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Urbanisation Trends and Patterns in the North-Eastern Region of India: A Comparative Perspective

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Abstract

This article analyses urbanisation trends in India's North-Eastern Region (NER) in comparison with the national pattern. Urbanisation, a key driver of growth, has been slower in the NER than the national average, though states like Sikkim, Nagaland, and Tripura show notable progress due to improved infrastructure and policy support. The region's cultural diversity and geographical isolation create both opportunities and challenges for balanced development. While urban growth is concentrated in a few states, others such as Assam and Meghalaya lag behind, highlighting the need for targeted, region-specific policies to address emerging urban challenges and promote inclusive development.

Keywords

Population Growth, Urbanisation, Basic Amenities, NER, India.

Introduction

Urbanisation plays a pivotal role in driving economic growth, alleviating poverty, stabilising population growth, and promoting long-term sustainability. The rapid pace of urbanisation in Asia and Africa shows a global shift, with developing nations and emerging economies now at the forefront of urban growth. Urbanisation is increasingly recognised as one of the most significant challenges and opportunities of the 21st century. Currently, over half of the global population resides in urban areas, and this proportion is expected to reach 75 per cent by 2050 (UN DESA, 2015). A significant share of this

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urban expansion is projected to occur in Africa and Asia. Particularly in developing countries, migration plays a major role in urbanisation, driven by people's pursuit of social and economic opportunities or compelled by environmental degradation. The availability of better education, employment opportunities, and enhanced healthcare services in urban areas serves as a key pull factor driving rural-to-urban migration (Arya & Rejuna, 2024). Rapid urbanisation brings challenges such as overcrowding, inadequate infrastructure, and environmental stress. Over 50 per cent of forcibly displaced people now live in urban areas. India, with its large population, is a key contributor to this global trend, with projections estimating its share of the world's urban population to reach 10-14 per cent by 2050 (UN DESA, 2018), highlighting both opportunities and challenges for sustainable urban growth.

The North Eastern Region (NER) of India consists eight states: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura. This region is known for its rich cultural and ethnic diversity, encompassing over 200 ethnic groups with unique languages, dialects, and socio-cultural identities. It accounts for 7.97 per cent of the country's total geographical area and 3.78 per cent of its population. North East India has a unique trend in the growth of villages and towns compared to the national average. During 2001-2011, the NE India had experienced a higher growth in the number of towns and villages than that of the overall India (Ali, 2023).

Against this backdrop, the present article aims to examine the trends and patterns of urbanisation in the North-Eastern states and presents a comparative analysis with the rest of India.

Review of Literature

Urbanisation refers to the concentration of population in smaller areas and a shift from primary to secondary and tertiary occupations, leading to the growth of cities and towns. Closely linked to industrialisation and service-sector expansion, as explained by economic base and central place theories, it reflects both economic transformation and historical influences, such as colonial trade centres that shaped India's present urban structure.

Theoretical Literature

Myrdal's (1957) theory of cumulative causation explains how economic changes trigger further aligned transformations. He introduced the backwash effect, in which growth in one region draws resources from others, and the spread effect, in which regional growth can benefit neighbouring areas through demand, knowledge, and technology spillovers. When backwash dominates, regional inequalities worsen. Kaldor (1970) connects these ideas to external and agglomeration economies. Similarly, Friedman's (1966) centre-periphery model also predicts regional polarisation, though he notes

prolonged growth can eventually foster spatial integration. Perroux's (1955) growth pole theory also emphasises targeted intervention to reduce disparities.

Modernisation theory (Riesman, 1964) links Western urbanisation to industrialisation—a pattern mirrored in developing nations, though often bypassing industry for services, leading to over-urbanisation. Castells and Sheridan (1977) apply dependency theory to urbanisation, viewing it as tied to capitalist expansion and colonial exploitation. King (1990) highlights how colonial cities like Mumbai, Kolkata, and Chennai shaped global urban hierarchies. These cities, once imperial ports or capitals, now concentrate more on their resources and financial institutions. Yet, as Friedman noted, while resource concentration fosters growth, Myrdal's spread effects remain limited, deepening uneven development and benefiting urban cores more than peripheral areas.

Empirical Literature

Recent studies on urbanisation in India have highlighted diverse drivers and patterns of urban growth. Krishan (1993) identifies the slowdown of urbanisation in India, attributing it to a decline in rural-urban migration. The study points to agricultural development as an important factor that reduced the push for migration to urban areas by providing rural employment opportunities. On the other hand, Kundu and Gupta (1996) found that urban population growth in India has been fluctuating over recent decades. This inconsistency led to higher population growth in large cities and many of the towns have got the urban status. Despite this, the study concludes that urbanisation in India has not maintained a steady upward trajectory. Mathur (2005) observed that the post-liberalisation era witnessed significant urban expansion driven by population growth and rising employment in the manufacturing and service sectors. Cali (2009) emphasised a strong correlation between the level of urbanisation and economic growth across Indian states over time. Kalamkar (2009) concludes, unlike Krishan (1993), that faster growth in urban population is primarily driven by rural-to-urban migration.

Sridhar (2010) found that proximity to large cities positively influences the growth of nearby urban centres due to agglomeration effects. Bhagat (2011) observed that the emergence of new towns has accelerated urbanisation, a trend also noted by Kundu and Gupta (1996). Das (2013) highlighted a significant rise in urban population since Independence and noted stark regional disparities in its distribution. Tripathi (2013) linked urbanisation to higher economic growth and lower poverty, though with increased urban inequality. Thongkhant Hang P. (2015) emphasised the role of amenities in driving urban migration in Northeast India, leading to the rise of Class-I cities. Mahey and Tripathi (2016) found a positive relationship between urbanisation and economic growth in Punjab. Chaudhuri et al. (2017) reported diverse town growth patterns across states, while Tripathi (2017) suggested that improved infrastructure may not boost population in large cities but can enhance their economic contribution.

Data and Methodology

The present study is descriptive in nature and completely based on the secondary data collected from the census of India of 1991, 2001 and 2011. Also, the data of United Nations Population Division (compiled from World Bank data bank) has been used for the study. The extent / level of urbanisation is measured as the percentage of urban population in total population. Village town ratio has been calculated to know how many villages a state has against one town. It is calculated by:

$$\text{Village Town Ratio of state } i = \frac{\text{No. of Villages in states } i}{\text{No. of Towns in State } i}$$

Then, The Revealed Urban Concentration Index (RUCI) has also been calculated for all the NE states. This index is helpful in determining the comparative intensity of urban population absorption of the individual states over the national average. This index is the modified version of the Revealed Comparative Advantage Index (Balassa, 1977) which is originally used to measure the Revealed Comparative Advantage in International Trade. In this paper the index is modified to find the relative urban concentration intensity of the states.

$$\text{RUCI}_i = \frac{\text{Share of Urban Population in State } i}{\text{Share of Urban Population in India}}$$

After this, the pace of urbanisation in India, and NER is measured by the rate of change in the proportion of the population residing in urban areas over a specific time period. This is determined by analysing the variation in the share of the urban population between two periods. Symbolically,

$$\text{Speed of Urbanisation} = \frac{\text{Share of Urban Population in period } t - \text{Share of Urban Population in period } t - 1}{\text{Share of Urban Population in period } t - 1}$$

Results and Discussions

Population Trends of India vis-à-vis with the World

The exponential growth rates of the total population and urban population for India and the world from 1971 to 2021 are presented in Figure 1. Over this period, both India and the world experienced declining growth rates for total and urban populations, indicating a global trend of slowing population growth.

India's population growth rate was 2.23 per cent in 1971, exceeding the global rate of 2.05 per cent. By 2021, it declined to 1.14 per cent, closely matching the global rate of 1.11 per cent, indicating gradual stabilisation. Similarly, urban population growth fell from 3.26 per cent in 1971 to 2.38 per cent in 2021, though still higher than the global urban rate, which dropped from 2.78 per cent to 1.94 per cent.

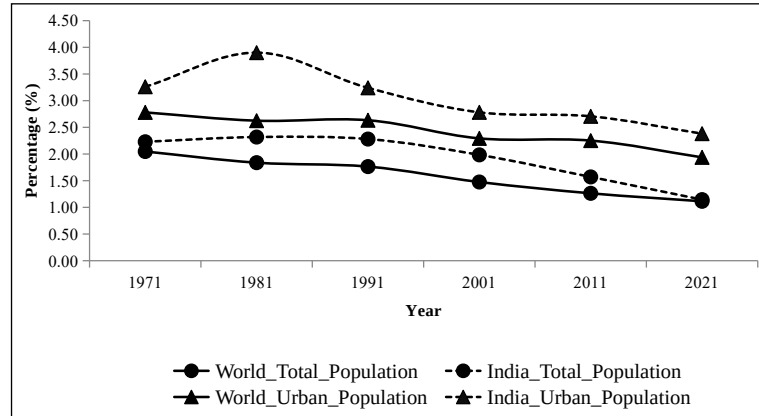


Figure 1: Exponential Rate of Growth of Urban and Total Population of India and the World

Source: United Nations Population Division

The urban population as a percentage of the total population reflects the extent of urbanisation and its growth over time across different countries. Figure 2 illustrates the growth of the urban population as a percentage of the total population for India, China, and the world from 1961 to 2023. India and China started with similar urbanisation levels in 1961 (18% and 17%, respectively), but China experienced a dramatic rise over the decades, reaching 65 per cent in 2023, far surpassing India's 36 per cent. This divergence highlights China's rapid urban development compared to India's more gradual progress.

Globally, the urban population share increased from 34 per cent in 1961 to 57 per cent in 2023, reflecting a steady global trend towards urbanisation. India's slower pace of urban growth contrasts sharply with China's accelerated transformation, particularly after 1991. The world average consistently outpaced India's growth but lagged behind China in recent years.

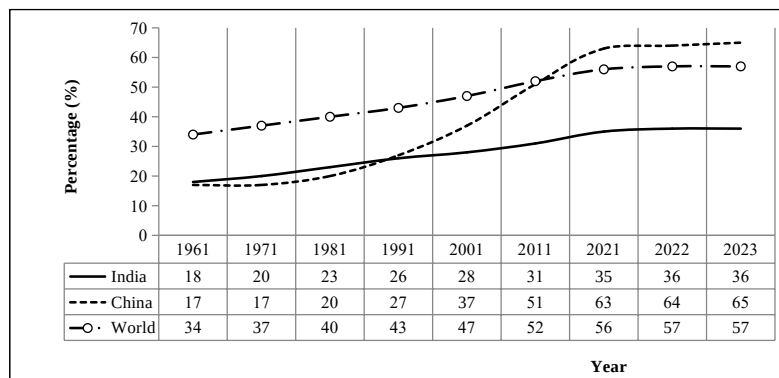


Figure 2: Urban Population as a Percentage of Total Population

Source: United Nations Population Division

Number of Villages and Towns in North Eastern States and India

Table 1 compares the growth and distribution of inhabited villages and towns in the North Eastern states of India, as well as the country as a whole, between 2001 and 2011. Over the decade, Arunachal Pradesh saw the highest growth in the number of villages (36.11%), while Sikkim experienced a decline (-5.56%). The number of towns grew significantly in states like Nagaland (188.89%) and Tripura (82.61%), reflecting a significant move towards urbanisation. In terms of the village-to-town ratio, Arunachal Pradesh had the highest ratio in 2001 (227.24), indicating a much larger rural population compared to urban areas. However, by 2011, the ratio declined in most states as towns increased in number, especially in Nagaland and Meghalaya, where urbanisation outpaced rural growth.

When comparing the NER with India, the data shows higher growth rates in both villages and towns in the North East. The region experienced a 6.49 per cent growth in villages and 62.99 per cent growth in towns, compared to India's 0.65 per cent and 53.71 per cent respectively. This indicates that urbanisation (in terms of number of towns) is advancing more rapidly in the North East compared to the national average. The village-town ratio has decreased both nationally and in the North East, signalling increasing urbanisation, but states like Nagaland and Tripura show more substantial urban growth than others.

Table 1: No. of Villages and Towns in North Eastern States vis-à-vis with India

States	No. of Inhabitant Village			No. of Towns			Village-Town Ratio	
	2001	2011	Growth (per cent)	2001	2011	Growth (per cent)	2001	2011
Arunachal Pradesh	3863	5,258	36.11	17	27	58.82	227.24	194.74
Assam	25124	25,372	0.99	125	214	71.20	200.99	118.56
Manipur	2315	2,515	8.64	33	51	54.55	70.15	49.31
Meghalaya	5782	6,459	11.71	16	22	37.50	361.38	293.59
Mizoram	707	704	-0.42	22	23	4.55	32.14	30.61
Nagaland	1278	1,400	9.55	9	26	188.89	142.00	53.85
Sikkim	450	425	-5.56	9	9	0.00	50.00	47.22
Tripura	858	863	0.58	23	42	82.61	37.30	20.55
North East India	40377	42,996	6.49	254	414	62.99	158.96	103.86
India	593732	597,608	0.65	5161	7,933	53.71	115.04	75.33

Source: Calculated from the Census, 2001 and 2011 data.

Comparative Picture of Urban Population Trends of North Eastern India vis-a-vis India

Table 2 provides a comprehensive overview of urbanisation trends in India, highlighting variations across states and Union Territories (UTs) between 2001 and 2011. At the national level, the urban population as a percentage of the total population increased from 27.81 per cent in 2001 to 31.14 per cent in 2011, reflecting a 3.33 percentage point (pp) rise. During this period, urban areas grew at a rate of 31.80 per cent, far surpassing the rural growth rate of 12.27 per cent, resulting in an urban-to-rural growth ratio of 2.6. This trend shows the rapid pace of urban expansion driven by rural-to-urban migration, natural population growth in cities, and the reclassification of rural settlements as urban areas. (Punyamurthy & Bheenaveni, 2023)

The NER, as an aggregate, saw its urban population share increase from 15.61 per cent in 2001 to 18.36 per cent in 2011, a modest 2.75 pp rise, slightly below the national average. Despite this, urban growth in the North-East (38.06%) outpaced its rural growth (13.59%), yielding an urban-to-rural growth ratio of 2.8, slightly higher than the national average. Among individual states, Arunachal Pradesh exhibited a balanced increase, with a 2.18 pp rise in urban population share and urban growth at 39.27 per cent, nearly double its rural growth of 22.56 per cent. Similarly, Nagaland demonstrated a unique trend with an urban growth rate of 66.57 per cent, though rural population decline (-14.55%) contributed significantly to this shift. Tripura showed remarkable urbanisation, with a 9.11 pp rise in urban population share, the highest in the region, driven by an urban growth rate of 76.17 per cent, far exceeding rural growth (2.22%).

Table 2: Population Trends in Urban India: A State-level Comparison

States / UTs	Urban Population as a per cent of Total Population		Share Differential (2001-2011)	Rural Growth	Urban Growth	Ratio of Urban-Rural Population Growth (2001- 2011)
	2001	2011				
Andhra Pradesh	27.30	33.36	6.06	1.73	35.61	20.5
Arunachal Pradesh	20.75	22.94	2.18	22.56	39.27	1.7
Assam	12.90	14.10	1.19	15.47	27.89	1.8
Bihar	10.46	11.29	0.83	24.25	35.43	1.5
Chandigarh	89.77	97.25	7.48	-68.53	26.96	-0.4
Chhattisgarh	20.09	23.24	3.15	17.78	41.84	2.4
Delhi	93.18	97.50	4.32	-55.64	26.83	-0.5
Goa	49.76	62.17	12.41	-18.51	35.23	-1.9
Gujarat	37.36	42.60	5.24	9.31	36.00	3.9
Haryana	28.92	34.88	5.96	9.85	44.59	4.5

States / UTs	Urban Population as a per cent of Total Population		Share Differential (2001-2011)	Rural Growth	Urban Growth	Ratio of Urban-Rural Population Growth (2001- 2011)
	2001	2011				
Himachal Pradesh	9.80	10.03	0.23	12.65	15.61	1.2
Jammu & Kashmir	24.81	27.38	2.57	19.42	36.42	1.9
Jharkhand	22.24	24.05	1.80	19.58	32.36	1.7
Karnataka	33.99	38.67	4.69	7.40	31.54	4.3
Kerala	25.96	47.70	21.74	-25.89	92.76	-3.6
Madhya Pradesh	26.46	27.63	1.18	18.42	25.69	1.4
Maharashtra	42.43	45.22	2.80	10.36	23.64	2.3
Manipur	25.11	29.21	4.10	17.68	44.83	2.5
Meghalaya	19.58	20.07	0.49	27.17	31.12	1.1
Mizoram	49.63	52.11	2.48	17.40	29.65	1.7
Nagaland	17.23	28.86	11.63	-14.55	66.57	-4.6
Odisha	14.99	16.69	1.70	11.77	26.94	2.3
Puducherry	66.57	68.33	1.76	21.33	31.47	1.5
Punjab	33.92	37.48	3.56	7.75	25.86	3.3
Rajasthan	23.39	24.87	1.48	18.96	29.01	1.5
Sikkim	11.07	25.15	14.08	-4.99	156.52	-31.4
Tamil Nadu	44.04	48.40	4.36	6.61	27.05	4.1
Tripura	17.06	26.17	9.11	2.22	76.17	34.3
Uttar Pradesh	20.78	22.27	1.49	17.97	28.82	1.6
West Bengal	27.97	31.87	3.90	7.68	29.72	3.9
North East	15.61	18.36	2.75	13.59	38.06	2.8
India	27.81	31.14	3.33	12.27	31.80	2.6

Source: Calculated from the Census, 2001 and 2011 data.

Note: Growth rate is in percentage.

When compared to the national average, urbanisation trends in the North-East reveal distinctive patterns. While the overall level of urbanisation in the NE region remains lower than the national figure, its urban growth rates indicate a gradual narrowing of this gap. Sikkim underwent remarkable urbanisation during this period, with its urban population share rising significantly by 14.08 percentage points to reach 25.15% in 2011 (see figure 3). This growth was fueled by an exceptional urban growth of 156.52 per cent, even the rural population experienced a decline of 4.99 per cent. In contrast, Meghalaya and Mizoram exhibited slower urbanisation, with minor increases in urban population shares of 0.49 pp and 2.48 pp, respectively, but still maintained urban growth rates higher than their rural counterparts.

Urbanisation trends across India reveal strong regional disparities. Southern states like Kerala and Tamil Nadu saw major gains, Kerala's urban share rose by 21.74 pp to 47.7 per cent in 2011, driven by 92.76 per cent urban growth despite a 25.89 per cent rural decline. Tamil Nadu's urban share grew by 4.36 pp, with urban growth (27.05%) far exceeding rural (6.61%). Andhra Pradesh added 6.06 pp to its urban share, supported by 35.61 per cent urban growth. In the west, Gujarat's urban share rose 5.24 pp, with urban growth (36 %) four times its rural rate (9.31%). Maharashtra, already urbanised, saw a 2.80 pp rise, with urban growth (23.64%) outpacing rural (10.36%). Haryana, in the north, posted a 5.96 pp gain, with 44.59 per cent urban growth—five times its rural rate (9.85%).

States with relatively low levels of urbanisation, such as Bihar and Uttar Pradesh, saw slower progress in urban growth. Urban population share of Bihar rose by only 0.83 pp, reflecting an urban growth rate of 35.43 per cent against rural growth of 24.25 per cent. Uttar Pradesh recorded a marginal 1.49 pp rise, with urban growth at 28.82 per cent compared to rural growth of 17.97 per cent. The lack of effective governance and resources in these states exacerbates spatial inequalities, limiting urban expansion (Kundu, 2014).

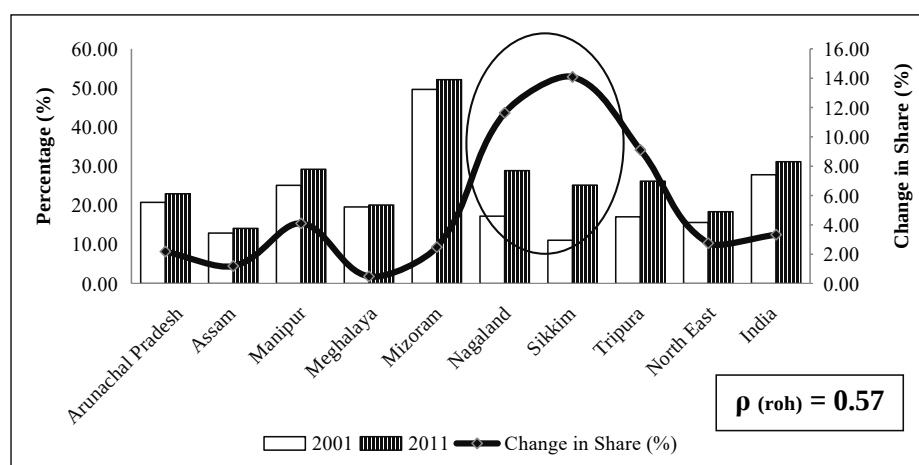


Figure 3: Population Trend in Urban India: A State-level Comparison

Source: Calculated from the Census, 2001 and 2011 data.

Table 2 also reveals unique outliers. Chandigarh and Delhi, highly urbanised UTs, saw urban population shares rise by 7.48 pp and 4.32 pp, respectively. However, rural population decline in these areas (-68.53% for Chandigarh and -55.64% for Delhi) shows the near-complete urbanisation of these territories. Goa, another notable case, exhibited a 12.41 pp rise in urban population share despite rural decline (-18.51%). This shift is indicative of a broader trend where urbanisation leads to significant rural depopulation, as individuals migrate for better economic prospects (Seetharam & Sridhar, 2019).

State level Urban Concentration Index

The Revealed Urban Concentration Index (RUCI) in Table 3 highlights diverse urbanisation trends across the North-Eastern Region (NER) and India from 1991 to 2011. While India's urban population rose from 25.7 per cent to 31.1 per cent, the NER's share increased modestly from 13.8 per cent to 18.4 per cent, with its RUCI rising from 54 to 59, indicating continued under-representation in the national urban landscape.

Sikkim, Nagaland, and Tripura showed the most significant progress, driven by infrastructure development, policy support, and migration towards urban centres. In contrast, Mizoram and Manipur displayed slower or balanced growth, while Assam and Meghalaya lagged due to limited connectivity, economic opportunities, and geographic constraints. Overall, the NER's urbanisation remains uneven, some states advancing rapidly while others face persistent structural and locational challenges. As noted by Bhagat (2011) and Kundu (2014), these disparities reflect the combined influence of geography, infrastructure, and socio-cultural factors shaping the region's urban transition.

The regional variation in RUCI across North-Eastern states shows the need for tailored policies to promote balanced urbanisation. Efforts to enhance connectivity, to increase investments in urban infrastructure, and address socio-economic disparities could help accelerate urban growth in underperforming states. Moreover, integrating regional urbanisation strategies with national urban development programmes could bridge the gap between the northeast and the rest of India. As India continues its urbanisation journey, understanding and addressing the unique challenges faced by the North-Eastern states will be crucial for achieving inclusive and sustainable urban growth.

Table 3: Degree of Urban Population Concentration

States	Urban Population as per cent of Total Population			Revealed Urban Concentration Index (per cent)		
	1991	2001	2011	1991	2001	2011
Arunachal Pradesh	12.80	20.75	22.94	50.0	75.0	74.0
Assam	11.10	12.90	14.10	43.0	46.0	45.0
Manipur	27.50	25.11	29.21	107.0	90.0	94.0
Meghalaya	18.60	19.58	20.07	72.0	70.0	64.0
Mizoram	46.10	49.63	52.11	179.0	178.0	167.0
Nagaland	17.20	17.23	28.86	67.0	62.0	93.0
Sikkim	9.10	11.07	25.15	35.0	40.0	81.0
Tripura	15.30	17.06	26.17	60.0	61.0	84.0
North East	13.83	15.61	18.36	54.0	56.0	59.0
India	25.70	27.81	31.14	100.0	100.0	100.0

Source: Calculated from the Census, 1991, 2001 and 2011 data.

Table 4 presents the speed of urbanisation across Indian states from 1991 to 2011. At the national level, urbanisation accelerated significantly from 8.22 per cent during the 1991-2001 period to 11.98 per cent in the following decade. This reflects India's overall movement towards urbanisation, driven by rural-to-urban migration, and infrastructural growth. The increasing rate of urbanisation in India during the 2001-2011 period indicates the country's transition towards more urban-centric growth, particularly in the context of economic liberalisation and increased industrialisation (Sarkar, 2020; Kundu, 2020)

Looking at the North-Eastern states as a group, the region exhibited a varied pace of urbanisation. The speed of urbanisation for the entire North East India was 12.90 per cent from 1991-2001, and it increased to 17.59 per cent from 2001-2011. This rise is significant but still remains below the national average. The relatively slower urbanisation in the first decade can be attributed to factors such as geographic isolation, underdeveloped infrastructure, and limited industrial growth compared to the rest of India (Ghising, 2024). However, the acceleration in the second decade indicates a shift towards urban growth, though at a slower pace than other parts of the country.

Urban growth in the NER varied across states. Sikkim led with 21.6 per cent (1991-2001) and 127.2 per cent (2001-2011) growth due to proactive policies and Gangtok's expansion (Lachungpa & Syangbo, 2024; Sharma & Singh, 2024). Nagaland rose from 0.15 per cent to 67.5 per cent with better connectivity and economic opportunities. Tripura showed steady growth, 11.5 per cent and 53.4 per cent, driven by infrastructure and jobs in Agartala (Goswami & Dutta, 2024; Das, 2024). Assam and Meghalaya grew moderately, while Manipur shifted from -8.7 per cent to 16.3 per cent due to post-conflict recovery and urban development in Imphal (Agrawal & Dixit, 2024; Sharma & Singh, 2024). These trends reflect different policies, infrastructure, and socio-political dynamics across the region.

On the other hand, Kerala stands out as an anomaly in the national context. The state saw a decline, at a rate of 1.66 per cent, in its speed of urbanisation during the 1991-2001 period, but a huge recovery of 83.73 per cent from 2001 to 2011. Kerala's unique social structure, where urbanisation was initially slower, may have been influenced by factors such as emigration, which has historically reduced the urban migration trend (Das et al., 2019). However, during the second decade, the state witnessed significant development in its cities, particularly in terms of infrastructure, IT hubs, and service industries, contributing to a sharp rise in urbanisation (Arya & Rejuna, 2024).

Among the states with higher urbanisation speeds, states like Andhra Pradesh and Tamil Nadu display substantial increases. Andhra Pradesh's urbanisation speed surged from 1.50 per cent in 1991-2001 to 22.19 per cent in 2001-2011, with rapid urban development in cities like Hyderabad and Visakhapatnam. Similarly, Tamil Nadu, with its urbanisation speed of 28.77 per cent in 1991-2001, experienced a more moderate 9.89 per cent in the subsequent decade, reflecting the maturing of its urban centres after

an initial boom. Both states demonstrate how industrialisation, improved infrastructure, and economic diversification can accelerate urban growth (Shekhar, 2021; Tripathi, 2021).

Punjab and Haryana, two of India's most industrialised states, also experienced considerable urban growth, although at a slower pace compared to some of the high-growth states. Punjab's speed of urbanisation was 14.98 per cent from 1991-2001 and 10.51 per cent from 2001-2011, while Haryana exhibited a faster urbanisation rate, moving from 17.57 per cent in 1991-2001 to 20.60 per cent in 2001-2011. The continued growth of Haryana's urban areas, particularly around Delhi, indicates the region's focus on economic and infrastructural development, positioning it as one of India's rapidly urbanising states. (Randhawa & Kumar, 2020; Mahey & Tripathi, 2016). See Table 4.

Table 4: Speed of Urbanisation in the States

States	Speed of Urbanisation (per cent)	
	1991-2001	2001-2011
Andhra Pradesh	1.50	22.19
Bihar	-20.15	7.98
Chandigarh	NA	8.33
Chhattisgarh	NA	15.68
Goa	21.36	24.95
Gujarat	8.29	14.02
Haryana	17.57	20.60
Himachal Pradesh	12.63	2.36
Jammu & Kashmir	4.24	10.34
Jharkhand	NA	8.11
Karnataka	9.99	13.79
Kerala	-1.66	83.73
Madhya Pradesh	14.04	4.44
Maharashtra	9.63	6.59
Delhi	3.65	4.64
Odisha	11.87	11.31

States	Speed of Urbanisation (per cent)	
	1991-2001	2001-2011
Pondicherry	4.02	2.65
Punjab	14.98	10.51
Rajasthan	2.12	6.35
Tamil Nadu	28.77	9.89
Uttar Pradesh	4.96	7.15
West Bengal	1.72	13.95
Arunachal Pradesh	62.15	10.51
Assam	16.24	9.24
Manipur	-8.70	16.33
Meghalaya	5.29	2.48
Mizoram	7.66	5.00
Nagaland	0.15	67.54
Sikkim	21.64	127.23
Tripura	11.50	53.41
North East India	12.90	17.59
India	8.22	11.98

Source: Calculated from the data compiled from Census, 1991, 2001 and 2011.

