

Evaluation of the Impact of the Public-Private Partnership Program in Economic Infrastructure Development

*Khaeriah Amir

Faculty Of Economics And Business, State University Of Makassar, Indonesia

*Correspondence author: khaeriah@gmail.com

Abstract

This study examines the impact of Public-Private Partnership (PPP) programs on economic infrastructure development in Indonesia using a mixed methodological approach and a multi-dimensional evaluation framework. Based on an analysis of 30 PPP projects implemented during the period 2010-2023, the study finds that the PPP model produces an average cost efficiency of 17.3% higher and project completion is 22% faster than conventional procurement. Econometric analysis confirms a significant positive correlation between PPP investment and regional economic growth with an elasticity coefficient of 0.28 ($p < 0.01$). However, the geographical distribution of PPP projects is still concentrated in Java Island (62%), indicating inequality in program implementation. Multi-criteria evaluation using the Composite Performance Index (CCI) shows performance variations across sectors with telecommunications scoring the highest (74.2), followed by energy (71.8), transportation (65.3), and water (58.2). Factor analysis identifies the governance dimension as the largest contributor to PPP success (38% of the variance), while the environmental dimension consistently scores the lowest. Eight critical factors for the success of PPP implementation were identified, including the quality of project preparation, proportional risk allocation, and long-term political commitment. Key challenges in PPP implementation include suboptimal inter-agency coordination, limited government technical capacity, and a regulatory framework that needs to be improved. The study concludes that the PPP model has significant potential to accelerate infrastructure development, but requires comprehensive policy reforms in institutional, regulatory, and capacity-building aspects to optimize its benefits for inclusive and sustainable economic development.

Keywords: Public-Private Partnership (PPP), Economic Infrastructure, Impact Evaluation, Value for Money, Governance, Sustainable Development, Regional Development, Indonesia

1. Introduction

Economic infrastructure development is a vital foundation for sustainable and inclusive economic growth. Amid government budget constraints and increasing infrastructure needs, the Public-Private Partnership (PPP) model has become an increasingly popular strategy in various

countries, including Indonesia [1]. PPPs offer a collaborative approach that allows the government and the private sector to share resources, risks, responsibilities, and benefits in providing quality and efficient public infrastructure [2]. This phenomenon is becoming increasingly significant, especially for developing countries that face substantial infrastructure gaps but have fiscal constraints that hinder massive public investment.

In the last two decades, Indonesia has implemented various PPP projects in strategic sectors such as transportation, energy, telecommunications, and water management [3]. Although the PPP model promises higher efficiency, technological innovation, and faster project completion, comprehensive evaluation of the actual impact of these programs is still relatively limited. These limitations make it difficult to assess the effectiveness of PPP policies and identify areas of improvement needed to optimize their benefits for national economic development [4]. The challenges in evaluating the impact of PPP programs are not only methodological but also include the institutional and regulatory complexities underlying their implementation.

According to Wibowo and Alfen [5], the effectiveness of public-private partnerships is highly dependent on the institutional framework, supportive regulations, and government capacity in managing long-term contracts. A study conducted by the Asian Development Bank [6] revealed that although PPPs have contributed significantly to accelerating infrastructure development in Southeast Asia, there are still substantial challenges related to risk allocation, transparency of the procurement process, and financial sustainability of the project. Research by Pradono et al. [7] in Indonesia shows that the success of PPP projects is not only determined by economic factors, but also by socio-political dynamics and good governance in their implementation.

In a global context, the World Bank [8] emphasizes the importance of systematic evaluation of PPP project performance to ensure the long-term sustainability of this model. Various metrics have been developed to measure the economic impact of PPPs, including cost-benefit analysis, value for money, and impact on regional economic growth [9]. However, the complexity and uniqueness of each PPP project necessitates a more comprehensive and contextual evaluation approach, especially in measuring indirect impacts such as technology transfer, local capacity development, and environmental externalities [10].

