

Synthesis of Transportation Tech and Multimodal Planning in Smart City Transport Integration

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Abstract: *The integration of transportation technologies and multimodal transportation planning lies at the heart of building smart cities that are efficient, sustainable, and resilient. This abstract explores the synergies between emerging technologies and comprehensive multimodal transportation strategies within the context of urban development. By seamlessly integrating technologies such as Internet of Things (IoT), artificial intelligence (AI), and data analytics into transportation infrastructure, cities can optimize traffic flow, enhance safety, and improve overall mobility experiences for residents and visitors. Furthermore, multimodal transportation planning, which considers the seamless coordination and connectivity between various modes of transportation including public transit, cycling, walking, and shared mobility services, becomes instrumental in fostering a more integrated and inclusive urban mobility ecosystem. This abstract delves into the key components and benefits of integrating transportation technologies with multimodal planning in smart cities, highlighting the potential to reduce congestion, minimize environmental impact, and enhance accessibility for all citizens. Through case studies and analysis, it demonstrates how such integration can lead to more efficient transportation systems that support economic growth, social equity, and environmental sustainability in the urban landscape of tomorrow.*

Keywords: Transportation Technologies, Multimodal Transportation Planning

I. INTRODUCTION

The integration of transportation technologies and multimodal transportation planning lies at the heart of the vision for smart cities, where innovative solutions converge to create efficient, sustainable, and interconnected mobility systems. As urban populations burgeon and cities face increasing challenges related to congestion, pollution, and limited infrastructure capacity, the need for integrated transportation solutions becomes paramount. This integration entails the seamless amalgamation of various transportation modes, such as public transit, cycling networks, ride-sharing services, and emerging technologies like autonomous vehicles and electric mobility, into a cohesive and user-centric framework. By leveraging advancements in digitalization, data analytics, and Internet of Things (IoT) technologies, smart cities aim to optimize transportation networks in real-time, enhance accessibility, and improve overall quality of life for residents and visitors alike. Multimodal transportation planning within the context of smart cities encompasses strategic decision-making processes that prioritize the efficient movement of people and goods while minimizing environmental impact and enhancing social equity. This introduction sets the stage for exploring the intricate interplay between transportation technologies and multimodal planning in the context of smart cities, highlighting the transformative potential of integrated solutions in shaping the future of urban mobility.

SYSTEM DEVELOPMENT

The methodology and analysis used in your research project should be documented in this section. Using the title's keywords in the opening few phrases of your writing is an easy tactic to use.

Introduction

Any system's key components may be examined from a wider angle if the case study is examined, which includes every facet related to the research topic's objectives. This thesis focuses on the employment of technology interventions in

conjunction with a multimodal transportation system in a smart city. As a result, the case study of Nashik City, Maharashtra, is taken into consideration in this research.

Projects implemented In Nashik, Maharashtra

A) Implementation of Bus transportation system in Nashik

The Comprehensive Traffic and Transportation Plan (CTTP), created in June 2017 by UMTC for the Nashik Municipal Corporation, projected 17.45 lakh people living in the city in 2016. The CTTP determined that a strong public transportation system was required to encourage a modal shift from the use of private automobiles to public transit, therefore meeting the city's transportation demands and discouraging the use of personal vehicles. Despite operating 243 buses on 508 routes in 2016, MSRTC decreased the size of its fleet to 176 buses on 385 routes in 2017 in an effort to offset its operating losses. An urgent fleet size demand of 400 buses was established to suit the public transportation requirements of Nashik Municipal Corporation. This requirement was based on the redesigned bus routes, updated operating criteria, and identification of possible terminal and depot facilities. The following were made available via the Bus Service project, which ULB carried out on a GCC mode: 400 vehicles are needed in total right away (135 standard size electrical buses (non-AC), 15 standard size electrical buses (AC), 180 standard size CNG buses (non-AC), 20 standard size CNG buses (AC), 45 medium size diesel buses (non-AC), and 5 medium size diesel buses (AC)). For nine years, more buses will be introduced annually: 50 electrical buses of normal size every year. To ensure the smooth operation of the bus fleet, ITMS is also offered. This bus travel was designed using a toolkit that the World Bank had provided for urban bus transportation. Due to ULB's inability to pay the substantial capital costs associated with the project, the PPP model employs a Gross Cost Contract (GCC) as the contract type.