Note: NA represents the unavailability of data.

Access to Basic Amenities: A Rural-Urban Comparison

Table 5 shows the 2011 Census data on household access to basic amenities in India and the North-East. Urban households have far better access than rural ones. For example, 92.7 per cent of urban homes have electricity vs. 59.5 per cent in rural areas; 81.4 per cent have toilets vs. 19.8 per cent; and 65 per cent use LPG / PNG vs. just 5.3 per cent in rural areas. These gaps underscore how urbanisation improves citizens' living standards.

In North-Eastern states, the data reveals diverse patterns, with some states performing well in certain areas and lagging in others. Sikkim and Tripura, for instance, exhibit high levels of urban household access to amenities like electricity (98.7 per cent and 91.6 per cent, respectively) and toilets (95.2 per cent and 97.9 per cent). In contrast, states like Nagaland and Manipur demonstrate a rural-urban gap, with urban households significantly outpacing rural ones in access to facilities such as toilets and drainage systems. Meghalaya and Mizoram also reflect similar trends, where urbanisation has brought substantial improvements, especially in access to bathrooms, kitchens, and modern fuels. (Konwar, 2015)

Comparing North-Eastern states to the national average, rural households in this region generally outperform the national rural average in several indicators. For example, rural Tripura's access to electricity (90.2 %) is considerably higher than the national rural figure of 59.5 per cent. However, urban households in these states often mirror the national urban standards, indicating that while rural areas are catching up, urbanisation remains a critical driver of access to basic services.

Table 5: Percentage of Households Having Access to Basic Amenities (2011)

States	Roof		Drinking Water		Electricity		Toilet		Drainage		Bathroom		LPG / PNG		Kitchen	
	R	U	R	U	R	U	R	U	R	U	R	U	R	U	R	U
A.P.	18.3	12.1	74.5	89.8	55.3	96.0	30.7	89.5	36.8	66.2	45.0	80.6	11.4	77.5	52.8	93.0
Assam	1.2	15.1	71.6	63.1	55.5	84.1	52.7	93.7	21.9	56.3	29.7	84.5	13.0	68.0	88.0	91.0
Manipur	0.6	10.8	60.2	60.5	28.4	82.4	59.6	95.8	13.8	70.4	33.9	65.7	9.9	56.4	87.8	6.0
Meghalaya	1.5	32.8	37.1	78.0	61.2	94.9	86.0	95.7	43.9	80.3	43.7	79.9	16.0	45.6	108.0	95.0
Mizoram	4.1	24.7	32.2	75.2	51.6	98.1	53.9	98.5	22.9	79.5	28.5	89.7	2.6	83.8	89.6	93.0
Nagaland	1.4	15.7	42.2	39.7	68.8	97.4	84.6	94.6	37.6	76.5	58.8	94.4	17.9	52.7	82.7	96.0
Sikkim	1.5	55.0	53.2	92.1	75.2	98.7	69.2	95.2	39.5	92.1	77.7	92.0	6.7	85.1	96.1	90.0
Tripura	10.8	13.5	82.7	75.4	90.2	91.6	84.1	97.9	37.5	53.4	59.5	64.0	24.3	49.7	90.3	92.0
India	0.6	51.9	41.9	82.5	59.5	92.7	81.5	81.4	16.2	81.8	19.8	87.0	5.3	65.0	83.4	79.0

Source: Census-2011, Government of India.

Note: U stands for Urban; R stands for Rural; A.P. stands for Arunachal Pradesh.

Conclusion and Policy Implications

Urbanisation in India and the North-Eastern Region (NER) reflects shifting population dynamics, with migration and natural increase driving rapid growth, though rates are slowing globally. India remains ahead of global averages, while the NER lags, except for states like Sikkim, Nagaland, and Tripura, which show notable progress due to infrastructure improvements, economic growth, and supportive policies. Regional disparities are stark: southern states such as Kerala, Tamil Nadu, and Andhra Pradesh have urbanised rapidly, whereas northern and eastern states like Bihar and Uttar Pradesh lag due to weak governance and poor infrastructure. In the NER, targeted initiatives in Sikkim and other states are helping close the urbanisation gap, despite challenges from geographic isolation and socio-political constraints.

The Revealed Urban Concentration Index (RUCI) further emphasises the disparities in urbanisation across regions. While the NE states have a modest share of the national urban population, states like Nagaland, Sikkim have shown impressive urban growth, reflected in their rising RUCI scores. However, other states, such as Assam and Meghalaya, exhibit slower urbanisation, which may be attributed to geographical and infrastructural constraints. However, Guwahati has emerged as the dominant urban centre, accounting for a growing share of the region's total urban population. Its rise is mainly due to its strategic location as the gateway to the Northeast, better transport connectivity through road, rail, and air networks, and its role as the administrative, educational, and commercial hub of Assam and the wider region. Rapid migration from nearby districts and smaller towns has further reinforced its primacy. In contrast, cities such as Silchar, Dibrugarh, Shillong, and Imphal have either stagnated or declined in rank due to topographical constraints, limited industrial diversification, and slower infrastructural development. The concentration of investment and services in Guwahati has widened intra-regional urban disparities, underscoring the need for balanced growth across emerging secondary cities.

The North-Eastern Region's (NER) strategic location offers vast potential for urban and economic transformation. Ongoing projects such as the South Asia Subregional Economic Cooperation (SASEC) corridor, Asian Highway routes (AH1 and AH2), the Matarbari Deep Sea Port, and the expansion of rail and land port networks are expected to boost trade and connectivity across the region. These developments will likely intensify urban growth along transport corridors, leading to the rise of logistics hubs and industrial clusters, alongside greater demand for housing and infrastructure. To harness these opportunities, states must focus on developing secondary urban centres, strengthening urban planning and governance, enhancing cross-border cooperation, and ensuring sustainable, climate-resilient infrastructure for balanced and inclusive regional growth.

These varying urbanisation rates in the North-East point to the need for special policies that address the specific challenges of the region. Improved connectivity, investment in urban infrastructure, and targeted development programmes could

accelerate urban growth in underperforming states and contribute to a more balanced national urbanisation process.

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User Perspectives on Satisfaction in Urban Green Spaces: A Data-Driven Approach to Improve Urban Environments

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Abstract

Urban green spaces play a vital role in shaping ecological balance, social cohesion, and overall quality of life in urban areas, particularly in small yet rapidly growing towns in India. This study evaluates users' satisfaction levels in selected urban green spaces of Midnapore town, West Bengal. Primary data were collected from 420 visitors across two functionally distinct green spaces through a structured questionnaire survey. The findings indicate relatively higher satisfaction with ease of access, inclusiveness for different age groups, and perceived environmental contributions. In contrast, lower satisfaction levels were reported regarding maintenance standards, supporting amenities, and visual attractiveness. Principal Component Analysis revealed several underlying dimensions shaping user satisfaction, prominently including accessibility and safety, suitability, aesthetic attributes, amenities, usability, and ecological functions. Additionally, variables such as distance from residence, travel time, household composition, educational level, and expenditure during visits were found to significantly affect overall satisfaction. The study underscores the need for context-specific planning, inclusive design approaches, and improved management practices to strengthen the role of urban green spaces in enhancing urban liveability in small and medium-sized Indian towns.

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Keywords

Urban Green Spaces, User Perception, Accessibility, Urban Planning, Public Open Space.

Introduction

Urban green spaces including parks, gardens, playgrounds, and other vegetated public areas play a crucial role in improving residents' quality of life and satisfaction within contemporary urban environments (Dallimer et al., 2020). Historically, the evolution of such spaces can be traced to the formal gardens and elite recreational landscapes of 18th and 19th century Europe, exemplified by sites such as the Gardens of Versailles and Central Park in New York, which were characterised by aesthetic grandeur and restricted access (Keshavarz et al., 2016; Jones, 2018). With the rapid industrialisation of cities during the 19th century, urban problems such as congestion, pollution, and declining public health intensified, prompting reformers and planners to advocate for publicly accessible green spaces as instruments for social and environmental improvement (Shanahan et al., 2016; Platt, 2018; O'Reilly, 2019; Sugiyama et al., 2021). This shift led to the development of major public parks, including London's Hyde Park and the landscape designs of Frederick Law Olmsted, which emphasised inclusivity, recreation, and public well-being (Rabbitts, 2017; Jones, 2022).

Contemporary scholarship identifies multiple determinants influencing residents' satisfaction with urban green spaces. Accessibility consistently emerges as a critical factor, with closer proximity and ease of access strongly associated with increased usage and higher satisfaction levels (Conedera et al., 2015; Yang et al., 2018; Jamei et al., 2022). The spatial extent of green spaces also matters, as larger areas tend to accommodate a wider range of recreational activities and social interactions, thereby enhancing user experience (Haaland & van den Bosch, 2015; Zhang et al., 2021). The availability and quality of facilities such as walking trails, play areas, exercise equipment, and cultural or leisure infrastructure further contribute to user satisfaction (Veitch et al., 2021; Hurst et al., 2023). Equally important are basic amenities, including seating, lighting, and restroom facilities, which directly influence comfort and prolonged use. Perceptions of safety, shaped by maintenance quality, illumination, and visible security measures, significantly affect visitors' willingness to engage with these spaces (Badiora et al., 2020; Rahm et al., 2021; Trop et al., 2023). In addition, the aesthetic character of green spaces reflected in landscape design, plant diversity, and overall visual appeal has been shown to enhance relaxation and recreational satisfaction (Baró et al., 2021; Zhang et al., 2024; Hung & Chang, 2024; Naghibi et al., 2024; Zhang & Qian, 2024). Opportunities for social interaction, such as community events and informal gatherings, further strengthen users' emotional attachment and

sense of belonging (Lachowycz and Jones, 2013; Wan et al., 2021; Jiang & Zhen, 2022; Vargas-Hernández et al., 2023).

In the Indian context, urban green spaces encompass a diverse range of forms, including public parks, botanical gardens, urban forests, and community-managed open spaces. Their development has been shaped by historical influences from Mughal landscaping traditions as well as British colonial planning practices (Sharma et al., 2019; Khan, 2021). Following independence, urban development policies increasingly emphasised the role of green spaces in improving living conditions, promoting environmental sustainability, and supporting community well-being (Mell, 2018; Bedi et al., 2020; Gupta et al., 2020; Sarkar & Kar, 2023). Despite these intentions, many Indian cities particularly smaller urban centres continue to face challenges such as inadequate maintenance, encroachment, environmental degradation, and uneven spatial distribution of green spaces. Rapid urban expansion and limited municipal capacity further exacerbate these issues (Haaland & van den Bosch, 2015; Turaga et al., 2020). In response, innovative approaches such as green roofs, vertical gardens, and nature-based solutions are being explored, alongside national initiatives like the Swachh Bharat Mission and the Smart Cities Mission, which promote integrated green infrastructure development (Sukhwani et al., 2020; Shruti et al., 2020; Prasad et al., 2021; Chandiramani et al., 2022; Yadav et al., 2023).

Urban green space planning and management in India are guided by a combination of national policies, state-level planning frameworks, and municipal regulations. Key policy instruments including the Urban and Regional Development Plans Formulation and Implementation (URDPFI) Guidelines, the Smart Cities Mission, and the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) advocate equitable access, minimum per-capita green space standards, environmental sustainability, and inclusive public space design. However, in practice, smaller towns frequently experience disparities between policy objectives and actual implementation, manifested through uneven provision, limited upkeep, and weak institutional coordination. This disconnect underscores the importance of empirical, user-based assessments for evaluating the functional performance of urban green spaces, identifying access-related inequalities, and informing adaptive, context-sensitive planning strategies.

RESEARCH METHODOLOGY

Research Design

This study employed a cross-sectional data-driven research design to explore the utilisation patterns and perceptions of Urban Green Spaces (UGSs) among residents of Midnapore town, West Bengal, India. The design aimed to capture a snapshot of visitors' experiences during peak visiting hours, specifically in the morning (5:00 am to 8:00 am) and afternoon (5:00 pm to 7:00 pm). Data collection took place from March to May 2024.

Selection of Urban Green Spaces

The selected urban green spaces are located within municipal wards of Midnapore town (Figure 1) characterised by moderate population density, mixed residential land-use patterns, and a dominance of middle- and lower-middle-income households. Census-based indicators show a high prevalence of nuclear families, long-term residents, and owner-occupied dwellings within the surrounding catchment areas. The limited presence of alternative recreational open spaces in these wards has increased residents' reliance on public parks and playgrounds for routine leisure, physical activity, and social interaction. Recognising this socio-demographic context is essential for interpreting visitors' profiles and understanding potential structural barriers affecting access for specific groups, particularly elderly residents, women, and individuals from peripheral neighbourhoods.

Two urban green spaces (Table 1) were purposively selected based on three key criteria: (i) functional differentiation (a formally designed park versus an open playground), (ii) ease of access and proximity to surrounding residential areas, and (iii) contrasts in maintenance levels and availability of facilities. This selection strategy enabled a comparative assessment of user perceptions across differently managed and designed green spaces within the same urban setting.

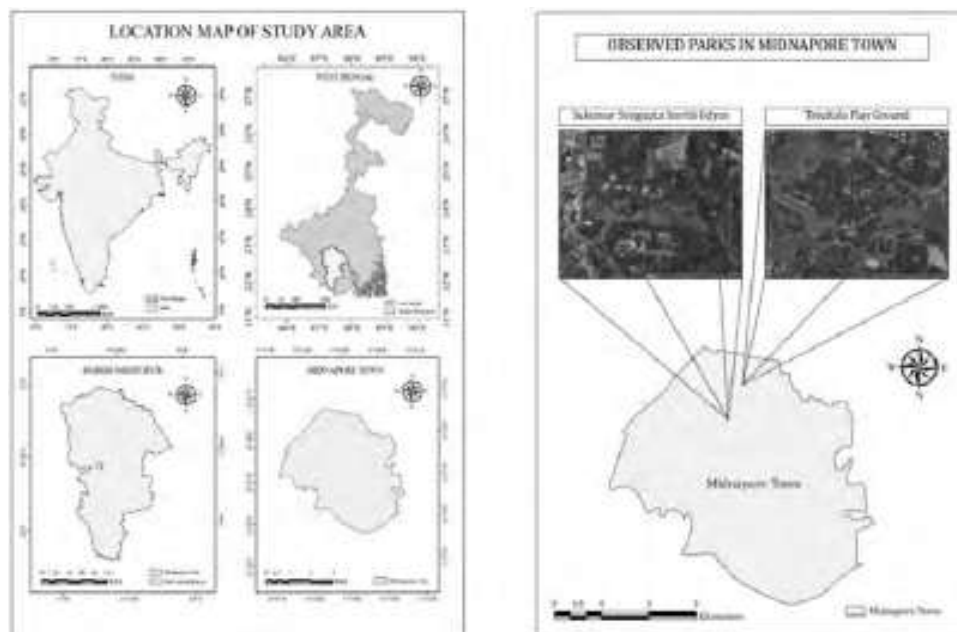


Figure 1: Location Map and Observed Urban Green Spaces in Midnapore Town.

Source: Prepared by the authors.

Table 1.: Selected Urban Green Spaces (UGSs) in Midnapore town for Primary Survey.

Name of the UGS	No. of Respondents	Percent	Remarks
Police Line Park (PLP), also known as Sukumar Sengupta Smriti Udyan	196	6.67	Public amusement park with recreational facilities well-maintained
Tetultala Play Ground (TPG)	224	3.33	Public open space without recreational facilities and not properly maintained
Total	420	00.0	—

Source: Primary survey conducted by the authors, 2024.

Population and Sample

The study sample comprised 420 users of urban green spaces in Midnapore town, representing a broad range of socio-demographic backgrounds. A convenience sampling approach was employed to facilitate the recruitment of respondents during peak visitation hours, ensuring the collection of authentic and experience-based responses. Eligibility criteria required participants to be at least 18 years of age and to have visited an urban green space within the preceding month.

According to the 2011 census, the total population of Midnapore municipality was 169,264. To calculate an appropriate sample size for interviews, Formula 1 was utilised, accounting for a 95 per cent confidence level and a five per cent margin of error.

$$n = \frac{(Z^2 \cdot p \cdot (1-p))}{E^2} \dots \text{Formula 1}$$

Where: n denotes the sample size needed, Z is the Z-score corresponding to the desired confidence level (approximately 1.96 for 95% confidence), p is the estimated proportion of the population that possesses the attribute in question (assumed as 0.5 to maximise sample size), E is the margin of error (0.05).

The calculated minimum sample size was approximately 385 respondents. To strengthen the robustness of the analysis and accommodate study-specific objectives, the final sample was expanded to 420 respondents, all of whom were active users of urban green spaces.

Data Collection

Primary data were gathered using a structured questionnaire specifically designed to assess user satisfaction and experiential quality of urban green spaces. The questionnaire consisted of four sections: (i) socio-demographic information, (ii) travel behaviour and visitation characteristics, (iii) perception-based satisfaction indicators across eight

dimensions, and (iv) perceived environmental benefits of green spaces. Responses to perception-based statements were recorded on a five-point Likert scale ranging from “very dissatisfied” to “very satisfied.”

Rather than directly measuring mental health outcomes, the study employed overall satisfaction levels and perceived functional performance of green spaces as proxy indicators of experiential quality and effectiveness.

Data Analysis

The reliability and validity of the measurement instruments for evaluating user satisfaction with urban green spaces were rigorously assessed. Cronbach’s Alpha revealed a high internal consistency with a coefficient of 0.902, indicating strong reliability, while a standardised value of 0.903 confirmed consistency after standardisation. Descriptive statistics were first calculated, including mean ratings and standard deviations for each satisfaction dimension, to identify overall trends. Subsequently, Principal Component Analysis (PCA) was employed to uncover underlying factors influencing satisfaction, effectively reducing data dimensionality and revealing relationships among various aspects. Principal Component Analysis was performed using a correlation matrix to ensure comparability among standardised variables. Components were retained based on eigenvalue criteria and conceptual interpretability. PCA facilitated the identification of latent satisfaction dimensions relevant for evaluating planning and design effectiveness. Finally, Chi-squared Automatic Interaction Detection (CHAID) analysis was utilised to examine how demographic factors and usage patterns impacted overall satisfaction levels, providing deeper insights into the characteristics of urban green space (UGS) users.

Results

Socio-demographic Profiles of the Sample Respondents

The survey of UGSs users (Table 2) highlighted a diverse demographic characteristics. The majority were aged 18-30 (41.7%) and over 60 (20%), with males comprising 65 percent of respondents. Most identified as Hindu (93.3%) and were married (60%), suggesting UGSs serve as family-friendly recreational spaces. Educationally, a large number of them were graduates (31.7%) or held postgraduate degrees (30%), indicating that higher education may influence UGS usage patterns. Employment was relatively balanced, although 53.3 per cent were unemployed, suggesting that UGSs provide an accessible leisure option for those not working. Household incomes were mainly in the INR 20,001-40,000 range (38.3%), highlighting affordability for lower- and middle-income groups. The majority lived within Midnapore Municipality (81.7%), were homeowners (78.3%), and had resided at their current location for more than ten years (66.7%), emphasizing the role of UGSs as a long-term community resource.

Table 2: Socio-demographic Profile of Sample Respondents.

Demographic variable	Category	Frequency	Percentage
Age group (in years)	Under 18	14	3.3
	18-30	175	41.7
	31-45	70	16.7
	46-60	77	18.3
	Over 60	84	20.0
Gender	Female and Others	147	35.0
	Male	273	65.0
Religion	Hindu	392	93.3
	Muslim	21	5.0
	Others	7	1.7
Marital status	Others	168	40.0
	Married	252	60.0
Educational status	Primary	21	5.0
	Upper primary	14	3.3
	Secondary	49	11.7
	Higher Secondary	77	18.3
	Graduate	133	31.7
	Postgraduate and above	126	30.0
Employment status	Unemployed	224	53.3
	Employed	196	46.7
Household income (in INR)	Up to 20,000	105	25.0
	20,001-40,000	161	38.3
	40,001-60,000	112	26.7
	60,001-80,000	21	5.0
	Above 80,000	21	5.0
Nature of family	Nuclear	168	40.0
	Joint	252	60.0
Number of family members	3-4	189	45.0
	5-6	161	38.3
	7-8	35	8.3
	Above 8	35	8.3
Residence	Outside Midnapore Municipality	77	18.3
	Inside Midnapore Municipality	343	81.7

Demographic variable	Category	Frequency	Percentage
Type of residence	Renter	91	21.7
	Homeowner	329	78.3
Duration of ownership/ rental (in years)	Less than 1 year	7	1.7
	1-5 years	84	20.0
	5-10 years	49	11.7
	More than 10 years	280	66.7

Source: Author's calculation based on primary data, 2024.

Travel Behaviour of the Sample Respondents

Travel patterns (Table 3) indicate that most respondents travelled from home (73.3%), primarily on foot (53.3%) or by bicycle (31.7%), reflecting high walkability. Daily visits were frequent (43.3%), with most respondents incurring no transport costs (56.7%). Travel times were generally short, with 36.7% reaching UGSs in under 15 minutes. Spending during visits was minimal; 43.3% reported no expenditure, while 31.7% spent on food and beverages, demonstrating that UGSs provide low-cost recreational opportunities.

Table 3: Travel Patterns and Expenditures of Sample Respondents.

Travel behaviours	Variable	Frequency	Percent
Origin of travel	Home	308	73.3
	Work	21	5.0
	Shops	14	3.3
	School	14	3.3
	College/University	56	13.3
	Others	7	1.7
	Total	420	100.0
Mode of travel	Walk	224	53.3
	Bicycle	133	31.7
	Drive (motorbike/car)	42	10.0
	Public transportation	14	3.3
	Others	7	1.7
	Total	420	100.0
Frequency of visits	Daily	182	43.3
	Several times a week	119	28.3
	Once a week	91	21.7
	Rarely/Never	28	6.7
	Total	420	100.0

Travel behaviours	Variable	Frequency	Percent
Transportation cost to visit UGSs (in INR)	Nil	238	56.7
	Less than 5	28	6.7
	5-10	42	10.0
	10-20	98	23.3
	More than 20	14	3.3
	Total	420	100.0
Travel time to visit UGSs (in minutes)	Less than 15 minutes	154	36.7
	15-30 minutes	105	25.0
	30-60 minutes	112	26.7
	More than 60 minutes	49	11.7
	Total	420	100.0
Accompanying persons during UGSs visit	Alone	105	25.0
	Friends	182	43.3
	Partner	70	16.7
	Children	56	13.3
	Others	7	1.7
	Total	420	100.0
Spending per visit to UGSs	None	182	43.3
	Less than 10 rupees	21	5.0
	10-20	126	30.0
	21-50	84	20.0
	More than 50	7	1.7
	Total	420	100.0
Primary expenditures during visits to UGSs	Nothing	168	40.0
	Food/beverages	133	31.7
	Equipment (e.g., sports gear)	7	1.7
	Entry fees (if applicable)	105	25.0
	Others	7	1.7
	Total	420	100.0

Source: Author's calculation based on primary data, 2024.

Users' Satisfaction with Urban Green Spaces

Satisfaction ratings across various dimensions (Figure 2) showed that accessibility scored relatively high (3.8), indicating convenient locations. Satisfaction with

maintenance was lower (3.2), highlighting a need for better upkeep. Facilities received moderate ratings (3.5), while suitability for different age groups was high (3.9), reflecting inclusive design. Safety scored 3.7, whereas appearance and amenities were the lowest-rated aspects (3.1 and 3.0, respectively). Overall, satisfaction with usage opportunities was 3.6, emphasising the recreational value of UGS while identifying areas for improvement.

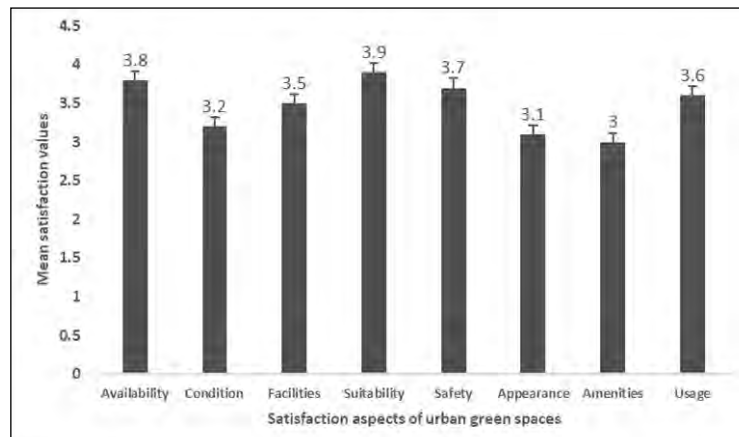


Figure 2: Satisfaction Aspects Towards Urban Green Spaces.

Source: Prepared by the authors using primary survey data, 2024.

Principal Component Analysis of Satisfaction

Principal Component Analysis (PCA) revealed seven components explaining variance in satisfaction (Tables 4 and 5). Component 1 reflected availability, accessibility, condition, safety, and environmental impact. Component 2 captured suitability for various age groups, security measures, and biodiversity. Components 3 and 4 focused on aesthetics and amenities, while component 5 represented usability factors such as travel time and crowding. Components 6 and 7 highlighted environmental benefits and overall satisfaction. Communalities ranged from 0.581 to 0.830, with high values for variables such as sufficient trash bins, adequate green space size, and biodiversity, indicating strong alignment with satisfaction dimensions.

Table 4: Communalities from Principal Component Analysis of User Satisfaction with Urban Green Spaces

Communalities		
	Initial	Extraction
There are enough green spaces in my area (size).	1.000	.806
Green spaces are easily accessible from my home.	1.000	.765
Green spaces are in good condition in my area (clean and well-maintained).	1.000	.777

Communalities		
	Initial	Extraction
Green spaces have sufficient trash bins and restrooms.	1.000	.830
Green spaces are well-equipped (amusement facilities).	1.000	.729
Green spaces have exercise equipments and sports facilities.	1.000	.772
Green spaces have picnic areas and seating arrangements.	1.000	.765
Green spaces in my area are suitable for children to play in.	1.000	.794
Green spaces are suitable for the elderly and people with disabilities.	1.000	.746
Green spaces are safe in my area.	1.000	.698
Green spaces have adequate lighting.	1.000	.740
Green spaces have a sufficient security presence.	1.000	.786
Green spaces are attractive in my area (appearance).	1.000	.730
Green spaces have diverse flora and fauna.	1.000	.773
Green spaces have aesthetic landscaping and design.	1.000	.776
Green spaces have adequate parking places.	1.000	.660
Green spaces have clean and functional restrooms.	1.000	.690
Green spaces offer food and beverage options.	1.000	.638
Green spaces are not crowded.	1.000	.708
Acceptable travel time, distance, and travel cost to green spaces.	1.000	.720
Green spaces are used for community events and activities.	1.000	.581
Environmental Impact.	1.000	.679
Green spaces contribute positively to air quality.	1.000	.730
Green spaces help in reducing urban heat.	1.000	.782
Green spaces promote biodiversity.	1.000	.788
Extraction Method: Principal Component Analysis.		

Source: Based on primary survey conducted by the authors, 2024.

Table 5: Component Matrix from Principal Component Analysis of Users' Satisfaction Towards Urban Green Spaces.

