampling strategy was employed, supplemented by snowball sampling to identify additional qualified respondents. This approach prioritizes depth of insight and diagnostic validity from strategically selected experts over statistical representativeness, aligning with the study's analytical objective of pattern identification and systemic diagnosis rather than statistical generalization. Data collection was conducted online from June to July 2024. Of the 25 questionnaires distributed, 20 complete and valid responses were obtained (response rate = 80%). This sample size (n = 20) is justified given the finite population of qualified experts and the study's diagnostic focus.

3.1.1. Respondent Profile and Justification of Sample Size

Respondent profiles are detailed in Table 2. The sample comprised 60% central government officials (providing a systemic, cross-regional perspective) and 20% local government practitioners (providing direct implementation experience). In aggregate, 55% of respondents possessed over five years of PPP experience, 55% held managerial positions, and 60% held postgraduate degrees, confirming a high level of expertise. The potential for central-government bias in the perceptions captured is acknowledged as a study limitation.

TABLE 2 - PROFILE OF SURVEY RESPONDENTS

Variables	Categories	Frequency	Percentage (%)
Institutional Affiliation	Central Government	12	60
	Local Government	4	20
	State Financial Institution	2	10
	Academia/Research	2	10
Organizational Level	Top Management	3	15
	Middle Management	8	40
	General Staff	9	45
Education Level	Bachelor's degree	8	40
	Master's Degree	11	55
	Ph.D.	1	5
PPP Experience	< 5 years	9	45
	5-10 years	6	30
	>10 years	5	25

3.3. Data Analysis

The results demonstrate high internal consistency across all scales: 0.894 for the likelihood scale, 0.896 for the consequence scale, and 0.848 for the allocation choice scale. All values exceed the recommended threshold of 0.70 (Bernardi, 1994), the survey instrument's reliability for measuring risk perceptions and allocation preferences. Descriptive statistics (mean and standard deviation) were computed for each risk item. The Risk Significance Score (RSS) was then calculated for each risk by multiplying its mean likelihood (L) and mean consequence (C) scores (RSS = L × C). This RSS served as the basis for categorizing risks into four severity levels: *Low* (RSS ≤ 5), *Medium* (RSS 6–10), *High* (RSS 11–15), and *Extreme* (RSS ≥ 16). This four-tiered categorization aligns with conventional risk matrix zones (e.g., a 5 × 5 matrix), providing a clear gradation for comparative ranking. Risks were ranked in descending order of their RSS. In cases of identical RSS values, the risk with the smaller standard deviation, indicating higher consensus among respondents, was assigned the higher rank (Field, 2018).

To analyze optimal risk-allocation preferences, a quantitative method developed by Chan et al. (2011) was employed. This approach interprets the mean allocation score using statistically derived thresholds based on a normal distribution: a mean score < 2.875 indicates allocation to the public sector; a mean between 2.875 and 3.125 indicates shared allocation; and a mean > 3.125 indicates allocation to the private sector. These thresholds, based on the properties of a five-point Likert scale, are considered to provide a more robust and accurate classification than methods that rely solely on simple percentage agreement.

4. RESULTS AND DISCUSSION

4.1. Risk Profile of Local Government AP-PPPs

The analysis results presented in Table 3 show that of the 39 risks, 12 (31%) are "extreme" and 11 (28%) are "high", meaning 59% pose serious threats. This confirms the complex and fragile implementation environment and aligns with the high failure rates of local AP-PPP implementation in Indonesia (Shodiqi

et al., 2024). The top five risks are dominated by governance and planning failures: "Limited human resource capacity" (RSS = 20.01), "Land acquisition delays or failures" (RSS = 19.80), "AP formula & quantum estimation errors" (RSS = 19.34), "Non-achievement of SLA" (RSS = 17.76), and "Inadequate feasibility study and planning" (RSS = 17.67). The standard deviation values for these top-ranked risks are relatively low for both likelihood and consequence scores (ranging from 0.40 to 0.78), indicating strong consensus among respondents about their critical importance.