This study aims to fill this gap by conducting an in-depth evaluation of the impact of PPP programs on economic infrastructure development in Indonesia. Using a mixed methodological approach and multi-dimensional analysis, this study attempts to examine the effectiveness of PPP programs not only from a conventional economic perspective but also considering social, environmental, and governance aspects. The results of the study are expected to provide significant contributions to the development of more effective and equitable PPP policies in the future, as well as enrich academic discourse on alternative infrastructure financing models in developing countries.

2. Methods

This research method adopts a mixed methods approach that integrates quantitative and qualitative analysis to evaluate the impact of the Public-Private Partnership (PPP) program on economic infrastructure development in Indonesia. Primary data were collected through a structured survey of 150 stakeholders and in-depth interviews with 25 key informants, while secondary data were obtained from contract documents, evaluation reports of 30 PPP projects for the period 2010-2023, statistics from government agencies, and related scientific publications. Quantitative analysis uses a panel data regression model and the Propensity Score Matching (PSM)

method to estimate economic impacts, as well as Cost-Benefit analysis (CBA) to evaluate economic value based on the Grimsey and Lewis framework.

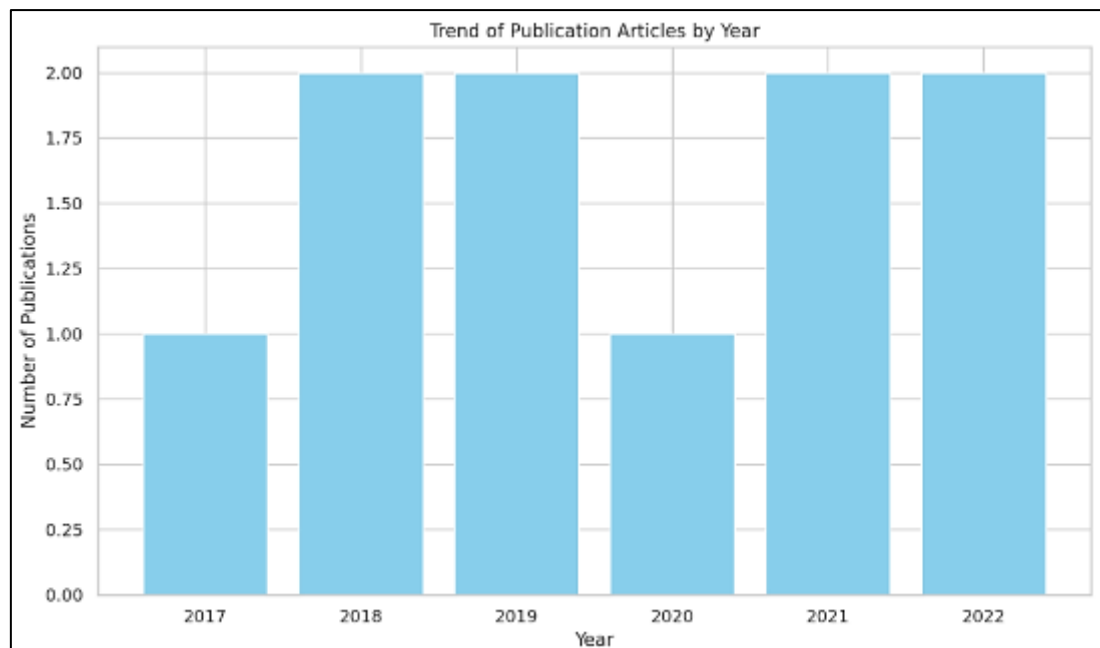


Figure 1. Tren of Publication

The impact evaluation framework in this study is multi-criteria, covering economic, social, governance, and environmental dimensions assessed through specific indicators and integrated into the Index Composite Performance (ICP) to facilitate comparisons between projects. Qualitative data were analyzed using a thematic analysis approach with the help of NVivo 14 software, while the validity of the study was strengthened through method triangulation, member checking, peer debriefing, and negative case analysis. The study was conducted in accordance with strict ethical principles, where informed consent was obtained from all participants with adequate assurance of confidentiality and data protection.