Component Matrix ^a							
	Component						
	1	2	3	4	5	6	7
There are enough green spaces in my area (size).	553	.038	.525	.423	163	103	.085
Green spaces are easily accessible from my home.	518	039	.633	.265	144	.052	.033
Green spaces are in good condition in my area (clean and well-maintained).	619	.399	.383	.203	.080	.129	.156
Green spaces have sufficient trash bins and restrooms.	625	.504	.100	070	.208	.327	.142
Green spaces are well-equipped (amusement facilities).	774	.008	013	019	.306	.148	.112
Green spaces have exercise equipment and sports facilities.	587	109	070	053	512	.012	.381
Green spaces have picnic areas and seating.	491	.021	299	166	596	.007	.228
Green spaces in my area are suitable for children to play in.	539	270	152	.423	165	.392	217
Green spaces are suitable for the elderly and people with disabilities.	332	383	514	.239	236	.329	056
Green spaces are safe in my area.	686	.009	326	.283	.001	.197	.050
Green spaces have adequate lighting.	465	.484	065	387	.031	.230	287
Green spaces have a sufficient security presence.	646	.317	209	118	.340	.279	134
Green spaces are attractive in my area (appearance).	610	054	067	.420	.291	.281	.107
Green spaces have diverse flora and fauna.	589	102	373	.281	.138	361	220
Green spaces have aesthetic landscaping and design.	619	005	381	.229	016	298	325
Green spaces have adequate parking places.	555	.319	.147	.088	053	462	.063
Green spaces have clean and functional restrooms.	474	.314	429	131	.121	289	.261
Green spaces offer food and beverage options.	494	.169	125	448	334	149	125
Green spaces are not crowded.	532	.225	.427	230	210	124	281
Acceptable travel time, distance, and travel cost to green spaces.	598	217	.345	120	244	.049	347
Green spaces are used for community events and activities.	536	.078	128	487	.084	.002	.164

Component Matrix ^a							
	Component						
	1	2	3	4	5	6	7
Environmental Impact.	558	.407	.127	216	.365	060	046
Green spaces contribute positively to air quality.	396	606	.182	316	.089	059	249
Green spaces help in reducing urban heat.	424	672	.003	331	.071	114	.154
Green spaces promote biodiversity.	456	593	.203	131	.231	.114	.321
Extraction Method: Principal Component Analysis.							
a. 7 components extracted.							

Source: Based on primary survey conducted by the authors, 2024.

Influences of Socio-demographic Factors

CHAID analysis indicated that family structure influenced satisfaction: nuclear families and smaller households reported higher satisfaction levels. Educational attainment was positively associated with satisfaction, suggesting that greater awareness and expectations may affect perceptions of UGS quality.

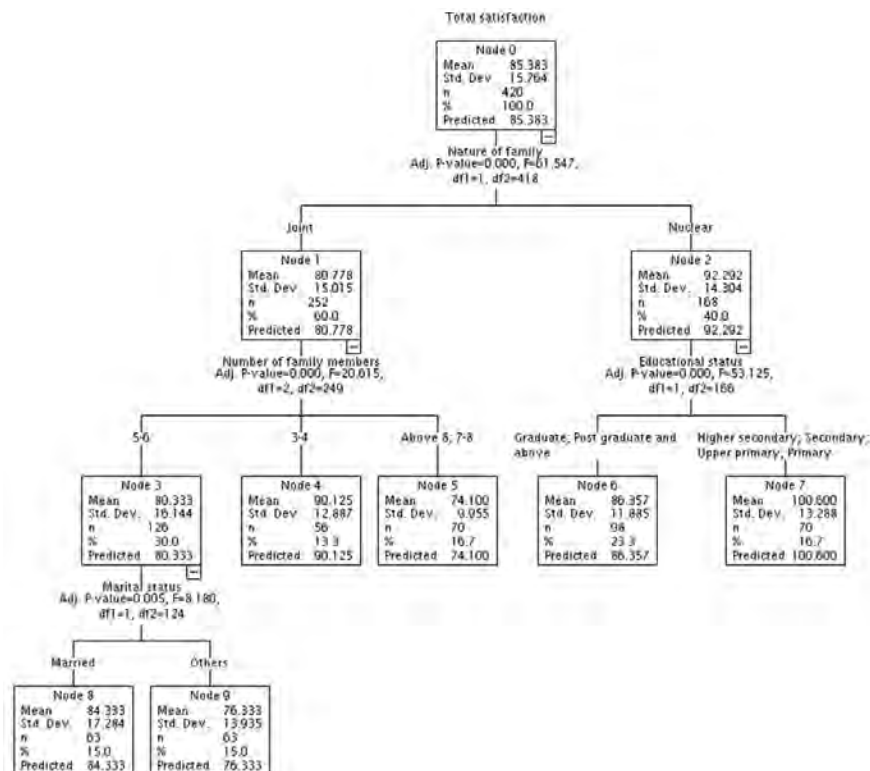


Figure 3: The CHAID Analysis on Total Satisfaction Data Related to Urban Green Spaces.

Source: Prepared by the authors using primary survey data, 2024.

Influence of Travel Behaviour

Travel-related factors significantly impacted satisfaction (Figure 4). Visitors from nearby locations (home or school) were more satisfied than those travelling from work, college, or shops. Spending per visit (10-50 INR) was linked to higher satisfaction, indicating that users value amenities. Visits with partners or children resulted in greater satisfaction than visiting alone or with friends. Short travel times (under 15 minutes) were associated with higher satisfaction, whereas longer commutes negatively affected perceptions, underscoring the importance of proximity and accessibility.

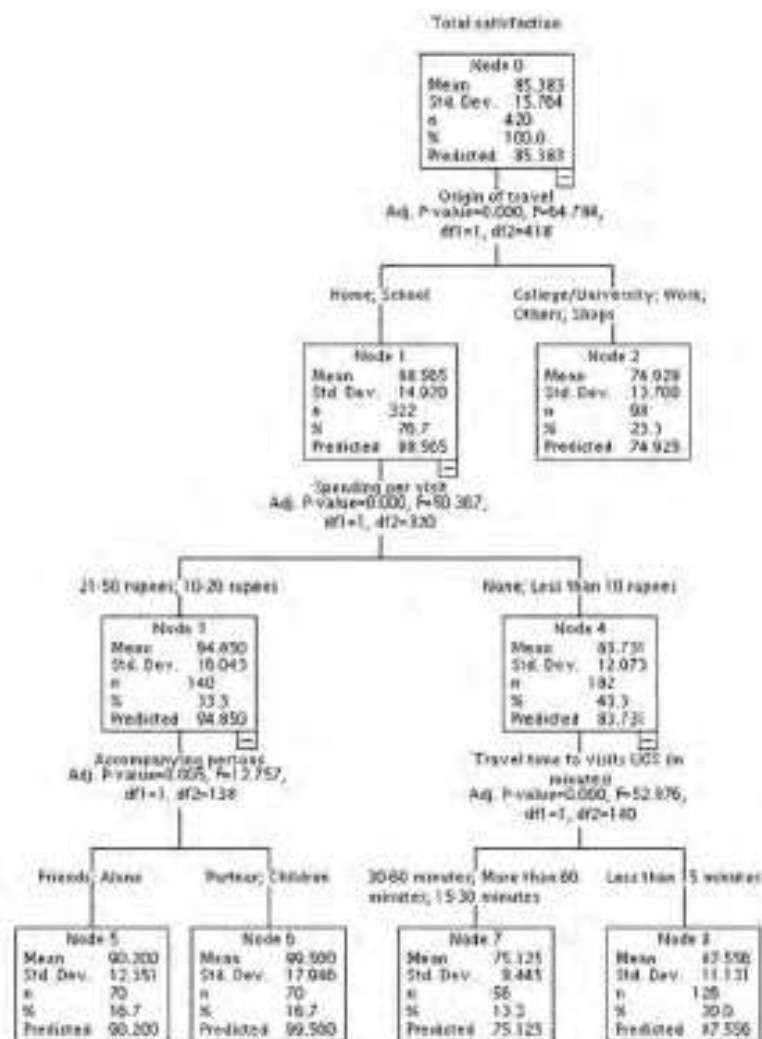


Figure 4: The CHAID Analysis Revealed Significant Factors Influencing Total Satisfaction Among Respondents in the Context of Urban Green Spaces.

Source: Prepared by the authors using primary survey data, 2024.

Discussions

The analysis demonstrates that perceptions of urban green spaces are influenced by an interplay of spatial configuration, ease of access, and management practices, which together shape both functional use and experiential quality. High satisfaction with availability and accessibility indicates that neighbourhood-level green spaces in Midnapore serve as essential everyday environments, particularly in a small-town context where private open areas and formal recreational infrastructure are limited. Consistent with findings from comparable urban settings, proximity and walkability emerge as stronger drivers of use than park size or specialised facilities (Feng et al., 2022; Liu et al., 2023). The predominance of walking and cycling further underscores the importance of local connectivity and compact urban form in promoting equitable access to green spaces.

Safety perceptions contribute significantly to overall satisfaction and are closely associated with physical design elements such as lighting, visibility, and continuous activity rather than reliance on formal security alone. In smaller urban centres, where green spaces are closely integrated into residential neighbourhoods, a sense of safety is often reinforced through familiarity and regular presence of users (Stigsdotter et al., 2020). Nonetheless, relatively lower satisfaction scores related to lighting and security presence indicate potential barriers for women, older adults, and evening visitors. This aligns with international evidence suggesting that perceived safety, rather than objective crime levels, is critical in sustaining routine use of public green spaces (Coley et al., 2021).

The provision and upkeep of basic amenities represent a key area of concern. Although users recognise the functional importance of green spaces, dissatisfaction with sanitation facilities, waste disposal, and seating highlights the central role of everyday maintenance in shaping user experience (Brown and Grant, 2021). Unlike large metropolitan parks that often emphasise themed or activity-oriented infrastructure, green spaces in small and medium towns depend heavily on consistent upkeep and basic comfort features. Similar patterns have been documented in other Global South contexts, where maintenance quality exerts a stronger influence on satisfaction than the presence of specialised recreational facilities (Rigolon, 2020; Maas et al., 2021). The Principal Component Analysis further supports this observation by demonstrating strong associations between cleanliness-related variables and overall satisfaction.

Visual quality and environmental characteristics, including landscaping, biodiversity, and overall appearance, also influence user perceptions, though these aspects currently receive moderate ratings. Respondents strongly acknowledge ecological benefits such as improved air quality and reduced urban heat, indicating an increasing awareness of environmental functions among users. This reflects broader international findings that perceived ecosystem services enhance emotional attachment to green spaces and encourage sustained use (Soga et al., 2020; Shanahan et al., 2022).

However, lower satisfaction with aesthetic design suggests that ecological functions are not always translated into visually engaging landscapes, pointing to the need for context-appropriate planting and design strategies.

Usability and inclusiveness emerge as important cross-cutting themes. While green spaces are generally perceived as suitable for children, comparatively lower satisfaction among elderly users and individuals with disabilities reveals design constraints related to accessibility, seating comfort, and pathway quality. This issue is particularly relevant in Indian towns experiencing demographic ageing without corresponding adjustments in public space design. Evidence from international studies indicates that relatively low-cost interventions such as barrier-free paths, shaded seating, and frequent resting points can substantially improve usability across age groups (Wolf et al., 2021).

From a planning and policy perspective, the findings suggest that foundational attributes such as proximity, safety, and basic amenities exert a greater influence on satisfaction than advanced recreational infrastructure in small and medium towns. Observed differences in satisfaction across household structure, educational attainment, and travel behaviour indicate that standardised design approaches may fail to address the diverse needs of local populations. Integrating user perception data with planning frameworks such as URDPFI guidelines and Smart City initiatives can help align regulatory standards with lived experiences. Overall, the study demonstrates that perception-based assessments offer a practical and scalable approach for informing neighbourhood-level green space planning, particularly in resource-constrained urban contexts.

Conclusion

This study offers valuable insights into users' satisfaction with urban green spaces and their implications for urban planning and policy. Accessibility emerges as the most influential factor shaping use and satisfaction, emphasising the need for green spaces within walkable distances and improved pedestrian connectivity. Inclusive design that accommodates diverse age groups, physical abilities, and household structures is essential for ensuring equitable access, while safety measures such as adequate lighting and visible surveillance are critical for sustaining user confidence. Maintenance quality and visual appeal remain major concerns, as deficiencies in cleanliness, amenities, and aesthetics significantly reduce satisfaction. Providing basic facilities such as seating, restrooms, and simple recreational infrastructure can greatly enhance comfort and usability. Encouraging community-based activities further strengthens social interaction and reinforces the civic role of green spaces, while integrating ecological functions such as heat mitigation and biodiversity support enhances their multifunctional value.

The study is limited by its focus on only two sites, restricting broader generalisation. Future research should include more locations, longitudinal observations, and spatial analyses to address service-area inequalities. From a policy perspective, aligning local

green space planning with national frameworks such as the URDPFI Guidelines and Smart Cities Mission while grounding decisions in user perception data can improve equity, effectiveness, and responsiveness in small and medium-sized Indian cities.

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An Approach Towards Elder-friendly Cities

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Abstract

The population of elderly people, i.e. above the age of 60 years has increased substantially in the last two decades in India. It increased from 7.4 per cent in 2001 to 8.3 per cent in 2011 and expected to reach 12.4 per cent by 2026, with 71 per cent in rural and 29 per cent in urban India. Modern cities are increasingly overlooking a vital truth: they belong to their inhabitants. From children and teenagers to the elderly, every generation has unique aspirations and needs that must be reflected and fulfilled by their urban environment. It is a widely accepted fact among the design fraternity that the physical environment that supports the elder people is likely to fulfill the needs of all other age groups. This paper identifies the issues faced by the elderly, discusses the need for age-friendly cities and explores the policy concerns as well as suggests the key design guidelines at local-level outdoors which help in enhancing the quality of life of the elderly in urban India.

Keywords

Urban elderly, Outdoors, Accessibility, Legibility, Livable, Inclusive development.

Introduction

The immense physical growth in the past few decades in Indian cities due to various factors has raised certain important questions as far as the quality of life of inhabitants is concerned. One of the major concerns which the cities of today are forgetting is that they belong to their inhabitants—to the children, to the teenagers, to the young and to their senior citizens. All age groups have their aspirations and needs which they expect to be fulfilled by their surrounding environment—the buildings, the urban spaces, the open spaces, the movement systems, etc. where they live, work, play, move and walk. In India, with the majority of its population being less than 30 years of age, the focus of development shifts towards addressing the needs and advantages of the youth while the problems of the senior citizens remain largely unaddressed. There cannot be any

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meaningful development in the city if it fails to fulfill the requirements and aspirations of its citizens of varied age groups. It is a widely accepted fact among the design fraternity that the physical environment that supports the elder people is likely to fulfill the needs of all other age groups (Martinoni et al., 1970).

The population of elderly people, i.e. above the age of 60 years has increased substantially in the last two decades in India. It increased from 7.4 per cent in 2001 to 8.3 per cent in 2011 and expected to reach 12.4 per cent by 2026 (*India's Daily E-magazine of GK and Current Affairs*, 2013) with 71 per cent in rural and 29 per cent in urban India. The 'Elderly in India 2016' Report by Ministry of Statistics and Programme Implementation, Government of India, states that the life expectancy at birth during 2009-13 was 69.3 years for women and 65.8 for men. It also revealed that at the age of 60 years average remaining length of life was about 18 years (16.9 years for men as against 19.0 for women), while at the age of 70 the life expectancy was less than 12 years with 10.9 years for men as against 12.3 for women. The Report further explained that the old age dependency ratio increased from 10.9 per cent in 1961 to 14.2 in 2011. For females it was 14.9 per cent while for males it was 13.6 per cent. As per 2011 census, this old age dependency ratio is 12.4 per cent in urban areas as against 15.1 in rural parts. The working old age population in rural areas is 66 per cent men and 28 per cent women as compared to urban areas with 46 per cent men and 11 per cent women. It shows that there is a large number of non-working elder people in urban areas (*The Times of India*, 2016).

In addition to examining policy-level concerns, this paper aims to explore the various design guidelines at local-level outdoors which are helpful in augmenting the quality of life of the elderly in urban India. There is no doubt that issues pertaining to the elderly are not homogeneous as they are determined by their surrounding environments, so varied in nature. There cannot be any standard design solutions but the attempt here is to help the designers in decision-making, however, specific design solutions shall come out of the corresponding contexts and requirements.

Characteristics of the Urban Elderly

The Government of India in 1999 adopted 'National Policy on Older Persons' which defines 'elderly' or 'senior citizens' as people of age 60 years or above. People aged between 15-59 years are considered as working population. At 60, people retire or withdraw themselves from work (Nayak, 2014). These elderly persons then experience change in their customary roles at this stage. With the rapid change in the physical and social milieu of urban India and the prevalence of nuclear family set-up, the urban elderly are experiencing emotional, physical, and social insecurity apart from financial issues. These people have different needs and preferences, but the common issues faced by them are:

- a. Sensory and perceptual changes;

- b. Decline in physical mobility, muscular efficiency and strength resulting in decreasing confidence of accomplishing tasks independently;
- c. Loss in comprehension and orientation, forgetfulness, incoherence;
- d. Decrease in the confidence of self-defense against any kind of odds; and
- e. Decrease in social contacts, inadequate intergenerational ties forcing the elders into an experience of left behind in a hostile environment, and increase in social isolation. (Sarkissian et al., 2013).

The higher levels of congestion, pollution, crime rates and the lower levels of safety, togetherness, variety undermine the quality of life of urban elderly. Cities offer great cultural and entertainment opportunities and service facilities but only a handful of senior citizens, who could afford, take advantage of these. The increased dependency ratio of senior citizens exerts more economic pressure on working population (Gusmano et al., 2010).

Need for Age- Friendly Cities

‘Active ageing is the process of optimising opportunities for health, participation and security in order to enhance quality of life as people age’ (*London Age- friendly Cities Research Report 2007* – World Health Organisation’s global initiative).

An age-friendly city is defined by a culture of inclusion for all generations, prioritising respect for the diverse needs and autonomy of its older residents. Such environments are characterised by their flexibility and commitment to honouring the choices and aspirations of the elderly. It makes active ageing enjoyable and respectful. The strategies for age-friendly cities infuse positivity in urban life. The cities gain immensely with the inclusion of elderly and the elders also benefit from the balanced urban living. Senior citizens have lots to offer to younger age groups and children. Building design is measured by its ability to eliminate the physical obstacles that make spaces uncomfortable or dangerous for older adults. Small improvements in the built environment make cities livable for the elderly with poor physical or mental health and enhance opportunities to age them actively. The holistic policies for co-existence of all age groups ensure the decision taken for the elders to age actively would not create any negativity and hamper the aspirations and development of the others.

Senior citizens are physically and mentally at risk outdoors. The issues of safety, affordability, unsympathetic driving and unreliable public services make them feel insecure and out of place. The elders who can afford it, sometimes, tend to live in suburban retirement communities with some security arrangements. There exist different perspectives among senior citizens of active ageing. One thought considers this part of life an opportunity to enjoy and fulfil their dreams after getting free from work and family. Cities for such people are ‘theatres of life’. The other thought,

however, emphasises on delaying the effects of ageing by keeping themselves fit, working till later years, actively engaging in cultural clubs and social causes. Cities for such people are places of good food, medical facilities, outdoors for healthy living and body reshaping, and community participation (Hanson, 2002). One thing worth considering is that cities also have concentrations of senior citizens who are poor and need more attention. Focusing on inclusive development determines the following goals for aged people in the cities:

- a. ***Enhancing dignity of the elderly:*** Retirement and ageing accompany the feeling of loss of value and respect. Elders have the maturity, the life-skills based on their experiences, time for society by participating in social, environmental and cultural causes. Their importance in the city needs to be recognised and respected. This can be done by imparting them with the sense of belongingness, security and respect by giving preferential treatment. This would improve their quality and zeal for life (Planning Department HK, 2002).
- b. ***Provision of adequate care services:*** The elders need to be supported by adequate health care and community services which would enable them to grow old in a familiar environment for the maximum part of their later life.
- c. ***Providing suitable outdoors:*** Independence, autonomy, sociability and safety are the major concerns of the senior citizens. Most of the seniors experience reduced mobility with age which makes it difficult to access nearby places like parks, clubs, transport stops, nearby shopping areas which were otherwise part of their everyday life earlier. This loss of feeling of 'home space' to sustain a meaningful existence is one of the root causes of insecurity (Farmer, 1999). The qualities of neighbourhoods in which older people live, influence their quality of life (Paduch, 2008). Research has established that mortality rates among older people are higher in poorly designed neighbourhoods with abandoned lots and spaces.

Older people living in supportive outdoors are at ease with their surroundings and enjoy outdoors to their maximum. These people are socially and physically more active, healthier and satisfied from life. They spend more time in outdoor environment than does the younger generation. Such outdoors enhance rather than hinder their independence, autonomy and consequently boost their self-confidence (Farmer, 1999). People feel attached to such spaces. Personalisation of spaces makes sense to elders, enhances opportunities for exploration, generate new choices and support new behaviour.

Barrier Free Regulations for Age- Friendly Built Environment in India-- Towards Universal Accessibility

The formulations for barrier free regulations for the disabled and the elderly have evolved through a long journey in India beginning from 1960s and continuing till date. The concept of barrier free environment is dynamic and keeps extending its scope continuously beginning with the making of specific guidelines for accessibility to the

development and integration of universal accessibility by incorporating principles of universal design.

Traditionally, the disabled and the elderly were marginalised with limited provisions for inclusion in society. It has been presumed that the recommendations and the guidelines established for the people with disability would invariably make buildings convenient for elderly persons as well as for those suffering with any kind of physical ailments. The initiative for creating regulations for the disabled was first taken in India by Central Public Works Department. It focused on providing an environment for independent functioning of these people in everyday life and came out with guidelines towards this end in 1968. These guidelines though recommendatory and not mandatory, addressed various aspects of building design to facilitate physical accessibility covering provision of ramps, staircases, entrances and exits, lifts, toilets, provision of signage, etc. These guidelines, though limited in scope, laid the foundations for the accessibility legislation and regulations in India for universal accessibility (Laskar et al., 2021).

‘Universal Design’ is an umbrella concept which lays down fundamental design concepts for accessible and inclusive environment meant for all. The principles of universal design are beneficial to all sections of society including disabled, elderly, pregnant women among others. It upholds the principle of equality for all. Four major requirements need to be met for universal accessibility include mobility requirement, sensory requirement, visibility requirement and cognitive requirement. Accessibility includes pathways for wheelchair users and visually impaired persons, accessible horizontal and vertical circulation like stairs and ramps with specific designs, accessible washrooms and other utilities, non-slippery surfaces including tactile surfaces color contrasts, provision of signages and symbols at selected locations inside and outside (Laskar et al., 2021).

The Government of India enacted ‘The Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act 1995’ which was first of its kind to recognise the rights of persons with disabilities in India. The Act defined and covered seven types of disabilities. It aimed to create barrier free environment and stated that public places including buildings should be provided with accessibility features. It assigns responsibility to the centre and state governments to provide services and facilities to ensure equal opportunities and participation for people with disabilities. It mandated the Central Government to make guidelines and standards to ensure accessibility to new buildings and retrofit the existing structures towards this end. Key aspects include accessibility to physical environment within and outside the building, transportation and information and communication technology. The ‘*Guidelines and Space Standards for Barrier Free Built Environment for Disabled And Elderly Persons*’ was also prepared by the Central Public Works Department in 1998 to ensure that everyone (including disabled and elderly) has equal access to everyday life. The access needs of diverse disability groups were considered while forming these guidelines (CPWD, 1998).

Several endeavours were witnessed at the international level in the past few decades towards the needs of accessibility of varied groups. The landmark effort among these was the UN Convention on the Rights of Persons with Disabilities (UNCRPD) which came into effect in 2008, ratified by India also. This convention viewed accessibility not as a medical problem but a societal issue. It states that society needs to be changed to ensure full freedom and rights to the disabled. It emphasised the need and importance of accessibility to physical, social and cultural, economic and other necessary infrastructure including information and communication. Under the Persons with Disability Act 1995 and in line with UNCRPD, the Ministry of Urban Development, Government of India, prepared '*Harmonised Guidelines and Space Standards for Barrier Free Built Environment for Persons with Disability and Elderly Persons 2016*' to ensure built environment is fully accessible to the needs of persons with disability and elderly covering a wide range of accessibility standards making environment universally accessible and inclusive (MoUD, 2016).

A new disability legislation, '*The Rights of Persons with Disabilities Act 2016*' (RPWD Act 2016) was enacted which makes universally accessible, inclusion and non-discrimination mandatory in India. Different clauses of this Act aim to ensure new and existing buildings are accessible within a given time frame. This Act also includes service providers, private agencies in making services accessible in a fixed time (RPWD Act document, 2016). Under this Act, the National Building Code of India also incorporated disability specific provisions in detail. The accessibility provisions in National Building Code of India 2016 (BIS 2016) were almost similar to the Harmonised Guidelines and Space Standards for Barrier Free Built Environment 2016. These together formulate the strong base towards making built environment accessible and inclusive. Under the RPWD Act 2016, the accessibility standards given in NBC 2016 are legally enforceable. The NBC 2016 also includes the private developers and builders who largely undertake construction activities under its ambit in providing accessibility features in their buildings. The RPWD 2016 enlarges the scope of disability by increasing the number of disability types from seven to twenty-one. The NBC 2016 recognised the need and provision of different specialists/professionals in universal accessibility for inspection of buildings, periodic accessibility audit and issuance of certificate for compliance of regulations/bye-laws of accessibility features in built environment (Laskar et al., 2021).

The *Harmonised Guidelines 2016* primarily focused on barrier free environment and removal of physical barriers for accessibility. As a follow-up of 2016 guidelines, the Government of India released '*Harmonised Guidelines and Standards for Universal Accessibility in India, 2021*' as a journey towards inclusivity and universal design making India more accessible. It includes all aspects of life accessible---physical, social, environmental and digital. These 2021 guidelines are mandatory for all agencies, government and private, under RPWD Act 2016 (MoHUA, 2021).

The Government of India further introduced the Rights of Persons with Disabilities (Amendment) Rules 2023 modifying the existing Rights of Persons with Disability Rules 2017 by incorporating several new accessibility standards in different sectors. These 2023 rules also include Indian standards covering ICT products and services (MoSJE Notification, 2023).

National Policy for Senior Citizens 2011

The policy was announced in 1999 by the Government of India to address the concerns of the elderly. The policy and plans were put in place by the central and state governments. The policy aimed to provide adequate shelter and welfare to senior citizens and specifically to those who are vulnerable. With the changing needs of the elderly, the Government reviewed and formed revised policy called National Policy for Senior Citizens (MoSJE, GoI, 2011).

The programmes were prepared in relevant areas by the Government of India in support of the elderly. Stress has been laid on inter-generational interaction and relationships. The concept of 'Ageing in Place' where thrust is laid on the care of the older people within the family in partnership with community/government agencies. The policy interventions include reservation of 10 per cent of housing in housing schemes, barrier free access to public places, transport carriers, bus-stands, etc, promote age-friendly facilities and standards of universal design, provision of areas for multipurpose activities for senior citizens in housing colonies, establishing housing for single elders who need specialised care (MoSJE, GoI, 2011). Several other measures also form part of this policy document 2011.

Global Good Practices

The National Institute of Urban Affairs (NIUA), New Delhi in collaboration with Ministry of Housing and Urban Affairs, Government of India with the support from the Department of International Development (DFID) of the UK Government established a Technical Assistance Support Unit (TASU) at NIUA to implement the project 'Building Accessible, Safe and Inclusive Indian Cities' (BASIIC) (NIUA, 2020).

The objective of this BASIIC programme is a step to build and enhance the capacities of Indian cities to be more sensitive and responsive to the needs of the diverse groups. A report has been prepared and published in this process in 2020 by NIUA entitled, '*Compendium of Global Good Practices Towards Building Accessible, Safe and Inclusive Indian Cities*'. This report documents the global good practices/missions adopted in different countries throughout the world based on the key parameters---Quality of Life-for persons with disabilities, the elderly and the children. The parameter is mapped on the three pre-set criteria namely accessibility, safety and inclusivity which lead to the lasting impact on the quality of lives of diverse groups. This compendium is a secondary study based on the literature and desk review. The

data in this report is collated from different sources including recommendations from community of stakeholders and other professionals working in related fields of urban planning and design. This document maps different good practices at country-level programmes and missions, city-level interventions and other innovative ideas which have been contributing in improving the quality of life in urban areas (NIUA, 2020).

