



A Study of Public-Private Partnerships and Their Role in Urban Development: A Case Study of Kolhapur City, Maharashtra

¹Gaikwad Anup Sampat, ²Prof.Dige Sndeeep G., ³Prof.Dr. Jadhav Anjali S.

¹Post - Graduate Student, ²Professor, ³Professor

¹S.P.S.M.B. H's College of Architecture, Kolhapur, Maharashtra, India

Abstract: This research paper provides an in-depth study of Public-Private Partnerships (PPPs) and their growing significance in the development of urban infrastructure, with a focused case study on Kolhapur City, Maharashtra. The study begins by exploring the fundamental concept of PPPs as collaborative arrangements between government entities and private sector participants, aimed at delivering public services and infrastructure projects more efficiently. It examines the key advantages such as access to private capital, improved project execution, risk sharing, and enhanced service delivery, while also addressing limitations like complex contract management, high financial costs, and potential regulatory challenges. The research further investigates various PPP models as well as the typical lifecycle stages of PPP projects from conceptualization to handover. Special attention is given to PPP structures and the classification of major project risks, assessing how responsibilities and risks are allocated between the public and private partners. The paper also explores the role of the Viability Gap Funding (VGF) scheme, a key financial support mechanism for PPPs in socially necessary but commercially unviable projects. A critical component of this study is the examination of the Kolhapur Municipal Corporation's (KMC) PPP framework and analysis of select PPP-based initiatives implemented in the city, including those in solid waste management, transportation, and urban beautification. The research concludes that well-structured PPPs, when aligned with transparent governance and strong stakeholder collaboration, play a crucial role in sustainable urban development for tier-2 cities like Kolhapur.

Index Terms - Public, Private, Partnership, Infrastructure, Project

I. INTRODUCTION

1.1. Public Private Partnership

A Public-Private Partnership (PPP) is a cooperative arrangement between government bodies and private sector companies designed to deliver public infrastructure or services more effectively and efficiently. This model combines the strengths of both sectors government oversight, regulatory support, and public accountability, along with private sector investment, innovation, and project execution capabilities. While the public authority often provides land and policy direction, the private partner handles financing, construction, and long-term operation. Risk is shared based on expertise, ensuring that each party manages what it handles best. PPPs help bridge infrastructure gaps, improve service quality, and promote sustainable development while reducing pressure on public finances.

1.2. Public Private Partnership - Advantages, Disadvantages

Public-Private Partnership (PPP) arrangements are being promoted not just because of limited public funds for infrastructure development, but also to improve the quality and efficiency of public services. More and more people now agree that PPPs can be a useful tool to meet infrastructure and service needs in many sectors. The success of past PPP projects, availability of private funds, the private sector's ability to handle more risk, and a global trend of using private sector efficiency have led both Central and State governments to consider PPPs across all infrastructure sectors.

Governments are increasingly realizing three key points:

1. There is a huge need for funding to build high-quality infrastructure and public services.
2. There is a big gap between this need and the funds available with the government.
3. It is important to not only find new sources of funding, but also to use existing public funds more wisely and effectively.

At the same time, governments are also recognizing the many benefits of working with the private sector through PPP projects, such as:

1. Faster investment in infrastructure: PPPs allow governments to spread out capital costs over time as ongoing service payments, helping projects move forward even when government budgets are tight.
2. Quicker project execution: Giving responsibility for design and construction to the private sector, with payments linked to service delivery, encourages faster project completion.

3. Lower costs over time: When private partners are responsible for operation and maintenance, they have strong reasons to reduce costs throughout the project's lifespan—something that is hard to achieve under traditional public sector methods.
4. Better risk sharing: In a good PPP model, risks are given to the party most capable of managing them. The goal is not to pass on all risk to the private sector, but to share it in a way that provides the best results.
5. Motivation to perform well: Since private partners get paid only when they meet required service standards (measured by Key Performance Indicators or KPIs), they are encouraged to manage the project effectively.
6. Higher quality services: Experience shows that services delivered through PPPs are often better than those done through traditional methods. This is because of better coordination, economies of scale, innovative practices, and built-in rewards and penalties.
7. Extra income: Private players may be able to generate additional revenue—for example, by making use of spare capacity which can lower the financial burden on the public sector.
8. Improved government focus: By handing over day-to-day service delivery to the private sector, governments can focus more on planning, regulation, and monitoring. Also, introducing competition through PPPs can improve public service performance.