TABLE 3 - RISK SIGNIFICANCE, RANKING, AND ALLOCATION PREFERENCES

Code	Risk	Probability		Severity		RSS	Risk Level	Risk Rank	Allocation		
		Mean	Std Dev	Mean	Std Dev				Mean	Std Dev	Allocated to
A.	PROJECT OPERATIONAL RISKS										
1	Planning and Preparation Phase										
1.1	Inadequate Feasibility Study and Planning	3.80	0.51	4.65	0.48	17.67	Extreme	5	1.80	0.93	Public
1.2	Land Acquisition Delays or Failures	4.40	0.58	4.50	0.59	19.80	Extreme	2	1.90	0.94	Public
1.3	Delays in Permitting and Prerequisite Approvals	3.30	0.56	4.25	0.62	14.03	High	15	2.15	1.15	Public
1.4	Failure to Establish the Business Entity/SPV	2.50	0.81	3.25	0.77	8.13	Medium	31	4.15	1.06	Private
1.5	Unclear Output Specification and Service Level Indicators	3.90	0.62	4.30	0.78	16.77	Extreme	11	2.55	1.12	Public
1.6	Procurement Process Failures	3.80	0.51	4.50	0.59	17.10	Extreme	9	2.35	0.91	Public
1.7	Design and PPP Contract Negotiation Challenges	2.70	1.14	3.05	1.16	8.24	Medium	28	2.95	0.74	Shared
1.8	Difficulty in Securing Central Government Guarantees	2.65	1.01	4.50	0.50	11.93	High	18	2.55	1.16	Public
1.9	Uncertainty in Government Support	2.50	0.81	3.20	0.75	8.00	Medium	32	2.35	1.19	Public
1.10	Inadequate Fiscal Capacity	4.10	0.70	4.25	0.77	17.43	Extreme	7	2.35	1.06	Public
1.11	Business Entity's Failure to Achieve Financial Close	4.00	0.71	4.40	0.73	17.60	Extreme	6	4.25	0.99	Private
2	Construction Phase										
2.1	Design Errors	2.45	0.92	3.40	0.97	8.33	Medium	27	4.00	1.26	Private
2.2	Unforeseen Site Conditions	2.55	0.67	3.85	0.65	9.82	High	19	2.75	0.99	Public
2.3	Work Accidents	2.35	1.19	3.50	0.97	8.23	Medium	29	4.55	1.07	Private
2.4	Construction Delays	3.35	0.65	4.45	0.50	14.91	High	13	4.45	1.02	Private
2.5	Construction Cost Overruns	3.60	0.73	4.00	0.77	14.40	High	14	4.20	0.98	Private
2.6	Post-Contract Scope Changes	2.75	1.18	3.55	1.02	9.76	High	20	3.05	1.02	Shared
2.7	Social Conflict	2.60	0.92	3.05	0.92	7.93	Medium	33	2.80	0.93	Public
3	Operation and Maintenance Phase										
3.1	Non-Achievement of Service Level Agreement (SLA)	3.70	0.46	4.80	0.40	17.76	Extreme	4	4.00	1.22	Private
3.2	Operation and Maintenance (O&M) Cost Increases	2.60	0.49	3.65	0.79	9.49	High	21	4.00	1.26	Private
3.3	Inadequate Management and Monitoring Performance	2.45	0.92	3.45	0.97	8.45	Medium	25	4.10	1.18	Private
3.4	Unavailability of Supporting Utilities	1.60	0.66	2.50	0.81	4.00	Low	37	4.30	0.84	Private
3.5	Scarcity/Price Increase of Operational Materials	1.80	0.60	3.85	0.85	6.93	Medium	36	4.35	0.79	Private
3.6	Poor Asset Condition at Handover	1.45	0.50	2.75	0.54	3.99	Low	38	3.20	0.98	Private

Code	Risk	Probability		Severity		RSS	Risk Level	Risk Rank	Allocation		
		Mean	Std Dev	Mean	Std Dev				Mean	Std Dev	Allocated to
4	**Availability Payment (AP) and Handover Phase**										
4.1	AP Formula & Quantum Estimation Errors	4.25	0.70	4.55	0.59	19.34	Extreme	3	1.50	0.50	Public
4.2	Flaws in the AP Adjustment Mechanism	2.90	0.62	4.50	0.50	13.05	High	17	2.95	0.59	Shared
4.3	AP Payment Delays	2.95	0.59	3.20	1.08	9.44	High	22	2.35	1.62	Public
4.4	Unreadiness/Ineffectiveness of the AP Management and Disbursement Unit	2.45	0.92	3.35	0.91	8.21	Medium	30	1.75	0.94	Public
B.	**REGIONAL GOVERNMENT GOVERNANCE AND INSTITUTIONAL RISKS**										
5.1	Limited Human Resource Capacity	4.35	0.57	4.60	0.58	20.01	Extreme	1	1.55	0.86	Public
5.2	Absence/Ineffectiveness of a Dedicated PPP Unit	2.65	1.01	3.15	0.85	8.35	Medium	26	1.65	0.65	Public
5.3	Communication and Coordination Failures	3.40	0.92	4.00	0.63	13.60	High	16	3.10	0.89	Shared
5.4	Political Instability and Changes in Regional Leadership	4.05	0.50	4.15	0.65	16.81	Extreme	10	2.00	1.26	Public
5.5	Immature Legal System/Framework	4.20	0.68	4.10	0.77	17.22	Extreme	8	1.90	0.94	Public
5.6	Corruption, Bribery, and Unethical Behavior	3.60	0.58	4.45	0.50	16.02	Extreme	12	1.95	1.07	Public
5.7	Government Intervention Not in Accordance with Contract	2.05	1.07	3.40	1.02	6.97	Medium	35	1.85	0.85	Public
C.	**EXTERNAL RISKS**										
6.1	Central Government Regulation & Policy Changes	2.70	1.23	3.15	0.96	8.51	Medium	24	2.10	1.14	Public
6.2	Macroeconomic Volatility (Exchange Rate, Inflation, Interest Rate)	2.75	1.04	3.35	0.79	9.21	High	23	3.80	0.98	Private
6.3	Natural Disasters	2.40	1.16	3.15	0.96	7.56	Medium	34	2.95	0.59	Shared
6.4	Extraordinary Political & Economic Events	1.25	0.00	3.10	0.89	3.88	Low	39	2.45	0.80	Public