This part of the paper is extracted from the compendium to briefly showcase some of the global good practices. The diverse practices include drafting of accessible master plan for the disabled, creating accessible environment through national level campaign, providing accessibility to basic utilities necessary for hygiene and sanitation for vulnerable groups, generating Apps to help users facing mobility impairments, making accessible cities for wheelchair residents, tourists and others (NIUA, 2020). Few of these have been discussed in brief below:

Country-Level Practices

- a. **Friendly Buildings-Singapore:** To cater to the changing national demographics of fast ageing population, the Building and Construction Authority prepared Accessibility Master Plan in 2006 and developed web application for effective dissemination and evaluation. The Master Plan framework integrated accessibility and universal design principles into the built environment through the multidimensional approach addressing the past, present and future development concerns of accessibility, inclusion and safety. It worked on removing existing barriers, maintaining existing accessibility features, dealing future challenges and raising awareness among stakeholders and industry to enhance accessibility of people.
- b. **Accessible India Campaign, India:** The campaign was launched by the Prime Minister of India in 2015 to create an accessible and inclusive society and the all-round development of persons with disabilities. To create universal accessibility for the persons with disabilities, three key areas were identified—built environment, transportation, Information & Communication Technology (ICT). Under these three identified areas, it was proposed to undertake accessibility audits of different important government buildings, make selected government buildings accessible, make international airports fully accessible immediately along with domestic airports and all A&B categories of railway stations. It was also proposed to make 10 per cent of government-owned transport carriers accessible to all. The government envisioned to make 50 per cent of government websites accessible, create online libraries for persons with print disabilities. The government has also created a dedicated website www.accessibleindia.gov.in and promoting an App to get feedback and address the concerns of the stakeholders.
- c. **Inclusive WASH in Uganda and Zambia:** The project aimed to understand and address the accessibility barriers that people with disabilities, elderly and people with chronic illness in these countries face in water, sanitation and hygiene

(WASH) related utilities and to promote such infrastructure to improve the lives of the target beneficiaries. It was observed that such people lack WASH services and face physical barriers including long distances to toilets, unsuitable design for vulnerable groups, etc., attitudinal barriers of society leading to exclusion and isolation, institutional barriers like lack of policies, strategies, non-involvement of stakeholders in decision-making of WASH related policies and lack of information in inclusive technologies. In response to the detailed issues identified in relation to WASH facilities to the target groups, low-cost interventions were designed. A Compendium of Accessible WASH Technologies for use in low-income countries which focused on suggesting solutions to make WASH facilities inclusive was also created.

City-Level Practices

- d. **Accessible City Breda, the Netherlands:** The historic city of Breda known for stretches of ancient cobblestone in its paths and public spaces add unique charm to the urban character of the city. However, the wheelchair users were facing accessibility problems while travelling in the city. The problem was addressed through engineering interventions where city planners using machinery, pulled up, sliced the cobblestone, flipped them over and finally returned to the ground creating a flat surface for mobility. Through this method, the city maintained its unique urban character of cobblestone pavements and still achieved accessibility for wheelchair users. The city won European Access city Award in 2019 for its universal accessibility, inclusion and a step towards enhancement of tourism.
- e. **Wheel Map App for Wheel Chair Users, Berlin, Germany:** The application WheelMap.org was designed, populated and used by wheelchair users, showcasing their active participation in adding datasets and important information accessible to all. The purpose of this Wheel Map App is to gather information about the accessibility of different public places and make aware of the problems of inaccessible public spaces. The users can, thus, plan their mobility routes accordingly. The App has been operational since 2010, helps find information regarding last-mile connectivity to different points of interest collated by other persons with mobility impairments. Users can also locate their current positions in relation to their places of interest and find a suitable route to their destination on WheelMap.org.

Key Policy Concerns for Making Cities Age- Friendly

The age of an elder does not matter much as long as he is able to act in his environment and performs tasks independently. Considering the 'old' as 'disabled' is a mistake. In fact, elderly people have witnessed changes in their environment for a long time along with their impacts and consequences. They have better understanding of the environment, its history; values related to it and, thus, can guide the course of future action/changes more suitably. A fresh approach towards the older people needs to be

developed where they are actively participating in the making of the outdoors at the level of immediate surroundings and at a larger city-level. An age-friendly approach towards cities shall reduce probability of disease or disease related disability, enhance active participation in the development and ensure good functioning of mental and physical capacity.

As the elderly people are, more often than not, restricted to their immediate surroundings, the design of immediate outdoors is a key concern. The immediate outdoors here include community facilities, services, physical aspects, safety and security and above all, the inter-linkages among all these factors. This calls for an interdisciplinary and integrated approach towards the concerns of the senior citizens and goes beyond the simplistic dimension of land use planning.

- a. There is a need to design the public spaces that encourage strong ties among the different age groups and minimise intergenerational gaps.
- b. The housing of the elderly needs to be integrated with the housing of other age groups for better social inclusion.
- c. Accessibility to public transport and the facility for easy private taxi/rickshaw on call.
- d. Principles of universal design needs to be integrated at policy-level in cities by removing architectural barriers and facilitate pedestrian crossing as per the latest guidelines.
- e. The traffic lights at pedestrian crossings for the elders should be adjusted considering their slow mobility.
- f. The elders need to be updated about the latest opportunities related to their healthy well-being. The older people who are isolated generally are not able to receive proper information in time and the benefits are limited to the well-connected ones (WHO, 2007).
- g. The elders living alone do not have adequate practical help in their everyday domestic works (WHO, 2007). The policies regarding such support need to be framed for the ease of the seniors.
- h. Lack of public toilets is a ubiquitous phenomenon in the public and community areas. If they are available, these are not in the usable conditions as they are either unclean, vandalised or closed (WHO, 2007). A good number of clean public toilets, possibly free for senior citizens, at suitable distances shall remove the anxiety among this age group while moving out of home.
- i. Provision of areas for multipurpose activities for senior citizens in housing colonies as per National Policy for Senior Citizens.

While framing policies for elders, consultation with them to identify their needs and services shall be of great help. Policies for elders need to be framed with their active participation (Martinoni et al., 1970).

Design Guidelines for Age- Friendly Cities

A holistic design approach is necessary at all the different levels from city to immediate outdoors of residential neighbourhoods for creating integrated environment, safe and inclusive in nature, for all the age groups and more so for the elderly. This includes not only the design for public & semi-public places but also those under private ownership which contribute in enhancing the urban form friendly for the seniors (ALGA, 2006). For this to happen, it is important to make seniors part of their immediate context in terms of connecting them physically and socially simultaneously offering opportunities in order to enhance their independence and autonomy. This may begin from simple things like watching street-life outdoors sitting in balcony and converse with the passersby, to enable them to the position where they walk leisurely to nearest community facilities, shops, transport stops, urban and open spaces, and to their friends, etc (Paduch, 2008).

Though there is a lot more to do, the design guidelines here are restricted to the neighbourhood street levels only. Based on the observations and personal experiences, the author has also found out that the cities of medieval periods were qualitatively more livable for all age groups and more so for older people. The city of Amritsar was founded in the year 1577AD. The old city had compact medieval planning with buildings generally G+1 to G+2 storeys high (Dua, 2013).

The following design guidelines are recommended for making neighbourhood level streets and spaces aged-friendly:

Accessibility

Accessible streets are easily approachable, have simple junctions and clearly defined movement without any conflict (Dua, 2014). These do not have steps, steep gradients, abrupt changes in levels and clearly differentiate the pedestrian space from the vehicular besides following the principles of barrier free design. Similarly accessible open spaces are the ones which are easily approachable to all the age groups, evenly distributed and well connected. The streets should not be long enough to generate high speed through traffic. Longer streets should be gently curved to limit the speed of vehicles. The pavement material should not become slippery under any circumstances.



Figure 1: Through vehicular movement hinders walkability

Source: Author



Figure 2: Even dead-end streets are not much safe for casual activities

Source: Author

Familiarity

It refers to the extent to which streets are recognisable and the spaces generate feeling of belongingness. Familiar streets and cluster level spaces are formed by different types of edges of buildings, open spaces, architectural detailing, etc. More the use of spaces, more would be the familiarity and informality (Dua, 2014). The buildings along the streets should be G+1/G+2 storied with wall articulations in the form of projections, string courses, openings, detailing or other kind of decorations to give the sense of human scale.

Transparency of wall surfaces

The experience of being in a public or private domain begins from the nature of edges along the streets and open spaces. The transparent nature of edges gives orientation, familiarity and security to the people. Transparency of edges in the form of openings, balconies, etc. creates charm and enhances quality of social interaction along with increasing the visual quality of streets and public spaces. The buildings should have low boundary walls with height lesser than normal eye-level, to foster the social interaction. The front setbacks then would become semi-public spaces for varied purposes and become interesting foregrounds for the buildings.



Figure 3: Transparent wall edges in old city give security and enhance social interaction

Source: Author



Figure 4: Poor edge conditions make the streets dead and monotonous

Source: Author

Edge Conditions

The edges generate meaningful relationships between public and the private realms, if designed appropriately. It is difficult for the older eyes to tolerate glare on regular basis while coming from interior of the building to outdoors specifically in harsh summers. A small semi-covered transition would help adjusting the light changes. Providing steps at the entrance to the building would also decrease the accessibility of senior citizens to street.

Legibility

Legible streets orient the elders in the environment and help them understand the routes and junctions with the help of signs and distinct visible features. In order to orient

people, the streets should have interesting and surprising features. The longer streets should have gentle curves to generate visual interest (Dua, 2014). Multiple activities help enhancing the legibility of the area. These small details not only add visual variety but also act as reference points at micro level for legibility.



Figure 5: Maintained spaces without life are unsafe and boring

Source: Author



Figure 6: Less vehicular access and security generate street life

Source: Author

Mixed Landuse

Mixing of light commercial activities in the form of shops, small eating joints with some seating arrangements, community facilities, small auto/cycle rickshaw stands at some distances help enhancing activity and generate pause points in the outdoors of the area. Care should be taken that the landuse should not generate heavy and through vehicular movement for longer durations.



Figure 7: Climate friendly mixed landuse generates social interaction in old city chowks

Source: Author



Figure 8: Interactive spaces for elders without infrastructure

Source: Author

Safety

It is the extent to which people can enjoy the outdoors without any kind of any fear of accident or being attacked or falling etc. Safe streets have defined movements for pedestrians and vehicles. Generally, the safe streets and spaces experience the houses facing them most hours of the day. Proper arrangement and management of parking, curbing the through traffic by gently curving longer streets and designing smaller lengths of branching streets enhance safety. Well-designed pedestrian movement,

specially designed street intersections to limit the vehicular speed while increasing the visibility, along with adequate provision of lighting would ensure safety at late hours (Dua, 2014).

Climate Friendliness

Two to three-storied high buildings laid out in compact form with lesser side setbacks and projecting out at upper levels, as seen in old structures, allow sun to penetrate only fewer hours of the day make streets elder-friendly. In case of wider streets, adequate landscaping & shading in the form of trees, small shelters with seating help generate variety and cope with the harshness of the climate. Shaded streets and intersections make the outdoors more livable for longer hours of the day in Indian conditions.

Landscaping

Apart from moderating the ambient temperature by shading, landscaping should add texture to the street in different seasons without creating any problems for the older citizens. Fallen leaves on streets create hazard by making surfaces slippery for the elderly walking on paths adjacent to trees. The planted areas adjacent to paths should have small retaining walls or timber edges or some other techniques to avoid the landscaping material spilling on the paths. Providing raised flower-beds at suitable places bring landscaping closer to elders who cannot bend.

Street Furniture

Seating for the elders should have arms and full back support. It should be such that it does not hinder the pedestrian movement, should be made up of timber rather than any metal which is uncomfortable in different weather conditions. Street furniture should be placed at different pause points-near the intersections, in front of community buildings, at suitable distances along the street for the elders to rest at different locations. It should be placed in a way to foster the interaction at some locations while permitting scope of withdrawal at others. The seating spaces should be designed for groups rather than serving individual persons.

Conclusion

The research highlights that making outdoors universally accessible and meaningful not only helps the vulnerable groups but also improves the quality of life of its inhabitants and specifically the elderly.

Role of Technology

Newer technologies are increasingly contributing towards making the lives of its inhabitants better. It is imperative for the elderly to understand and learn to use technology to their advantage. The application of information technology through

Accessible India Campaign played an important part in improving the universal accessibility for urban environments. Stress needs to be laid towards dissemination of relevant information and capacity building of the elderly which would make them independent and productive to the society. Urban interventions can be made more effective through the creation of useful datasets to help the senior citizens.

Stakeholders' Participation

The good practices have taught that the participation of stakeholders, the elderly, is necessary in making outdoor environment better. Even small changes make substantial impacts in improving the lives of the vulnerable people (NIUA, 2020). It is necessary to consult the diverse groups and document the processes followed in planning urban environments for better understanding.

Age-friendly cities make active ageing enjoyable and respectful. The strategies for age-friendly cities infuse positivity in urban life by creating opportunities for intergenerational interactions, boosting self-confidence by facilitating independence and autonomy to the elderly. Apart from making planning policies, the design decisions at different scales are equally necessary to integrate ageing issues into the development process. The most important factor is to recognise that the policies for elders need to be framed with active participation of the elders (Martinoni et al., 1970). Good outdoors invite more number of people and broaden the spectrum of human activities thereby creating physical environment which enhances the quality of urban life across different age groups.

Declaration of Conflicting Interests

The author declares that there is no conflict of interest.

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Disempowering the Urban Poor: Housing Rights and Basic Services for Squatters in Amritsar

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Abstract

The article examines the challenges faced by squatters in Punjab, including limited access to basic services, threats of demolition, and lack of property rights. The Punjab government's Improvement and Clearance Act 1961 obstructs the provision of land and basic services to non-notified squatters, causing poor environmental conditions and preventing them from investing in shelter upgrading. Western elitists' perspectives on the urban poor have shaped national and provincial legal systems, housing policies, and city planning. The present article calls for immediate government intervention to amplify the voices of the marginalised, describing the Punjab government's approach as exclusionist and undemocratic, particularly regarding the refusal to grant property rights on land held by the government and local bodies.

Keywords

Squatter, Urban poor, Jawaharlal Nehru National Urban Renewal Mission (JNNURM)-Basic Services for the Urban Poor (BSUP), Vulnerability, Tenure Rights.

Introduction

Urbanisation is a process wherein the human settlements undergo various geographical, economic and social transformations. Rural areas have an agriculture, livestock and allied, primary activities-based economy whereas urban centres have secondary, tertiary sector-based economy. The raw materials produced in the rural areas are processed to make value added products in the city. Urban economy exhibits a complex

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interrelationship between urban development and growth of secondary-manufacturing and tertiary-commerce, trade, transport and services sectors, offering better wages and employment opportunities pulling in lakhs of migrants from villages and lower hierarchies of urban centres to major employment centres. The larger the cities, the more advanced are the economic activities. Such economic activities are an invitation card for the rural populace in search of better education, health, entertainment and foremost employment opportunities. To accommodate the highly advanced and diverse economic activities, the cities go through space related transformation, i.e. industrial, commercial, residential, recreational infrastructure related constructions, transforming the built space over time.

There were just four class one towns having a population of one lakh in Punjab in 1971 (Census of India, 1971) which rose to 16 in 2015 (Government of Punjab [GoP], State Annual Action Plan, Atal Mission for Rejuvenation and Urban Transformation: 2015). There are three metropolises having a population of ten lakhs in Punjab—Ludhiana, Amritsar and Jalandhar in 2024. Amritsar housed nearly 30 per cent of its population in total 63 slums in 2011. This is a major challenge for the urban human settlements' planners and city managers. The proportion of the slum populace living in the squatters/slums of Ludhiana (209 slums) and Jalandhar (97 slums) was 22.5 per cent and 15 per cent respectively in 2011 (Master Plan Amritsar: 2011, Master Plan Ludhiana: 2011, Master Plan Jalandhar: 2011). Hence, the metropolitan cities of Punjab have an uphill task to ensure provision of basic services and housing for the urban poor, and slum dwellers. The Missions JNNURM-BSUP defined Basic Services as property titles at affordable prices, improved shelter, water supply, sewerage, drainage, toilet, paved all weather roads, solid waste management, electricity, parks and green open spaces. A household earning less than Rs. 25,000 in urban Punjab living in a tenement made up of makeshift materials without the provision of basic services was declared urban poor (Below Poverty Lines [BPL] Survey, Municipal Corporation Amritsar [MCA], GoP, 2005). Household means a group of people related by blood or otherwise living together and sharing common expenses of kitchen, electricity, rent, etc. Slum dweller is an individual or a household living in unhygienic conditions, without the provision of basic services. However, the slum dweller owns the land of his house. In legal terms, a slum dweller is entitled to get basic services as Municipalities have a legal obligation to ensure basic services in the notified slums.

Funding and planning capacity starved Municipalities and GoP find it a herculean task to provide all the infrastructure to the poor urban slum dwellers/squatters. Therefore, haphazard urbanisation, proliferation of slums and ensuring a liveable affordable house, with basic services is an uphill task. The slums and squatters are vulnerable to serious housing, socio-economic, environmental, city planning and governance related dire challenges (Jha, 2023). At its core, the affordable housing crisis is an economic challenge. Achieving sustainable results requires-- continuous affordable developed land supply, housing supply on ownership or rental basis,

investments in housing industry, low-cost building materials and construction technologies, access to cheap shelter finance especially to the urban poor squatter and infrastructure inputs. A squatter is defined as a household or individual occupying land or property—typically government-owned—without legal title, lease, or authorisation. Because they lack formal land tenure, squatters face significant barriers in accessing public services, including formal identification, address proof, ration cards, and social welfare programmes (e.g., BPL cards). Consequently, they are often considered as “illegal citizens” or unauthorised occupiers due to their non-legal status and lack of citizenship documentation, leaving them vulnerable to eviction.

Urban planners, planning theory and spatial planning literature eulogise and advocate for ‘in-situ’ development on the tenable lands even if occupied illegally (National Slum Policy [NSP], 2001). In-situ development means to rehabilitate the slum/squatter populations on the land where they are living. It is a good practice. Tenable land is hazard free, suited for human habitation and is not against public interest. On the contrary, ‘ex-situ’ rehabilitation projects uproot the squatters from their original residences, disturbing their work-place relationship causing unemployment, low wages, high transport costs and robbing them off their cultural assets. Despite the benefits ‘in-situ’ development offers, in practice, Urban Local Bodies (ULBs) often succumb to market forces like land scarcity and high land prices in the city cores and relocate the squatters insensitively to the city peripheries which is a bad practice. Moreover, we need to consider that housing and basic services are market products with price tags which have limited supply and involve high development costs. Right to land in India is not a fundamental right but a legal right.

Slums, or more accurately, the informal economy, are a stark example of the urbanisation of poverty phenomenon. The most depressing aspect is that these homes, which have several functions--residential, commercial, industrial, etc. are not recognised as homes legally, unworthy of use for collateral or insurance. Therefore, squatters’ entire investment is worthless (Sharma & Sharda, 2023). Further the advantages of in-situ and ex-situ development are listed. Vulnerable communities and their socio-cultural property ties remain intact. Communities stay close to the city core and employment centres and their jobs; wages stay relatively stable ensuring better workplace relationships. In addition, transport costs remain low. Education of school children is affected the least. Parekh et. al., (2008) found that governments need to invest only in ‘basic services’ which can be done incrementally with subsidies as low as 30-35 per cent of the new construction costs of equal scales and dimensions. The investments remain lower as compared to ex-situ development. On the contrary, ex-situ development is suited in case the ‘in-situ’ site is ‘un-tenable’ or against ‘public purpose’. Cheap land is available in case squatters are rehabilitated in the city outskirts as compared to city core lands. But ex-situ development does not offer all the advantages that ‘in-situ’ development offers to the squatters. Further, Parekh et. al., (2008) also found in-situ rehabilitation projects to be affordable, better than the lengthy, cumbersome and costly

land acquisition process including land development and land use conversion. In fact, in-situ slum development' is speedy, financially feasible and sustainable. However, the pre-condition is an enabling law. On the contrary, ex-situ development must be opted in case the site is either untenable or against the public-purpose. Explicitly an untenable site is one that poses threat to life and property and is against the public interest.

City Governance Failure and its Impact on the Squatters' Lives

The Punjab Slum Areas, Improvement and Clearance Act, 1961, Section 3 (1) delineates slum areas as those habitations deemed uninhabitable for humans due to deterioration, overcrowding, inadequate architectural arrangements or designs, insufficient ventilation, light, or sanitation facilities, and poorly designed narrow streets. If any combination of these components is present in an urban settlement, it poses a threat to safety, health, or morality; thus, such a settlement may be designated as a slum based on the report of qualified officers or other information held by the Municipality, as stated in the official Gazette. The suitability of a building for human habitation is contingent upon its maintenance and repairs, absence of dampness, provision of light and air as fundamental human necessities, availability of water supply, drainage and sanitary facilities, as well as amenities for food storage, preparation, cooking and wastewater disposal. This law defines both the residential areas, buildings and ideal conditions of physical environment worthy of human habitation. But the poor may not be able to create such ideal liveable conditions. So, the law has an elitist approach and advocates for improvements of inhabitable housing by clearance promoting anti-poor demolitions and evictions, dispossessing the poor of their scanty assets and housing. Many cities in India demolished the housing of the poor and rehoused the slum dwellers far away from city centres aggravating their hardships. The government's direct intervention and provider policy cost heavily to the public exchequer by way of investing in the new housing apartments for the slum dwellers which was economically not feasible. It was a lose-lose proposition for both the squatters and Governments. Hence, this law represents demolition and eviction phase--- a negative approach for the poor urbanite/ slum dwellers and the squatters living on Government lands illegally. Implementing this imported approach without contextualising in the Indian socio-economic, cultural, and urban context was uncalled for.

Moreover, municipal laws in Punjab, categorise slums in two categories--- notified and non-notified slums. Notified slums are those where the inhabitants own the lands upon which they constructed houses without any provision of basic services. Any individual or a group of people who occupy Government- owned lands illegally without property titles for constructing housing which may be ascribed to poverty, popular vote bank politics or political patronage, then the settlement is not notified by the prevalent laws in Punjab verbising such settlement as non-notified slum. Thus, the migrants, city builders, contributing to reducing production costs for the capitalists and masses, without any socio-economic safety net doing drudgery amidst lack of any

‘Grant of Property Rights’ become the illegal occupants of Government lands (referred here as squatters). The new migrants are vulnerable physically, socio-economically, personally, legally, unaware of the intricate legalities of city statutes such as detrimental forced demolitions and evictions whose paltry earnings are consumed mostly by food, clothes and the other basic needs leaving them with low savings insufficient to buy a piece of land, or a house which will cost them dearly in a highly monetised present urban civilisation. They become the victims of multiple issues such as poverty, lack of quality education, inadequate housing and environmental hazards, aggravating their vulnerabilities.

Thus, both the Government and private formal housing supply systems fail to fulfil the basic housing needs of the urban poor, forcing them to find solutions in the informal housing supply chains which are more responsive to their affordability. The households (hhs) suffering from abject poverty and destitution are forced to make tenements of temporary material without the provision of any human rights and basic services on the Government- owned lands with a hope that the electoral politics and political patronage will be of help to access a roof over their heads. Punjab being a land of opportunities for the migrants from the least developed, backward districts of Northern Eastern and Central India, has been an ideal destination. But Government authorities in Punjab have dealt with non-notified slums- squatter settlements with an iron fist, resorting to eviction and demolitions dispossessing the urban poor of their hard-earned assets.

Multiple Dimensions of Poverty Phenomenon

Based on BPL Survey, the Punjab Government adopted the following multiple vulnerability criteria to determine poverty lines in urban Punjab--- gross annual income, lack of ownership of land, unliveable house due to dilapidation, unworthy of habitation due to poor construction quality and use of temporary materials, without the provision of basic services (MCA, 2005-06). A household that earned less than Rs 25,000 as gross annual income was declared urban poor. The present research paper narrows down the scope of the research to status of the squatters with respect to the provision of land and basic services for in-situ development in Amritsar under the Basic Services for Urban Poor programme. Moreover, the incidence of urban poverty has been graver in Punjab in contrast to rural poverty amidst rapid urbanisation wherein every 4th person out of ten was an urbanite (Census of India, 2011). Urbanisation trends reveal that Punjab always experienced greater levels of urbanisation in comparison with national average of urbanisation.

Policies of Government of India (GoI) in housing sector dealing with slums and squatters have undergone sea change since Independence. These policies are influenced by the prevalent ‘political economy’ ideologies like socialism and capitalism. Socialism ideology terms housing as a social and a welfare good and the welfare state of India opted to be the provider of housing’ especially for the poor necessitating for the direct state interventions. India also opted for ‘redistributive justice’ as a tool for poverty

alleviation. 'Neo-liberalism' considers housing as a 'market good' having a price tag subject to the market forces of demand and supply while land, labour, capital and entrepreneurship being the factors of production. 'Neo-liberalism', as opposed to the direct interventions, advocated that income of the poor will increase once economy is deregulated through the 'trickle-down effect' and Liberalisation, Privatisation and Globalisation (LPG) will lead to poverty eradication. However, India took a middle-path-economy under the Nehruvian perspective privatising a few sectors and intervening directly in the creation of basic infrastructure including housing for the urban poor. Moreover, what the western developed economies practised in cities also became a precedent for the under-developed, developing countries. However, neither socialism nor capitalism has been successful in India to alleviate poverty of the urbanites especially housing poverty. In the present situation amidst ever widening gap between the haves and the have nots, the markets have been unable to provide housing for the urban poor, requiring direct intervention of the government/ULBs by assuming the role of direct provider of land, housing and basic services to those whose housing needs cannot be met with by the profit mongering land developers.

Phase of Negative Approach towards the Slum/Squatter Dwellers (1950-60)

There are positive and negative approaches when the governments deal with the shelter of the urban poor. One negative view holds that the urban poor are themselves to blame as they build tenements of make shift- temporary material from which they are usually evicted and their temporary structures are demolished. Thus, the slums and squatter become the centres of bootleggers, violence, prostitution and crime. These views validated the policies of demolition of slums and relocation of slum dwellers in the city outskirts, which usually resulted in the poor losing their scanty housing assets and precious savings. All the housing policies, slum/squatter legislations from 1950-1960 promoted demolitions and favoured the government as the direct housing provider. On the contrary, the positive view on slum dwellers holds that the slum dwellers are an integral part of the socio-economic fabric of the city. The urban poor engaged in informal economic activities help run the city smoothly. Anyone earning his own livelihood without loot and begging deserves dignity and respect and is worthy of decent housing and basic human rights and basic services.

However, most of the slums/squatters related legislations in this phase (1950-1960) in India were influenced by the negative approach promoting demolitions, forced evictions, relocation and rehabilitation in the city outskirts. For example, the Punjab Slum Areas Improvement and Clearance Act, 1961, Tamil Nadu Slum Areas Improvement and Clearance Act, 1971, the Maharashtra Slum Areas Improvement, Clearance and Redevelopment Act, 1971 have provisions for 'clearance, redevelopment and improvement'. Under these legal frameworks, residential areas deemed hazardous or unfit for human habitation can be demolished for improvements, such as sanitation

infrastructure. Consequently, these actions often result in the forced displacement of the urban poor, depriving them of their homes and destroying their accumulated life savings and investments.

Further, the urban poor/squatters are housed far away from their demolished houses, aggravating their work-place relationship amidst no provision of public transport causing more travel cost and time. Moreover, the urban poor living close to the city core areas having high densities offer better employability and wages along with better access to medical, education facilities. The 'demolition and eviction' approach is dangerous to the public exchequer, as the state ought to invest more to house the urban poor. The whole process is not feasible economically for the Governments/ULBs to house the new migrants in the city as it is beyond the budgets of both the Union as well as State Governments. Nonetheless, as the squatters are afraid of demolitions and evictions and losing their wealth, they stop investing and upgrading their housing resulting in perpetual sustenance of the dilapidated housing. De Soto (2000) has argued that the squatters' houses become like 'dead capital' worth no basic services and bankable loans due to 'non-notified'- informal status of the settlements. The Punjab Slum Areas Improvement and Clearance Act, 1961 influenced by the 'negative approach' has disempowered the squatters. Hence, legal bottlenecks can cause multiple vulnerabilities like economic, social segregation and personal--- forcing all the new migrants, who are illiterate, unskilled, casual-marginal, underpaid labourers getting work for less than 183 days a year trapping them in a vicious circle of multi-dimensional poverty-- income, housing, education, environment and health. Various professionals offer them varied remedies. Granting property titles is one of the legal tools to alleviate poverty of the squatters. Thus, the city planners, urban managers and academics find 'in-situ' development the best option as opposed to 'ex-situ' development which should be the last option. But 'in-situ' development can be done by removing legal barriers and an enabling law to grant property rights to the squatters.

The Government of India in its landmark policy- (NSP, 2001) tried to undo the damages, caused by the negative approach to the squatters and slum dwellers. The absence of legal property rights is the primary cause which restricts poor households from participating in their shelter improvement. The potential threats of eviction and resettlement in the city peripheries serve as a specific disincentive for investing households' capital in upgrading housing incrementally. Simultaneously, given the absence of adequate tenure and collateral, households are precluded from accessing formal loan finance for housing. This policy aims to grant property titles to squatters through enacting an enabling statute. These measures will accelerate the attainment of squatters' enhanced perceived security of tenure, while also streamlining and enhancing the procedures for land acquisition and negotiated compensation for tenable settlements on private land through the implementation of innovative strategies such as land sharing arrangements and augmented spatial rewards as compensation. Basic Services for the Urban Poor reforms and its successors--- policies and programmes also

supported for positive approach of ‘in-situ’ development in housing for upgradation of slums and squatters.

