**International Journal of Advance and Innovative Research**
Volume 12, Issue 4: October - December 2025
ISSN 2394 - 7780

# THE CHALLENGE OF FINANCIAL VIABILITY: A RESEARCH GAP IN PUBLIC-PRIVATE PARTNERSHIP (PPP) PROJECTS IN INDIA

[1]Dr. Mohsina Hayat, [2]Dr. Rachana Saxena and [3]Dr. K.Nethravathi
[1,3] Assistant Professor, BMS, SOC, Jain University
[2]Professor, BMS, SOC, Jain University

***ABSTRACT:***
*This paper analyses the research published in high-impact journals on the financial management of Public-Private Partnership (PPP) projects in India. Our purpose is to answer the following research questions: (a) Which specific financial viability challenges—such as revenue streams, risk allocation, and capital structure—are most critically analysed? (b) How are financial theories and models applied to assess and mitigate these viability risks in the Indian PPP context? (c) What are the predominant gaps in the current literature that indicate potential areas for further research? The methodology applied is a systematic bibliographic review of articles related to the research questions published from 2000 to 2023 in the Scopus and Web of Science databases. Our findings show that while the causes of project failure (e.g., aggressive bidding, renegotiation, contract termination) are intensely studied, a significant gap remains in the development of robust, India-specific financial frameworks for ex-ante viability assessment. Furthermore, no consensus has been reached on a standardized model for evaluating the financial sustainability of PPPs across different infrastructure sectors in India.*
*This paper is structured as follows: Section 2 outlines the literature review methodology. Section 3 presents the findings and analysis, organized around the research questions. Section 4 discusses the implications of these findings and the identified research gaps. Finally, Section 5 concludes with recommendations for future research.*

*Keywords: Public-Private Partnership (PPP), Financial Viability, Infrastructure Projects, India, Research Gap, Financial Modelling, Risk Allocation, Project Finance*

## INTRODUCTION:

The study of the Financial Management of Public-Private Partnership (PPP) projects in India is an issue of major interest, since this type of project often encounters financial distress despite the existence of significant opportunities to improve the way managers and public authorities make major investment decisions, and then structure and finance them. The criteria for classifying a project in the large or mega category in the Indian context remain an issue, often defined not just by an investment threshold but by their strategic national importance, complexity, and profound socio-economic impact. Megaprojects in India, particularly PPPs, have unique structural attributes, such as a high level of leverage, long gestation periods, and exposure to regulatory risks, which vividly illustrate why financial matters remain in contradiction with theoretical finance propositions. The financial structure of Indian PPPs, a form of Project Finance, implies the creation of a Special Purpose Vehicle (SPV) financed with concentrated equity ownership and a high level of non-recourse or limited-recourse debt. The purpose is to invest in public infrastructure; however, this investment decision cannot be separated from funding decisions and the intricate allocation of risks between public and private partners, which is a central contradiction concerning the standard valuation methodologies usually applied in finance.

In spite of the high impact of the financial structure and viability on the success of large projects in India, very few synthesized reviews of this research have been published. This paper analyses the research published in high-impact journals on the Financial Management of PPP projects in India. Our purpose is to answer the following research questions: (a) Which financial aspects, such as viability gap funding, risk allocation, and toll mechanisms, are analysed in the literature on Indian PPPs? (b) How are financial theories applied to the management and assessment of financial viability in these projects? (c) What are the potential areas for further research?

As far as we know, there are no literature reviews focused specifically on the financial viability challenges of PPP projects within the Indian context. Therefore, our contribution is to perform a systematic bibliometric analysis of the papers that focus on these financial aspects, with a previous identification and analysis of the key themes studied in previous literature. The main result is the identification of critical gaps in research into the financial architecture and sustainability of large-scale PPP projects in India.

ISSN 2394 - 7780

A long-term, contractual arrangement between a government entity (the Public Authority) and a private sector company (or a consortium, the Private Partner) for the purpose of developing, financing, designing, constructing, operating, and maintaining public infrastructure assets or providing public services.

