

# Affordable Housing in Smart Cities: Policy Integration for Urban India

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**Abstract.** India's rapid urbanization has created a significant demand for affordable housing, particularly for low- and middle-income groups. Challenges such as uneven income distribution, soaring land costs, and limited infrastructure exacerbate the shortage. The Smart Cities Mission (SCM) aims to build sustainable, technology-driven urban spaces but has not fully integrated affordable housing policies. This paper reviews financial strategies including Public-Private Partnerships (PPP), Tax Increment Financing (TIF), Land Value Capture (LVC), municipal bonds, and Transit-Oriented Development (TOD), examining their role within smart city frameworks. Case studies from Pune, Ahmedabad, and Bhopal illustrate successful implementation and highlight remaining challenges. Key recommendations include establishing integrated urban finance authorities and leveraging smart technologies like GIS and AI. This integration can foster inclusive, efficient urban housing systems aligned with India's future urban development goals.

**Keywords:** Affordable Housing, Smart Cities, Urban Finance, PPPs, Land Value Capture, Urban Governance.

## 1. Introduction

India is undergoing a massive urban transition, with over 40% of its population expected to live in urban areas by 2035. This growth presents both opportunities and challenges especially in the provision of basic services and affordable housing. The urban housing shortage is estimated at over 10 million units, disproportionately affecting economically weaker sections (EWS) and low-income groups (LIG). At the same time, the Smart Cities Mission (SCM) represents a national initiative to develop urban centres through technology, sustainability, and citizen-centric governance. However, the SCM has not systematically addressed affordable housing. This paper explores the intersection between housing finance mechanisms and smart city policies, seeking ways to achieve a synergistic model where technology, governance, and financial innovation converge to deliver housing that is not only affordable but also inclusive and sustainable.

## 2. Financial Strategies for Affordable Housing

The following table 1 summarizes A comparative summary of strategic tools and their expected outcomes for supporting affordable housing.:

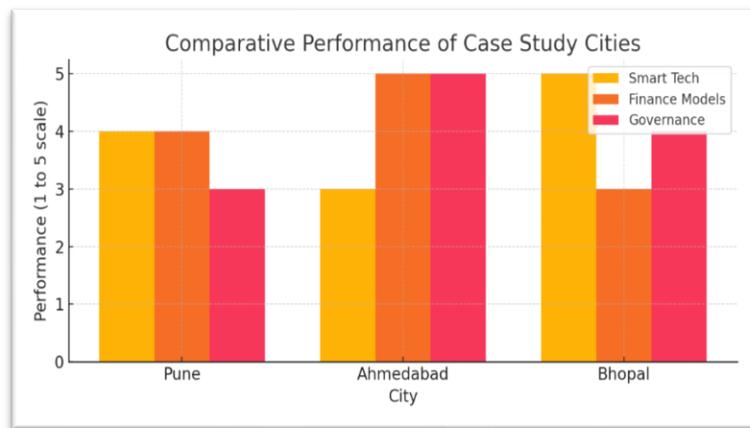
**Table 1:** Financial Mechanisms in Smart Cities.

Strategy	Key Tools	Expected Outcome
PPP	Viability Gap, Land Incentives	Private Participation
LVC	Impact Fees, TDR	Revenue Generation

<b>TIF</b>	Tax Growth Projections	Future Tax-based Funding
<b>Municipal Bonds</b>	ULB Credit Ratings	Infra Investment
<b>Govt. Subsidies</b>	CLSS, State Grants	Demand Boost

### 3. Case Study Insights

The comparative chart below evaluates three Indian cities on Smart Technology Use, Financial Model Integration, and Governance Coordination:



**Figure 1:** Comparative Performance of Case Study Cities.

The comparative performance chart reveals distinct strengths and gaps among the three cities. Ahmedabad demonstrates high effectiveness in both financial innovation and governance coordination, making it a well-rounded performer. Bhopal excels in the use of smart technology, supported by centralized digital governance tools. Pune, while showing consistent efforts across all dimensions, lags slightly in governance integration. These variations suggest that policy interventions must be context-specific and city-sensitive. Figure 1 shows the Comparative Performance of Case Study Cities.

### 4. Literature Review

Several studies and policy frameworks have shaped the discourse around affordable housing and smart cities in India:

- Gandhi [2] points out that rising land costs and informal housing dominate urban India, making financial innovation essential for increasing supply.
- Malhotra et al. [3] stress the potential of Tax Increment Financing (TIF) for funding infrastructure that supports housing, particularly in fast-growing urban corridors.
- Mittal et al. [4] discuss Transit-Oriented Development (TOD) and zoning reforms that incentivize private developers to include affordable units near public transport.
- Agarwal et al. [1] highlight the importance of Critical Success Factors (CSFs), such as inter-agency coordination, stakeholder trust, and regulatory clarity, in housing projects.

