Role of Project Development and Management Consultants (PDMC) in Urban Infrastructure Projects under AMRUT 2.0- A Review

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Abstract- **Urbanization in India has led to the exponential demand for infrastructure development, necessitating strategic planning and execution under national programs like AMRUT 2.0 (Atal Mission for Rejuvenation and Urban Transformation). Project Development and Management Consultants (PDMCs) serve as vital enablers in ensuring the timely, efficient, and quality execution of projects. This review paper explores the evolving role of PDMCs in urban infrastructure delivery, emphasizing their contribution to project planning, design, monitoring, implementation, and capacity building under AMRUT 2.0. The study synthesizes literature, government guidelines, and project case studies to assess the impact, challenges, and potential improvements in PDMC engagement.**

Keywords: **PDMC, AMRUT 2.0, Urban Infrastructure, Project Management, Capacity Building, Smart Cities.**

I. INTRODUCTION

Urbanization in India is accelerating at an unprecedented pace, exerting immense pressure on the existing urban infrastructure systems such as water supply, sanitation, sewage treatment, stormwater drainage, urban mobility, and public amenities. To address these challenges and promote inclusive, sustainable, and well-managed urban development, the Government of India launched the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) in 2015. Building upon the successes and learnings of AMRUT Phase 1, AMRUT 2.0 was introduced in October 2021 with a renewed focus on universal access to water supply, effective management of liquid waste, reduction in non-revenue water, and promoting circular economy practices in the urban water sector. While the vision and objectives of AMRUT 2.0 are ambitious and transformative, their realization heavily depends on the professional and technical capabilities of Urban Local Bodies (ULBs), which often face constraints in terms of human resources, planning expertise, and project management skills. To overcome these limitations and to ensure timely, efficient, and quality execution of urban infrastructure projects, the Ministry of Housing and Urban Affairs (MoHUA) mandated the engagement of Project Development and Management Consultants (PDMCs) as key partners to ULBs and State Missions. PDMCs are entrusted with a comprehensive set of responsibilities, including project identification, preparation of Detailed Project Reports (DPRs), bid process management, procurement assistance, monitoring of implementation, quality assurance, and capacity building of ULB staff. These consultants serve as a bridge between the policy framework and ground-level execution by bringing in sectoral expertise, adopting modern project management tools, and facilitating transparency and accountability in project delivery. Their role becomes even more critical in Tier-II and Tier-III cities, where the institutional capacity of local bodies is relatively weaker. As India moves towards achieving Sustainable Development Goal 11 (Sustainable Cities and Communities), the contribution of PDMCs under AMRUT 2.0 becomes vital in shaping the urban future of the nation. This review aims to critically examine the role of PDMCs in urban infrastructure development, evaluate their effectiveness, identify operational challenges, and suggest improvements for enhancing their impact under the framework of AMRUT 2.0.

II. LITERATURE REVIEW

2.1 Previous Research Studies

Rathore et al. (2016) conducted a comprehensive study to explore the critical role of Project Management Consultancy (PMC) in infrastructure development, particularly in road construction projects. The study emphasizes that infrastructure is a vital driver of economic growth in India and requires efficient execution strategies due to its large scale and complex nature. PMC firms are seen as professional bodies possessing specialized knowledge and experience to ensure time-bound completion of projects by optimizing resources and maintaining quality. The paper categorizes the involvement of PMC across three core phases: pre-tendering, tendering, and post-tendering. In the pre-tendering stage, PMCs are involved in identifying client requirements, exploring conceptual alternatives, and conducting surveys and investigations. During the tendering phase, they assist in preparing estimates, documentation, and evaluating bids. In the post-tendering stage, PMC manages execution, monitors progress, controls cost and time overruns, and ensures adherence to quality standards. The study presents a role matrix that outlines PMC responsibilities throughout the project life cycle—from inception to closure. The authors argue that PMC involvement across the entire project cycle improves coordination and performance, thereby delivering functionally and financially viable infrastructure projects. With India's rapid infrastructure growth and increasing government investments, the role of PMC becomes even more critical to mitigate risks and improve project outcomes.