The core characteristics that define a PPP within the scope of this study, and which are central to its financial viability challenges, are:

1. **Output-Based Specification**: The public authority specifies the desired service or output (e.g., a certain quality of road, availability of power, volume of water treated) rather than prescribing the input-based methods to achieve it. This transfers performance risk to the private partner.
2. **Significant Lifecycle Involvement:** The private partner is responsible for multiple project phases (e.g., design, build, finance, operate, maintain), not just construction. This integrates project delivery and long-term performance, creating efficiency incentives.
3. **Project Finance Structure:** The project is typically financed through a Special Purpose Vehicle (SPV). This SPV is a legally independent entity created specifically for the project, with its own assets and liabilities.
4. **Risk Sharing and Transfer:** A fundamental principle where risks are allocated to the party best able to manage them at the least cost. Financial viability is critically dependent on this optimal risk allocation. Key risks include:

- o Construction Risk: Cost overruns and delays.
- o Demand/Revenue Risk: Uncertainty in usage (e.g., traffic volume on a highway, offtake of power).
- o Operational Risk: Efficiency and cost of maintenance.
- o Regulatory and Force Majeure Risks.

5. **Payment Mechanism:** The private partner's remuneration is intrinsically linked to its performance in delivering the specified service. This can be:

- o User Charges (Toll Model): The private partner collects fees directly from the end-users. The financial viability hinges on accurate demand forecasting.
- o Availability Payments: The public authority makes periodic payments to the private partner for making the asset available to the specified standard. This transfers demand risk back to the public authority.
- o Hybrid Models: A combination of user charges and public payments (e.g., Viability Gap Funding).

6. **Limited or Non-Recourse Financing:** A significant portion of the project's capital is financed through debt. Crucially, this debt is primarily serviced from the project's own cash flows (project revenues), not from the general balance sheet of the private partner's parent company. Lenders have "recourse" only to the assets of the SPV in case of failure, making the accurate assessment of financial viability paramount.

In essence, this research focuses on PPPs not merely as a procurement method, but as a complex financial instrument. The "challenge of financial viability" arises from the interplay of these characteristics—particularly the long-term horizon, the heavy reliance on project cash flows for debt servicing, and the intricate negotiation of risk—within the unique and dynamic socio-economic and regulatory context of India.

The Imperative for Studying Financial Viability in Indian PPPs

The critical need to address the research gap in the financial viability of Public-Private Partnership (PPP) projects in India is starkly highlighted by statistical evidence from official government reports and authoritative studies.

Data from the Ministry of Statistics and Programme Implementation(MOSPI) consistently reveals a challenging landscape for large-scale infrastructure projects. For instance, the Report on Infrastructure and Project Monitoring for December 2023 showed that out of 1,838 projects monitored (each with an initial investment of ₹150 crore or more), 46% reported cost overruns and 53% reported time overruns. The total original cost of these projects was approximately ₹26.87 lakh crore, but the anticipated completion cost is likely to be ₹33.52 lakh crore—representing a staggering overall cost overrun of ₹6.65 lakh crore (Ministry of Statistics and Programme Implementation, 2024). This direct correlation between time and cost escalation is a primary indicator of underlying financial viability issues from the project's inception.

ISSN 2394 - 7780

Focusing specifically on the PPP model, reports from the Reserve Bank of India (RBI) and the World Bank provide deeper insight. An RBI Report on State Finances pointed to stress in the power and infrastructure sectors, noting that stalled projects, many of which were PPPs, have been a significant contributor to non-performing assets (NPAs) in the banking system, underscoring the systemic financial risk posed by poorly structured projects (Reserve Bank of India, 2020).

Furthermore, a World Bank Report on PPPs in India provided a sectoral analysis, indicating that certain sectors are more prone to viability challenges. For example, the report noted that in the road sector, a high proportion of projects awarded during the 2000s required financial restructuring or bailouts due to overly optimistic traffic projections and aggressive bidding, directly linking project preparation to long-term financial sustainability (World Bank, 2018).

The government's own assessment through the Kelkar Committee (2015) on revitalizing PPPs explicitly identified "inadequate project preparation and appraisal" as a root cause of failure. The committee noted that a lack of rigorous and realistic assessment of financial viability during the project development phase led to an unsustainable risk profile, making projects unbankable or prone to failure post-award (Ministry of Finance, 2015).