The allocation analysis reveals that 21 risks (53.8%) are allocated to the public sector, 5 risks (12.8%) for shared allocation, and 13 risks (33.3%) to the private sector. More notably, the relationship between risk significance and allocation shows a strong pattern (Figure 1): 10 of the 12 "extreme" risks (83%) are allocated to the public sector, with the remaining two allocated to the private sector.
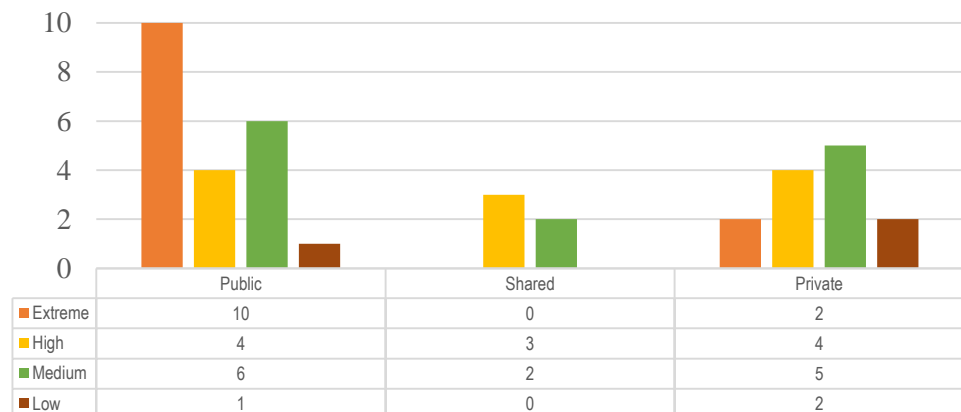

	Public	Shared	Private
■Extreme	10	0	2
■High	4	3	4
■Medium	6	2	5
■Low	1	0	2

FIGURE 1 - CROSS-TABULATION OF RISK SIGNIFICANCE LEVEL AND ALLOCATION

4.2. *Diagnosing the Systemic Pathology: Risk Clusters and Causal Linkages*

The concentration of "extreme" risks at the regional level reveals a risk dynamic that differentiates sub-national from national PPP implementation. This pattern empirically substantiates the institutional vulnerabilities of local governments (Casady & Peci, 2021; Hussain et al., 2025) while mapping their causal link to project failure. The following analysis structures these risks into distinct yet causally linked groupings, revealing the systemic pathology of local AP-PPPs.

4.2.1. Governance and Institutional Crisis as the Root Cause

This cluster represents the fundamental failure in the core governance functions essential to AP-PPP success and consists of four systemic, mutually reinforcing risks.

"Limited human resource capacity" (rank 1) constitutes the origin point of all governance weaknesses. The root cause is that local governments are fundamentally unaccustomed to this non-conventional delivery system. This unfamiliarity creates a deficit in the specific institutional capacity in technical, financial, and legal competencies (Al Hazmi, 2024) required to design, negotiate, and manage contracts, a fundamental condition for successful local PPPs (Bolomope et al., 2020; OECD, 2016). As a result, the implementation of AP projects at the regional level remains limited. This situation, in turn, results in a critical absence of institutional memory and a repository of lessons learned regarding the scheme's complexities.

This foundational weakness directly gives rise to, and is exacerbated by, an "Immature legal framework" (rank 8). This ambiguous and non-comprehensive regulatory environment creates a void, fostering unilateral interpretation, inconsistency, and a lack of legal certainty. Within this void, complex contractual clauses become highly vulnerable to domination by more experienced private entities, leading to a risk boomerang effect.

"Political instability and changes in local leadership" (rank 10) consistently poses an operational constraint (Hussain et al., 2025; Shodiqi et al., 2024; Wang et al., 2021). This instability acts as a structural disincentive that erodes the foundation of long-term partnerships: credible commitment. Each change threatens project continuity through budget delays, renegotiation requests, or even cancellation threats, undermining the long-term fiscal certainty essential to the AP mechanism. This dynamic is concretely illustrated by the dissolution of the special PPP unit in Bandung City following a leadership change, which crippled the project's driving force and coordination (Shodiqi et al., 2024).

"Corruption, bribery, and unethical practices" (rank 12) emerge directly from this dysfunctional system. The combination of weak capacity, uncertain legality, and unstable leadership creates a perfect ecosystem for their proliferation. This risk not only erodes the legitimacy of the AP-PPP scheme but fundamentally perverts its purpose, transforming it from an instrument for efficiency into a channel for budgetary waste. In Indonesia, such

pathologies in public procurement have led to significant budget leakage, with estimates reaching up to 30% of regional budgets due to systemic collusion (Anggriawan, 2025; Hardinata et al., 2025; Mumtaaz et al., 2025).

4.2.2.   Failure in Critical Planning and Preparation Phases

This cluster represents the tangible manifestation of the governance crisis during the 'project's initial stages. "Inadequate feasibility studies and planning" (rank 5), a direct symptom of limited technical capacity, is a critical weakness that deters private sector participation (Kerf & Izaguirre, 2007). This flawed foundation directly leads to two subsequent critical failures: (1) "Unclear output specifications and service level indicators" (rank 11), where overly broad or rigid requirements create interpretative problems that trigger contractual disputes during operations (Wibowo & Hartiati, 2023), and (2) inaccurate forecasts, which undermine financial feasibility and can lead to the "Failure of the business entity to achieve financial closure (rank 6)" by rendering the project less bankable (Nugroho et al., 2024).