Overall, PPPs can be an effective way to improve the quality and delivery of infrastructure services. If well-designed and implemented within a fair policy and regulatory framework, PPPs can bring greater efficiency, better risk-sharing, and reduce pressure on government budgets by attracting private investments. However, PPPs are also complex. One of the main challenges is the long-term nature of these agreements, which can bring unexpected issues that are hard to predict when the project is first designed. So, PPP contracts should include ways to handle future uncertainties. Another issue is the high cost of capital for private investors the cost of borrowing or raising money is often higher for them than for governments. Also, some financial risks, such as payments required if a contract ends early, may not be clearly shown in government accounts, creating additional concerns.

PPPs also have some limitations that must be kept in mind:

1. Not all projects are suitable for PPPs. Legal, political, and financial issues, or a limited ability to apply full lifecycle and operational models, may make some projects unfit.
2. The private sector may not be interested in certain projects due to high risks or lack of technical or financial capacity.
3. PPPs may cost more if the higher transaction and financing costs are not balanced by increased efficiency.
4. PPPs alone may not lead to better economic outcomes unless other reforms, like market or sector reforms, are also carried out.
5. The success of PPPs often depends on how well they are regulated.

Success of PPP depends on a robust implementation framework and alignment of objectives between public and private partner. To get the most benefit, all stakeholders need to better understand the different PPP models and the best ways to design and manage them.

1.3 Eligible sectors

Public-Private Partnerships (PPPs) can be implemented across various sectors to enhance infrastructure and service delivery. Key eligible sectors include transportation infrastructure such as roads, bridges, railways, seaports, airports, and inland waterways. Power projects and urban infrastructure, including transport, water supply, sewerage, and solid waste management, also qualify. PPPs extend to infrastructure in Special Economic Zones, National Investment and Manufacturing Zones, and tourism-related projects like international convention centers. Other sectors include modern storage facilities, cold chains, education, health, and skill development. Oil, gas, and LNG storage, along with city gas distribution networks and pipelines, are also eligible. Additionally, PPPs cover irrigation projects, telecommunication networks, towers, terminal markets, common agricultural infrastructure, and soil testing laboratories, promoting economic growth and sustainable development.

II. TYPES OF PPP MODEL

1. Build-Operate-Transfer (BOT): In this setup, a private company takes care of the entire process funding, building, and running the project for about 20 to 30 years. After that period, the project is handed over to the government. It is a way for the private sector to invest in infrastructure while eventually returning it to public hands.
2. Build-Own-Operate-Transfer (BOOT): This model works a lot like BOT, but the key difference is that the private company owns the project during the concession period. It makes its money back by charging users, and then, just like BOT, gives the asset back to the government at the end of the term.
3. Build-Own-Operate (BOO): With BOO, the private sector does not just build and run the infrastructure it owns it permanently. The government still oversees things through regulation, but ownership and operations stay with the private company for good.
4. Design-Build (DB): Here, a private firm is hired to design and build a project based on public sector requirements. The private firm takes on both the design and construction responsibilities and the risks while the government keeps ownership and control.
5. Operation and Maintenance (O&M) Contract: Under this arrangement, the public authority keeps ownership of the asset, but a private company is brought in to operate and maintain it. This allows governments to benefit from private-sector efficiency without giving up control.

6. Design-Build-Finance-Operate (DBFO): This model puts a lot on the private partner's plate. They design, build, pay for, and operate the project. The government regains ownership when the lease or contract ends. It is a full-package deal, often used for complex infrastructure needs.

7. Buy-Build-Operate (BBO): In the BBO model, a private firm acquires an existing public asset, upgrades it, and then runs it for a set time. It is a way to modernize infrastructure without the public sector footing the bill right away.

8. Build-Lease-Operate-Transfer (BLOT): In BLOT, the government leases public land to a private company, which then builds on that land and operates the facility. After the lease is up, the whole setup is turned over to the government.

9. Operation License: This is a straightforward licensing model. The government lets a private firm operate a public service for a certain time. Ownership does not change hands, and once the license expires, the public sector takes back operations.

10. Finance-Only: Sometimes, the private sector just provides the money. In this case, the government handles building and running the project, but pays the private investor back over time. It is a way to fund public projects without upfront government spending.