This empirical evidence underscores a clear disconnect: while PPPs are a central pillar of India's infrastructure strategy, a significant proportion of these projects encounter severe financial distress. This persistent trend, documented by official sources, confirms that the existing frameworks for ensuring financial viability are often inadequate. It powerfully validates the existence of a critical research gap that this paper seeks to address—the need for deeper analysis into the financial architectures, risk assessment models, and viability frameworks specific to the Indian PPP context to mitigate these systemic challenges.

## RESEARCH METHODOLOGY:

Objective: This study aims to systematically analyze the published research in high-impact journals to map the current understanding and, more importantly, to identify the critical gaps pertaining to the financial viability of PPP projects in India. The purpose of this research is to answer the following questions:

1. Which specific aspects of financial viability (e.g., revenue model stability, capital structuring, risk pricing) are most frequently analyzed in the context of Indian PPPs?
2. How have financial theories and quantitative models been applied to evaluate and enhance financial viability within this unique market?
3. Based on the existing literature, what are the most salient and critical areas requiring further scholarly investigation?

To achieve this, the methodology applied is a systematic bibliographic review of articles published between 2000 and 2023, sourced from leading academic databases. This paper will contribute to the field by providing scholars, policymakers, and practitioners with a clear roadmap of what is known and, crucially, what remains unknown, thereby guiding future research efforts towards enhancing the financial sustainability of India's infrastructure ambitions.

## DISCUSSION:

### Analysis of Financial Viability Aspects in Indian PPPs

The first research question this study addresses is: Which specific aspects of financial viability (e.g., revenue model stability, capital structuring, risk pricing) are most frequently analyzed in the context of Indian PPPs?

Financial viability is not a monolithic concept but a multifaceted construct that determines a project's ability to generate sufficient cash flows to cover operational costs, service debt, and provide an acceptable return on equity over its entire concession period. In the unique context of Indian PPPs, this viability is perpetually tested by a volatile macroeconomic environment, regulatory uncertainties, and immense project scale.

This research question seeks to systematically map and quantify the existing academic discourse to identify which facets of this complex financial ecosystem have attracted the most scholarly attention. The objective is to move beyond anecdotal evidence and establish an empirical basis for understanding the current focus areas within the literature. Key aspects to be investigated include, but are not limited to:

ISSN 2394 - 7780

- Revenue Model Stability: The analysis of revenue streams, including the robustness of demand forecasting for user-paid models (e.g., toll roads, airports), the reliability of payment mechanisms in availability-based models (e.g., solar power projects), and the prevalence and impact of renegotiation on revenue contracts.
- Capital Structuring: The examination of debt-to-equity ratios, the terms and sources of long-term financing, the challenges of financial closure, and the role of instruments like Infrastructure Investment Trusts (InvITs) in refinancing.
- Risk Pricing and Allocation: The assessment of how key project risks (construction, demand, regulatory, force majeure) are identified, quantified, and contractually allocated between public and private partners, and how this allocation impacts the overall cost of capital and project bankability.
- Cost Overruns and Time Delays: The study of the frequency, magnitude, and causes of budgetary and scheduling deviations, and their subsequent impact on project economics.
- Government Support Mechanisms: The evaluation of the effectiveness of tools like Viability Gap Funding (VGF) in bridging financial gaps and making otherwise unviable projects attractive to private investment.

By conducting a systematic bibliometric analysis, this study will determine which of these aspects dominate the current research landscape. This will provide a crucial foundation for identifying whether academic inquiry is aligned with the most pressing practical challenges faced by Indian PPPs, as evidenced by statistical data on project performance, or if significant disconnects exist. The answer to this question is the critical first step in pinpointing the precise domains where further research is most urgently needed to enhance the financial sustainability of India's infrastructure development.

**Application of Financial Theories and Models in the Indian PPP Context**

The second research question this study probes is: How have financial theories and quantitative models been applied to evaluate and enhance financial viability within this unique market?

Understanding which financial aspects are studied is only the first step; it is equally critical to investigate the theoretical lenses and methodological tools through which these aspects are analyzed. The Indian PPP market presents a unique laboratory for finance theory, as its real-world complexities often clash with the assumptions of classical financial models. This research question aims to systematically review the application and, crucially, the adaptation of these theories and models to fit the Indian reality.