Concurrently, "Delays/failure in land acquisition" (rank 2) operates as a parallel critical path, often independently derailing projects (Subesar et al., 2025). Although not specific to AP, it constitutes a profound test of governmental legitimacy and administrative competence in Indonesia. It is triggered by factors such as regulatory complexity (Amal, 2024), unfair compensation (Pattra et al., 2025), poor socialization (Yasim et al., 2025), inaccurate data and ineffective coordination (Perdana & Rohman, 2021). Ultimately, its root cause is governance failure. The consequences are not only significant delays and cost overruns (Putri & Marzuki, 2020; Topan et al., 2025) but also a fundamental erosion of investor confidence.

"The Limited fiscal capacity of regional governments" (rank 7) poses another fundamental threat. AP is designed to make projects bankable by providing a reliable revenue stream. However, high fiscal dependence on central transfers, coupled with suboptimal local governance, renders local governments' long-term payment commitments vulnerable and their reliability questionable (Mumtaaz et al., 2025; Wibowo, 2023). This risk directly challenges the rationale for using AP in fiscally weaker regions.

Finally, "Procurement process failure" (rank 9) encapsulates how governance weaknesses paralyze execution. The suboptimal e-procurement system, hampered by uneven human resources and technology (Hardinata et al., 2025; Rahman et al., 2025), consequently creates delays, unfair practices, and legal challenges.

4.2.3.   Inherent Vulnerabilities of the Availability Payment Scheme

The AP scheme requires the government to act as a "smart buyer of service," with the capacity to define output specifications, model whole-life costs, and design incentive mechanisms. This high demand, however, clashes with the reality of severe local constraints, creating a core structural vulnerability in the scheme. This contradiction manifests most critically in two interrelated "extreme" risks.

First, "Errors in estimating the AP formula" (rank 3). This risk concerns the irreversible contractual consequences of poor forecasting within the AP framework. The financial model is directly translated into a legally binding, long-term payment formula, locking in any errors for the duration of the contract. An overestimated AP creates a permanent, mandated fiscal burden (budgetary waste), while an underestimated AP threatens financial viability, all but ensuring renegotiation or default.

Second, "Failure to achieve SLAs" (rank 4) constitutes an "extreme" operational risk, triggering direct payment deductions (penalties) (Nathaniel et al., 2022). This model requires the government to act as a strict, technically competent monitor, a role that demands sustained capacity. Herein lies a profound contradiction: the same government, lacking the capacity to formulate precise SLAs (due to unclear output specifications), is tasked with assessing their achievement.

These two "extreme" risks collectively expose the defining challenge. The scheme's financial integrity hinges on two demanding and contradictory capabilities: sophisticated initial financial calculation and rigorous long-term performance monitoring. This finding directly contradicts the assumption that AP offers a simpler or safer solution for fiscally constrained regions.

4.2.4.   Derivative and Contained Risks in Later Project Phases

This analysis reveals that the majority of high-ranked risks in later project phases are not independent events but are symptoms and cascading consequences of root governance and planning failures. For instance, "Construction delays" (rank 13) and "Construction cost overruns" (rank 14) are typically preceded by inadequate feasibility studies and failures in land acquisition. Similarly, "Permit delays" (rank 15) and "Communication and coordination failures" (rank 16) often stem from the immature legal framework and limited human resource capacity. Even "Delays in AP payments" (rank 22) can be traced to limited fiscal capacity or poorly defined SLAs. This diagnostic tracing confirms that these operational issues are systematically linked to upstream governance deficiencies. Conversely, the Medium and Low-ranked risks are assessed to have a more contained and direct impact on project delivery, as they are less entrenched in the systemic governance pathology.

The primacy of governance failures explains a key divergence from global PPP risk literature: the surprisingly moderate ranking of "Construction cost overruns". While a top risk internationally (Roumboutsos & Anagnostopoulos, 2008; Sarvari et al., 2014), its lower position here highlights a distinct regional risk hierarchy. Local AP-PPP projects must first navigate "extreme" institutional hurdles before conventional technical-operational risks become the dominant concern.

4.3.   *Interpretation of the Risk Allocation Pattern*

A cross-analysis reveals a significant and instructive pattern: 83% of "extreme" risks (10 out of 12) are allocated to the public sector (see Figure 1). This should not be interpreted as an allocation failure but as

a realistic acknowledgment that resolving root causes within the public sphere can, in theory, be undertaken only by public actors. This logic aligns with the core principle of allocating risk to the party best able to manage it (Grimsey & Lewis, 2004).

However, this creates a profound paradox: a formally optimal allocation that concentrates critical risks on the party least equipped to handle them. Execution failure becomes a significant threat precisely because the local government is institutionally the weakest link. This situation exposes a critical flaw in the foundational allocation principle: it presupposes that the designated risk-bearer possesses the fundamental capacity to manage the risk. When this precondition is absent, the contract effectively codifies a responsibility for failure rather than a viable framework for success.

The proportion of risks allocated to the private sector in this study (33.3%) provides further comparative insight. Empirical studies on risk allocation preferences in large-scale, national PPPs (predominantly user-pay schemes) consistently report a higher proportion allocated to private partners: approximately 52% in Indonesia (Hatmoko & Susanti, 2017; Tjendani et al., 2020), 48-53% in China (Chan et al., 2011; Ke et al., 2010), and 56-59% in Nigeria (Ibrahim et al., 2006; Tolani, 2013). This consistent pattern highlights that greater risk transfer is both feasible and expected at the national level, where institutional capacity is stronger.