Critical Analysis of Impacts of Municipal Laws and BSUP Affordable housing Projects in Amritsar on the Urban Poor/squatters in Punjab

Not only have planning laws been found to be an obstacle in ensuring tenure rights to the urban poor, but Municipal laws also proved to be detrimental for them to access basic services in squatter/slums. Municipal laws in Punjab as in India categorised slums as notified and non-notified slums. In a study on the availability of civic amenities, i.e. water supply, sanitation, drainage, electricity and housing conditions of the migrants in 30 slums in Ludhiana, 15 each in notified and non-notified slums, the major finding was that notified slums had far better infrastructure as compared to non-notified slums in Ludhiana (Sengupta & Benjamin, 2016). In fact, in many other states of India, this practice harmed the urban poor. To be eligible to get basic services, a slum must be notified by the ULBs. Similarly, Municipal Corporation Amritsar (MCA) has categorised slums in two categories, notified and identified but the procedure MCA follows for notification and identification of slums opaque (Risbud, 2012). Therefore, the provisions of municipality laws have led to lack of basic services for the poor in Ludhiana.

There was a provision of ensuring land titles through land lease acts to the urban poor as a long-term strategy to improve lives of the poor and for orderly development. Government of India, time and again has reiterated to enact laws for granting tenure rights to the eligible squatter dwellers under the provisions of the NSP (2001), JNNURM-BSUP (2006) guidelines, National Urban Housing and Habitat Policy (NUHHP) (2007), Punjab Housing and Habitat Policy (PHHP) (2008) and Rajiv Awas Yojana (RAY) (2013) also stressed on GoI and State Governments to ensure property rights to the squatters even if they are living on government lands but Punjab Government did not have any enabling law to implement such strategies.

Government of Punjab has also recognised granting legal titles in the Punjab Housing and Habitat Policy-2008 (PHHP-08), though the needed laws were not enacted. The policy says that slums/squatters constructed on government lands will be transferred to Municipal bodies and regularised and/or relocated under a specific programme assuring security of tenure and involving people and communities (PHHP, 2008). When Municipal Corporation of Amritsar and Government of Punjab executed BSUP in Amritsar, they did not grant property rights to the squatters’ sites where they were living for decades, though both owned the parcels of land where squatters were living (MCA, 2006; Kumar, 2022).

A study conducted in Amritsar observed that the key objectives of programmes like Urban Basic Services Programme (UBSP) 1985-1990 and Environment Improvement and Upgradation of slums Scheme (EIUS) 1972 implemented in some notified slums

of Amritsar, aimed at ensuring basic services to the slum dwellers. However, “... these programmes do not include land/shelter consolidation programmes...” (Sandhu, 2006). It is evident that urbanisation policy in general and policy provisions to help urban poor has been lacking in the absence of master planning, and land lease or *Patta* laws in Punjab. Lack of monitoring and enforcement systems have also contributed to unorganised growth of urban Punjab. Hence, by not enacting pro-poor legislations the poor could not avail the probable benefits. As this law is enacted post JNNURM-BSUP and Rajiv Awaas Yojana hence no property titles could be granted to the squatters living on GoP owned lands in any city/town in Punjab (MCA, 2005-06; Kumar, 2022). This Act could not empower the squatters in the age of enablement.

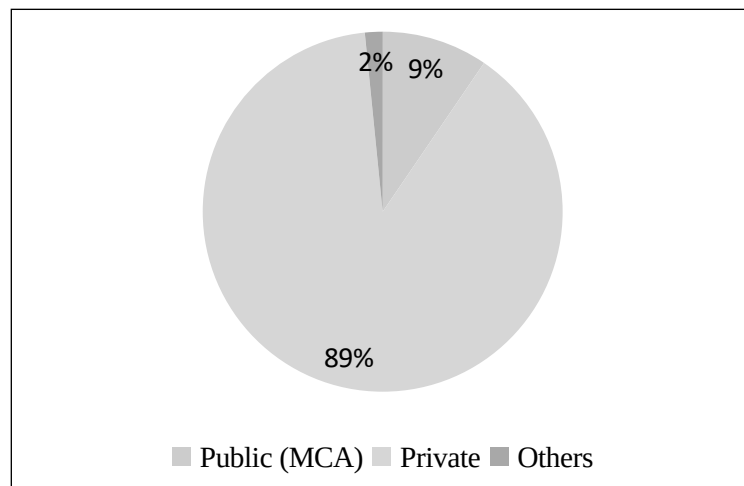


Figure 1: Land Ownership Status vis-a-vis Squatters of Amritsar

Source: MCA, 2009 as quoted in (Draft Master Plan of Amritsar [DMPA], 2010)

BSUP Affordable Housing Projects in Amritsar is a classic example of violation of ‘in-situ development’ as the mission could not rehabilitate the squatters near their place of work, while most of the squatters who lived on the tenable Government owned lands, they could have been rehabilitated ‘in-situ’.

About 89 per cent of the slums existing on private owned properties have been called ‘notified slums while the squatters on public lands have been termed as ‘non-notified slums’. Most of the squatters proliferate on government-owned lands as the urban poor-squatters find it an easy escape due to electoral politics in India and Punjab. Figure 1 displays that out of total 63 slums, 89 per cent of the slums are located on private lands and nine per cent of the squatters are located on public lands owned by the GoP and ULBs- MCA and Amritsar Improvement Trust’s (AIT) (Master Plan Amritsar [MPA], 2011).

Table 1: Squatters' Land owned by various departments of Government of Punjab in Amritsar

S. No.	Name of Area	Dwelling Units	Ownership Status of land	Area Acres	Tenability Status
1.	Bangla Basti (Ekta Nagar) Ganda Nallah	180	PWD (Irrigation)	3.14	Tenable
2.	Chamrang Road Near Truck Stand Scheme	57	Improvement Trust Amritsar	0.55	Tenable
3.	Near Gillwali Gate	11	MCA	0.14	Tenable
4.	Dana Mandi Bhagta Wala	21	Punjab Raj Mandi Board	0.08	Tenable
5.	Valla Bye Pass	35	PWD (B&R)	0.55	Untenable
6.	Valla Near the Banks Canal	6	PWD (Irrigation)	0.03	Untenable
Total (Tenable +Untenable)		310		4.49	
Total Tenable		269 (87%)		3.91 (87%)	Tenable

Source: Tenability Survey of Squatter Lands in Amritsar (MCA, 2020).

There are bright possibilities of tenable lands available for 'in-situ' development as Public Works Department owns the largest piece of land- 3.14 acres, housing 180 dwelling units in Bangla Basti (Ekta Nagar) Ganda Nallah, followed by AIT the second largest chunk of land 0.55 acres housing 57 HHs along Chamrang Road near Truck Stand Scheme of AIT. MCA owned 0.14 acres of tenable land near Gillwali Gate in South Amritsar housing 11 HHs. Similarly, Punjab Raj Mandi Board held 0.08 acres of tenable lands in Dana Mandi, Bhagta Wala that housed 21 HHs. The survey declared Valla Bye Pass and Vallah near the Banks Canal sites as untenable due to the hazard of flooding. Table 1 depicts total tenable lands owned by GOP/MCA/AIT and the dwelling units erected on such lands. Having taken stock of the whole picture of lands and their tenability status, it is now pertinent to focus on tenable sites to explore whether there are possibilities of 'in-situ' development.

Both the figures 2 and 3 are derived from Table 1 for further analysis. Dwelling units existing on untenable land area are out of the scope for 'in-situ' development as they are hazardous and against public good. Major finding is, 87 per cent (269) of the tenements were located on 'non-notified' squatter sites which could have been improved/developed 'in-situ' protecting work-place relationship in high density population zones—natural markets ensuring more lucrative/regular employments and wage opportunities in addition to keeping social-cultural property of the urban poor intact (Refer to Table 1). Just 13 per cent of the tenements were located on untenable squatter sites owned by GOP/MCA/AIT in Amritsar.

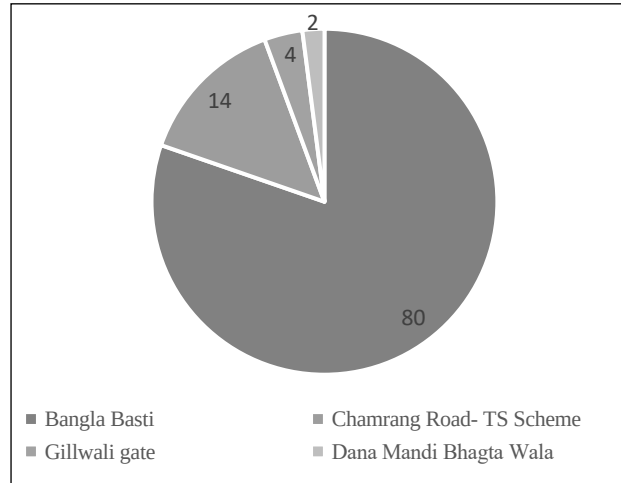


Figure 2: Distribution of GOP/AIT/MCA Owned Tenable Lands in Amritsar (Acres)

Source: MCA 2020, Computed values

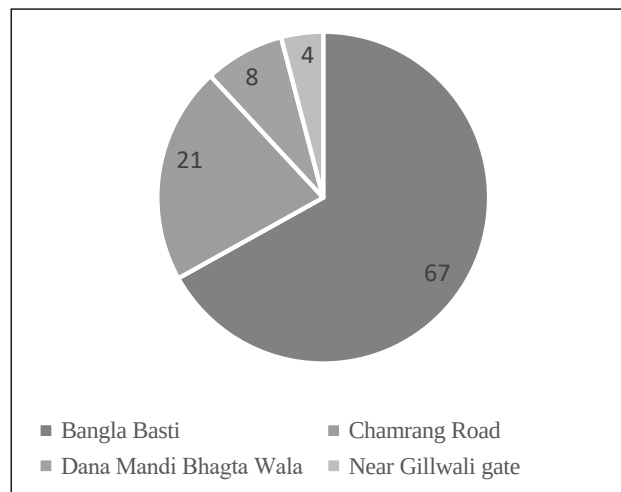


Figure 3: Distribution of Dwelling Units Located on Tenable Land in Amritsar

Figure 2 shows that Bangla Basti out of the total tenable squatter lands in Amritsar composes 80 per cent of the total tenable lands and 67 per cent of the total dwelling units, followed by Chamrang Road near Truck Stand Scheme composing 14 per cent of the total land and 21 per cent dwelling units. MCA owns 4 per cent of the total tenable land near Gillwali Gate followed by Punjab Raj Mandi Board owning two per cent of the total land in Dana Mandi Bhagta Wala (Refer to table 1). Figure 3 presents the number of dwelling units in descending order, dominated by Bangla Basti. Both the figures make a strong case for ‘in-situ’ development in Bangla Basti and Chamrang Road as BSUP guidelines dictate. Nonetheless, Dana Mandi Bhagta Wala and Gillwali

also qualify for 'in-situ' development according to BSUP guidelines that allow for construction of minimum 15 flats on tenable sites.

Interestingly the total area of all BSUP affordable housing project sites combined is 9.12 acres (New Amritsar 3.53 acres, Mall Mandi 2.87 acres and Rasoolpur 2.72 acres), whereas tenable squatter lands owned by GOP/ULBs in Amritsar are 3.91 acres worth in-situ habitation. Bangla Basti alone has an area of 3.14 acres, larger than some of the BSUP shelter sites, making a strong case for 'in-situ' squatter development. Thus, it is inferred that there was availability of tenable lands but due to the absence of any law for conferring property rights to the squatters, 'in-situ' development could not be pursued in any of the tenable sites owned by GoP/ULBs in Amritsar.

Further, MCA shifted the urban poor squatters in 'ex-situ' rehabilitation shelter sites even before the completion of housing projects without any transient housing and provision of operational basic services. This caused inhuman uprooting of the most vulnerable communities and disturbed their work-place relationships during the rehabilitation of BSUP affordable housing project sites. This 'spatial exclusion' has impacted their livelihood. Thus, all the benefits of 'in-situ' development have been denied to the urban poor squatters. Nonetheless, half of the total 1010 flats foisted under BSUP in the city are lying vacant reflecting failure amidst poor access to basic services and no maintenance in Rasoolpur, New Amritsar and Mall Mandi (MCA, 2024; Kumar, 2020). Even the felt needs of the squatters have not been accommodated. The case of Amritsar is like the national trends under BSUP foisting mass housing, sacrificing the 'in-situ' development option. The BSUP projects in Amritsar are not in consonance or are not as per the BSUP guidelines. However, the projects failed to achieve the 'pro-poor' urban reforms, legal, technical, economic and financial reforms on time. GoP was reluctant to enact legislative reforms like Grant of tenure rights during the implementation of the BSUP mission.

Conclusion

The Punjab Slum Areas (Improvement and Clearance Act 1961) could not follow or adopt inclusionary approach towards squatters in urban Punjab which resulted in basic service being inaccessible 'ex-situ' sites. The law resulted in forced evictions, demolitions and discouraged the ULBs and the squatters to invest and upgrade housing with basic services. GOI during BSUP phase promoted granting property rights to the squatters to facilitate in-situ development. Though sufficient land was available during the BSUP phase for in-situ development in Amritsar city, yet the GoP was unable to enact a law to grant property rights to the squatters to promote the ideal practice of in-situ development. Therefore, ex-situ development was resorted to while implementing BSUP resulting in eviction, demolition, and spatial exclusion of the squatters.

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The Master Plan of Patna, 2031: A Critical Appreciation in Urban Geography

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Abstract

The *Patna Master Plan 2031* envisions a transformative roadmap for Bihar's capital city, addressing the pressing challenges of rapid urbanisation through a comprehensive and sustainable development framework. This research paper critically examines the Plan's key components—land use zoning, multimodal transportation, inclusive housing, smart infrastructure, and ecological resilience—within the context of global urban planning paradigms such as smart growth and new urbanism. Emphasis is placed on the institutional architecture led by the Patna Metropolitan Development Authority (PMDA), which fosters inter-agency coordination, decentralised governance, and participatory implementation. The study also explores financing strategies, stakeholders' engagement, and real-time monitoring mechanisms that aim to ensure transparency and efficiency. Drawing on empirical data and stakeholders' insights, the paper evaluates the feasibility and impact of the Master Plan in enhancing urban livability, economic vitality, and environmental sustainability. It concludes with strategic recommendations to bridge implementation gaps and promote an inclusive, resilient, and future-ready Patna.

Keywords

Patna Master Plan 2031, Sustainable Urban Development, Governance, Infrastructure, Inclusive Growth, Smart City Planning.

Introduction

Patna, the capital of Bihar, has experienced rapid urbanisation in recent decades, leading to both economic opportunities and critical challenges such as infrastructure deficits, environmental degradation, and social inequality (Rai, 2020; Singh, 2019). The city's growing population—estimated at 2.46 million in 2025, with the larger metropolitan area approaching 3 million—has significantly increased demand for

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housing, transportation, and essential services, highlighting the urgent need for a structured and sustainable urban planning approach (Census2011.co.in, 2025; Kumar & Mishra, 2018).

In response, the Government of Bihar introduced the *Patna Master Plan 2031*, a comprehensive development framework aimed at guiding the city's transformation. The Plan's objectives include balanced urban growth, infrastructure enhancement, economic development, environmental sustainability, and social inclusion (Government of Bihar, 2019; Prasad, 2021). It emphasises harmonising modernisation with ecological conservation to foster a livable and resilient urban environment (*The Times of India*, 2017).

The Master Plan incorporates key components such as land use zoning, improved mobility and transport systems, affordable housing, upgraded utilities, and environmental protection strategies (Sharma, 2015a; Das, 2016). These are underpinned by actionable policies and projects addressing present and future urban challenges (*The Indian Express*, 2020).

This paper critically assesses the Plan by integrating theoretical frameworks—including sustainable urban development, smart growth, and new urbanism (Sivaramakrishnan, 2016a; *Hindustan Times*, 2018)—with empirical data such as demographic trends, land use patterns, and stakeholders' perspectives (Thakur, 2014; Datta, 2019; Bhaskar, 2020).

While the Master Plan presents a robust vision for Patna's future, it faces hurdles including land acquisition, funding gaps, and weak institutional coordination. This evaluation seeks to analyse its effectiveness and recommend strategies to enhance its role in shaping an inclusive and sustainable urban Patna.

Objectives of the Master Plan

The *Patna Master Plan 2031* aims to guide the city's growth through sustainable, inclusive, and well-planned urban development (Government of Bihar, 2019). Its primary objective is to balance population expansion and economic activities with environmental sustainability and social equity. It promotes optimised land use and efficient resource management to ensure long-term resilience.

A core focus is modernising infrastructure across key sectors—transport, water supply, sanitation, and housing—to support urban expansion and enhance quality of life (Bihar Urban Infrastructure Development Corporation, 2022). The Plan also prioritises economic development by establishing industrial and commercial zones and fostering entrepreneurship to boost employment and productivity (Kumar & Mishra, 2018).

Environmental sustainability is integrated through pollution control, solid waste management, and the protection of green spaces and biodiversity, alongside climate

resilience measures (Bihar State Pollution Control Board, 2021). Social inclusion is emphasised through affordable housing, improved access to services, and targeted support for marginalised groups, ensuring equitable development (Datta, 2019).

Together, these objectives form the foundation of a holistic vision to transform Patna into a livable, economically vibrant, and environmentally responsible urban centre.

Methodologies and Planning Process

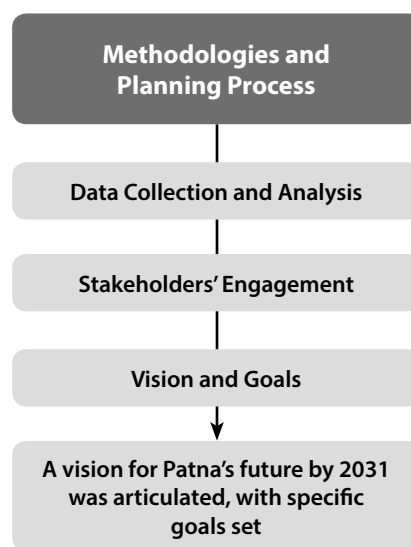


Figure 1: Methodologies and Planning Process

Source: Author

Data Collection and Analysis

The planning process for the Master Plan involved extensive data collection and analysis. This included demographic studies, land use surveys, transportation assessments, and environmental impact analyses. Geographic Information System (GIS) technology was utilised to map and analyse spatial data, facilitating informed decision-making (Sharma, 2015b).

Stakeholders' Engagement

Stakeholders' engagement was a critical component of the planning process. Consultations were held with government agencies, local communities, businesses, and non-governmental organisations to collect inputs and build consensus on key issues and priorities. This participatory approach aimed to ensure that the Plan reflects the needs and aspirations of diverse stakeholders (Sivaramakrishnan, 2016b).

Vision and Goals

Based on the data analysis and stakeholders' consultations, a vision for Patna's future was articulated. The vision emphasises sustainable and inclusive development, aiming to transform Patna into a livable, resilient, and economically vibrant city by 2031 (Government of Bihar, 2019). Specific goals were established in areas such as infrastructure, economic development, housing, and environmental sustainability.

Key Components of the Master Plan

Land Use Planning

Land use planning forms the backbone of the Master Plan 2031 and is structured around the principle of sustainable and efficient spatial organisation. The Plan delineates distinct zones for residential, commercial, industrial, and recreational purposes to ensure optimal land utilisation and minimise functional conflicts (Thakur, 2014). A key observation is the promotion of mixed-use development, which reflects a strategic shift towards creating compact, walkable urban environments. This planning paradigm encourages social integration and economic vitality by enabling people to live, work, and recreate within the same neighbourhoods, thereby reducing dependence on long-distance commuting and mitigating urban sprawl.



Figure 2: Key Components of The Master Plan of Patna, 2031

Institutionally, this vision relies on strong coordination between the Patna Metropolitan Planning Committee (PMPC) and Urban Local Bodies (ULBs) to enforce zoning regulations and facilitate stakeholders consultations for land use reclassification, as outlined in the governance structure of the plan (PMAA, 2023).

Transportation and Mobility

The Master Plan 2031 prioritises the modernisation and diversification of urban transport to improve connectivity and sustainability. Central initiatives include the development of a metro rail network, augmentation of public bus services, and creation of dedicated infrastructure for non-motorised transport, such as cycling and walking (Ministry of Urban Development, 2017). These integrated mobility strategies aim to reduce vehicular congestion, promote eco-friendly commuting, and ensure equitable access to transport services (*Hindustan Times*, 2018).

From an institutional standpoint, the Plan assigns a coordinating role to the Patna Urban Transport Authority (PUTA), to be established under the PMDA, for unified traffic management, infrastructure investment, and modal integration. The governance framework calls for close collaboration among the Road Construction Department, Urban Development and Housing Department, and transport-related parastatal agencies to implement these proposals (PMAA, 2023). This clearly defined inter-agency mechanism strengthens the feasibility of delivering complex multimodal projects.

Housing and Urban Development

The Master Plan's housing strategy addresses both the quantitative demand for urban housing and the qualitative need for inclusivity and resilience. It emphasises affordable housing projects, the in-situ redevelopment of slums, and the upgradation of informal settlements to provide essential services like clean water, sanitation, and electricity (Datta, 2019). Additionally, the Plan integrates green building norms and climate-resilient construction practices to promote sustainability (*The Indian Express*, 2020).

The implementation framework proposes the establishment of a City Housing and Habitat Cell within the PMDA, tasked with coordinating housing policies across agencies and ensuring alignment with centrally-sponsored schemes such as PMAY (Urban). This institutional provision ensures a focused and accountable mechanism for addressing housing challenges across income groups (PMAA, 2023).

Infrastructure and Utilities

Urban infrastructure is addressed through a multi-pronged strategy involving upgrades to water supply systems, sanitation, solid waste management, and electricity grids. A noteworthy feature is the emphasis on smart infrastructure, which includes the adoption of ICT-based systems and IoT technologies for real-time monitoring and service optimisation (Smart Cities Mission, 2020).

The Master Plan proposes the creation of a Unified Urban Services Management Cell (UUSMC) under the PMDA to oversee integrated service delivery. This institutional innovation aims to break departmental silos and promote data-driven decision-making, supported by partnerships with private operators and civic tech start-ups (BUIDCO,

2022; PMAA, 2023). The feasibility of these provisions is enhanced by their alignment with ongoing smart city projects in Patna (*The Times of India*, 2017).

Environmental Management

Environmental sustainability is a key concern addressed through specific policies on pollution control, natural resource conservation, and climate resilience. The Master Plan advocates for afforestation, wetland protection, and improved waste treatment systems to mitigate air and water pollution and reduce the city's ecological footprint (Bihar State Pollution Control Board, 2021).

Institutionally, the Master Plan proposes the formation of an Urban Environmental Management Unit (UEMU) within the PMDA to coordinate with the Bihar State Pollution Control Board and other environmental agencies. This unit would oversee implementation of ecological safeguards, including flood management protocols and renewable energy initiatives, particularly in vulnerable and low-lying areas prone to climate impacts (PMAA, 2023; Bhaskar, 2020). These measures reflect a governance commitment to resilience and ecological balance.

Overall, the *Patna Master Plan 2031* is a forward-looking and comprehensive blueprint that addresses the critical dimensions of land use, transportation, housing, infrastructure, and environmental management. A key strength lies in its detailed governance and institutional architecture, which not only designates lead agencies such as the PMDA but also proposes specialised units and inter-departmental coordination mechanisms to ensure effective implementation. The feasibility of the Master Plan is thereby enhanced through clear lines of authority, capacity-building provisions, and an emphasis on stakeholders' participation, ensuring that urban development in Patna is both inclusive and resilient.

Implementation Strategies

Governance and Institutional Framework

The feasibility of implementing the Master Plan of Patna 2031 hinges significantly on the strength and coherence of its governance and institutional mechanisms. A central pillar of the plan is the establishment and empowerment of the Patna Metropolitan Development Authority (PMDA), envisioned as the nodal agency responsible for strategic oversight, inter-agency coordination, and regulatory enforcement (Patna Municipal Corporation, 2021a). The Master Plan proposes a tiered governance structure, integrating the PMDA with existing municipal bodies, such as the Patna Municipal Corporation, and state-level departments, including the Urban Development and Housing Department, the Transport Department, and the Environment and Forest Department, to ensure a synchronised execution of multifaceted urban interventions.

One of the key observations from the governance blueprint is the emphasis on decentralised decision-making and clarity of jurisdiction, which are designed to

minimise bureaucratic overlap and enhance responsiveness. Institutional reforms proposed in the Plan advocate for digital governance tools and e-governance platforms to streamline approvals, track project implementation, and enable transparent public service delivery (Government of Bihar, 2019).

The framework also underscores the critical role of public-private partnerships (PPPs) in project execution, particularly for infrastructure, housing, and transport. These partnerships are expected to inject technical innovation and capital, reducing fiscal burdens on government agencies. Civil society and community-based organisations are explicitly identified as key actors in participatory governance, particularly in the areas of informal settlement upgrading, environmental stewardship, and inclusion of marginalised populations (*Hindustan Times*, 2018). However, the successful realisation of this inclusive governance model depends on institutional capacity-building, legislative backing, and sustained political will.

Funding and Financing

The Master Plan outlines a comprehensive financial strategy that blends public financing with innovative private capital mobilisation. Governmental budgetary allocations form the backbone of funding, supplemented by centrally-sponsored schemes and external funding from international agencies such as the World Bank and the Asian Development Bank (*The Times of India*, 2017). The Plan also promotes land value capture mechanisms, municipal bonds, and user charges to generate sustainable revenues for urban projects.

A key insight is the proposal to establish a dedicated urban investment fund under the PMDA, tasked with managing funds from diverse sources and disbursing them based on project readiness and priority. This approach not only enhances fiscal discipline but also ensures timely execution of critical interventions in housing, mobility, and utility sectors (Government of Bihar, 2019).

Monitoring and Evaluation

A robust Monitoring and Evaluation (M&E) framework is embedded within the Master Plan to ensure transparency, accountability, and adaptive planning. Key Performance Indicators (KPIs) are outlined across various sectors, including infrastructure expansion, environmental conservation, housing affordability, and socio-economic inclusion (Sivaramakrishnan, 2016b). The Plan proposes a centralised dashboard, managed by the PMDA, to track real-time progress using geospatial and administrative data.

Importantly, the M&E system is designed to be participatory, incorporating feedback loops from stakeholders through surveys, grievance redress platforms, and periodic public consultations. This not only democratises the planning process but also enhances its responsiveness to ground-level realities (*The Indian Express*, 2020). The iterative nature of this system allows for course corrections, making the Plan dynamic

and context-sensitive in addressing emerging urban challenges (*The Hindu*, 2021; *The Economic Times*, 2021).

Impact Assessment

Urban Life and Social Dynamics

The Master Plan of Patna aims to transform urban life by addressing socio-economic disparities and improving living conditions in marginalised communities. Emphasising social inclusion, the Plan focuses on affordable housing and slum redevelopment to enhance the quality of life (Datta, 2019). Affordable housing initiatives are designed to alleviate shortages and prevent informal settlement expansion, while slum redevelopment projects will upgrade infrastructure and basic services in informal areas. This approach is expected to reduce health risks, enhance educational opportunities, and foster social cohesion (Datta, 2019; *The Times of India*, 2022).

Economic Development

Economic development is a key objective of the Master Plan, with the aim of revitalising Patna's urban economy. By creating commercial and industrial zones, the Plan seeks to stimulate investment and generate employment opportunities (Kumar & Mishra, 2018). Infrastructure improvements, including road expansions and a new metro system, are critical for supporting business operations and attracting investments. These upgrades are anticipated to boost Patna's economic competitiveness and support growth in various sectors, including manufacturing and retail (Kumar & Mishra, 2018; *Hindustan Times*, 2023).

Environmental Sustainability

Environmental sustainability is central to the Master Plan, with strategies to enhance green spaces, reduce pollution, and improve waste management. Integrating green spaces and urban forests aims to improve air quality and provide recreational areas, supporting biodiversity (Bihar State Pollution Control Board, 2021). Pollution control measures, such as stricter regulations and better waste management, are crucial for mitigating environmental degradation. Climate resilience measures, including flood management and renewable energy adoption, are essential for long-term sustainability (Bihar State Pollution Control Board, 2021; *The Indian Express*, 2024).