- MoHUA and NITI Aayog have issued various guidelines, including the PMAY Urban Scheme, which uses credit-linked subsidies and incentives to stimulate demand.

Despite these developments, there is limited integration of smart technology and finance mechanisms to support affordable housing under the Smart Cities Mission.

Insights from international practices enhance our understanding of this issue. For example, Singapore's Housing and Development Board (HDB) model demonstrates how public housing can be effectively integrated with digital planning tools, regulatory innovation, and strong institutional support [10]. In the United States, the Department of Housing and Urban Development (HUD) has promoted data-driven strategies through initiatives like the Smart City Challenge, aimed at improving housing access and equity [11]. Similarly, Vienna's socially inclusive housing policies are closely tied to sustainability goals and supported by advanced urban infrastructure systems, exemplifying how cities can align affordability with technological advancement [12].

## 5. Conceptual Methodology

This paper adopts a qualitative and exploratory framework, relying on:

- Secondary data from policy documents, academic literature, and urban finance reports;
- Case study analysis from cities implementing Smart Cities and housing finance programs;
- Comparative analysis to assess financial mechanisms' viability in Indian urban contexts;
- A normative approach suggesting integrated planning models based on global and local insights.

Rather than generating empirical data, the focus is on constructing an informed, explanatory narrative that can support future policy innovation and implementation.

## 6. Integration with Smart City Initiatives

Affordable housing and smart cities should work together because combining them makes cities more efficient, better to live in, and fair for everyone.

### 6.1 Smart Governance and Technology

- Use of Geographic Information Systems (GIS) to map slums and land availability;
- Aadhaar-enabled digital platforms for beneficiary identification, reducing fraud;
- Integrated command and control centres (ICCCs) for service delivery in housing clusters.

### 6.2 Transit-Oriented Development (TOD)

- Affordable housing near transit hubs improves accessibility to jobs and services;
- Cities like Ahmedabad and Delhi NCR have incorporated affordable units in TOD zones via zoning incentives.

### 6.3 Smart Infrastructure

- Green building codes, rainwater harvesting, solar lighting, and energy-efficient materials;
- Real-time utilities monitoring enhances quality of life in housing clusters.

## 7. Case Study Insights

**Table 2:** Comparative Overview of Smart City Housing Initiatives in Pune, Ahmedabad, and Bhopal.

City	Tools Used	Key Outcomes
Pune	Municipal Bonds, GIS	Mixed-use, Online Allotment
Ahmedabad	Land Pooling, LVC	Serviced plots, Digitized Planning
Bhopal	Central Portal, AI Tracking	Smart Housing Governance

Table 2 represents the Comparative Overview of Smart City Housing Initiatives in Pune, Ahmedabad, and Bhopal.

### 7.1 Pune

- Implemented smart city reforms and issued municipal bonds in 2017.
- Used GIS for land records, streamlined housing allotments via online platforms.
- Emphasized mixed-use development with affordable components near transit corridors.

### 7.2 Ahmedabad

- Innovated with land pooling and Town Planning Schemes (TPS) to provide serviced plots for housing.
- Integrated LVC tools with transport projects and digitized urban planning.

### 7.3 Bhopal

- Developed a centralized housing portal under Smart City governance.
- Used AI and automation to track construction and beneficiary status.

## 8. Challenges and Constraints

- **Land Acquisition Delays:** Legal disputes and high costs make urban land inaccessible.
- **Fragmented Governance:** Poor coordination between Smart City SPVs and housing boards.
- **Low Private Sector Interest:** Limited margins in EWS/LIG housing without strong incentives.
- **Digital Divide:** Many potential beneficiaries lack access to smart services.
- **Institutional Capacity:** Most ULBs lack technical expertise to implement finance tools like TIF or LVC.

## 9. Recommendations

- Establish Integrated Urban Finance Authorities to coordinate planning and finance.
- Pilot TIF and LVC models with policy support in select Smart City zones.

- Enhance PPP attractiveness via tax benefits, fast-track approvals, and land banks.
- Conduct digital literacy campaigns for housing beneficiaries.
- Offer performance-based grants for smart housing innovations by ULBs.
- Encourage sustainable construction using green codes and energy-efficient materials.

## 10. Conclusion

India's rapid urbanization has intensified the demand for affordable housing, especially among low- and middle-income groups. Although the Smart Cities Mission has upgraded urban infrastructure, affordable housing remains underprioritized.

Financial tools like PPPs, LVC, TIF, and municipal bonds offer promising avenues if backed by governance reforms and institutional capacity. Combined with smart technology—GIS mapping, real-time dashboards, and Aadhaar-based services these can improve transparency, efficiency, and inclusiveness.

Case studies from Pune, Ahmedabad, and Bhopal show that integrated policy and finance models can deliver housing that is inclusive, sustainable, and aligned with India's urban vision.

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