While differences in payment schemes must be acknowledged, the substantial gap suggests that the lower private-sector allocation is not primarily due to scheme type or private-sector reluctance. The core issue is a systemic inability to transfer more risk, constrained by project unbankability stemming from weak preparatory documentation and limited regional fiscal capacity, factors largely beyond the private sector's control. Therefore, these allocation patterns should be interpreted not merely as a contractual guide, but as a diagnostic tool and a priority roadmap for intervention. It delivers a clear, non-negotiable message: strengthening local government governance and capacity is the fundamental prerequisite for success.

5.   CONCLUSIONS

This research concludes that the paramount barrier to successful AP-PPPs at Indonesia's local government level is institutional frailty, not technical complexity. The risk profile reveals a core pathology of three systemic failures (governance, planning, and AP-model vulnerabilities), with consequences that manifest as a distinct set of operational risks. This pathology is starkly reflected in the risk allocation pattern, which, while formally optimal, creates a fatal paradox: the party least capable of management is contractually burdened with the most severe risks. The markedly lower risk transfer to the private sector (33.3%) compared to national PPP benchmarks thus signals a systemic incapacity to transfer risk, rooted in the unbankability of projects crippled by weak local governance.

Consequently, the derived analysis functions not primarily as a contractual checklist but as a diagnostic instrument that reveals systemic, interconnected risk clusters and provides a prioritized roadmap for intervention. It issues an unequivocal policy imperative: strengthening local government governance and core competencies is the indispensable prerequisite for viable AP-PPPs. The strategic focus must therefore shift decisively from perfecting contract clauses to building foundational public institutional capacity. Ultimately, this study affirms that the success of a PPP hinges less on the sophistication of its contract than on the capability of the public institutions entrusted to execute it.

While this study provides critical diagnostic insights, its limitations also delineate a clear agenda for future research. The sampling approach, though rich in expert perspectives, is constrained by its small size and by the dominance of the central government. Future studies should therefore employ stratified sampling and triangulate perspectives from local governments and the private sector to validate and enrich these findings. Furthermore, while the Indonesian focus necessarily limits the direct generalizability of specific risk rankings, the core diagnostic finding is that institutional capacity is the binding constraint. Moreover, the tripartite risk framework itself offers transferable analytical concepts for comparative studies in other developing and decentralized contexts. Ultimately, this diagnostic map must catalyze the next, prescriptive phase of research. The priority is to design targeted capacity-building programs, adaptive model contracts, and robust oversight mechanisms that directly address the root-cause risks identified here. The goal is to transform this systemic diagnosis into actionable policy, thereby enabling the successful implementation of local AP-PPPs.

REFERENCES

Adeniyi, A., Yetunde, A., & Namboozo, S. (2024). Bridging the Infrastructure Gap: Assessing the Impact of Critical Infrastructure Investments on Economic Growth in the United States and Emerging Markets. *International Journal for Multidisciplinary Research*, *6*(5). https://doi.org/10.36948/ijfmr.2024.v06i05.28772

Al Hazmi, R. A. (2024). Public-Private Partnerships: A New Hope for Infrastructure Development in Indonesia. *Journal of Law, Administration, and Social Science*, *4*(6), 1101–1118. https://doi.org/10.54957/jolas.v4i6.1010

Amal, B. (2024). Evolving Notions of Public Interest: A New Perspective on Land Acquisition in Indonesia. *Indonesia Law Review*, *14*(2). https://doi.org/10.15742/ilrev.v14n2.3

Ameyaw, E. E., & Chan, A. P. C. (2015). Risk Ranking and Analysis in PPP Water Supply Infrastructure Projects: An International Survey of Industry Experts. *Facilities*, *33*(7/8), 428–453. https://doi.org/10.1108/F-12-2013-0091

Anggriawan, R. (2025). From Collusion to Corruption: How Indonesian Law Fights Back in Procurement Conspiracy. *Jurnal Penegakan Hukum Dan Keadilan*, *6*(1), 66–81. https://doi.org/10.18196/jphk.v6i1.24577

Babatunde, S. O., Perera, S., & Adeniyi, O. (2019). Identification of Critical Risk Factors in Public-Private Partnership Project Phases in Developing Countries: A case of Nigeria. *Benchmarking: An International Journal*, *26*(2), 334–355. https://doi.org/10.1108/BIJ-01-2017-0008

Bao, H. X. H., Wang, Z., & Wu, R. L. (2024). Understanding Local Government Debt Financing of Infrastructure Projects in China: Evidence Based on Accounting Data from Local Government Financing Vehicles. *Land Use Policy*, *136*, 106964. https://doi.org/10.1016/j.landusepol.2023.106964

Bernardi, R. A. (1994). Validating Research Results when Cronbach'S Alpha is Below .70: A Methodological Procedure. *Educational and Psychological Measurement*, *54*(3), 766–775. https://doi.org/10.1177/0013164494054003023

Bolomope, M., Awuah, K., Amidu, A.-R., & Filippova, O. (2020). The Challenges of Access to Local Finance for PPP Infrastructure Project Delivery in Nigeria. *Journal of Financial Management of Property and Construction*, *26*(1), 63–86. https://doi.org/10.1108/JFMPC-10-2019-0078

Casady, C. B., & Peci, F. (2021). The Institutional Challenges of Public-Private Partnerships (PPPs) in Transition Economies: Lessons from Kosovo. *Economic Research-Ekonomska Istraživanja*, *34*(1), 1949–1965. https://doi.org/10.1080/1331677X.2020.1860791