Infrastructure and Services

The Master Plan's focus on infrastructure aims to significantly improve urban services in Patna. Expanding transportation networks, including roads and a metro system, will enhance mobility, reduce congestion, and improve urban efficiency (Smart Cities Mission, 2020). Upgrading water supply and sanitation infrastructure is vital for addressing public health issues and improving quality of life. Efficient waste

management systems will handle increased waste volumes and reduce environmental impacts. Additionally, smart city initiatives leveraging technologies like data analytics and IoT will optimise service delivery and resource management (Smart Cities Mission, 2020; *The Times of India*, 2023).

Challenges and Limitations

Despite its comprehensive vision, the implementation of *Patna's Master Plan 2031* faces several critical challenges. Land acquisition and resettlement remain major obstacles, with resistance from landowners and affected communities due to inadequate compensation, livelihood disruptions, and weak rehabilitation efforts (Thakur, 2014; *The Hindu*, 2022a). Although the Plan advocates transparent rehabilitation and inclusive consultations (*The Economic Times*, 2024), inconsistencies on the ground hinder progress. Ensuring fair compensation, alternative housing, and stakeholders' engagement is essential to avoid delays.

Funding constraints further limit execution. Reliance on State/Central schemes and underutilisation of municipal bonds and Public-Private Partnerships (PPPs) have led to the mobilisation of only 40–45 per cent of the required funds by 2023 (Government of Bihar, 2019; PMAA, 2023; *Business Standard*, 2023). Diversifying funding sources through fiscal decentralisation, multilateral financing, and robust PPP frameworks is vital for sustained urban development.

Institutional coordination among entities like Patna Municipal Corporation, BUIDCO, and PHED is weak, leading to duplicated efforts and fragmented governance (Sivaramakrishnan, 2016c). Although proposals like a Unified Metropolitan Transport Authority and cross-sectoral task forces exist, they lack institutional backing. Strengthening inter-agency collaboration, clarifying mandates, and empowering metropolitan bodies are necessary for effective governance (*The Economic Times*, 2024).

Socio-economic disparities persist, undermining the Plan's inclusive agenda. Marginalised communities continue to face inadequate access to housing, sanitation, and employment (Datta, 2019; *The Telegraph*, 2023a). Social inclusion requires targeted investments in underserved areas, equity-focused budgeting, and integrated support programmes in health, education, and livelihoods.

Addressing these structural limitations through policy reforms, financial innovation, and participatory governance is crucial for translating the Master Plan's vision into an equitable and resilient urban reality.

Policy Recommendations for Effective Implementation

To ensure the successful implementation of *Patna's Master Plan 2031*, robust governance, sustainable financing, inclusive development, and environmental

sustainability must be prioritised. Strengthening the institutional framework begins with enhancing the capacity of the Patna Metropolitan Development Authority (PMDA), the primary body responsible for urban development. This requires targeted investments in resources, advanced tools, training, and technical support to enable the PMDA to manage complex urban projects efficiently (Patna Municipal Corporation, 2021b; *The Hindu*, 2022b). Furthermore, inter-agency collaboration among key stakeholders such as the Patna Municipal Corporation, BUIDCO, and PHED is essential to minimise duplication and misalignment. Creating clear communication channels and joint planning mechanisms can facilitate coordinated governance (Sivaramakrishnan, 2016c; *The Economic Times*, 2024).

Promoting transparency and accountability through monitoring systems, regular audits, and stakeholder engagement can foster trust and ensure efficient resource use (Patna Municipal Corporation, 2021b; *The Telegraph*, 2023b). Moreover, community participation in planning and implementation enhances the responsiveness and acceptance of development initiatives (Sivaramakrishnan, 2016c).

Sustainable financing is equally critical. Exploring innovative mechanisms such as Public-Private Partnerships (PPPs) and land value capture can mobilise additional resources and expertise (Government of Bihar, 2019; *Business Standard*, 2023). Issuing municipal bonds allows capital generation while distributing financial responsibility over time. Funding support from multilateral agencies like the World Bank and ADB can complement local efforts, provided transparent allocation is ensured (Government of Bihar, 2019). Effective financial oversight is essential for achieving targeted outcomes.

Inclusive development requires targeted investments in underserved areas to improve access to infrastructure and basic services (Datta, 2019). Expanding affordable housing options and implementing slum redevelopment programmes address urban housing deficits. Equitable access to education, healthcare, and livelihoods ensures that development benefits all socio-economic groups. Community-based programmes and planning forums can promote social cohesion and resilience (Datta, 2019).

Environmental sustainability demands comprehensive waste management practices—segregation, recycling, and proper disposal—to enhance public health (Bihar State Pollution Control Board, 2021). Efforts to reduce pollution, particularly from industrial sources, must be supported by cleaner technologies. Incorporating green spaces and urban biodiversity into planning can mitigate heat islands and enhance ecological health. Building climate resilience through flood mitigation infrastructure and renewable energy integration is essential. Encouraging energy efficiency and transitioning to renewables reduces dependence on fossil fuels and enhances long-term sustainability (Bihar State Pollution Control Board, 2021).

Achievements and Objectives

The *Patna Master Plan 2031* outlines strategic goals for enhancing infrastructure, economic growth, housing, and environmental sustainability. However, a nuanced evaluation requires examining sector-wise progress, including completed projects, those under tendering, feasibility stages, and projects yet to be initiated, along with financial allocations and utilisation.

1. **Infrastructure Development:** A core objective is the improvement of physical infrastructure. The proposed Patna Metro Project, divided into two corridors, has completed Detailed Project Reports (DPRs), and implementation is underway under the aegis of Patna Metro Rail Corporation. Meanwhile, road network expansion, including the AIIMS-Digha elevated corridor and new ring roads, has seen partial completion, with others at the tendering or feasibility stages (PMAA, 2023).

Water supply augmentation and sewerage improvements have DPRs approved in several zones, but implementation remains uneven across wards. Notably, projects like stormwater drainage and solid waste treatment are under DPR or Detailed Feasibility Report (DFR) stages, with limited on-ground progress (PMAA, 2023).

The estimated infrastructure budget under the Master Plan is over ₹30,000 crore, with proposed funding from Central and State schemes (AMRUT, Smart Cities Mission), multilateral loans (ADB, World Bank), and Public-Private Partnerships (PPPs). However, utilisation audits indicate discrepancies in fund absorption, particularly in sanitation and urban transport sectors (UDHD, 2023).

2. **Economic Growth:** To spur economic activity, the plan envisages dedicated commercial and industrial zones, such as the Bihar Industrial Cluster and Patna-Gaya Economic Corridor. While the feasibility studies have been completed, and land identified, project execution is slow due to land acquisition and investor apprehension (*Business Standard*, 2023).

The development of logistics hubs and modern mandi systems is at the DPR preparation stage, with limited budgetary allocations as of 2023–24 (Kumar & Mishra, 2018; PMAA, 2023). The plan anticipates these zones to boost employment, regional investment, and promote decentralised economic growth.

3. **Housing and Urban Development:** The Master Plan targets the construction of 1.5 lakh affordable housing units and the redevelopment of 100+ slum clusters. As per the latest data, around 30 per cent of housing targets are under implementation through PMAY-Urban, while several slum redevelopment proposals remain at preparation or approval stages (PMAA, 2023).

Financial support has come from centrally sponsored schemes and municipal funds, though actual fund disbursement remains under 50 per cent of projected needs. Housing development is uneven, and institutional gaps in urban land policy further delay project execution (Datta, 2019; *The Telegraph*, 2023b).

4. **Environmental Sustainability:** Environmental objectives include improving green cover, pollution control, and flood management. So far, the city forest at Danapur and riverfront beautification near Ganga have progressed, while the proposed urban green belts and rejuvenation of lakes and wetlands are still under DFR stages.

Flood management initiatives, such as channel desilting and embankment strengthening, have received partial funding under State Disaster Response Funds (SDRF), but their integration into urban planning remains fragmented. The total budget for environmental measures stands at ₹2,300 crore, of which only ₹600 crore has been released (BSPCB, 2021; Bhaskar, 2020).

Conclusion and Future Directions

The *Patna Master Plan 2031* presents a strategic, data-driven blueprint to steer the city's urban transformation. Successful implementation hinges on targeted actions across governance, financing, inclusion, and sustainability. Strengthening the Patna Metropolitan Development Authority (PMDA) is vital for managing over 1,100 proposed projects in transport, housing, and water supply. This includes a 30 per cent increase in staff, GIS-based planning tools, and dedicated project monitoring units (Patna Municipal Corporation, 2021a; *The Hindu*, 2023). Coordination among 14 urban local bodies and public engagement through town halls and feedback systems will promote transparency and responsiveness.

Financial sustainability is equally critical, with the Master Plan's total estimated outlay exceeding ₹48,000 crore. The Government of Bihar should mobilise 15–20 per cent of this via Public-Private Partnerships (PPPs), particularly for the ₹13,411 crore metro rail project. Additional financing through ₹2,000 crore in municipal bonds and land value capture from transit-oriented zones can diversify revenue sources. Rigorous audits and transparent accounting will ensure fiscal integrity (Government of Bihar, 2019; *The Economic Times*, 2024; *Business Standard*, 2023).

Inclusive development is central, as nearly 30 per cent of Patna's population lives in informal settlements. The construction of 1.25 lakh affordable housing units and allocation of 25 per cent of infrastructure funds to underserved wards reflect this focus. Special attention to women-led, differently-abled, and elderly households will ensure equitable urban growth (Datta, 2019; *The Telegraph*, 2023b).

On sustainability, the plan earmarks 350 hectares for green spaces, including a 100-hectare urban forest, alongside 40 new parks and 7 decentralised STPs. Renewable energy goals—like 20 MW of rooftop solar—aim to cut emissions by 10 per cent by 2030 (Bihar State Pollution Control Board, 2021; *The Hindu*, 2022b).

Ultimately, bridging the ₹12,000 crore funding gap, acquiring 1,800 hectares of land, and maintaining institutional accountability will determine the plan's long-term success (Sivaramakrishnan, 2016c; PMAA, 2023).

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Review of Smart City Projects in Relation to Jalandhar Master Plan 2031

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Abstract

This paper critically examines the alignment between the Smart City Mission (SCM) initiatives and the statutory provisions outlined in the Jalandhar Master Plan 2031. The Master Plan primarily focuses on land use, spatial growth, and infrastructure development, reflecting traditional urban planning approaches. However, it lacks emphasis on digital governance and smart urban solutions, as the Smart City Mission had not yet been conceptualised at the time of its preparation. The study explores how the Smart City Project has addressed this gap by introducing smart governance tools, integrated infrastructure, and data-driven service delivery mechanisms aligned with contemporary urban demands. A detailed review of Smart City projects in Jalandhar is provided, including area-based and pan-city development initiatives, along with a thematic analysis across key urban sectors such as economic development, recreational spaces, transport, environmental management, and ICT-based governance. The paper also includes funding and investment patterns of the SCM. Through comparative analysis, the paper offers insights into how strategic planning documents and centrally-sponsored missions can work in synergy to support inclusive, sustainable, and smart urban development in Indian cities.

Keywords

Smart City Mission, Master Plan Jalandhar, Urban Development sectors.

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Introduction

Centrally-sponsored Scheme, Smart Cities Mission was launched to equip cities with better infrastructure and promote a sustainable environment, thereby improving citizens' quality of life. The mission focuses on comprehensive efforts around the city's social, economic, physical, and institutional pillars to develop sustainable and inclusive cities. The Smart Cities Mission (SCM), introduced in 2014, initially proposed building 100 new greenfield smart cities. However, by 2015, the focus shifted to retrofitting and modernising existing cities, moving away from new urban developments (MoUD, 2015).

On the other hand, Master Plans follow a structured statutory process, as in Punjab, these are governed by the Punjab Regional and Town Planning and Development Act, 1995. The need for Master Plans arises from rapid urbanisation, infrastructure pressures, and the demand for organised spatial growth. They serve as essential tools for guiding land use, transportation, housing, environmental protection, and economic development over a 20–30-year horizon, ensuring balanced and sustainable urban expansion while improving the quality of life for residents.

The implementation of Master Plan proposals are primarily carried out through government schemes, public-private partnerships, and institutional mechanisms led by Urban Development Authorities, Municipal Corporations, and Improvement Trusts. Funding for these proposals typically comes from centrally-sponsored schemes like AMRUT (Atal Mission for Rejuvenation and Urban Transformation), Smart Cities Mission, PMAY (Pradhan Mantri Awas Yojana), and the Swachh Bharat Mission and state-level schemes besides mobilising resources locally through development charges, property taxes, and building permit fees.

Jalandhar, the third-largest city in Punjab, has a rich administrative history, established as a Municipal Committee in 1867, upgraded to Class I in 1950, and became a Municipal Corporation in 1977. Selected in the second round of the Smart Cities Mission (SCM), Jalandhar is undergoing urban transformation under the guidance of Jalandhar Smart City Limited (JSCL), a Special Purpose Vehicle (SPV) created under the Companies Act, 2013. JSCL coordinates with the Municipal Corporation of Jalandhar and other departments to implement and fund smart city projects at their various stages.

This article focuses to review the Smart City projects in Jalandhar and evaluate their alignment with the provisions of the statutory Master Plan 2031. It begins with an overview of the Smart City concept and the Government of India's Smart City Mission. The paper also presents a summary of the Smart City initiatives undertaken in Jalandhar, followed by an examination of the key challenges and concerns highlighted in the Master Plan. A comparative analysis is then conducted to assess how Smart City proposals support and align with the implementation of the Master Plan's objectives.

Finally, the paper evaluates the investment patterns, outcomes of Smart City Mission initiatives across key thematic areas.

Literature Review

This section reviews existing literature, focusing on the concept and structure of smart cities, criteria for their selection, and the challenges encountered in implementing the Smart City Mission.

Concept of Smart Cities

The smart city concept has gained prominence in academic and policy discussions, although it is not entirely new. According to Downs (2005), it emerged in the late 1990s as part of the United States' "smart growth movement." The term gained global traction when major technology companies like IBM adopted it, defining a smart city as one that utilises information and communication technologies (ICT) to collect, analyse, and integrate data for managing core urban systems (IBM, 2008). Initially, the focus was on improving the efficiency of urban infrastructure and services through ICT. However, the concept has since expanded to encompass a broader range of technological innovations in urban governance, including smart mobility, environmental sustainability, energy efficiency, and emergency management systems (Praharaj, 2021).

Since the 1970s, India's infrastructure-focused urban schemes like IDSMT (Integrated Development of Small and Medium Towns), Mega-City Scheme, and JNNURM (Jawaharlal Nehru National Urban Renewal Mission) largely failed due to lack of funds. This led to a shift in urban policy towards market-driven approaches. As a result, the concept of "smartness" in Indian cities emerged ambiguously, either as technology-driven governance (e-governance) or as elite-oriented urban developments like IT hubs. Early smart city projects such as Dholera and GIFT City (Gujarat International Finance Tec-City) in Gujarat reflect this elite-centric vision influenced by global tech collaborations (Prasad and Alizadeh, 2020).

In India in 2014, the Bharatiya Janata Party (BJP) first mentioned the Smart Cities Mission (SCM). It was stated as greenfield development to construct 100 new cities with technology and infrastructure. The mission aimed at creating sustainable, walkable, green cities. By July 2014, the mission's orientation moved away from greenfield smart city development and towards the promotion of satellite towns, smart urban clusters within metropolitan regions, and the modernisation of medium-sized cities (Ministry of Urban Development, 2015). Further, in 2015, the draft of smart cities was focused on retrofitting projects in existing cities, thus further moving away from greenfield and satellite towns (Bharatiya Janata Party, 2014).

In 2015, several global corporations contributed to shaping the smart city narrative with a strong emphasis on ICT as the key enabler of urban transformation. Cisco

defined a smart city as a carefully planned city that leverages ICT to address urban challenges (Cisco, 2015). Similarly, PwC envisioned smart cities evolving from increased digitisation, where an ICT master plan supports more sustainable and livable urban environments. It emphasised the need for Indian cities to integrate IT seamlessly with their physical, social, and economic infrastructures (PwC, 2015). Deloitte (2015) also highlighted the convergence of digital technology, innovation, and urban systems, recommending that Indian cities adopt cloud-based ICT solutions to integrate diverse data sources and enable quicker decision-making for improved infrastructure and service delivery.

The Smart Cities Mission emphasises fostering competitiveness and innovation among cities to drive urban transformation. Central to this is the “India Smart Cities Challenge,” a merit-based competition assessing cities’ readiness and proposal quality. Funding from the Ministry of Urban Development was tied to city rankings and capabilities, marking a shift from earlier large city-centric investment models to a meritocracy-driven approach. This competitive framework aligns with EU smart city initiatives, which also focus on assessing and ranking regional competitiveness before project implementation (Annoni & Dijkstra, 2017).

The SCM in India aims to develop 100 smart cities, selected through a two-stage competitive process: intra-city (state-level) and inter-city (national-level) challenges (Refer to Figure 1).

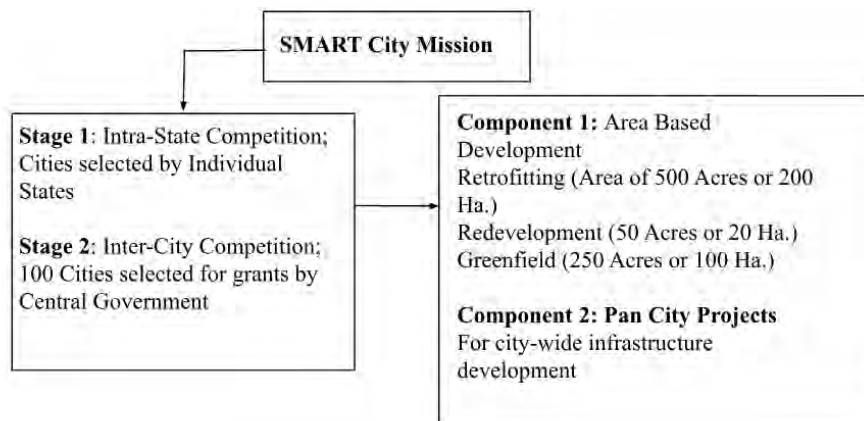


Figure 1: SMART City Structure

Source: SCM Guidelines, Ministry of Urban Development, 2015

The Smart Cities Mission is governed through a system of co-funding and co-monitoring by central, state, and local governments. At the city level, it is managed by a Special Purpose Vehicle (SPV), a statutory entity with 50:50 equity shared between the state and city governments, and provisions for limited private sector participation (MoUD, 2015). Operating alongside existing municipal bodies, the SPV is designed to ensure autonomy and insulate the programme from local political pressures. It is granted

municipal-like powers to streamline implementation and decision-making. While initial funding involves ₹100 crore each from the central and state/city governments over five years, SPVs are expected to eventually become financially self-sustaining through revenue generation mechanisms (Kesar and Ache, 2024). The Government of India selected 99 cities out of 110 in 4 rounds through a competitive structure.

Challenges in the Implementation of the Smart City Mission

The Smart Cities Mission (SCM) guidelines acknowledged that there is no universal definition of a smart city, as interpretations differ based on context and goals (MoUD, 2015). While this flexible approach allows cities to customise their strategies, it also creates ambiguity that can hinder effective planning and implementation. The mission's open-ended framework allows stakeholders the flexibility to prioritise various infrastructure components based on local needs and contexts (MoUD, 2015). The Smart Cities Mission was introduced alongside AMRUT, Housing for All, and HRIDAY, and aligned with national programmes like Digital India, Skill India, and Swachh Bharat. Although these initiatives are designed to complement each other, cities often face challenges in coordinating them. The absence of a unified framework has led to overlapping planning documents, conflicting objectives, and fragmented implementation, ultimately hindering progress towards sustainable urban development (Praharaj et al., 2017).

The Smart Cities Mission mandates citizen consultation during the proposal stage, typically led by the city commissioner with inputs from experts and consultants. However, the guidelines remain vague about the actual influence of citizens, lacking details on participant selection, roles, decision-making authority, and information-sharing mechanisms. Crucial aspects like veto power, consensus-building, and formal channels for public inputs are undefined (Kesar & Ache, 2024). In practice, citizen engagement has been limited, with only 10–15 per cent of residents participating in most cities. The heavy reliance on digital tools excluded individuals without regular access to technology, failing to address the digital divide and thereby undermining meaningful and inclusive participation in the planning process (Basu, 2019; Praharaj, 2021; Prakash, 2025).

While the Smart Cities Mission (SCM) aims to deliver citywide infrastructure and area-based renewal, it lacks alignment with existing master and development plans. Cities often focus on limited-scope “sandbox initiatives” or pilot projects, resulting in fragmented implementation (Praharaj et al., 2017). Area-Based Development (ABD) under SCM covers less than five per cent of a city's area, yet 81 per cent of total investments are concentrated in these zones, benefitting only about 10 per cent of the urban population, and as few as three per cent in larger cities (Praharaj, 2021). It is further noted that 92 smart cities adopted ABD strategies centred on central business districts and urban cores, where many residents live in slums. As per the 2011 Census, approximately 14 million households live in urban slums, and around three million

people are homeless. The implementation of smart city projects has, in several instances, led to the forced eviction of slum dwellers and residents of informal settlements, often without fair compensation or resettlement options (Housing and Land Rights Network, 2018). Globally, such digitally driven urban development models have increased living costs, further marginalising the urban poor (Praharaj, 2021).

Sector-wise analysis of Smart city proposals reveals that urban mobility received the largest share of over 25 per cent of the investment across 100 cities. Economic development, including startup clusters and innovation hubs within ABD areas, accounted for above 15 per cent of the funding. ICT and centralised command and control centres received nearly 14 per cent of the total spending. In contrast, sectors like education, health, and environmental management received minimal attention, receiving just over three per cent of investments (Praharaj, 2021). This pattern indicates a preference for hard infrastructure projects such as transport and utilities, which are more amenable to large-scale technological implementation and digital solutions, while largely neglecting soft infrastructure sectors like education, health, and environmental management.

Smart City Framework for Jalandhar Smart City

Jalandhar, a sports city and an emerging metropolitan city is spread across 11,000 hectares. Jalandhar Smart City Limited (JSCL) plans, implements, and releases funds for Jalandhar City in coordination with the Municipal Corporation of Jalandhar (MCJ) and other nodal departments. The vision of Smart City Jalandhar is to make Jalandhar the leading sports and manufacturing hub in Asia and to enhance Jalandhar's livability and sustainability over the next 5-10 years.

The Jalandhar Smart City framework is a comprehensive plan outlining the development strategy for transforming Jalandhar into a sustainable and citizen-centric city. The Smart City Framework for the city includes physical, social value, and smart governance. It emphasises leveraging technology and innovative solutions to address key urban challenges. Following are the details of breakdown of the core elements of the framework.

The smart city framework relies on information and communication technologies (ICT) such as the Integrated Command and Control Centre (ICCC) to enable real-time monitoring (Smart City Jalandhar, 2021). Providing online platforms for citizens to access government services, such as applying for permits, paying taxes, or reporting issues. Develop a user-friendly mobile app and online portal for citizens to access government services, pay bills, and lodge complaints. E-government platforms can make it easier for citizens to engage with their government and provide feedback.

Developing physical and social infrastructure with smart technology and digital solutions is a key strategy for building a smart city. On the physical infrastructure front, this includes implementing traffic management systems and smart grids to improve

energy efficiency and reduce power consumption. It also focuses on water conservation through rainwater harvesting, leak detection systems, and water-efficient infrastructure. In social infrastructure, the strategy involves developing schools equipped with digital learning tools and tele-education facilities, providing access to affordable internet, and promoting digital literacy programmes. Additionally, it includes ensuring affordable housing, accessible public transportation options, well-equipped healthcare facilities, and public spaces with free Wi-Fi to foster inclusive and connected communities, the creation of value infrastructure such as transportation, water supply and sanitation systems, energy grid, green initiatives, and digital preservation of historical sites

The city's development plan prioritises six key areas: *Economic Development; Public & Recreational Spaces; Transport & Traffic Management; Infrastructure Modernisation; Environment and Sanitation; Smart Governance*. These initiatives collectively aim to transform Jalandhar into a smarter, more connected, and citizen-centric city. The present paper covers a comparative analysis across these priority areas in the following sections.

Smart City Projects in Jalandhar

The completed work includes projects that are finished and fully operational (refer to figure 2). A total of 44 smart city projects (68%) have been completed across all three approaches of the Smart Cities Mission (SCM). These include LED light installations, junction improvements, green area development projects, smart road construction, solar panel installations on 26 government buildings, and the establishment of a digital library.

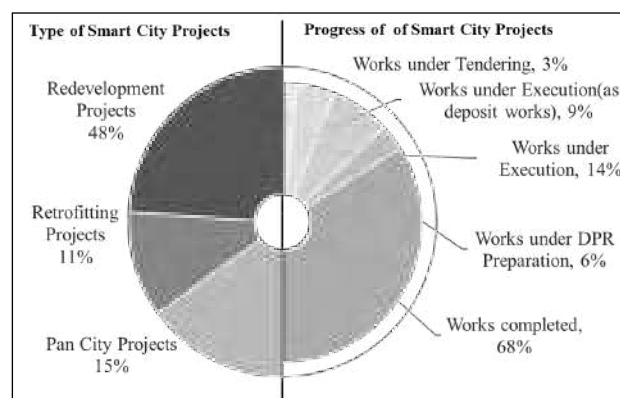


Figure 2: Summary of Smart City Projects in Jalandhar

Source: Jalandhar Smart City Pvt.Ltd., 2021

Approximately 14 per cent of the total smart city projects are currently in the execution stage. These projects include the development of the Burlton Park Sports Hub, solid waste management at the Wariyana dump site through a bio-mining project, modernisation of the hockey stadium at Mithapur, Jalandhar, construction of

a foot over- bridge (FOB) and escalators at the city railway station (deposit work), installation of GIS-linked QR code-based property UID number plates integrated with municipal services, and the construction of rooftop rainwater harvesting structures on government buildings.

About three per cent of the smart city projects are currently in the tendering stage. These include the rejuvenation and beautification of the 15 km stretch of the Kalasingha drain within the city, solid waste management at the city level through the procurement of machinery, the use of treated water from the STP for irrigation, GIS-based property map updates through ground verification of existing property data, and the procurement of smart security and surveillance vehicles, along with other law and order equipment for the police department (Research Gate, n.d.). Another six per cent of the projects are under Detailed Project Report (DPR) preparation including the beautification of public space (walls & building façade) with theme-based painting (graffiti) in Jalandhar City, the beautification of the City Entrance Corridor from PAP Chowk to Khalsa College (Length-1.5 km), The Model Town Market Redevelopment Project-” MOVE” and Police Command & Control Centre (PCCC).

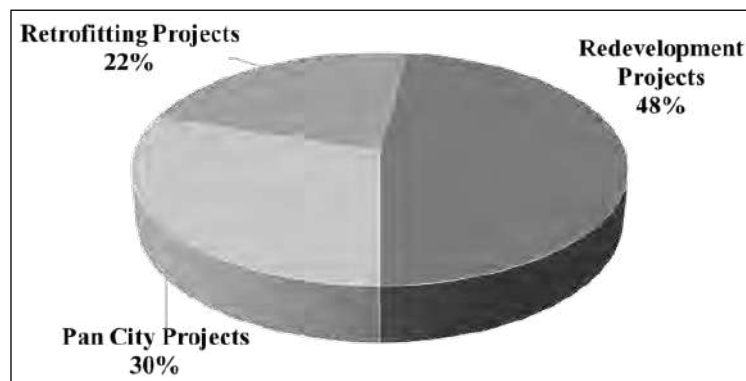


Figure 3: Types of Smart City Projects

Source: Computed by Author, 2024

Distribution of Smart City Projects in Jalandhar City

About 48 per cent of the total projects are redevelopment projects, 22 per cent are retrofitting projects, and 30 per cent are pan-city projects distributed in Jalandhar smart city (refer figure 3). The Pan-City projects encompass initiatives implemented across the entire city. These include public transportation improvements (buses, depots, and shelters), Intelligent Transportation Systems (ITS), LED Street lighting, and an Integrated Technology Solution for Public Utility and Public Safety (ITSPUPS) with cameras and a command centre. The Area-Based Development Projects target specific areas for concentrated development. The retrofitting projects prioritise the creation of new and enhanced spaces over merely renovating existing ones. In terms of distribution of projects, the city is divided into 7 zones. Table 1 and Figure 4 depict that Zones 2,

4, 5, and 7 have a smaller number of smart city projects. Zone 1 is the core area of Jalandhar. Zone 1 and Zone 3 have key projects of Jalandhar Smart City like ABD projects, retrofitting projects, and pan-city projects. There is an uneven distribution of smart city projects in Jalandhar city. In comparison to other zones, such as Zones 5A, Zones 4, and Zones 7, the majority of the major smart city projects are located in Zones 1 and 3.