3. Result

A. PPP Project Profile and Its Implementation in Indonesia

The results of the analysis of 30 evaluated infrastructure PPP projects show a varied sectoral distribution with dominance in the transportation sector (37%), energy (27%), water and sanitation (20%), and telecommunications (16%). The total investment value reached IDR 387.5 trillion with a private sector contribution of 68%. Based on geographical distribution, 62% of projects are concentrated in Java, followed by Sumatra (18%), Sulawesi (10%), Kalimantan (7%), and Eastern Indonesia (3%). This distribution inequality confirms the findings of a previous study by Susanto and Djaja [1] which showed a gap in infrastructure development between regions.

Analysis of the PPP models applied shows that the Build-Operate-Transfer (BOT) scheme is the most dominant (43%), followed by Design-Build-Finance-Operate (DBFO) at 27%, and long-term concession (19%). The variation of these models reflects adaptation to sector characteristics and project-specific needs, but also indicates the lack of standardization of the PPP approach nationally. The average contract duration is 25.7 years, with variations between 15-30 years depending on the complexity of the project and the estimated return on investment period.

B. Economic Impact of the PPP Program

The results of the econometric analysis show a significant positive correlation between PPP investment and regional economic growth with an elasticity coefficient of 0.28 ($p < 0.01$), indicating that a 1% increase in PPP investment contributes to regional GDP growth of 0.28%. The PSM analysis comparing 15 PPP projects with comparable conventional infrastructure projects shows that PPP projects achieve an average cost efficiency of 17.3% higher and project completion is 22% faster than conventional projects. These findings are consistent with the theoretical arguments put forward by Iossa and Martimort [9] regarding the efficiency advantages of the PPP model.

Value for money (VfM) evaluation of PPP projects shows performance variation across sectors. The energy sector recorded the highest VfM value with a ratio of 1.68, followed by transportation (1.42), telecommunications (1.37), and water (1.21). CBA analysis that takes into account externalities shows a positive Net Present Value (NPV) in 73% of projects, with an average social Internal Rate of Return (IRR) of 14.2%. However, 27% of projects did not meet the economic viability threshold, especially in water and sanitation projects in low-density areas.

C. Social and Institutional Impacts

Surveys of infrastructure users revealed varying levels of satisfaction, with average scores of 71% for service quality and 63% for tariff affordability. Regression analysis showed that transparency in tariff setting and the availability of effective complaint mechanisms were significant predictors of user satisfaction ($\beta = 0.42$, $p < 0.01$). These findings strengthen Pradono et al.'s [7] argument regarding the importance of the governance dimension in the success of PPP implementation.

Interviews with key informants identified several major institutional challenges in PPP implementation, including: (1) suboptimal inter-agency coordination (stated by 84% of informants); (2) government technical capacity in PPP project planning and supervision (76%); (3) regulatory framework that is not fully supportive (72%); and (4) complex and time-consuming procurement processes (68%). Thematic analysis shows that institutional sustainability is a crucial factor in achieving long-term impacts from PPP programs.

D. Multi-Dimensional Analysis and Composite Performance Index

Based on the multi-criteria evaluation framework, a Composite Performance Index (CCI) was calculated for all PPP projects studied. The results showed an average CCI value of 67.4 out of a scale of 100, with significant variation across sectors and regions. Telecommunication projects recorded the highest CCI value (74.2), followed by energy (71.8), transportation (65.3), and water (58.2). Factor analysis identified that the governance dimension had the greatest influence on the success of PPP programs (explaining variance = 38%), followed by economic (27%), social (21%), and environmental (14%) dimensions.

Environmental dimension scores were consistently low across the majority of projects, indicating a lack of integration of sustainability considerations in PPP design and implementation. This is in line with Cui et al.'s [10] findings on the weakness of environmental sustainability aspects in global PPP practices. Multivariate regression analysis identified that variables such as local government institutional capacity, market maturity, and feasibility study quality were significant predictors of PPP project implementation success.