Chan, A. P. C., Yeung, J. F. Y., Yu, C. C. P., Wang, S. Q., & Ke, Y. (2011). Empirical Study of Risk Assessment and Allocation of Public-Private Partnership Projects in China. *Journal of Management in Engineering*, *27*(3), 136–148. https://doi.org/10.1061/(ASCE)ME.1943-5479.0000049

Cibils, V. F., & Ter-Minassian, T. (Eds). (2015). *Decentralizing Revenue in Latin America: Why and How*. Inter-American Development Bank. https://publications.iadb.org/en/decentralizing-revenue-latin-america-why-and-how

Demirel, H. C., Leendertse, W., & Volker, L. (2022). Mechanisms for Protecting Returns on Private Investments in Public Infrastructure Projects. *International Journal of Project Management*, *40*(3), 155–166. https://doi.org/10.1016/j.ijproman.2021.11.008

Fatima, A., Mubin, S., & Masood, R. (2024). Risk-based integrated Performance Assessment Framework for Public-Private Partnership Infrastructure Projects. *Organization, Technology and Management in Construction: An International Journal*, *16*(1), 251–274. https://doi.org/10.2478/otmcj-2024-0018

Field, A. (2018). *Discovering Statistics Using IBM SPSS Statistics* (5th Edition). Sage Publications Ltd.

Grimsey, D., & Lewis, M. K. (2004). *Public Private Partnerships the Worldwide Revolution in Infrastructure Provision and Project Finance*. Edward Elgar Publishing Limited.

Hardinata, D., Yenisrida, Y., & Putra, H. D. (2025). Case Analysis of Public Procurement Management in Indonesia for The Period of 2023. *Dinasti International Journal of Economics, Finance & Accounting*, *5*(6), 5865–5876. https://doi.org/10.38035/dijefa.v5i6.3631

Hatmoko, J. U. D., & Susanti, R. (2017). Risk Management of West Semarang Water Supply PPP Project: Public Sector Perspective. *IPTEK Journal of Proceedings Series*, *0*(1), 48. https://doi.org/10.12962/j23546026.y2017i1.2191

Hussain, A., Apostu, S. A., Tabbasum, S., & Mehmood, A. (2025). *Unlocking the Sustainable Development Goals with Public Private Partnership and Local Government Role: Insights from Pakistan*. SSRN. https://doi.org/10.2139/ssrn.5078829

Ibrahim, A. D., Price, A. D. F., & Dainty, A. R. J. (2006). The Analysis and Allocation of Risks in Public Private Partnerships in Infrastructure Projects in Nigeria. *Journal of Financial Management of Property and Construction*, *11*(3), 149–164. https://doi.org/10.1108/13664380680001086

IIGF. (2022). *Risk Allocation Reference Book*. Indonesia Infrastructure Guarantee Fund. https://www.ptpii.co.id/alokasi-risiko

Ikhsanti, P. M., Arnezti, N., & Alika, D. Z. (2025). A Comparative Analysis of The Implementation of Public-Private Partnership (PPP) in The Palapa Ring Project: Case Study of Western, Central, and Eastern Packages. *Economic Military and Geographically Business Review*, *3*(1), 23–39. https://doi.org/10.61511/emagrap.v3i1.2025.1873

Jokar, E., Aminnejad, B., & Lork, A. (2021). Assessing and Prioritizing Risks in Public-Private Partnership (PPP) Projects Using the Integration of Fuzzy Multi-Criteria Decision-Making Methods. *Operations Research Perspectives*, *8*, 1–20. https://doi.org/10.1016/j.orp.2021.100190

Ke, Y., Wang, S., & Chan, A. P. C. (2010). Risk Allocation in Public-Private Partnership Infrastructure Projects: Comparative Study. *Journal of Infrastructure Systems*, *16*(4), 343–351. https://doi.org/10.1061/(ASCE)IS.1943-555X.0000030

Kerf, M., & Izaguirre, A. (2007). *Revival of Private Participation in Developing Country Infrastructure* (No. 10720; World Bank Publications - Reports). The World Bank Group.

Kukah, A. S. K., Owusu-Manu, D.-G., Badu, E., & Edwards, D. J. (2023). Evaluation of Risk Factors in Ghanaian Public-Private-Partnership (PPP) Power Projects Using Fuzzy Synthetic Evaluation Methodology (FSEM). *Benchmarking: An International Journal*, *30*(8), 2554–2582. https://doi.org/10.1108/BIJ-09-2021-0533

Meng, X., & Harshaw, F. (2014). The Application of Whole Life Costing in PFI/PPP Projects. *Proceedings 29th Annual Association of Researchers in Construction Management Conference, ARCOM 2013*, 769–778.