Table 1: Distribution of Projects in Various Zones of Jalandhar City

Zones	PAN-City projects	Area-Based Development Projects	Retrofitting projects
ZONE 1	✓	✓	✓
ZONE 2	✓	✗	✓
ZONE 3	✓	✓	✓
ZONE 4	✗	✓	✗
ZONE 5	✓	✓	✓
ZONE 5A	✗	✗	✗
ZONE 6	✓	✓	✓
ZONE 7	✗	✓	✗

Source: Computed by Author, 2025

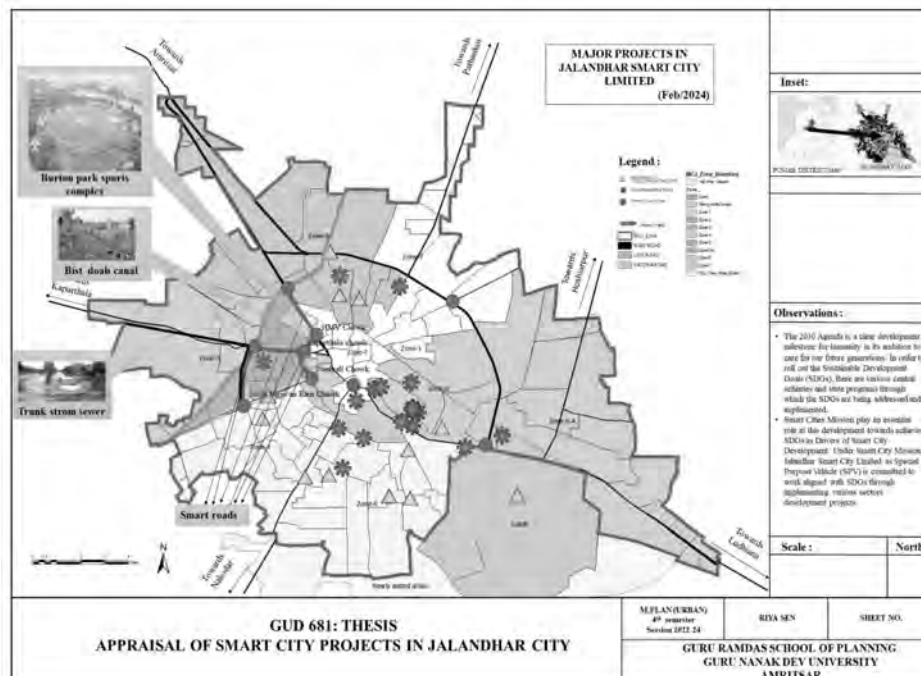


Figure 4: Distribution of Different Projects in Jalandhar

Source: Author Generated, 2025

Comparative Insights: Coverage of Smart City Mission Initiatives versus Issues and Proposals in Jalandhar Master Plan 2031

This section presents a comparative analysis of the Smart City Mission initiatives against the issues and proposals identified in the Jalandhar Master Plan 2031. Organised around key thematic categories, the study covers: Economic Development; Public & Recreational Spaces; Transport & Traffic Management; Infrastructure Modernisation, including Water & Sewerage, Solid Waste, Storm Water, and Fire & Emergency Response; Environment & Sanitation; and Smart Governance. By examining these themes side-by-side, this section aims to highlight areas where the Smart City Mission complements, extends, or falls short of the Master Plan's vision.

Economic Development

The redevelopment of Model Town Market, upgradation of the Burlton Park Sports Hub, and modernisation of the Mithapur Hockey Stadium align with the Plan's emphasis on strengthening Jalandhar's identity as a sports and recreational hub (Table 2). These initiatives reflect effective synergy between spatial planning and infrastructure investment, enhancing economic activity and urban appeal.

Table 2: Comparative Review of Economic Development Initiatives

Issues/Proposals Identified in Master Plan 2031	Smart City Project	Comparative Review
Model Town Market is proposed as a district/community centre to reduce congestion in Rainak Bazaar.	Model Town Market Redevelopment Project – “MOVE”	Aligned with the Master Plan's vision. Supports decentralisation and revitalisation.
The development of Burlton Park was identified as a key infrastructure investment expected to enhance economic growth and urban appeal.	Burlton Park Sports Hub	Direct implementation of the Master Plan proposal. Strong synergy between the Master Plan vision and Smart City execution.
Emphasised role of Punjab Institute of Medical Sciences, multiplexes, and Mumbai-Amritsar Corridor for economic and industrial growth.	No specific project listed	Gap identified. These critical nodes have not been integrated into Smart City interventions, indicating missed alignment opportunities.
Proposed development of national/international level sports infrastructure.	Modernisation of Hockey Stadium at Mithapur	Reinforces Jalandhar's identity as a sports city. Supports physical infrastructure upgrade as per the Master Plan vision.
No specific reference to street vendors, though informal sector is vital.	Street Vending Zones at 4 Locations	Positive addition. While not proposed in the Master Plan, the initiative supports inclusive urban employment and informal sector integration.

Source: Author Derived, 2025

However, critical gaps remain; strategic locations like the Punjab Institute of Medical Sciences (PIMS), multiplex zones, and the proposed Mumbai–Amritsar Economic Corridor, which are central to the Master Plan’s economic and institutional vision, have not been addressed under Smart City projects. On the other hand, initiatives like designated vending zones and smart property identification systems, though not mentioned in the Master Plan, represent forward-thinking additions. These support inclusive urban governance and informal sector integration, areas that future updates to the Master Plan should formally incorporate for a more comprehensive and integrated urban development strategy.

Public & Recreational Spaces: The Jalandhar Master Plan 2031 places considerable emphasis on strengthening public and recreational spaces to enhance quality of life, promote environmental sustainability, and improve community well-being. The Smart City Mission has responded to this vision through targeted investments that align with the Plan’s intent. For instance, the rejuvenation of the Upper Bist Doab Canal, a core proposal in the Master Plan, has been addressed through green area development efforts. These aim at aesthetic enhancement, ecological restoration, and potential future water resource management, marking a significant step towards integrated urban sustainability.

Similarly, the modernisation and digitisation of the library resonate well with the Master Plan’s call to expand public resource access. Furthermore, the phased development of local parks under various green area initiatives demonstrates a proactive move to meet the Master Plan’s implied objectives regarding neighbourhood-level green space distribution (Table 3).

Table 3: Comparative Review of Public & Recreational Spaces Initiatives

Issues/Proposals Identified in Master Plan 2031	Smart City Project	Comparative Review
Upper Bist Doab Canal area proposed for beautification, desilting, and future water sourcing.	Rejuvenation of Bist Doab Canal Area.	Strong alignment with Master Plan proposal; visible progress on beautification and ecological restoration.
Need for expanded, digitised library access.	Digitisation of Shri Guru Nanak Dev Library – Part A (Civil Upgrade) Part B (Library Management System).	Aligns directly with the Master Plan recommendation; enhances library infrastructure and increases access to resources through ongoing digital and tech-based solutions for improved service delivery.

Issues/Proposals Identified in Master Plan 2031	Smart City Project	Comparative Review
Development of local parks to promote green space access.	Green Area Development Phases I–III (multiple parks), Biodiversity Park.	The green space initiatives under the Smart City Mission promote environmental improvement, by enhancing park infrastructure and recreational accessibility. These interventions align well with the Master Plan’s focus on public and recreational space enhancement.

Source: Author Derived, 2025

Transport & Traffic Management

The Master Plan emphasises decongesting arterial corridors, improving traffic safety, and ensuring seamless connectivity across the city. Several Smart City interventions demonstrate strong alignment, particularly in the domain of junction upgrades. The focused improvement of critical intersections reflects the Master Plan’s vision of segregating through-traffic from local flows, enhancing both mobility and safety. The use of intelligent traffic management systems (ITMS) and CCTV integration introduces a modern dimension to traffic regulation, offering real-time monitoring, an advancement over the traditional infrastructure-focused proposals of the Master Plan.

Railway station redevelopment under the Smart City Project also directly supports the Master Plan’s mobility goals. The beautification and accessibility upgrades at Jalandhar City Railway Station improve circulation, pedestrian safety, and intermodal connectivity (Table 4).

Table 4: Comparative Review of Transport & Traffic Management Initiatives

Issues/Proposals Identified in Master Plan 2031	Smart City Project	Comparative Review
Proposed flyovers and elevated road on NH-1 to decongest key junctions and improve safety and flow.	Traffic Junctions Improvement – HMTV Chowk, PNB Chowk, Guru Ravidas Chowk, Doaba Chowk, Kapurthala Chowk, Guru Amardas Chowk, BMC Chowk, Model Town Chowk	Aligns directly with the Master Plan objectives; improves intersection safety, traffic flow, and pedestrian movement using ITMS and CCTVs.

Issues/Proposals Identified in Master Plan 2031	Smart City Project	Comparative Review
No mention.	Development of Smart Roads in the ABD Area.	Indirectly supports Master Plan's mobility vision through modern road infrastructure with ITMS, CCTVs, utility ducts, and drainage systems.
The Master Plan aims to improve pedestrian access, reduce congestion, and ensure seamless mobility at the Railway Station.	Beautification of Circulating Area at Jalandhar City Part-A: Railway Station Part-B: FoB and Escalators at Railway Station.	Supports overall city-wide mobility improvement; complements Master Plan goals.
Not explicitly mentioned in the Master Plan.	Smart Multi-Level Car Parking-cum-Shopping Complex -Nikku Park, Model Town Partap Bagh.	This initiative aligns well with the Master Plan's objective, even though not directly included in it, to reduce congestion in the core city by providing organised parking solutions.

Source: Author Derived, 2025

However, certain initiatives, such as smart road development and multilevel parking complexes, while not being explicitly mentioned in the Master Plan, offer significant additions in city planning. They support compact urban growth by promoting walkability, reducing on-street parking congestion, and integrating utility infrastructure below the road surface. However, the success of such projects depends on being firmly grounded in comprehensive public participation studies. These projects reveal an opportunity to update or revise the Master Plan to accommodate evolving technological and environmental requirements of the city.

Infrastructure Modernisation

The Master Plan outlines the urgent need to modernise basic infrastructure systems. In the water and sanitation sector, the Smart City Project addresses key Master Plan concerns such as groundwater stress and contamination by introducing a 24x7 bulk surface water supply scheme (funded under the AMRUT mission). Similarly, automation of tube wells and reuse of treated sewage water, though not detailed in the Master Plan, represents strategic improvements that enhance system efficiency and support sustainable water management. Rooftop rainwater harvesting structures also extend the Plan's original mandate, embedding conservation into public infrastructure (Table 5).

In terms of solid and stormwater management, the Smart City approach surpasses the Master Plan in scope and execution. While the Plan identifies deficiencies in waste handling, it does not propose dedicated solutions for construction and demolition (C&D) waste or bio-mining. The Smart City Project fills this gap through infrastructure for scientific C&D waste processing and bio-mining of overburdened landfill sites, promoting sanitation, pollution control, and material recovery. Likewise, initiatives such as the rejuvenation of the Kala Sanghian Drain align closely with flood mitigation, integrating ecological restoration and urban greening (Table 5).

Fire safety and emergency response are other areas where the Smart City interventions operationalise the Master Plan's risk mitigation recommendations. Moreover, the development of an Integrated Command and Control Centre (ICCC) absent in the Master Plan establishes a centralised hub for emergency coordination and smart governance.

Table 5: Comparative Review of Infrastructure Modernisation Initiatives

Category	Issues/Proposals Identified in Master Plan 2031	Smart City Project	Comparative Review
Water & Sewerage	Significant stress on groundwater, contamination, need for alternative surface water, equitable distribution, and modernisation. 24x7 potable water supply system is an objective.	24x7 Bulk Surface Potable Water Supply Scheme	Master Plan highlights groundwater issues but does not explicitly mention 24x7 bulk supply; Smart City project operationalises this, aiming to reduce groundwater extraction and improve water quality.
	No systemic automation strategy is mentioned, though chlorination and dual supply exist.	Automation of Tubewells	Automation is not addressed in the Master Plan; the Smart City initiative could enhance operational reliability, addressing maintenance and power failure issues.
	Potential for reuse in irrigation acknowledged, but no direct proposal.	Use of Treated STP Water	Aligns conceptually with the Master Plan, but more proactive implementation under the Smart City project; delays due to site acquisition issues.
Solid Waste Management	Overburdened Wariyana dump site lacking scientific processing.	Bio-mining project	The Master Plan acknowledges poor waste management; the Smart City project operationalises advanced treatment (bio-mining), enhancing health and environmental outcomes.

Category	Issues/Proposals Identified in Master Plan 2031	Smart City Project	Comparative Review
	Not mentioned	Construction & Demolition Waste	The Smart City project fills the gap in the Master Plan with dedicated C&D processing Plant at Gadaipu, improving city cleanliness and resource recovery.
	Identified need for machinery; current equipment inadequate	Machinery for Solid Waste	Partial alignment; Smart City project enhances operational capacity, Procurement of machinery (excavators, loaders, tippers) to mechanise solid waste operations and improve efficiency.
Stormwater Management	Severe deficiency in infrastructure; flooding issues; Kala Sanghian Drain needs pollution control, desilting, greening, and waste treatment.	Rejuvenation and beautification of 15 km Kala Sanghian Drain	Master Plan and Smart City both identify drainage and flood challenges; Smart City is actively implementing ecological restoration and infrastructure upgrades.
	Mandated rainwater harvesting for new plots; lacking in public buildings.	Rooftop Rainwater Harvesting	The Smart City project advances water conservation beyond Master Plan mandates by targeting 50 public buildings for RWH structures.
Fire & Emergency Response	Seismic zone 4; need for disaster preparedness and training.	Capacity building, including mock drills, procurement of firefighting equipment	Master Plan emphasises disaster preparedness; Smart City project operationalises equipment procurement and capacity building to improve emergency response and resilience.
	Not specified	Integrated Command Control Centre	The Smart City initiative introduces advanced command and control systems for emergencies not detailed in the Master Plan, enhancing coordination and response.

Source: Author Derived, 2025

Environment and Sanitation

Jalandhar Master plan places general emphasis on promoting sustainability and alternative energy use, but lacks detailed proposals for environmental enhancements or

sanitation-related innovations. In contrast, the Smart City Mission introduces targeted interventions that expand the city's green footprint, promote energy efficiency, and integrate public health with environmental care, effectively filling conceptual and operational gaps left by the Master Plan (Table 6).

Green area development initiatives, such as under-flyover greening, park upgrades, etc, were not explicitly outlined in the Master Plan. Similarly, LED installations and rooftop solar panels on government buildings resonate with the Plan's encouragement of alternative technologies that substantially reduce energy consumption, enhance public safety, and support climate action (Table 6).

Table 6: Comparative Review of Environment and Sanitation Initiatives

Issues/Proposals Identified in Master Plan 2031	Smart City Project	Comparative Review
No mention.	Green Area Development Phase I: Industrial/Nivia Park.	Development of jogging track, gym, kid play area, sports grounds, sprinklers, plantation, LED lights, and social spaces providing environmental and recreational benefits in an industrial area.
	Green Area Under 3 Flyovers.	55,000+ saplings planted, vertical gardens, automatic irrigation, dust pollution mitigation, aesthetic improvement, and public appreciation.
	Green Area Dev. Phase I (Beant Singh Park, B.R. Ambedkar Park, etc.)	Improved parks with irrigation, walking paths, greenery, sports fields, open gyms, and kids' play equipment enhance public recreational spaces.
No mention, but the Master Plan encouraged solar energy use in public areas.	LED Street Lights – PAN City	Replacement of 72,000 sodium street lights with smart LEDs, installation of 1,000 CCMS units (400 installed so far), reducing electricity bills by 60%, improving lighting levels, security, surveillance, and lowering O&M costs.
	Rooftop Solar Panels – 26 Government Buildings	Solar panels of a total 1616 kW capacity installed, supporting green energy goals aligned with the Master Plan encouragement.

Issues/Proposals Identified in Master Plan 2031	Smart City Project	Comparative Review
No mention.	Reverse Vending Machines for PET Bottles (18 units).	Helps reduce plastic pollution by incentivising bottle recycling with coupons/SMS rewards, improving cleanliness and environmental sustainability.
	Sanitary Napkin Vending Machines & Incinerators (76 sets).	Improved women's healthcare through easy, stigma-free access to sanitary napkins; benefits approx. 30,000 women via machines installed in public places and government schools.

Source: Author Derived, 2025

Innovative sanitation efforts, such as **Polyethylene Terephthalate (PET)** bottle reverse vending machines and sanitary napkin vending with integrated electric incinerators, go beyond the Master Plan's scope, addressing contemporary urban challenges through citizen-centric and tech-enabled solutions. These additions signal a progressive shift towards integrated solid waste management and inclusive public health infrastructure, especially for women.

Smart Governance

The master plan does not address the digital transformation of governance systems, as smart initiatives were not a part of the planning discourse at the time of its preparation. In this context, the Smart City Project addresses a major strategic need aligned with current trends and demands by introducing smart governance tools that enhance service delivery, accountability, and public safety. This represents a significant step forward by funding recent global initiatives, enabling their practical implementation at the city level.

The installation of GIS-linked QR code-based property UID plates, establishment of the ICCC, and the Police Command & Control Centre (PCCC) represent a leap towards integrated, tech-driven urban management and public safety. These hubs facilitate real-time surveillance, traffic management, environmental monitoring, and emergency coordination, modern functions not envisioned in the original Master Plan but essential for a responsive, data-driven city (Table 7).

Table 7: Comparative Review of Smart Governance Initiatives

Issues/Proposals Identified in Master Plan 2031	Smart City Project	Comparative Review
The Master Plan 2031 does not mention any of the smart governance initiatives.	GIS-Linked QR Code-Based Property UID Plates.	The Master Plan 2031 does not mention this initiative. The Smart City Project introduced a GIS-linked property UID system with ground survey completed for 70k of 3 lakh properties and plate installation underway.
	Upgradation of Integrated Command & Control Centre (ICCC).	Not covered in Master Plan 2031; Smart City Project established ICCC as the operational core for real-time monitoring and integrated management of city services, including safety, traffic, waste, water, health, and street lighting.
	Police Command & Control Centre (PCCC).	No reference in the Master Plan 2031. The Smart City Project includes PCCC to strengthen law enforcement coordination, emergency response, and overall public safety under the smart governance framework.
	Smart Security & Surveillance Vehicles and Law & Order Equipment.	Not mentioned in Master Plan 2031, the Smart City Project strengthens real-time monitoring and rapid police response by equipping law enforcement with modern surveillance vehicles and tools, enhancing public safety under the smart governance framework.

Source: Author Derived, 2025

Together, these smart governance initiatives create a foundational layer for intelligent urban administration in Jalandhar. Overall, the Smart City Project effectively bridges the gap between the vision-oriented nature of the Master Plan and the implementation-focused Smart City Projects. However, to ensure integrated and sustainable growth, future revisions of the Master Plan should incorporate these advancements, promoting long-term planning.

Sector-wise Investment and Current Status of Smart City Projects

The city has a total investment plan of ₹644.79 crore under the Smart City Mission. Investment data for Jalandhar's Smart City projects highlights a strong focus on infrastructure modernisation, which constitutes 43 per cent of the Smart City funding,

amounting to ₹279 crore (Table 8). The additional ₹808 crore under the AMRUT scheme further reinforces the city's emphasis on upgrading essential urban services, thereby raising the total investment to ₹1,086.91 crore. Notably, 27 per cent of the total infrastructure investment is covered under the Smart City Mission alone.

In the fire and emergency response sector, 20.4 per cent of the total investment is allocated, with 5.5 per cent earmarked for disaster management initiatives. Approximately 80 per cent of the investment in this sector is dedicated to the establishment of the ICCC. However, nearly 99 per cent of the sector's budget remains under the tendering stage. While the local government has already procured key infrastructure-related machinery, projects such as the rejuvenation and beautification of the Kala Sanghian Drain, which represents 8.5 per cent of the investment, are still in the tendering and Detailed Project Report (DPR) preparation phase.

Transport infrastructure has also received substantial attention with a 15 per cent investment. Although only 3.6 per cent of the total planned investment has been fully utilised, several projects such as junction improvements, traffic signage, and beautification of circulation areas have been completed. Meanwhile, smart road development projects, which account for nearly 40 per cent of the transport sector's investment, are currently in progress. Another significant component development of multi-level car parking facilities represents 51 per cent of transport-related investment and remains in the tendering and DPR stages.

Table 8: Sector-Wise Investment and Progress Status Under Jalandhar Smart City Mission

Sectors/Themes	Sector-wise Funding (₹ Cr)	Percentage of total Smart city Investment	Share of Investment in Completed Projects (%)	Share of Investment in Ongoing Projects (%)
Economic Development	94.85	14.7	0	0
Public & Recreational Spaces	22.67	3.5	0.1	1.7
Transport	157.69	15	3.6	9.9
Infrastructure Modernisation	278.91	43.3	1.2	10.1
Environment & Sanitation	80.27	12.4	4.2	8.3
Smart Governance	10.4	1.6	0.6	0
Total	644.79	100	9.7	30

Source: Jalandhar Smart City Pvt. Ltd, 2021

The Environment & Sanitation sector received the fourth-highest investment in the city, with nearly 100 per cent of the allocated funds utilised and most projects under this theme fully completed. One of the key initiatives installation of LED lights across

the city, accounts for 5.1 per cent of the total investment and was reported to be 90 per cent complete as of 2021.

In contrast, Public & Recreational Spaces and Smart Governance received relatively smaller shares, accounting for 3.5 per cent and 1.6 per cent respectively, and showed minimal progress in terms of project completion. As per the 2021 data, only 6.1 per cent of the total investment had been fully utilised, while over 50 per cent of the funds were tied up in ongoing projects. Additionally, nearly one-third of the total investments remained at the tendering or DPR preparation stage.

Nearly 40 per cent of the total investment has been utilised to complete various projects, while the remaining 60 per cent is committed to projects still in the pipeline. A significant portion of this investment is directed towards infrastructure developments, such as multi-level car parking facilities. However, the success of such projects remains uncertain, particularly in cities of similar size, where structured parking is often underutilised unless high levels of traffic congestion exist. These facilities are more viable in vertically expanding urban areas. Therefore, it is crucial to engage the public through participatory processes before launching such high-investment initiatives.

In contrast, projects like bio-mining, drain rejuvenation, the establishment of the ICCC, development of sports hubs, and citywide LED light installation, which collectively account for 59 per cent of the total investment, are more likely to deliver long-term benefits. These initiatives are crucial for improving urban infrastructure and enhancing the overall quality of life, and they are expected to yield positive outcomes for the city in the future.

Conclusion

The Smart City Mission in Jalandhar has made a significant contribution, particularly in decentralising commercial activities and enhancing sports infrastructure. Infrastructure modernisation dominates investment, reflecting the Master Plan's core emphasis on upgrading essential services. Transport projects show potential to alleviate congestion and improve connectivity. Economic diversification, public recreation, and environmental sustainability receive comparatively less attention. Emerging smart governance initiatives introduce advanced technological capabilities that were absent from earlier Plans, representing promising avenues to strengthen urban management and citizen engagement. To conclude, Smart City projects have contributed and are in the process of contributing substantially to transforming Jalandhar into a resilient, inclusive, and future-ready city, even though many of the projects are ongoing or in the pipeline. Such missions and programmes support cities by providing crucial funding that local government can utilise to address urban infrastructure challenges and promote sustainable development.

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Navigating Urban Sustainability: A Critical Assessment of India's Smart Cities Mission amid Rapid Urbanisation

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Abstract

India's Smart Cities Mission (SCM) was launched in 2015 to address the challenges of rapid urbanisation by promoting sustainable, technology-driven, and citizen-centric urban development. The effectiveness of the initiative remains a subject of debate, given the socio-economic, environmental, and governance complexities in Indian cities. This paper critically assesses the SCM's progress, examining its impact on urban sustainability in terms of infrastructure development, environmental resilience, social inclusivity, and economic growth. Through an analysis of policy frameworks and case studies, the authors explore whether the mission has successfully fostered sustainable urbanisation or exacerbated existing urban disparities. The findings suggest that while SCM has catalysed innovation in urban governance and infrastructure, challenges such as inadequate citizen participation, financial constraints, and the digital divide hinder its full potential. This study underscores the need for a more integrated and inclusive approach to urban sustainability, balancing technological advancements with equitable development.

Keywords

Smart Cities Mission, Urban sustainability, Rapid urbanisation, India, Sustainable development, Governance.

Introduction

The cities are growing quickly because rural regions are becoming urban areas. This is happening because of increased job possibilities, social advantages, contemporary infrastructure and services, and natural population expansion. Despite covering only

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two per cent of the planet, cities house 50 per cent of the world's population. Architects and urban planners faced significant obstacles in developing intelligent systems to encourage efficient resource use and sustainable growth. The concept of the smart city began to emerge after 1990. It seeks to tackle the following issues: establishing a solid economic base, building effective urban infrastructure, enhancing the standard of living and the environment, guaranteeing social integration, preserving the natural environment, and ensuring good governance (Shukla, 2017).

The term “smart city” is commonly associated with the use of advanced digital technologies like Big Data, Blockchain, Internet of Things (IoT), Artificial Intelligence and wireless communications to improve urban systems. This entails connecting city components to receive, analyse, and manage data in real-time using cloud-based IoT sensors, actuators, video cameras, and other intelligent devices. Pairing sensors and data with a city's infrastructure and services can boost operational efficiency, reduce waste, and improve environmental performance (McKinsey Global Institute, 2018).

Cities across the globe are endeavouring to become smarter by adopting digital technology-enabled gear and software to satisfy the demands of expanding urbanisation. The demand for smart city technology is expanding quickly. Between 2022 and 2030, the worldwide smart cities market is anticipated to rise at a compound annual growth rate (CAGR) of 24.2 per cent, from an estimated USD 1,090.64 billion in 2021 (Grand View Research, 2017). The way people interact and participate in cities is changing as a result of digital innovations like civic technology, geographic information systems, the sharing economy, open data, and digital platforms. The COVID-19 pandemic made it even more urgent for national and local governments to build more effective and source data management systems, protect citizens' privacy when using digital services, and close the digital divide, especially for marginalised groups and communities living in informal settlements.

However, there is also a dark side to digital technology, as smart cities may also perpetuate existing social and economic inequalities. While internet connectivity is becoming the norm requisite for full participation in society, globally there are 3.7 billion people offline according to United Nation records (International Telecommunication Union, 2022). Internationally, many smart city programmes have failed when it comes to sustainability because technology has been used indiscriminately and based on supply rather than demand. The intended outcomes have not been achieved by investments in smart city projects that put the capabilities of technology ahead of the needs of the populace. Simultaneously, as cities have evolved into testing grounds for surveillance technologies driven by artificial intelligence, worries regarding oversight, transparency, and possible human rights violations in smart city frameworks have grown. (Ismagilova et.al, 2002).

The smart city concept has evolved over a long period of time. The genesis of the concept could be traced back to cybernetic movement of the 1950s, which began

to study various complex urban systems through computer applications (UN-Habitat, 2022). However, mainstreaming of computer applications began only from the mid-1990s as technology corporations such as International Business Machines and Cisco, started to develop e-governance applications for urban services (Hollands, 2008). Initial focus was on building large scale digital infrastructure, to bring about optimisation of services delivery and cost reduction. Subsequently, significant developments in Internet of Things (IoT), machine learning, cloud computing, cognitive computing, and data analytics as well as a quantum leap in smart phone adoption, began to expand potential for the digitalisation of nearly all municipal services.