III. LIFE CYCLE OF PPP PROJECT

Public-Private Partnerships (PPPs) involve complex contracts that go through six main phases during the project's life cycle. Each phase has its own details and can influence the project's success or failure. These phases are further divided into different stages. It is important to note that, like different PPP models and classifications, these phases are not always strictly separate. Some phases and stages may overlap or happen at the same time, depending on the project's requirements. The specific phases and activities carried out in each stage may vary based on the unique needs of the project.

1. Phase 1 - Project Identification: The first phase of the PPP lifecycle is project identification, which focuses on understanding the need for infrastructure services and exploring ways to provide them. This involves two key analyses: Need Analysis, which assesses whether infrastructure services are required, and Options Analysis, which examines different ways to deliver these services. The Public Sector Authority (PSA) identifies the core issue the project aims to address, the beneficiaries who will gain from it, and the possible solutions available. Once the need for the project is confirmed, potential solutions are evaluated to determine if they are suitable for a Public-Private Partnership (PPP) model. Finally, feasibility reports are prepared to assess the practicality and viability of these solutions.

2. Phase 2 - Feasibility Analysis: In the second phase of the PPP lifecycle, a detailed feasibility study is conducted to evaluate the best way to implement the project identified in the first phase. This study examines various factors, including technical feasibility (whether the project can be built and operated effectively), financial feasibility (if it is affordable and financially viable), economic feasibility (its overall benefits to the economy), legal feasibility (compliance with laws and regulations), and environmental feasibility (its impact on the environment). The purpose of this phase is to determine whether the project can be successfully developed as a Public-Private Partnership (PPP) and to select the most suitable project structure.

3. Phase 3 - Project Structuring: After completing the feasibility analysis, the next step is project structuring, where the details of the PPP model are finalized. This stage involves identifying and allocating risks between the public and private partners, defining the contract framework, and setting clear roles and responsibilities for both parties. It also includes establishing monitoring guidelines with key performance indicators (KPIs) and technical performance standards, planning the funding process if financial assistance is required, and finalizing reporting requirements, including the format and frequency of performance reports.

At the same time, the Public Sector Authority (PSA) prepares essential bid documents such as the Request for Qualification (RFQ), Request for Proposal (RFP), Project Information Memorandum (PIM), and Draft Concession Agreement. These documents outline the bidding process, eligibility criteria, bid security, and technical and financial requirements for bidders. Additionally, they define key contract terms, including project scope, responsibilities of both parties, performance guarantees, penalties, and conditions for termination. This stage ensures that all legal, financial, and operational details are in place before inviting private sector participation.

4. Phase 4 - PPP Project Appraisal: At the end of Phase 3, the PSA's project plans and contract documents are carefully checked by the responsible authority. This review makes sure everything is correct before moving forward. If approved, the project can then move to the PPP procurement phase.

5. Phase 5 - PPP Procurement: The next phase is PPP procurement, where the bidding process is completed. This includes inviting and evaluating bids, conducting Expressions of Interest (EoI), Request for Qualification (RFQ), and Request for Proposal (RFP) as needed. A bid opening and evaluation committee is formed to review the bids and select a private partner. Once chosen, a letter of award is issued, and the concession agreement is signed. Different methods can be used to procure PPP projects, such as Open Tender Enquiry, Global Tender Enquiry, and Limited Tender Enquiry.

6. Phase 6 - PPP Contract Management (Monitoring and Dispute Resolution): The final and longest phase of the PPP lifecycle is post-award contract management. This phase begins when the Concession Agreement is signed and continues until the contract period ends, either naturally or due to early termination. During this phase, the project is closely monitored to ensure it delivers the expected results. Since PPPs are long-term partnerships and the future can be uncertain, a strong dispute resolution mechanism is also in place to handle any issues that arise. A contract management team is set up to oversee the project and

ensure the private partner follows the contract terms. This team needs expertise in different areas to manage all stages of the contract effectively.

IV. MAJOR RISK ASSESSED IN CLASSIFICATION OF PPP MODEL

Over the years, many different PPP models have developed. However, the main factor that defines each model is how major risks are shared between the public and private partners. Based on the level and type of risk taken by each party, PPP models can be broadly categorized. While PPP projects involve many risks, the classification of PPP models is based on different levels of the four major risks, also known as the 'Four Cardinal Risks'. PPPs also have some limitations that must be kept in mind:

The Four Cardinal Risks in PPP projects are:

1. Ownership Risk - The risk related to who owns the asset.
2. Finance Risk - The risk of whether the project can generate enough revenue to repay loans and give a fair return on investment. This includes both the cost of funding the project and the ability to earn enough income to cover expenses.
3. Design/Construction Risk - The risk that the project's design may not meet performance standards (KPIs) or that there may be delays and cost overruns during construction.
4. Operation Risk - The risk of problems in operating and maintaining the asset during the contract period, ensuring that performance standards (KPIs) are met.