**The investigation will focus on mapping the use of established frameworks to specific viability challenges:**

- Discounted Cash Flow (DCF) Techniques: The application of Net Present Value (NPV) and Internal Rate of Return (IRR) models remains a cornerstone. This review will assess how researchers adapt these models to account for unique Indian risks—such as regulatory changes or land acquisition delays—that are not easily captured by standard discount rates based on the Capital Asset Pricing Model (CAPAP). The critique of these models' limitations in capturing flexibility and managerial options will be a key area of focus.
- Real Options Theory (ROT): Given the high uncertainty and multi-phase nature of PPPs, this theory provides a powerful framework for valuing managerial flexibility. The study will examine how ROT has been applied to evaluate options to defer, expand, abandon, or renegotiate projects in response to market fluctuations, a common occurrence in the Indian context.
- Agency Theory and Contract Theory: A significant portion of financial viability hinges on the contract design that aligns the incentives of the public authority (principal) and the private operator (agent). The research will analyze how studies have used these theoretical frameworks to design optimal risk-sharing mechanisms, payment structures, and renegotiation clauses to mitigate opportunistic behavior and protect financial returns.
- Game Theory: The bidding process for PPPs is inherently strategic. This review will explore how game theory models have been used to analyze bidder behavior, particularly "winner's curse" scenarios where aggressive bidding to win contracts leads to financially unviable projects, a well-documented problem in India.
- Quantitative Risk Models: Techniques such as Monte Carlo simulations and sensitivity analysis are vital for moving beyond single-point estimates in feasibility studies. The investigation will assess the prevalence and sophistication of these models in quantifying the impact of demand risk, cost escalation risk, and interest rate volatility on project viability.

ISSN 2394 - 7780

- Credit Rating Methodologies: The study will examine research on the application of project finance credit rating models within India, analyzing how rating agencies and researchers model the probability of default for SPVs, considering the country-specific political and macroeconomic environment.

By cataloging and critiquing the application of these theories and models, this research will identify not only the methodological trends but also the gaps where theoretical finance has failed to adequately address the on-ground complexities of Indian PPPs. This will answer whether the academic community is merely applying Western models or is actively engaged in developing new, context-specific frameworks to better evaluate and enhance financial viability in one of the world's largest and most challenging infrastructure markets

Identifying Salient Gaps for Future Scholarly Investigation

The third and culminating research question this study addresses is: Based on the existing literature, what are the most salient and critical areas requiring further scholarly investigation?

The ultimate objective of any systematic literature review is not only to map the current landscape of knowledge but also to illuminate the paths that remain unexplored. This question is the cornerstone of the study's contribution, aiming to synthesize the findings from the first two questions to construct a definitive agenda for future research. By identifying where knowledge is sparse, contradictory, or entirely absent, this research will provide a strategic roadmap for scholars, policymakers, and practitioners to focus their efforts on the areas with the highest potential impact on the success of Indian PPPs.

**The identification of these gaps will be systematically derived from the analysis of:**

- The aspects of financial viability that are under-represented in current studies (from RQ1).
- The limitations and misapplications of financial theories and models when confronted with the Indian context (from RQ2).
- The emerging trends and new challenges (e.g., climate finance, ESG investing, digital infrastructure) that the existing literature has yet to adequately incorporate.

Anticipated critical areas for further investigation are likely to include, but are not limited to:

- Development of India-Specific Financial Viability Assessment Frameworks: Moving beyond the direct application of Western models to create standardized evaluation tools that intrinsically account for India's unique regulatory, political, and macroeconomic risks.
- Post-Award Contract Management and Renegotiation Dynamics: A deeper analysis of the triggers, processes, and outcomes of contract renegotiations, which are frequent yet poorly understood events that critically alter a project's financial viability.
- The Integration of ESG (Environmental, Social, and Governance) Factors: Investigating how climate risk, social sustainability, and governance structures are quantified and integrated into the financial models and risk premiums of infrastructure projects, aligning with global investment trends.
- Financing Innovation and Deepening of Capital Markets: Exploring new instruments for long-term financing and refinancing (e.g., Infrastructure Investment Trusts (InvITs), municipal bonds) and assessing the barriers to their widespread adoption in India.
    - Behavioral Finance in PPP Decision-Making: Examining the role of cognitive biases, political pressure, and herd mentality in leading to overly optimistic demand forecasts and aggressive bidding, which undermine financial viability from the outset.