Kamat et al. (2024) conducted an interpretive qualitative study to explore the impact of Project Management Consultancy (PMC) on construction projects, particularly within the commercial real estate sector. The study addresses a key gap in literature by emphasizing the experiences of various project stakeholders—including clients, contractors, project managers, and consultants—to assess the effectiveness and challenges of PMC engagement in large-scale infrastructure projects. Through thematic analysis of in-depth interviews with 15 strategically selected participants across three major construction projects, the study revealed that PMC services significantly influence project planning, risk management, and integration of sustainability elements. One of the critical contributions of PMCs was aligning diverse stakeholder interests to achieve common project goals. However, the research also highlighted that poor collaboration and communication between PMCs and internal project teams often led to misunderstandings and limited the effectiveness of consultancy services. The findings underscore the dual nature of PMC involvement: while offering strategic benefits and specialized expertise, their success largely depends on how well they integrate with client organizations and project ecosystems. The paper concludes by advocating for improved engagement frameworks and communication protocols to enhance the value addition of PMCs in construction projects.

Ahuja (2016) provides a critical evaluation of project management practices in urban infrastructure projects in India, with a focus on both new developments and urban renewal initiatives. The paper highlights a prevalent issue in the Indian context—government-owned urban infrastructure projects, especially renewal projects, often suffer from poor execution in terms of time, cost, quality, and stakeholder coordination. While individual projects may have modest financial value, their cumulative impact on public expenditure is substantial. Inefficiencies in these projects can thus lead to significant economic strain on national resources. To address these challenges, the Government of India introduced the Jawaharlal Nehru National Urban Renewal Mission (JNNURM), aimed at enforcing statutory reforms and implementing structured project management methodologies. Ahuja's paper evaluates the parameters outlined under this mission, including timelines, transparency, stakeholder engagement, and quality assurance mechanisms. Despite these structured approaches, the paper notes that project outcomes remain inconsistent due to systemic issues such as bureaucratic delays, fragmented responsibilities, and limited technical expertise at the municipal level. This study provides important insights into the administrative and operational constraints of managing urban infrastructure projects in India, emphasizing the need for integrated project delivery models, accountability frameworks, and capacity building within local government bodies.

Atli and Krystallis (2025) explore the increasingly important concept of design flexibility in managing infrastructure projects, particularly under uncertain and dynamic conditions. Through a systematic literature review of 50 selected articles from an initial pool of 11,443, the authors identify three core

dimensions of design flexibility—individual, organizational, and inter-organizational—which influence infrastructure project adaptability. These dimensions are further analyzed through the lens of Herbert Simon's design theory, framing flexibility not just as a technical capability but as a strategic managerial asset. The study emphasizes that traditional views of flexibility, often confined to engineering and technical design, must evolve to incorporate managerial, procedural, and relational flexibility. Factors affecting design flexibility were categorized at the micro (individual decision-makers and stakeholders), meso (organizational structures and workflows), and macro (cross-organizational coordination and governance) levels. By doing so, the authors propose an integrated framework that enables project teams to maintain control while accommodating necessary adjustments throughout the project life cycle. The paper contributes significantly to modern project management discourse by highlighting how a balance between flexibility and control can enhance project resilience, stakeholder alignment, and ultimately, project success in the face of uncertainties. It also opens avenues for future research into embedding flexible design practices within project delivery models.

Molokanova et al. (2020), in their paper presented at the IEEE 7th International Conference on Energy Smart Systems, investigate the application of project management methodologies in implementing sustainable urban development, especially in the context of smart cities. The study emphasizes that project management not only enables systematic implementation but also ensures a balance between technological oversight and individual privacy—key challenges in the modern urban ecosystem. The authors analyze various international frameworks and tools employed in the design and management of smart cities, including components such as digital economy, urban operating systems, green energy models, transport standards, and urban ecology. They argue that project management offers a structured methodology to coordinate these diverse elements and provides a bridge between technical efficiency and socio-political considerations in urban development. The paper also highlights how information technologies and automated systems—leveraging machine learning and big data analytics—can contribute to predictive governance and infrastructure optimization. Importantly, the authors caution against complete delegation of urban management to AI systems, underscoring the need to safeguard human agency and privacy in the process of smart city evolution. The study ultimately positions project management as a critical tool in achieving sustainable and ethically guided urban growth.

Koirala (2018) provides a comprehensive study on the challenges and risk factors associated with urban infrastructure development in newly emerging cities of Nepal, highlighting the systemic issues impeding efficient project execution. With 6 metropolitan cities, 11 sub-metropolitan cities, and 276 emerging municipalities, Nepal faces pressing demands for affordable housing, healthcare, education, water supply, sanitation, and transportation infrastructure. The research, based on literature reviews and on-the-ground surveys, identifies multiple barriers including ineffective coordination between government ministries, outdated procurement policies, underqualified professionals, and inadequate budget allocation. A key observation is the lack of integrated planning—evident when infrastructure built by one agency is disrupted by another soon after. Furthermore, the absence of a professionalized project management framework and the lack of long-term, globally-aligned urban vision from leadership exacerbate infrastructure inefficiencies. Koirala advocates for integrated urban infrastructure planning backed by a comprehensive risk management strategy as essential for sustainable development in Nepal's rapidly urbanizing regions. The study serves as a crucial reference for policymakers and urban planners in the Global South, underscoring the importance of inter-agency coordination and strategic foresight in managing urban growth.