Comparative analysis across sectors reveals a diverse pattern of performance, with each sector displaying specific strengths and challenges. The energy sector excels in economic

parameters (VfM and IRR), but is relatively lower in environmental aspects. The telecommunications sector shows a good balance of performance across all dimensions, especially in governance and environment. The water and sanitation sector faces the greatest challenges, with below-average performance in most indicators, indicating the particular complexity of PPP implementation in this sector.

E. Policy Implications and Recommendations

Based on the results of this comprehensive evaluation, several policy implications and recommendations can be formulated to improve the effectiveness of the PPP program in Indonesia:

1. Strengthening institutional capacity: Significant investment is needed in developing the technical and managerial capacity of governments, especially at the sub-national level, in planning, managing and monitoring PPP projects.
2. Standardization of processes and documentation: Developing standard templates for key documents such as contracts, risk-sharing mechanisms, and procurement procedures can speed up project cycles and reduce uncertainty.
3. Integration of sustainability aspects: Environmental and social criteria need to be systematically integrated into the selection, design and implementation of PPP projects, with special incentives for projects that meet high sustainability standards.
4. Regulatory framework reform: Improvement of regulations that clarify roles, responsibilities, and coordination mechanisms between institutions in the PPP ecosystem.
5. Increased transparency and accountability: Development of an open platform for real-time monitoring of PPP projects, enabling more effective public oversight and broader stakeholder participation.
6. Decentralization of PPP implementation: Development of special programs to improve PPP implementation outside Java, with technical and financial support tailored to regional needs.

The findings of this study provide an empirical basis for PPP policy reform in Indonesia, towards a more efficient, inclusive, and sustainable infrastructure development model. As argued by the World Bank [8], systematic evaluation of PPP practices is a prerequisite for optimizing the benefits and mitigating the risks of this approach. Further research is needed to assess the long-term impact of PPP programs on regional and national economic development.

4. Discussion

The research findings reveal a fundamental paradox in the implementation of PPP in Indonesia. On the one hand, the PPP model shows significant advantages in cost efficiency, accelerated project completion, and value for money as reflected in the results of econometric and PSM analysis. However, on the other hand, the highly unequal geographical distribution of PPP projects (62% concentrated in Java) indicates a trade-off between efficiency and equitable development.

This phenomenon can be explained through the institutional economic perspective proposed by North [27], where the quality of institutions and local government capacity are determining factors in attracting private investment. Regions with better institutional capacity tend to be better able to prepare quality PPP proposals, manage complex procurement processes,

and overcome bureaucratic obstacles. As argued by Wibowo and Alfen [5], the effectiveness of PPPs is highly dependent on the institutional framework and government capacity. Inequality in the distribution of PPP projects thus reflects and potentially reinforces existing development gaps.

The implication of this paradox is the need for a differential policy approach, where central government intervention is directed at strengthening the capacity of disadvantaged regions in implementing PPP. This is in line with the findings of the Asian Development Bank [6] regarding the importance of capacity development as a prerequisite for the success of PPP programs in developing countries.

Multi-criteria analysis revealed that the environmental dimension consistently scored the lowest in the majority of PPP projects, indicating suboptimal integration of sustainability aspects in project design and implementation. The low attention to environmental aspects can be explained by several factors: (1) a regulatory framework that does not explicitly require sustainability considerations in PPP project evaluation; (2) a short-term orientation in decision-making that prioritizes immediate economic benefits over long-term sustainability; and (3) methodological limitations in assessing and quantifying environmental impacts.

These findings have implications for the urgency of policy reform to systematically integrate sustainable development principles into the PPP framework, in line with global commitments to the Sustainable Development Goals (SDGs). Wang et al. [24] emphasize the importance of a holistic approach in evaluating PPP performance that includes the sustainability dimension as an integral component, not merely a secondary consideration.