All other risks in PPP projects are variations or extensions of these Four Cardinal Risks. These four main risks form the foundation for understanding and managing all other risks in a PPP project.

V. KOLHAPUR MUNICIPAL CORPORATION (KMC)'S COST-EFFICIENCY STRATEGIES THROUGH PPP AND ITS MULTIPLE OPTIONS

The Corporation plans to implement upcoming projects on a Build-Operate-Transfer (BOT) basis, a strategic model that enhances cost efficiency. Under BOT, private entities will finance, design, construct, and operate the projects for a specified period, recovering investments through operational revenues before transferring ownership back to the Corporation. This approach reduces the Corporation's financial burden, ensures timely delivery, and introduces advanced technologies and practices through private sector expertise. It allows the Corporation to concentrate on oversight and regulatory roles while maintaining high standards in project execution.

In parallel, there is a pressing need to establish a dedicated Commercial Department to manage all financial and transactional activities. This department will be essential for ensuring smooth handling of revenues, payments, procurement, and partnership agreements. It will serve as a coordination hub between internal operations and external stakeholders such as contractors, vendors, and government bodies.

To operate effectively, the department will comprise professionals from diverse fields including finance, accounting, economics, legal affairs, business administration, contract management, and IT. Their varied expertise will enable the department to handle complex commercial operations efficiently.

However, a multidisciplinary team alone does not guarantee success. Employees must undergo comprehensive training tailored to the Corporation's systems and processes. Training will cover financial tools, contract management, digital systems, and emphasize transparency, accountability, and ethics. Regular workshops and refresher sessions will keep staff informed about regulatory updates and industry best practices. Cross-functional training will also promote collaboration across roles.

Possible PPP (Public-Private Partnership) Options for KMC

The idea is to use a Design-Build-Operate (DBO) model for projects. This means:

1. A private developer undertakes the full project cycle designing, constructing, and operating infrastructure ensuring continuity, efficiency, and accountability throughout the project's lifespan under a fixed-term agreement with KMC.
2. A comprehensive contract must define roles, responsibilities, payment terms, risk sharing, performance standards, and handover conditions to ensure smooth project execution and protect both public interest and developer responsibilities.
3. KMC must establish a transparent selection process, including prequalification and detailed evaluation criteria, to assess technical capability, financial viability, innovation, and long-term service potential of participating developers.

This model is a good fit when

1. When government funds are available, the DBO model ensures efficient use of public money while leveraging private sector expertise for design, construction, and operation without full private investment.
2. In cases where high risks discourage private investors, the DBO model limits their exposure by focusing on execution and service delivery, making the project more viable than full BOT arrangements.
3. The DBO approach allows public agencies to gain private sector efficiency by bundling engineering, procurement, construction, and operation services under one contract, ensuring better coordination and lifecycle performance.
4. Including a warranty or transition period ensures the private operator trains and supports municipal staff post-construction, enabling smooth handover and sustained performance after the contract period ends.

VI. CASE STUDIES OF PUBLIC PRIVATE PARTNERSHIP BASED INITIATIVES BY THE KMC

4.1 Project No.1 - Sewage treatment plant at Kasaba Bawada, Kolhapur.

To improve sewage treatment and combat pollution in the Panchganga River, the Kolhapur Municipal Corporation (KMC) launched a 76 MLD Sewage Treatment Plant (STP) at Kasba Bawda. Rising pollution had led to fish deaths and disease outbreaks, prompting the Maharashtra Pollution Control Board (MPCB) to issue a notice and file a criminal case against KMC. In response, KMC urgently addressed the issue by adopting a Public-Private Partnership (PPP) model with Viability Gap Funding (VGF). This approach reduced financial burden and shared project responsibilities, aiming to restore ecological balance and ensure a cleaner, healthier environment for the city.

4.1.1 Key Stakeholders and their roles responsibilities:

KMC and Vishwa Infrastructure and Services Pvt Ltd (VISPL) entered into the concession agreement on 4th November 2010

1. Public sector partner: Kolhapur Municipal Corporation (KMC) project owner, responsible for monitoring and partial funding.