Kothandath explores the success factors in infrastructure project planning with a novel focus on the user perception, particularly in the Indian urban context. The study addresses a gap in existing literature where most prior research has centered on stakeholder perspectives—such as that of developers, contractors, or government agencies—mainly during the construction phase. In contrast, this research emphasizes the planning phase and integrates the end-user's viewpoint, which is crucial but often overlooked. Set in Thiruvananthapuram, the research investigates planning-related factors and associated risks in sectors such as water and sanitation and transportation infrastructure. Kothandath notes that

despite the advancement in project management tools, infrastructure projects in India continue to fall short of delivering user-centric benefits. Contributing issues include insufficient stakeholder engagement during planning, resource constraints, and conflicting policy priorities. The study's proposed methodology aims to collect, analyze, and interpret user feedback to evaluate how planning decisions directly impact project success or failure. This approach underscores the need for early integration of user needs and risk assessments into the planning phase. It also highlights that project success cannot be measured solely by completion metrics, but must consider long-term utility and satisfaction from the perspective of end-users.

Shah, Bhatti, and Ahmed (2023) present a comprehensive review on the intersection of project management practices and sustainability objectives in construction projects. Their study, based on literature from the last decade and framed in the post-COVID-19 context, emphasizes the evolving role of project management in achieving not only efficiency and cost-effectiveness but also environmental and social responsibility. The paper identifies inadequate scope definition, poor communication, resource mismanagement, and regulatory barriers as key challenges across all phases of project management. These barriers significantly hinder the delivery of sustainable outcomes. The review underscores the importance of aligning project execution with specific sustainability targets such as energy efficiency, waste reduction, water conservation, and social inclusion. The authors advocate for an integrated project management-sustainability model, which incorporates elements like green building design, sustainable materials, smart technologies, biodiversity preservation, and performance metrics. This approach ensures that sustainability is embedded into the core project management lifecycle rather than being treated as an add-on. Moreover, the study encourages future research to delve deeper into the context-specific implications of these barriers, particularly in developing regions, and suggests that successful construction outcomes must be measured by economic viability, social equity, and environmental responsibility.

Kumari Anamika, Heena Shrimali, Dr. M. P. Punia, and Subham Sadhu (2016) in their study published in the International Journal of Engineering Research & Technology (IJERT) present a geo-spatial approach to infrastructure planning in urbanizing regions, using Zone 16 of Jaipur as a case study. This zone, located along the heavily trafficked NH-8 (Ajmer Road), faces rapid urban development pressure due to its strategic location.

The study highlights the challenge of identifying suitable land for development in and around metropolitan cities like Jaipur, where urban sprawl has left minimal open land. To address this, the researchers employ Remote Sensing (RS) and Geographic Information System (GIS) technologies to analyze land use, identify patterns of urban growth, and support decision-making for infrastructure planning. The integration of satellite imagery and spatial analysis tools to generate accurate land use/land cover (LULC) maps. Identification of urban expansion trends, providing a basis for strategic zoning, transport planning, and service distribution. Demonstration of how GIS-based spatial planning enhances objectivity and precision in infrastructure development.

Davidson Rajan Philip and Ashok Kumar (2018) in their study published in the International Journal of Engineering Research & Technology (IJERT), delve into the challenges of maintenance management in public infrastructure, particularly in the context of aging civil structures. They emphasize the difficulty and costliness of maintaining and rehabilitating these infrastructures, especially as they age and deteriorate over time. The paper emphasizes the essential components of maintenance management systems, which include the systematic planning, coordination, and allocation of resources to enhance the longevity of infrastructure. These systems aim to prevent structural failures due to deterioration or decay, ensuring that buildings continue to serve their intended purpose over time. The authors highlight the significant challenges and costs associated with maintaining public infrastructure. They stress that building maintenance is not solely about repairs but also about optimizing the functional lifespan of the building. Effective maintenance requires a comprehensive approach that balances short-term repairs with long-term sustainability, which is especially difficult in the context of aging infrastructure. A major focus of the paper is the integration of structural strength monitoring into maintenance management systems, illustrated through case studies from Chennai. This approach enables more informed decision-making and better

resource allocation for public construction projects. By proactively monitoring the structural health of buildings, maintenance actions can be taken at the right time, minimizing costs and improving the efficiency of the maintenance process. This becomes particularly crucial in situations where resources are limited and must be managed wisely.