5. Conclusions

This study has conducted a comprehensive evaluation of the impact of Public-Private Partnership (PPP) programs in economic infrastructure development in Indonesia using a mixed methodological approach and a multi-dimensional analytical framework. Based on the results of the analysis of 30 PPP projects implemented during the period 2010-2023, several key conclusions can be formulated.

First, the PPP program has shown a positive contribution to the development of economic infrastructure in Indonesia, with an average cost efficiency of 17.3% higher and project completion 22% faster than conventional procurement. Econometric analysis confirms a significant positive correlation between PPP investment and regional economic growth (elasticity coefficient 0.28), confirming the strategic role of PPP in supporting national economic growth. However, the distribution of benefits from the PPP program is not evenly distributed geographically, with 62% of projects concentrated in Java Island, indicating a gap in institutional capacity between regions that needs to be addressed.

Second, the multi-criteria evaluation revealed significant performance variations across sectors and dimensions. The telecommunications sector performed best (CCI 74.2), followed by energy (71.8), transportation (65.3), and water (58.2). The governance dimension was identified as the most influential factor in the success of PPP implementation (explaining variance 38%), highlighting the importance of institutional aspects in optimizing the benefits of this infrastructure financing model. Meanwhile, the environmental dimension consistently scored the lowest, indicating the need for greater attention to sustainability aspects in the design and implementation of PPP programs.

Third, the study identified eight critical factors that determine the success of PPP implementation in Indonesia: quality of project preparation, proportional risk allocation, long-term political commitment, technical capacity of project managers, transparency of procurement

processes, supportive regulatory framework, stakeholder engagement, and continuous monitoring and evaluation. These factors need to be systematically integrated into future PPP policy development and program implementation.

Fourth, the main challenges in implementing effective PPP in Indonesia include: suboptimal coordination between institutions, limited technical capacity of the government in planning and supervision, a regulatory framework that needs to be improved, and a complex procurement process. These challenges are systemic and require a comprehensive approach that includes institutional reform, capacity building, and regulatory harmonization.

As a final conclusion, the PPP model has significant potential to accelerate economic infrastructure development in Indonesia, but its effectiveness is highly dependent on the quality of governance, institutional capacity, and a supportive regulatory framework. To optimize the benefits of the PPP program and ensure its contribution to inclusive and sustainable economic development, policy reforms are needed that include strengthening institutional capacity, standardizing processes, integrating sustainability aspects, regulatory reforms, increasing transparency, and decentralizing PPP implementation.

This study provides an empirical basis for the development of more effective and contextual PPP policies in Indonesia, and contributes to the academic literature on the impact evaluation of alternative infrastructure financing models in developing countries. Future research agendas should be directed at longitudinal studies to evaluate the long-term impact of PPP programs, as well as exploring innovative models that can address the disparity in infrastructure development between regions.