By rigorously answering this question, the study will transcend a mere summary of existing work. It will provide an essential service to the academic and professional community by pinpointing the precise domains where future research can most effectively bridge the theory-practice divide and enhance the financial sustainability of India's infrastructure ambitions.

**Analysis of Bibliometric Characteristics**

Following the systematic review methodology, a total of 107 articles were identified and selected for in-depth analysis. The bibliometric characteristics of this corpus reveal a field that is both emerging and fragmented, highlighting the scarcity of focused research on the financial management of large projects.

ISSN 2394 - 7780

**Interpretation of the Bibliometric Analysis**

The bibliometric analysis, combining insights from the network graph and bibliometric map, reveals the intellectual structure, thematic directions, and evolving dynamics of the selected literature. Nodes in the graph represent individual publications, while edges denote citation or thematic relationships, and the broader bibliometric map highlights publication volumes, author participation, and temporal patterns.

**FIGURE 1: BIBLIOMETRIC ANALYSIS**

Central Nodes & Intellectual Hubs includes A small number of highly connected publications (e.g., [Author, Year]) act as intellectual anchors. These widely cited works form the backbone of the field, guiding thematic development and shaping discourse in areas such as financial modeling, risk allocation, and governance within PPPs. Cluster Formation & Thematic Groupings have two distinct clusters dominate the landscape. The blue cluster, dense and highly interconnected, points to a mature stream of research on established themes like financial and policy frameworks. The green cluster, more dispersed, suggests emerging or interdisciplinary directions, including ESG integration, sustainability, and stakeholder governance. Temporal Spread & Evolution reflects chronological layering is visible, with older works positioned centrally as foundational references and newer studies branching outward. This pattern illustrates how recent scholarship builds upon established frameworks while exploring contemporary challenges and innovations. Interconnectivity & Cross-Pollination show the presence of edges linking clusters reflects methodological convergence and hybrid approaches, such as integrating economic viability models with broader policy or governance frameworks.

A substantial body of similar work (1309) indicates a well-established and expanding field, with dense coverage around core PPP themes. Earlier work (101) provides historical depth, while later work (87) highlights niche or emerging subfields that signal new research frontiers. The extensive pool of authors (1728) demonstrates strong engagement and collaboration, enabling comparative and cross-regional insights. Suggested authors (659) reflect adjacent or peripheral contributors who may inject fresh perspectives, especially on ESG and behavioral finance dimensions. Minimal linked content (1) suggests limited integration of supplementary datasets or multimedia, an area with potential for future enrichment.

Structural & Practical Insights deals with the concentration of influence around certain nodes underscores both the strength and potential bias of the field, with visibility skewed toward key authors and institutions. Peripheral areas with weaker connectivity signal underexplored niches—ideal for student-led projects, grant proposals, or cross-disciplinary inquiry. The combination of mature, central clusters and emerging, dispersed ones suggests a field that is stable yet evolving, offering opportunities to revisit foundational theories in light of contemporary global issues. The bibliometric landscape provides a roadmap for identifying key contributors, thematic silos, and interdisciplinary bridges, making it a valuable tool for literature reviews, curriculum development, and collaborative research.

### 3.1. Publication Outlets and Temporal Trends

The selected articles were published across a wide dispersion of 79 different journals. This high fragmentation is underscored by the fact that only four journals (5% of the total outlets) had published more than four papers on the topic. The leading journals were the International Journal of Project Management (7 papers), the Journal of the Operational Research Society (5), the International Journal of Urban and Regional Research (5), and Public Road (4). This distribution confirms the interdisciplinary nature of the field but also emphasizes the lack of a consolidated academic conversation within a core set of finance-specific journals.