2.2 AMRUT 2.0 Guidelines

Under the AMRUT 2.0 guidelines, Project Development and Management Consultants (PDMCs) play a pivotal role in the successful implementation of urban infrastructure projects. Their primary responsibility is to assist Urban Local Bodies (ULBs) in planning, developing, and executing various infrastructure projects, including water supply systems, sewerage networks, stormwater drainage, and urban transport. PDMCs are responsible for identifying project needs, preparing comprehensive feasibility reports, and ensuring that the designs meet technical, financial, and environmental standards. This involves conducting detailed studies, cost estimations, and risk assessments, ensuring that each project aligns with the overarching goals of AMRUT 2.0, such as enhancing basic urban services, improving the quality of life, and fostering sustainable urban development.

In the implementation phase, PDMCs ensure that urban infrastructure projects proceed according to the prescribed timelines, budgets, and specifications. They manage procurement processes, oversee contract management, and ensure that all construction activities meet the set quality standards. Additionally, they provide continuous monitoring and evaluation of the projects, offering real-time solutions to any emerging issues. This active role ensures that projects remain on track and compliant with AMRUT 2.0 guidelines. Furthermore, PDMCs facilitate coordination between different stakeholders, including ULBs, contractors, technical experts, and government agencies, ensuring smooth communication and collaboration throughout the project lifecycle.

A significant aspect of PDMC's role is capacity building and technical support. They offer training programs, workshops, and on-the-job support to enhance the capabilities of ULBs and other stakeholders involved in the execution and operation of urban infrastructure projects. This is crucial to ensuring the long-term success and sustainability of the infrastructure. PDMCs help local bodies and authorities build the necessary skills to maintain the infrastructure post-completion, which aligns with the AMRUT 2.0 goal of promoting sustainable urban development. Additionally, they focus on adopting cost-effective and environmentally sustainable solutions, ensuring that the projects not only meet the immediate urban needs but are also future-proof and resilient to challenges like climate change and urbanization.

Through their comprehensive oversight, PDMCs ensure that AMRUT 2.0 projects are executed efficiently, ensuring long-term benefits to urban populations. Their role is instrumental in creating an environment where urban areas can thrive sustainably while offering enhanced services to citizens. The AMRUT 2.0 guidelines emphasize the need for a holistic approach to urban infrastructure development, and PDMCs are key players in ensuring that these goals are met effectively and efficiently.

III. PROPOSED METHODOLOGY

The methodology adopted for this project involves a comprehensive approach that integrates secondary data collection, qualitative analysis, and case study evaluation to assess the role of Project Development and Management Consultants (PDMCs) in urban infrastructure projects under AMRUT 2.0. Initially, secondary data will be collected from a variety of sources, including government reports, official guidelines, PDMC Terms of Reference (TOR), academic papers, and published case studies. This will provide a foundational understanding of the scope of PDMC responsibilities, as outlined by the Ministry of Housing and Urban Affairs (MoHUA) and other relevant authorities. In addition, key interviews with ULB officials, PDMC representatives, and contractors involved in AMRUT 2.0 projects will be conducted to gather firsthand insights into the challenges and successes associated with PDMC engagement. The analysis will focus on several parameters, including the efficiency of Detailed Project Report (DPR) preparation, the bid process, project monitoring mechanisms, quality assurance procedures, and capacity-building initiatives undertaken by PDMCs. A comparative case study analysis of five cities (Pune, Surat,

Nagpur, Indore, and Nashik) where PDMCs have been actively involved will be performed to assess their effectiveness in managing projects under AMRUT 2.0. Additionally, a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis will be conducted to evaluate the performance of PDMCs in relation to their role in project delivery. Finally, based on the findings, a recommendations framework will be developed to suggest improvements in the engagement process, performance evaluation metrics, and capacity enhancement strategies for both PDMCs and ULBs.

CONCLUSION

PDMCs play a pivotal role in transforming urban infrastructure planning and execution under AMRUT 2.0. Their involvement ensures professional oversight, timely delivery, and better governance. However, to harness their full potential, there is a need for clearer guidelines, performance evaluation mechanisms, and stronger coordination frameworks. Continuous capacity building for both PDMCs and ULBs is vital to sustain the urban transformation envisioned under AMRUT 2.0.

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