Mofokeng, M., Alhassan, A. L., & Zeka, B. (2024). Public–Private Partnerships and Economic Growth: A Sectoral Analysis from Developing Countries. *International Journal of Construction Management*, *24*(10), 1029–1037. https://doi.org/10.1080/15623599.2023.2217374

Muksin, I. (2023). Local Government Capacity in Transmigration Development, Indonesia. *Ilomata International Journal of Social Science*, *4*(2), 313–325. https://doi.org/10.52728/ijss.v4i2.736

Mumtaaz, G. M., Ferdiansyah, A. D., & Murjani. (2025). Reformulation of Fiscal Decentralization to Promote Sustainable Regional Development Governance: The Challenge of Preventing Regional Budget Corruption. *Pena Justisia: Media for Communication and Legal Studies*, *24*(1), 1973–1992. https://doi.org/10.31941/pj.v24i1.5782

Nahdi, M., Widayati, N., Wibowo, M. A., Sari, E. M., Tamin, R. Z., & Thohirin, A. (2024). Examining Solicited Projects of Public–Private Partnerships (PPP) in The Initiative of Indonesian Government. *Buildings*, *14*(6), 1870. https://doi.org/10.3390/buildings14061870

Narbaev, T., Aitkhozha, B., Samoilov, A., & Castelblanco, G. (2025). An Assessment of Financial Stability of Artificial Intelligence-based Monitoring Project in Kazakhstan. *Eurasian Journal of Economic and Business Studies*, *69*(2), 95–108. https://doi.org/10.47703/ejebs.v69i2.507

Nugroho, F. A. A., Rosid, R., & Tojibussabirin, M. (2024). Financial Risk Analysis of Public-Private Partnership (PPP) Projects Case Study on Pandaan—Malang Toll Road. *Interdisciplinary Social Studies*, *3*(4). https://doi.org/10.55324/iss.v3i4.715

OECD. (2016). *Making the Most of Public Investment in Colombia: Working Effectively across Levels of Government*. OECD. https://doi.org/10.1787/9789264265288-en

Osei-Kyei, R., & Chan, A. P. C. (2017). Risk Assessment in Public-Private Partnership Infrastructure Projects: Empirical Comparison Between Ghana and Hong Kong. *Construction Innovation*, *17*(2), 204–223. https://doi.org/10.1108/CI-08-2016-0043

Pattra, L., Ismail, N., & Wibowo, R. A. (2025). National Strategic Projects and Compensation Issues in Land Acquisition in Indonesia: A Justice Theory Perspective. *Jurnal Hukum Dan Peradilan*, *14*(1), 1–28. https://doi.org/10.25216/jhp.14.1.2025.1-28

Perdana, A. P., & Rohman, M. A. (2021). Land Acquisition Problems Project for Electrical Infrastructure Development. *IPTEK Journal of Proceedings Series*, *1*, 178. https://doi.org/10.12962/j23546026.y2020i1.8484

Putri, K., & Marzuki, P. (2020). Model of Land Acquisition Productivity Performance for Toll Road Projects in Indonesia. *Civil and Environmental Science*, *003*(02), 84–94. https://doi.org/10.21776/ub.civense.2020.00302.3

Rahman, R., Sangkala, & Hasniati. (2025). Transparency of Procurement of Goods and Services in Luwu District Government. *Lex Localis - Journal of Local Self-Government*, *23*(S6), 5216–5233. https://doi.org/10.52152/vde5qk35

Ramadhani, A., Musleh, Moh., Tamrin, M. H., & Subianto, A. (2025). Public-Private Partnership as an Infrastructure Development Solution: A Literature Study of the Kediri Airport Project. *Journal of Contemporary Public Administration*, *5*(1), 1–14. https://doi.org/10.22225/jcpa.5.1.2025.1-14

Rasheed, N., Shahzad, W., Khalfan, M., & Rotimi, J. (2022). Risk Identification, Assessment, and Allocation in PPP Projects: A Systematic Review. *Buildings*, *12*(1109), 1–19. https://doi.org/10.3390/buildings12081109

Rasheed, N., Shahzad, W. M., & Rotimi, J. O. B. (2024). Risk Management Capability for Risk Allocation in Social Infrastructure Public Private Partnerships: A New Zealand Perspective. *Journal of Engineering, Project, and Production Management*, *14*(4), 0034. https://doi.org/10.32738/JEPPM-2024-0034

Regan, M., Love, P., & Smith, J. (2016). Whole Life Costing of Infrastructure Investment: Economic and Social Infrastructure Projects in Australia. *2016 International Conference on Smart Infrastructure and Construction, ICSIC 2016*, 701–706.

Rillo, A. D., & Ali, Z. (2018). Toward an Innovative Approach of Financing Infrastructure in Asia. *Journal of Infrastructure, Policy and Development*, *2*(1), 87–96. https://doi.org/10.24294/jipd.v2i1.141

Roumboutsos, A., & Anagnostopoulos, K. P. (2008). Public–Private Partnership Projects in Greece: Risk Ranking and Preferred Risk Allocation. *Construction Management and Economics*, *26*(7), 751–763. https://doi.org/10.1080/01446190802140086

Sarvari, H., Valipour, A., Yahaya, N., & Norhazilan, M. N. (2014). Risk Ranking of Malaysian Public Private Partnership Projects. *Applied Mechanics and Materials*, *567*, 613–618. https://doi.org/10.4028/www.scientific.net/AMM.567.613

Sastoque, L. M., Arboleda, C. A., & Ponz, J. L. (2016). A Proposal for Risk Allocation in Social Infrastructure Projects Applying PPP in Colombia. *Procedia Engineering*, *145*, 1354–1361. https://doi.org/10.1016/j.proeng.2016.04.174

Shodiqi, A. Z. I., Tamin, R. Z., & Mahani, I. (2024). Study on Basic Requirements and Critical Success Factors (CSF) of Implementing Availability Payment in Public-Private Partnership (AP PPP) in Regency/Municipal Government. *Journal of the Civil Engineering Forum*, 287–300. https://doi.org/10.22146/jcef.12564