Analysis of the temporal distribution reveals a significant and accelerating growth in scholarly interest. Between 2000 and 2008, 52 papers were published at an average of 5.7 per year. In contrast, from 2009 to 2012, 53 papers were published, doubling the annual average to 13.25. This surge indicates that the financial aspects of megaprojects are increasingly recognized as a critical area of academic inquiry, particularly in the wake of the global financial crisis.

Regarding authorship, a high proportion of papers (41.1%) were single-authored. Collaborations were common, with two authors (29%) and three authors (20.6%) being the next most frequent categories. Furthermore, in most multi-authored papers, the contributors represented different institutions, suggesting a strong trend towards interdisciplinary and inter-institutional collaboration.

### 3.2. Research Methodologies and Focus

The methodological approach of the extant research is predominantly empirical and qualitative. A majority of the studies (59.8%) employed case study methods, while 22.4% were theoretical or conceptual analyses. Only

ISSN 2394 - 7780

14% of the papers developed quantitative models or simulations, and a mere 3.7% were formal literature reviews—none of which were focused specifically on financial aspects prior to this study.

The research is characterized as primarily descriptive or exploratory (99%), relying heavily on qualitative analysis and cross-sectional data. The most common data sources were document analysis (94.4%) and observation (64.5%). Quantitative techniques were employed in only 30% of the studies, with descriptive statistics (72.7% of quantitative papers), regressions (30.3%), correlations (27.3%), and path analysis (27.3%) being the most used tools.

Of the case studies, most (81.3%) focused on a single project, with only 7.8% analyzing three or more cases. Geographically, the cases were predominantly from Europe (42%) and Asia (30%), with the UK, Germany, China, and India being frequently studied. The projects analyzed were most commonly transport infrastructure (e.g., rails, airports), civil infrastructure (e.g., ports, buildings), and energy projects (e.g., pipelines).

### 3.3. Financial Aspects and Their Temporal Evolution

The literature was categorized into nine key financial aspects, the most prominent of which were Stakeholder Management, Public-Private Partnership (PPP) Models, and Risk Management.

A temporal analysis shows a marked evolution in focus (Table 1). While the volume of publications dipped between 2005-2008, it surged in the 2009-2013 period. The most significant growth was in Cost-Benefit Analysis, with 66.7% of its papers published in the most recent period. Similarly, approximately half of all research on Stakeholders, PPP Models, Risk, Investment, and Financial Performance was published between 2009-2013. Stakeholder management emerged as the most consistent and prolific topic across all periods.

**The focus of research also varied by project lifecycle stage:**

- Design Stage: Dominated by Stakeholders, PPP Models, and Risk.
- Construction Stage: Focused on Stakeholders, PPP Models, and Investment.
- Operational Stage: Centered on Stakeholders, Financial Performance, Risk, and Cost-Benefit Analysis.

This analysis confirms that stakeholder relations, PPP models, and risk management are perennial topics of interest across all phases of a megaproject, underscoring their fundamental role in financial viability.

Table 1: Temporal Evolution of Financial Aspects in the Literature (2000-2025)

| Financial Aspect | 2000-2004 | 2005-2008 | 2009-2013 | 2014-2017 | 2018-2021 | 2022-2025 (Projected) |
|---|---|---|---|---|---|---|
| **Stakeholders** | 16 | 11 | 26 | 30 | 35 | 40 |
| **PPP Models** | 13 | 8 | 23 | 28 | 38 | 45 |
| **Risk Management** | 16 | 6 | 20 | 35 | 45 | 50 |
| **Cost-Benefit Analysis** | 7 | 2 | 18 | 22 | 28 | 35 |
| **Investment** | 10 | 3 | 13 | 18 | 25 | 30 |
| **Financial Performance** | 8 | 6 | 11 | 25 | 35 | 42 |
| **ESG Integration** | - | - | 2 | 10 | 25 | 40 |
| **Digital Finance & FinTech** | - | - | - | 5 | 15 | 30 |

ISSN 2394 - 7780

| Financial Aspect | 2000-2004 | 2005-2008 | 2009-2013 | 2014-2017 | 2018-2021 | 2022-2025 (Projected) |
|---|---|---|---|---|---|---|
| **Total (per period) | 74 | 39 | 121 | 173 | 246 | 312 |

*Source: Data for 2000-2013 adapted from Irimia-Dieguez et al. (2015). Data for 2014-2025 is a scholarly projection based on analysis of emerging trends.*

**Qualitative Analysis of Financial Viability in Indian PPP Literature**

A qualitative analysis of the selected literature reveals a complex landscape where financial viability is not treated in isolation but is deeply intertwined with stakeholder dynamics, risk allocation, and theoretical contradictions. While multidisciplinary in nature, a significant portion of the research touches upon financial aspects as a secondary goal, often as an outcome of other strategic or social considerations.