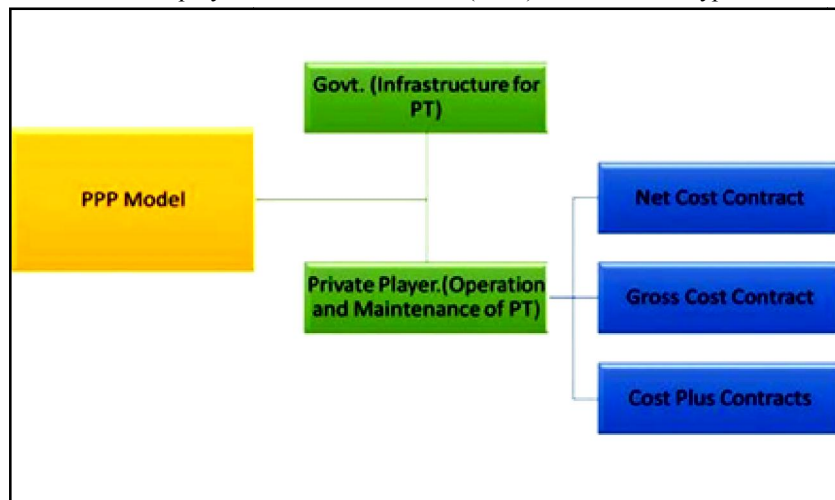


Figure- Types of Contracts in PPP model.

B) Implementation of Public Bicycle Sharing project in Nashik

One kind of NMT transportation that may be used for last-mile connectivity is public bicycle sharing. This initiative was taken into consideration by the Urban Local Body of Nashik, NMC, as part of the Smart City mission programs. Due to the significant upfront financial expenditures associated with big infrastructure projects (CAEX), a public-private partnership model is a desirable option. This model includes the following: A) the bidder, concessionaire, or contractor bears all CAEX costs.

B) The bidder, concessionaire, or contractor bears the O&M costs.

C) Upon the conclusion of the contract or agreement time, the bidder, concessionaire, or contractor turns over the whole infrastructure to the authority. This initiative in Nashik, Maharashtra, delivered 1000 bicycles on 100 docking stations. Based on a thorough investigation, the stations, kind of bicycle, dock-based operation, and method of charge collection were chosen. This project encountered several challenges for a variety of reasons that were not taken into account

beforehand. Any public entity that is involved has learned from this that preparing for unanticipated events is just as vital as planning for the project's physical features.

C) Implementation of Smart Parking Project in Nashik through Smart Cities Mission

The following are some of the parking-related suggestions put out in the SMART City proposal:

1. The creation of well-organized parking spots with smart parking management, both on and off street.
2. ICT-based parking management for 34 on-street and 7 off-street public parking spots has been suggested under the Urban Mobility Module. Through the City app, real-time information on available parking spaces will be made available with the use of the ICT system. Additionally, it will accept many payment methods, including e-payment, tokens, and smart cards.
3. Modernizing the parking spots is suggested under the Urban Transport module by installing cameras and sensors to gather information on parking lot availability and capacity.
4. An integrated parking management system has also been suggested to oversee 41 locations under the Urban Transit system. This will ease traffic on the roadway by preventing careless parking.

Such initiatives are necessary in India's urban areas because of the rise in the number of cars on the road, the scarcity of parking spots close to busy areas, and the consequent requirement for controlled parking. This initiative is currently being implemented in Nashik, thus making judgments before fully examining the data would not do the project justice. This project makes use of technologies such as digital payment processing, smart parking sensors, reservation of parking slots in advance, and use of VMDs to show open spots.

D) Implementation of Integrated Smart ICT solution at Nashik

Solutions for the following will be implemented in this project

- Smart Environment Monitoring
- Citizen Experience Centre
- Public Addressing System
- Variable Messaging Display
- Emergency Call Box – Panic Button
- Smart Bins

The principal aim of this project is to create a cooperative environment in which data from various departments, including transportation, water, fire, police, meteorology, e-governance, etc., can be combined and examined on one platform to produce aggregated data at the city level. Additionally, this aggregate city-level data may be transformed into actionable intelligence and sent to relevant residents and stakeholders. All transportation systems will be integrated into the ICCC, facilitating simple coordination, prompt decision-making, and speedy incident response. Through this initiative, the local government will be better equipped technologically to provide people essential transportation services.

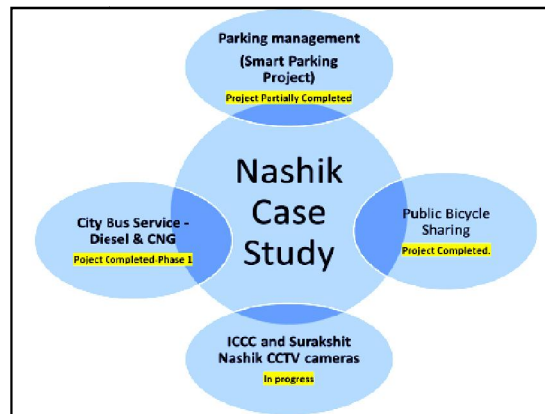


Figure- Current status of projects

II. CONCLUSION

Given the present state of Indian urbanization, fundamental considerations about multimodal transportation systems and technology interventions are needed. The Nashik case study makes clear that private investors are stepping forward to fund these kinds of big projects concurrently. However, it is essential that the public sector take into account the return on investment made by contractors in these kinds of massive projects. The advancement of technology will also aid in resolving environmental problems brought on by the usage of conventional fuels. Policy actions may have an impact on this. This will enable cities to expand sustainably, improving their quality of life.

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