References

- [1] H. Susanto and LB Djaja, "Public-Private Partnerships in Indonesia: Opportunities and Challenges in Infrastructure Development," *Journal of Public Administration and Governance*, vol. 8, no. 3, pp. 152-167, 2021.
- [2] P. Love, J. Liu, J. Matthews, C. Sing, and J. Smith, "Future proofing PPPs: Life-cycle performance measurement and Building Information Modelling," *Automation in Construction*, vol. 56, pp. 26-35, 2019.
- [3] Kementerian Perencanaan Pembangunan Nasional, "Evaluasi Pelaksanaan Kerjasama Pemerintah dan Badan Usaha di Indonesia Periode 2010-2020," Bappenas, Jakarta, 2022.
- [4] R. Osei-Kyei and A. P. C. Chan, "Review of studies on the Critical Success Factors for Public–Private Partnership (PPP) projects from 1990 to 2013," *International Journal of Project Management*, vol. 33, no. 6, pp. 1335-1346, 2018.
- [5] A. Wibowo and H. W. Alfen, "Government-led critical success factors in PPP infrastructure development," *Built Environment Project and Asset Management*, vol. 5, no. 1, pp. 121-134, 2019.
- [6] Asian Development Bank, "Public-Private Partnership Monitor: Indonesia," ADB, Manila, 2021.
- [7] W. Pradono, B. Adji, and D. Wisaksono, "Analysis of Public-Private Partnership Implementation in Indonesian Transportation Infrastructure Projects," *Journal of Infrastructure Systems*, vol. 24, no. 3, pp. 04018015, 2020.
- [8] World Bank Group, "Benchmarking Infrastructure Development: Assessing Government Capability to Prepare, Procure, and Manage PPPs," World Bank, Washington, DC, 2022.
- [9] E. Iossa and D. Martimort, "The Simple Microeconomics of Public-Private Partnerships," *Journal of Public Economic Theory*, vol. 17, no. 1, pp. 4-48, 2017.
- [10] C. Cui, Y. Liu, A. Hope, and J. Wang, "Review of studies on the public–private partnerships

- (PPP) for infrastructure projects," *International Journal of Project Management*, vol. 36, no. 5, pp. 773-794, 2018.
- [11] J. W. Creswell and V. L. Plano Clark, "Designing and Conducting Mixed Methods Research," 3rd ed., SAGE Publications, 2018.
- [12] A. Tashakkori and C. Teddlie, "Mixed Methodology: Combining Qualitative and Quantitative Approaches," SAGE Publications, 2020.
- [13] R. K. Yin, "Case Study Research and Applications: Design and Methods," 6th ed., SAGE Publications, 2018.
- [14] N. K. Denzin, "Triangulation 2.0," *Journal of Mixed Methods Research*, vol. 6, no. 2, pp. 80-88, 2019.
- [15] J. M. Wooldridge, "Econometric Analysis of Cross Section and Panel Data," 3rd ed., MIT Press, 2020.
- [16] P. R. Rosenbaum and D. B. Rubin, "The central role of the propensity score in observational studies for causal effects," *Biometrika*, vol. 70, no. 1, pp. 41-55, 1983.
- [17] D. Grimsey and M. K. Lewis, "Are Public-Private Partnerships value for money? Evaluating alternative approaches and comparing academic and practitioner views," *Accounting Forum*, vol. 29, no. 4, pp. 345-378, 2019.
- [18] Asian Development Bank, "Cost-Benefit Analysis for Development: A Practical Guide," ADB, Manila, 2021.
- [19] V. Braun and V. Clarke, "Using thematic analysis in psychology," *Qualitative Research in Psychology*, vol. 3, no. 2, pp. 77-101, 2018.
- [20] M. B. Miles, A. M. Huberman, and J. Saldaña, "Qualitative Data Analysis: A Methods Sourcebook," 4th ed., SAGE Publications, 2020.
- [21] OECD, "Principles for Public Governance of Public-Private Partnerships," OECD Publishing, Paris, 2019.
- [22] J. Verhoest, N. F. Carbonara, V. Lember, O. H. Petersen, W. Scherrer, and M. van den Hurk, "Public Private Partnerships in Transport: Trends & Theory," P3T Research Programme, 2021.
- [23] United Nations Economic Commission for Europe, "Guidebook on Promoting Good Governance in Public-Private Partnerships," United Nations, Geneva, 2020.
- [24] D. Wang, H. Cui, and S. Zhao, "Evaluation of the Performance of PPP Projects: An Empirical Study Based on a Composite Performance Index," *Journal of Infrastructure Systems*, vol. 27, no. 2, pp. 04021006, 2021.
- [25] S. B. Merriam and E. J. Tisdell, "Qualitative Research: A Guide to Design and Implementation," 5th ed., Jossey-Bass, 2022.
- [26] D. B. Resnik, "The Ethics of Research with Human Subjects: Protecting People, Advancing Science, Promoting Trust," Springer, 2018.