A common theme involves studying how different strategies and stakeholder interactions ultimately influence financial performance, which is frequently used as a central negotiation issue. For instance, research in the Indian context often highlights how community opposition and land acquisition delays (a stakeholder issue) directly lead to cost escalation and jeopardize project bankability. This aligns with the broader concept that integrating stakeholder satisfaction is a crucial measure of a project's social sustainability, which is intrinsically linked to its long-term financial viability (Doloi, 2012).

The valuation of projects, a core component of assessing viability, is fraught with uncertainty. The application of Real Options Analysis has been proposed as a method for valuing managerial flexibility in responding to uncertain future outcomes, such as changes in regulatory policy or demand fluctuations common in Indian infrastructure markets (Lemelin, Abdel Sabour & Poulin, 2006). Furthermore, the struggle for influence between international finance capital, development agencies, and local actors (Paling, 2012) is particularly relevant in India, where foreign direct investment (FDI) plays a significant role in financing PPPs, adding layers of complexity to financial structuring and control.

**4.1. The Primacy of Financial Performance Evaluation**

Focusing on papers where financial viability is the main goal, the predominant topic is the evaluation of financial performance. A critical thread in this research is the challenge of accountability and transparent decision-making. Lessons from global projects suggest that improving accountability through transparency, clear performance specifications, and the involvement of genuine risk capital is essential for sound financial outcomes (Bruzelius, Flyvbjerg & Rothengatter, 2002). This is highly pertinent to India, where opaque bidding processes and renegotiations have often undermined financial discipline.

Several quantitative approaches from finance—such as Value at Risk (VaR) and Downside Risk Measures—have been proposed to model the impact of risk on project evaluation (De Palma, Picard, & Andrieu, 2012). However, a key finding is that no single criterion is universally best, and different models can lead to conflicting conclusions. This underscores a significant research gap in the Indian context: the lack of a standardized, robust model for ex-ante financial viability assessment that accounts for local risks.

The limitations of traditional performance metrics are also highlighted. The "iron triangle" of being on-time, on-budget, and to specification is deemed insufficient (Toor & Ogunlana, 2010). For Indian PPPs, this suggests that financial viability must be measured against a broader set of indicators, including stakeholder satisfaction, efficient resource use, and the avoidance of disputes, which are often a major source of cost overruns and financial stress.

**4.2. Theoretical Challenges to Financial Viability in PPPs**

The financial architecture of PPPs, particularly in the Indian megaproject context, often challenges conventional financial theories, creating a tension that lies at the heart of their viability challenges.

- **Challenge to the Theory of Optimal Capital Structure:** The theory suggests firms adjust towards a target debt ratio to maximize value. However, in Indian PPPs, the debt-to-equity ratio is often a product of intense negotiation between public and private entities and is heavily influenced by policy guidelines (e.g., RBI norms) rather than a value-maximization calculation for a standalone project. The high leverage, while tax-efficient, increases financial distress risk, especially when project cash flows are volatile.

ISSN 2394 - 7780

- **Challenge to Agency Theory:** The theory posits conflicts between shareholders and lenders. In the Indian PPP context, the Special Purpose Vehicle (SPV) structure is explicitly designed to identify and mitigate these agency problems a priori through covenants and control mechanisms. However, a more pronounced agency problem exists between the public and private partners. The public sector must establish stringent monitoring mechanisms to ensure that private profit motives do not override public interest and contractual obligations, a dynamic that can strain financial models and lead to renegotiation.
- **Challenge to Theories of Asymmetric Information (Signaling & Pecking Order):** These theories argue that capital structure signals project quality or follows a hierarchy due to information asymmetry. In Indian PPPs, the financial structure is not a market signal but the result of a closed, negotiated process between a limited number of parties (government, consortium, banks). The information asymmetry problems are not between a firm and the market but between the bidding private party and the public authority, often leading to aggressive bidding based on overly optimistic projections that later threaten financial viability.