Responsibilities: The KMC will support the project by providing land free of cost for the STP and pumping stations, granting right of way for laying pipelines, assisting in obtaining approvals, contributing a predefined share of the project cost, and ensuring sewage is transported to the designated pumping stations within the city.

2. Private sector partner: (VISPL - Vishwa Infrastructure and Services Pvt Ltd) Responsible for design, build, finance, operate, and maintain (DBFOM).

Obligations: The private partner will design, finance, construct, operate, and maintain the STP, build I&D structures, pumping stations, and rising mains, and ensure treated water meets prescribed quality standards during O&M.

Rights: The private partner is granted a 15-year concession period, including 2 years for construction, and is allowed to generate revenue through the use or sale of treated water and by-products.

4.1.2 Financial Structure:

The project cost totals ₹57 crores, with ₹39.9 crores funded by the National River Conservation Directorate (NRCD) and ₹17.1 crores contributed by the private sector.

4.1.3 Project Management Consultants:

NJS Engineers India Pvt. Ltd.

4.1.5 Outcome:

The STP is a model of successful PPP implementation in Kolhapur. VGF proved essential for projects with high long-term socio-economic benefits but limited immediate financial returns. The initiative strengthens urban infrastructure while restoring ecological balance in the region.

4.2 Project No.1 - Sewage treatment plant at Kasaba Bawada, Kolhapur.

Kolhapur Municipal Corporation (KMC) launched a 17 MLD STP at Dudhali to boost sewage treatment and reduce Panchganga River pollution. To ensure financial viability and sustainable development, the project adopted a Public-Private Partnership (PPP) model with Viability Gap Funding (VGF) support.

4.2.1 Key Stakeholders and their roles responsibilities:

1. Public sector partner: Kolhapur Municipal Corporation (KMC) project owner, responsible for monitoring and partial funding.

Responsibilities: KMC will provide land, right of way, approvals support, a fixed project cost share, and ensure city sewage reaches designated pumping stations for the STP's effective implementation.

2. Private sector partner: (Laxmi Civil Engineering Services Pvt. Ltd.) Responsible for design, build, finance, operate, and maintain (DBFOM)

Obligations: The private partner will DBFOM the STP, build supporting infrastructure, and ensure treated water meets quality norms during the operation and maintenance period.

Rights: The private partner gets a 15-year concession, including 2 years construction, with rights to sell treated water and by-products.

4.2.2 Financial Structure:

The project cost totals ₹21.50 crores, with ₹10.75 crores funded by the Maharashtra Suvana Jayanti Nagarotthan Maha-Abhiyan (MSJNMA) and ₹10.75 crores contributed by the private sector.

4.2.3 Outcome:

The STP showcases successful PPP in Kolhapur, with VGF enabling projects of high socio-economic value but low short-term returns, enhancing urban infrastructure and aiding ecological restoration in the region.

VII. CONCLUSION

Public-Private Partnership (PPP) has emerged as a transformative approach in infrastructure development, particularly for growing urban centres like Kolhapur, Maharashtra. This study examined various dimensions of PPP, including its definition, key

advantages such as improved efficiency and innovation, disadvantages like complex contracts and risk allocation issues, as well as different models and structures that define how public and private entities collaborate. The lifecycle of a PPP project—from project identification and structuring to procurement, implementation, and monitoring—was also explored. One important financial tool studied was the Viability Gap Funding (VGF) scheme, which supports projects that are economically necessary but financially unviable without government assistance. PPP-based infrastructure projects in Kolhapur were analysed to understand how this model works in practice. The findings reveal that PPPs allow municipal bodies to overcome resource constraints by leveraging private sector investment, technology, and operational expertise. In cities like Kolhapur, where rapid urbanization puts pressure on existing infrastructure, PPP offers a practical solution for addressing a wide range of urban challenges. These include not just sewage treatment and sanitation but also transportation logistics, water supply, solid waste management, affordable housing, urban mobility, street lighting, healthcare, and education infrastructure. By sharing risks and responsibilities, PPPs help ensure the timely completion and sustainable operation of infrastructure projects. Ultimately, PPP is a crucial mechanism for enabling local governments to meet growing public demands, promote economic development, and improve the quality of life for citizens in urban areas like Kolhapur.

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