Shrestha, A., Tamošaitienė, J., Martek, I., Hosseini, M. R., & Edwards, D. J. (2019). A Principal-Agent Theory Perspective on PPP Risk Allocation. *Sustainability*, *11*(22), 6455. https://doi.org/10.3390/su11226455

Sondang S., E., Sumaryana, A., Widianingsih, I., & Nurasa, H. (2017). Local Government Challenges' to Implement Public Private Partnership Projects in Indonesia. *HOLISTICA – Journal of Business and Public Administration*, *8*(3), 83–96. https://doi.org/10.1515/hjbpa-2017-0026

Subesar, H., Hamid, A., Oka, I. K., Iriantoro, A., & Widya Putri, D. (2025). Between Investment and Social Justice: Legal Challenges of Land Acquisition for National Strategic Projects in Indonesia. *Substantive Justice International Journal of Law*, *8*(1), 1–12. https://doi.org/10.56087/substantivejustice.v8i1.372

Suhendra, M., & Satrio, P. B. (2020). The Key Success Factors of Availability Payment Scheme Implementation in The Palapa Ring Western Package PPP Project. *International Journal of Scientific & Technology Research*, *9*(01).

Sy, D. T., Likhitruangsilp, V., Onishi, M., & Nguyen, P. T. (2016). Impacts of Risk Factors on The Performance of Public-Private Partnership Transportation Projects in Vietnam. *ASEAN Engineering Journal*, *5*(1), 49–71.

Tan, S., & Taeihagh, A. (2020). Smart City Governance in Developing Countries: A Systematic Literature Review. *Sustainability*, *12*(3), 899. https://doi.org/10.3390/su12030899

Tembo-Silungwe, C. K., & Khatleli, N. (2017). A Conceptual Model for Risk Allocation in the Construction Industry. *American Journal of Applied Sciences*, *14*(7), 690–700. https://doi.org/10.3844/ajassp.2017.690.700

Ter-Minassian, T. (2020). *Intergovernmental Fiscal Cooperation and Subnational Revenue Autonomy*. Inter-American Development Bank. https://doi.org/10.18235/0002212

Tjendani, H. T., Marleno, R., & Subiyantoro, I. (2020). Risk Factors of the Public-Private Partnership (PPP) Scheme for Road Infrastructure Projects in Indonesia. *Proceedings of the National Seminar on Vocational Civil Engineering VIII*, *1*, 67–81. https://ojs.pnb.ac.id/index.php/Proceedings/article/view/2210

Tolani, O. V. (2013). An Examination of Risk Allocation Preferences in Public-Private Partnerships in Nigeria. *Journal of Sustainable Development Law and Policy*, *2*(1), 206–221.

Topan, Lopa, R. T., & Bakri, B. (2025). The Impact of Land Acquisition Delays on Time and Cost Performance in Construction Projects: A Case Study of the Bekasi River Flood Control Project Package 6. *Engineering, Technology & Applied Science Research*, *15*(5), 27400–27405. https://doi.org/10.48084/etasr.13165

Wang, Y., Song, W., Zhang, B., & Tiong, R. L. K. (2021). Official Tenure, Fiscal Capacity, and PPP Withdrawal of Local Governments: Evidence from China's PPP Project Platform. *Sustainability*, *13*(24), 14012. https://doi.org/10.3390/su132414012

Wang, Y., Wang, Y., Wu, X., & Li, J. (2020). Exploring the Risk Factors of Infrastructure PPP Projects for Sustainable Delivery: A Social Network Perspective. *Sustainability*, *12*(4152), 1–26. https://doi.org/10.3390/su12104152

Wibowo, A., & Hartiati, D. (2023). Value-for-Money Drivers in Public-Private Partnerships in Affordable Housing in Indonesia: An Analytic Network Process Perspective. *Journal of Construction in Developing Countries*, *28*(2), 101–119. https://doi.org/10.21315/jcdc-07-22-0137

Wibowo, T. (2023). Fiscal Sustainability and Risks of Provincial Government After Pandemic. *JEJAK*, *16*(1). https://doi.org/10.15294/jejak.v16i1.38067

World Bank Group. (2017). *PPP Reference Guide Version 3.0: Introduction* (Public-Private Infrastructure Advisory Facility (PPIAF)) [Reference Guide].

Yang, M., Chen, H., & Xu, Y. (2020). Stakeholder-Associated Risks and Their Interactions in PPP Projects: Social Network Analysis of a Water Purification and Sewage Treatment Project in China. *Advances in Civil Engineering*, *2020*(1), 8897196. https://doi.org/10.1155/2020/8897196

Yasim, S., Pratiwi, A. D., Nuraliah, D., & Mausili, D. R. (2025). Land Acquisition for Public Interest Development: Legal and Regulatory Perspectives in Indonesia. *Journal of Scientific Research, Education, and Technology (JSRET)*, *4*(1), 434–445. https://doi.org/10.58526/jsret.v4i1.711

Zancan, V., Paravano, A., Locatelli, G., & Trucco, P. (2024). Evolving governance in the space sector: From Legacy Space to New Space models. *Acta Astronautica*, *225*, 515–523. https://doi.org/10.1016/j.actaastro.2024.09.005

Zhang, X. Q., & Kumaraswamy, M. M. (2001). Procurement Protocols for Public-Private Partnered Projects. *Journal of Construction Engineering and Management*, *127*(5), 351–358. https://doi.org/10.1061/(ASCE)0733-9364(2001)127:5(351)