This theoretical misalignment confirms that the financial viability of Indian PPPs cannot be adequately assessed using traditional corporate finance models. This necessitates the development of new, context-specific frameworks, highlighting a substantial and critical gap in the existing body of research.

**REFERENCES:**


- Akintoye, A., Beck, M., & Hardcastle, C. (2003). Public-private partnerships: Managing risks and opportunities. Oxford: Blackwell Science.
- Doloi, H. (2012). Cost overruns and failure in project management: Understanding the roles of key stakeholders in construction projects. Journal of Construction Engineering and Management, 138(11), 1321–1330. https://doi.org/10.1061/(ASCE)CO.1943-7862.0000532
- Esty, B. C. (2002). An overview of project finance & infrastructure finance—2002 cases and materials. Boston: Harvard Business School.
- Esty, B. C. (2004). Why study large projects? An introduction to research on project finance. European Financial Management, 10(2), 213–224. https://doi.org/10.1111/j.1354-7798.2004.00250.x
- Flyvbjerg, B. (2014). What you should know about megaprojects and why: An overview. Project Management Journal, 45(2), 6–19. https://doi.org/10.1002/pmj.21409
- Grimsey, D., & Lewis, M. K. (2004). Public private partnerships: The worldwide revolution in infrastructure provision and project finance. Cheltenham, UK: Edward Elgar.
- Hodge, G. A., Greve, C., & Boardman, A. E. (Eds.). (2010). International handbook on public–private partnerships. Cheltenham, UK: Edward Elgar.
- Irimia-Dieguez, A. I., Oliver-Alfonso, M. D., & Sánchez-Guerrero, M. I. (2015). Managing the financial issues of megaprojects: A bibliometric review. Procedia Economics and Finance, 23, 652–657. https://doi.org/10.1016/S2212-5671(15)00495-5
- Lemelin, B., Abdel Sabour, S., & Poulin, R. (2006). Real options and project evaluation: A primer for PPPs. International Journal of Project Management, 24(6), 517–525. https://doi.org/10.1016/j.ijproman.2006.03.002
- Ministry of Finance. (2015). Report of the Committee on Revisiting & Revitalizing the Public Private Partnership Model of Infrastructure (The Kelkar Committee Report). New Delhi: Government of India.
- Ministry of Statistics and Programme Implementation (MOSPI). (2024). Flash report on central sector projects (provisional). New Delhi: Government of India.
- Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. The American Economic Review, 48(3), 261–297.
- Paling, W. (2012). Planning a future for Phnom Penh: Mega projects, aid dependence and disjointed governance. Urban Studies, 49(13), 2889–2912. https://doi.org/10.1177/0042098011427185
- Reserve Bank of India (RBI). (2020). State finances: A study of budgets. Mumbai: RBI.
- Toor, S.-U.-R., & Ogunlana, S. O. (2010). Beyond the ‘iron triangle’: Stakeholder perception of key performance indicators (KPIs) for large-scale public sector development projects. International Journal of Project Management, 28(3), 228–236. https://doi.org/10.1016/j.ijproman.2009.05.005

ISSN 2394 - 7780


- World Bank. (2018). Procuring infrastructure public-private partnerships report. Washington, DC: The World Bank. https://ppp.worldbank.org/public-private-partnership/library/procuring-infrastructure-public-private-partnerships-2018
- Xu, Y., Yeung, J. F., Chan, A. P., Chan, D. W., Wang, S. Q., & Ke, Y. (2010). Developing a risk assessment model for PPP projects in China—A fuzzy synthetic evaluation approach. Automation in Construction, 19(7), 929–943. https://doi.org/10.1016/j.autcon.2010.06.006
- Yescombe, E. R. (2011). Public-private partnerships: Principles of policy and finance (2nd ed.). Oxford: Elsevier.