However, beginning in the mid-2010s, researchers and government officials began to question the concept of a smart city, recognising that the use of technology in smart cities had no defined purpose and was primarily driven by private sector interests. It is becoming clearer that just using digital technology does not automatically improve a city's performance or sustainability outcomes. Finally, the adoption of smart technology must be based on genuine human requirements and result in tangible improvements to municipal government features, making it more outcome-oriented and people-centric. International organisations like the United Nations and the Organisation for Economic Cooperation and Development (OECD) suggests the need for smart cities to apply digitalisation by involving stakeholders to promote people's well-being and develop more inclusive, sustainable and resilient societies through participatory governance (International Telecommunication Union, 2014). The UN Habitat has brought out a "people-centric smart cities framework" which is aligned to the Sustainable Development Goals (SDGs) and articulates participatory governance features of the New Urban Agenda (UN-Habitat, 2022). Technological advancements have the potential to facilitate sustainable urban development by transforming the planning, management, and experiences within cities. Cities can use new digital tools like Artificial Intelligence (AI), machine learning, and big data analytics to plan for problems, use resources more efficiently, and deliver solutions on time, which makes them efficient and sustainable. For example, smart meters and sensors that use the Internet of Things (IoT) will be able to keep track of how much energy and water is being used in real time, which will help save resources and reduce waste. Combining smart grids with renewable energy sources like wind and solar power helps reduce the need for fossil fuels and keep energy clean and reliable. Electric Vehicles, smarter road management, smarter transportation, powered by GPS, non-motorised transportation infrastructure (bike paths, walking paths, etc.) —all of this would help reduce the carbon emissions and make it less difficult to move around. Cities can also adopt a more circular economy, with less landfills, by using smart trash cans, recycling and converting waste into energy. Modern urban farming and resilient green infrastructure strengthen sustainability by securing food systems against climate change. Online governance and smart apps transform the physical and political landscape into a participatory, inclusive environment. This shift simplifies communication between citizens and the

state, ensuring marginalised groups can more easily voice their concerns and access essential services. The improvement of disaster management tools, including artificial intelligence-based early warning systems and risk mapping based on Geographic Information System, also makes cities more resilient to climate change and natural disasters. Technical innovations are crucial for developing cities that are socially just, economically vibrant, and environmentally conscious for future generations. These advancements address immediate challenges while creating sustainable systems, ensuring long-term well-being and usability of urban spaces.

As India is moving towards an urban future, it is also rapidly embracing digital technology. A key objective of the Indian government in most sectors, such as e-governance and delivery of services to the populace, direct transfer of social welfare benefits to the poor, cashless financial transactions, etc. are achieved through digitalisation. The use of digital technology has been gaining popularity in society over the past few years. With the Smart Cities Mission, the use of digital technology in cities has become simpler by developing a Data Smart Cities Strategy (Smart Cities Mission, 2023). The Smart Cities Mission has laid the foundation of transformative change in the urban governance system in India by deploying digital technology infrastructures and people-centric data management guidelines.

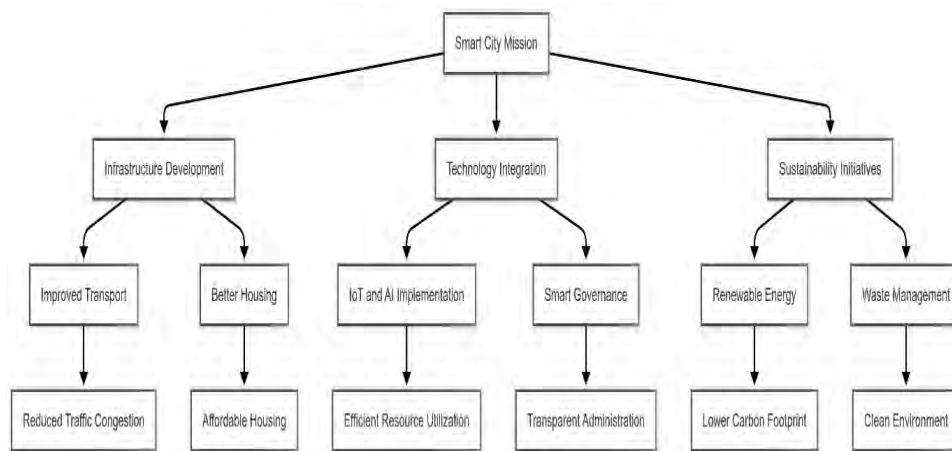


Figure 1: The Impact of Smart City Mission on urbanisation

Source: Compiled by the authors

Review of Literature

The Government of India's Smart Cities Mission is an innovative initiative designed to catalyse economic growth and elevate living standards. By developing 100 smart cities, the programme aims to provide millions of citizens with transparent e-governance and modernised infrastructure. This strategic transformation is intended to alleviate poverty, bolster disaster resilience, and significantly improve urban quality of life.

India's rapid urbanisation, driven by population, migration, and economic growth, has created challenges for urban planning and sustainability. The government launched the Smart Cities Mission in 2015 to transform urban spaces into more efficient, sustainable, and livable cities. The concern people have, however, is how it will be implemented, its compatibility with sustainability objectives, and whether it can address the needs of the urban poor, the environment, and infrastructure.

Developing a Smart City Framework

Sujata and Saxena (2016) developed a comprehensive strategy of smart city development, with a focus on the data-oriented urban planning, technological convergence, and policy formulation. They have proposed in their work in *Procedia Computer Science* (Elsevier Journal) that, in order to be successful smart cities, efforts to achieve sustainability, governance, and public participation need to be synchronised.

Socio-Economic and Cultural Issues

The socio-economic disparities and cultural challenges within Indian villages are examined in multiple studies. Afzal and Hoque (2017) study gender disparity in Mirzapur Village, Uttar Pradesh, identifying deep-rooted inequalities in access to resources and opportunities. (Hoque and Khan, 2017) analyse the impact of India's anti-poverty programme, MGNREGA, on reducing rural migration in West Bengal, arguing that employment security plays a crucial role in stabilising rural economies.

Irrigation and Agricultural Development

Siddiqui, Afzal, and Hoque, (2017) present a block-level analysis of irrigation development in Uttar Dinajpur District, West Bengal. Their study highlights the need for better water management policies and infrastructural improvements to support sustainable agricultural growth.

Sanitation and Public Health Concerns

Taufique et al. analyse the critical issues of inadequate sanitation and open defecation in rural India, highlighting the severe risks to public health and personal dignity while urging the government to modernise sanitation infrastructure and intensify community awareness programmes. (Taufique, et al. 2020).

The idea of smart cities in India is examined in a number of studies focusing on the most important areas, issues, and development models. A case study of Chandigarh City (Singh et al., 2017) described the difficulties in governance and infrastructure and technology adoption. Likewise, Soni (2016) offers a thorough overview of smart city programmes in India, discussing policies, structures and development. According to Kunkulol and Waghmare (2016), smart cities in India are developing and improving with emphasis on digital transformation and infrastructure development. Aishwarya and Chellasamy, (2021) discuss the introduction of smart cities in India, the distinction

between the purpose of policy making and real challenges encountered by citizens. The Smart Cities Mission (SCM) has come to the forefront of tackling the issues of urbanisation faced by India with technology-based solutions in the areas of smart waste management, 24x7 water supply, intelligent traffic management systems, e-governance platforms, and renewable energy projects. These initiatives have made it easier, aided the process of providing services, making cities more sustainable.

While Surat and Bhubaneswar demonstrate the Smart Cities Mission's potential for success, the overall impact remains uneven. Progress is frequently hampered by bureaucratic delays, the absence of empowered local governance, and insufficient citizen engagement. Furthermore, a persistent tension between rapid economic growth and environmental security, alongside the digital divide, undermines the mission's effectiveness. Consequently, the SCM exhibits a "conditional smartness" that prioritises technological solutions over social inclusiveness and ecological sustainability. The mission should be less technocratic and more people-oriented by tackling the problems posed by a growing urban population through devolution of power, ensuring equal connectivity of all stakeholders to smart services, and expanding green urban policies. It will be a balance between technological progress and social equilibrium and the sustainability of the environment.

Research Questions

- How well does the Smart Cities Mission deal with the problems of growing urbanisation in India, especially when it comes to environmental sustainability?
- How can technical breakthroughs contribute to the promotion of sustainable urban development as part of the Smart Cities Mission?
- How can the Smart Cities Mission's governance systems be improved to increase its influence on sustainable urbanisation in India?
- What are the social and economic effects of establishing smart cities in India's fast-growing metropolitan regions?
- What new governance strategies may be used in the Smart Cities Mission to better align sustainability with the requirements of populations in India that are increasingly urbanising?

India SCM needs to explore its comprehensive governance and implementation framework in order to know the institutional, operational, and strategic underpinnings of the project. The Smart Cities Mission has a multi-dimensional strategy which incorporates governance reforms, technological innovation, infrastructure development, citizen participation and principles of sustainability in solving multi-faceted urban challenges. Table 1 in this respect, displays the SCM Framework, describing, the functions and responsibilities of each component. The table systematically summarises the role of policy design, funding mechanisms, technology integration, public-private

partnerships and monitoring systems in planned, inclusive, and resilient urban development in the Smart Cities Mission.

Table 1: SCM Framework

Framework Component	Description	Key Functions & Responsibilities
Governance Structure	Multi-tiered governance model involving Central Government, State Governments, and Urban Local Bodies (ULBs).	Ensures alignment between national objectives and local urban requirements.
Funding Mechanism	Funded through a mix of central and state government grants, municipal resources, international funding, and private sector investments (PPP model).	Provides financial support for smart infrastructure, digital services, and urban sustainability projects. Encourages cities to generate their own revenue through municipal bonds.
Smart City Planning & Implementation	Area-Based Development (ABD) and Pan-City initiatives for infrastructure improvement and digital integration.	Develops urban spaces with smart transportation, green infrastructure, and e-governance services.
Technology Integration	Use of IoT, AI, big data analytics, and GIS mapping for better city management.	Enables real-time monitoring of urban services like traffic, waste management, and energy consumption. Improves decision-making with data analytics.
Citizen Participation	Digital governance platforms, e-participation mechanisms, and public grievance redressal systems to enhance inclusivity.	Allows citizens to provide feedback, access e-governance services, and participate in decision-making through mobile apps and online platforms.
Sustainability & Environmental Considerations	Integration of renewable energy, green buildings, water conservation, air quality monitoring, and waste management in urban planning.	Reduces carbon footprint, ensures long-term urban resilience, and promotes eco-friendly urban development.
Infrastructure Development	Focuses on smart roads, public transport, energy-efficient public utilities, waste-to-energy plants, and resilient housing.	Enhances urban living conditions with better transport networks, energy-efficient solutions, and smart grids. Ensures seamless connectivity through Intelligent Transportation Systems (ITS).

Framework Component	Description	Key Functions & Responsibilities
Resilience & Disaster Management	Development of climate-resilient infrastructure to mitigate the impact of natural disasters.	Implements early warning systems, smart emergency response systems, and urban flood management solutions.
Monitoring & Evaluation	Performance measurement through Smart City Command Centres, Key Performance Indicators (KPIs), and ranking systems.	Tracks project progress, service efficiency, and impact on urban sustainability. Uses real-time dashboards for transparency.
Public-Private Partnerships (PPP)	Encourages collaboration with private investors for financing and expertise in smart city projects.	Attracts investments in technology-driven urban solutions such as smart transport, digital payment systems, and sustainable waste management.
Urban Mobility & Smart Transportation	Development of integrated public transport, electric vehicles (EVs), non-motorised transport (NMT), and intelligent traffic management.	Improves urban mobility through smart traffic signals, e-buses, cycle-sharing programmes, and dedicated pedestrian pathways.
E-Governance & Digital Services	Adoption of cloud-based platforms, digital IDs, smart governance portals, and AI-based decision support systems.	Enhances government efficiency, automates public service delivery, and ensures transparency in governance.
Affordable Housing & Urban Livelihood	Development of low-cost housing projects, rental housing schemes, and inclusive urban employment programmes.	Provides sustainable housing for economically weaker sections (EWS), reduces slum growth, and promotes inclusive economic development.
Energy Efficiency & Smart Grids	Promotion of solar energy, smart metering, energy-efficient buildings, and decentralised renewable energy projects.	Reduces dependency on fossil fuels, ensures energy security, and promotes decentralised renewable power generation.
Water Management & Smart Utilities	Implementation of smart water meters, rainwater harvesting, wastewater recycling, and leakage detection systems.	Ensures efficient use of water resources, reduces wastage, and improves urban water sustainability.
Solid Waste Management	Introduction of smart waste collection, waste segregation at source, composting, and waste-to-energy projects.	Reduces landfill dependency, promotes circular economy principles, and ensures efficient urban waste management.

Framework Component	Description	Key Functions & Responsibilities
Digital Economy & Smart Business Ecosystem	Development of start-up hubs, fintech ecosystems, digital payment infrastructure, and innovation clusters.	Encourages economic growth through digital transactions, start-up incubation centres, and e-commerce-friendly urban spaces.
Urban Safety & Surveillance	Deployment of smart CCTV surveillance, AI-based crime analytics, emergency response systems, and women's safety apps.	Enhances public security, reduces crime rates, and ensures quick response during emergencies.
Challenges & Bottlenecks	Issues like bureaucratic delays, lack of coordination, financial constraints, digital divide, and limited local governance capacity.	Requires policy reforms, better integration across government levels, and improved funding mechanisms.

Source: Compiled by the authors.

This comprehensive SCM framework provides a detailed roadmap covering governance, funding, technology, sustainability, infrastructure, urban resilience, and public participation.

Smart Cities Mission and Its Role in Addressing Urbanisation and Sustainability in India

The SCM, launched by the Government of India in 2015, aims to foster sustainable and inclusive urban development through smart solutions. Its positive contributions include a focus on sustainable infrastructure with renewable energy integration, improved waste management, and green mobility initiatives like electric buses. SCM also promotes water and resource efficiency through smart metering and wastewater reuse, and enhances urban resilience with climate-adapted planning and disaster management systems. Technology-enabled governance, via Integrated Command and Control Centers (ICCCs), facilitates real-time monitoring for improved resource management, and its Area-Based Development model serves as a pilot for scalable sustainable living.

However, SCM faces significant limitations. Implementation is fragmented, focusing on specific areas rather than entire cities, which may create disparities. The mission is narrow in response to urban poverty and is prone to overemphasise technology to the detriment of basic service provision including housing and healthcare. Environmental sustainability is still on the edges, as most of the projects are based on the aesthetics, and not the systemic changes. The long-term sustainability is hampered by financial and institutional bottlenecks such as the dependency on central funding and a different

local body capacity. Moreover, pilot projects scaled and replicated have not reached full-scale transformations as the pressures of urbanisation keep on increasing. Although the SCM has shown sustainability-consciousness in energy efficiency, mobility, and governance, it has not fully addressed the structural issues of the urbanisation process like affordable housing, inclusion, and large-scale waste and pollution control, and socio-economic differences. The sustainability initiatives are usually fragmented, regional, and technologically focused, not systematic and equity focused.

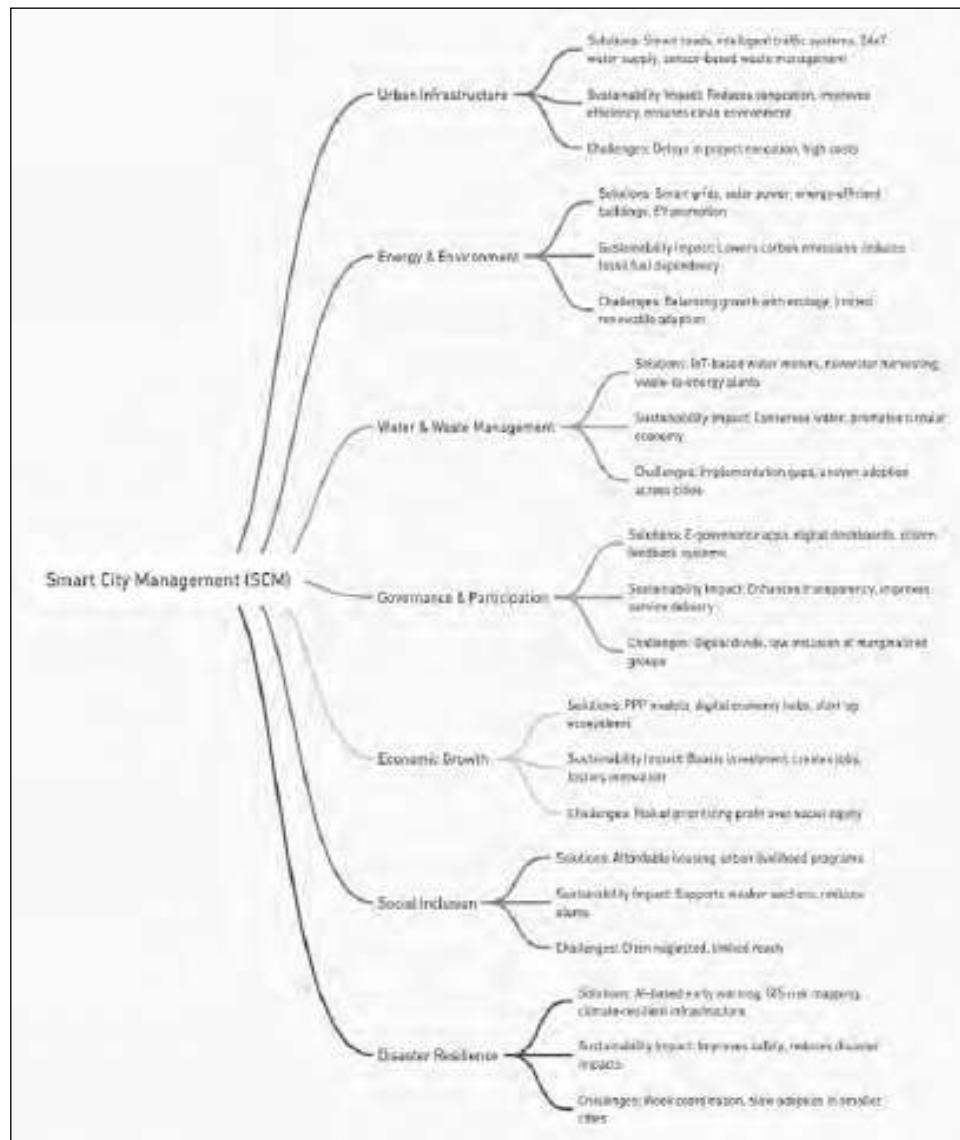


Figure 2: Smart Cities Mission and Its Role

Source: Compiled by the authors

The Smart Cities Mission has demonstrated the shift in Indian city development to a more sustainable and efficient environment through the implementation of Smart waste systems, 24x7 water availability, the use of renewable energy, intelligent transport, and disaster-resistant infrastructure. With these initiatives, pollution is curbed, resource is optimised, and quality of life is enhanced. However, the mission is mostly plagued by a top-down, technology-oriented practice that marginalises inclusivity, and environmental concerns, striking out the marginalised groups and creating loopholes in equality. Its effectiveness is also limited by frequent bureaucratic delays, absence of local government empowerment and little citizen participation. Thus, while SCM contributes to sustainability in urbanisation, it still requires a stronger focus on green policies, participatory governance, and context-based planning to achieve truly balanced and long-term sustainable urban growth in India.

Role of Technological Breakthroughs in Driving Sustainable Urban Development

Smart Infrastructure

Use of intelligent traffic systems, smart grids, and digital urban planning to optimise resource use and reduce congestion. Smart cities attempt to integrate ICT systems, data and citizen participation in managing the city's infrastructure (across sectors), applying principles of smart system transformation.

Energy Efficiency

Adoption of renewable energy (solar, wind), energy-efficient buildings, and electric mobility to cut carbon emissions. Smart cities enhance energy efficiency because they are concerned with low energy consumption, they use renewable energy where feasible, generate low carbon footprint, and the city is technology oriented and ICT enabled. The urban density and spatial organisation also matter in this aspect because they may affect the energy consumption pattern of transport services along with the energy consumed by residential and commercial buildings. A grid network that is adequately distributed to be able to reach all areas of the city, and supply itself at the same time is highly desirable in smart cities because it saves untold amounts of money in transmission lines to serve a distant generation facility.

Water and Waste Management

IoT-enabled water monitoring, rainwater harvesting, and waste-to-energy technologies promote circular economy practices. Smart management aims at optimal use of available water, enhancement of water resources and matching the demand and supply through viable infrastructure building to be integrated and ICT supported. This is done

with the help of smart meters and sensors integrated into water supply infrastructure, such as pipes and pumps to make operation and maintenance of the system to be more demand driven, easy and efficient. Such systems also contribute to balance the forces of demand and supply making the city to respond to floods and drought and promote all round water conservation through reuse of water wherever feasible.

The idea of smart waste management incorporates a series of independent and connected actions which holistically reduce waste generation and manage the generated waste in the best possible way. Consequently, the process involves implementing suitable measures in reducing the waste generated, categorise and sort wastes at the origin stage with a clear idea of the end process management, recycling and recovery (both material and energy) incorporated as measures to utilise waste and disposal being done avoiding adverse environmental and public health impacts and for these measures, ICT/IoT support is employed as much as possible.

Environmental Protection

Advanced sensors and AI models help monitor air quality, manage pollution, and reduce fossil fuel dependency. A range of policies aimed at greening the city and its suburbs can help the city to be environmentally smart. Green policies can help reduce carbon emissions and avert the ills of climate change at the city's level. Green spaces and active life styles of people complement each other; providing spaces that promote an active life style to its people. The health benefits delivered by such measures are unparalleled and reduce carbon emissions indirectly.

E-Governance & Transparency

Digital dashboards, citizen apps, and AI-driven decision-making enhance accountability and participatory governance.

Economic Growth

Technology fosters start-up ecosystems, digital hubs, and PPP models, creating jobs while supporting green innovation.

Social Inclusion

Smart housing solutions, e-learning platforms, and urban livelihood programmes improve access for marginalised groups.

Disaster Resilience

AI-based early warning systems, GIS mapping, and climate-resilient infrastructure help mitigate disaster risks.

Governance Challenges and Solutions for Smart City Implementation

Table 2: The Challenges of Governance

Governance Challenges & Issues	Explanation	Proposed Solutions
Bureaucratic Obstacles and Delays	Lengthy decision-making processes slow down smart city project approvals and implementation due to lack of coordination among central, state, and local governments.	Streamline approval processes, enhance inter-governmental coordination, and improve municipal-level technical expertise.
Lack of Local Government Empowerment	Urban Local Bodies (ULBs) have limited authority and financial autonomy, making them dependent on higher government levels for funding and decision-making.	Strengthen municipal governance by increasing financial independence, enhancing decision-making authority, and providing capacity-building programmes.
Insufficient Public Involvement	Despite digital governance platforms, citizen participation in decision-making remains limited. Vulnerable groups such as migrants and informal workers are often excluded.	Implement more inclusive governance structures with public consultations, participatory planning, and accessible feedback channels.
Conflicts Between Economic Growth and Environmental Sustainability	Rapid urban expansion often prioritises economic growth over ecological concerns, leading to deforestation, overuse of natural resources, and urban sprawl.	Integrate strict environmental regulations into urban planning, promote green infrastructure, and prioritise sustainability in policy decisions.
Delays in Sustainability Projects	Administrative inefficiencies delay essential projects like water recycling, waste management, and sustainable urban infrastructure.	Improve governance mechanisms for sustainability, ensure faster project execution, and reduce bureaucratic red tape.
Digital Divide in Smart City Benefits	Many urban poor and informal sector workers lack access to smart technologies, leading to disparities in service accessibility and social exclusion.	Develop smart city initiatives that are accessible to all socio-economic groups, provide subsidies, and increase digital literacy programmes.
Weak Implementation of Data-Driven Governance	While smart city projects generate valuable real-time data, lack of proper response mechanisms reduces effectiveness.	Enhance data integration into governance, ensure that real-time analytics lead to actionable policies, and strengthen municipal data utilisation capacity.

Governance Challenges & Issues	Explanation	Proposed Solutions
Limited Public-Private Partnerships (PPPs)	Many smart city initiatives suffer from inadequate funding and expertise at the local level.	Encourage PPPs to bring in investment, expertise, and technology from the private sector, particularly in sustainable infrastructure and smart solutions.

Source: Compiled by authors.

Empirical Insights

The SCM in India has made considerable progress in changing the appearance of cities, although its effects have been inconsistent in different towns. There are several cities that have become success stories, showing that the purpose has the ability to create urban environments that are more sustainable, efficient, and liveable. However, there are still many hurdles to overcome, especially when it comes to making sure that everyone is included and that complete environmental measures are put into place.

Success Stories: Surat and Bhubaneswar

Surat and Bhubaneswar have emerged as two of India's most successful urban stories, but each through very different pathways of transformation. Surat has consistently stood out as a national leader in waste management, sanitation, and sustainability, while Bhubaneswar has gained recognition as a pioneer in public transport, citizen-centric mobility, and air quality improvement.

In Surat, the transformation has been anchored in systemic solid waste management reforms. The city was the topmost in the Super Swachh League 2025, in which it won the award with a phenomenal score of 12,151 out of 12,500, edging out long-time champions such as Indore and Navi Mumbai. It scored seven stars in the Garbage Free City rating that shows excellent results in 24 parameters such as 100 per cent segregated sources, scientific treatment of all municipal solid waste, and a full achievement of open dumping and open burning. Surat manages 1,800 tonnes waste daily and has already managed to bio-mine over 10 lakh tonnes of the old of waste and reclaimed good land and reduced environmental risks. The city has also ensured that all its individual neighbourhoods are covered by sanitation, that all parts of the city are clean and lastly, welfare of the sanitation workers, which the city has scored almost perfectly in all the three factors. Besides waste management, Surat became the first city in India to ever be LEED Platinum, as a result of sustainability plans in every one of energy, water, waste, mobility, and quality of life indicators. Its inbuilt waste water management system ensures that it does not release any untreated discharge to the natural water bodies and this had an added advantage in that during the COVID-19

pandemic, it registered 100 per cent first-dose vaccination coverage in record time among the large cities. Collectively, these results place Surat on the forefront to be emulated by cities that would like to excel in urban cleanliness, infrastructure-driven sustainability and institutional governance capacity.

The case of Bhubaneswar is relatively new and yet its success was also impressive but at a different level. The city had been ranked 34th in cleanliness surveys but it leaped quantumly to 9th in Swachh Survekshan 2025 with a score of 10.772 out of 12.500. This increased with 97 per cent door-to-door collection of waste, 98 per cent of daily waste collection, and the outstanding result of 100 per cent clean residential places, marketplaces and water bodies. Its greatest transformation, however is in urban mobility. Under the Mo Bus and Mo E-Ride feeder services, Bhubaneswar developed an inclusive, inexpensive and extensive transport network. During the past couple of years,, the ridership has doubled and the decrease in the number of passengers who shift to the private transportation is 57 per cent (Institute for Transportation & Development Policy, 2023), which is not typical in a country where the percentage of individuals who own an individual vehicle is gradually increasing. It is also worth noting that the system is more inclusively oriented: 40 per cent of the conductors are women, which makes the system even more inclusive of the female commuters and, therefore, engages the person of the opposite gender in the urban working sphere even more. This was a novelty that earned Bhubaneswar a national award of the Best Public Transport System in 2024 by the Ministry of Housing and Urban Affairs (Press Information Bureau, 2024). The city has also improved at least slightly in terms of its air quality management by ranking 4th in its category in Swachh Vayu Survekshan 2025, and demonstrating that its investments in mobility and waste systems are actually improving air quality and making cities healthier (Mishra, 2025).

Surat and Bhubaneswar form two mutually supportive patterns of Indian urban transformation, when compared. Surat has been putting efforts to improve the infrastructure and institutional mechanisms in the waste and water and sanitation and offer measurable outcomes of the quality of cleanliness and the scale of sustainability. However, Bhubaneswar has been concerned with the experience of the citizens, an inclusive movement, and convergence of services, and has been an innovator of taking people out of personal cars with the consequent multiplication of cleanliness and environmental wellness. Together, they offer highly practical lessons, including Surat illustrating the power of long-term planning, data-driven governance, and waste cycle management, and Bhubaneswar illustrating why the innovative service design, gender inclusion, and behavioural change should be put at the heart of developing sustainable cities. Both the cities highlight that urban transformation can take place in India, but it should be guided by ensuring infrastructure investment is carried out in tandem with needs of citizens, good political determination, and results should be monitored.

- **Surat's Strengths:**
 - Long-term planning and institutional reforms.
 - Infrastructure-driven solutions for waste and sanitation.
 - Global benchmarking through certifications like LEED.
 - High scores in both cleanliness and public health management.
- **Bhubaneswar's Strengths:**
 - Innovation in public transport and last-mile connectivity.
 - Emphasis on gender inclusion and affordability.
 - Rapid improvement in cleanliness rankings.
 - Direct impact on air quality through sustainable transport.

Collectively, these cities provide important lessons to other cities: Surat illustrates the need to manage the entire cycle of waste and to have the capacity to do so on an institutional scale, whereas Bhubaneswar reveals how an urban centre can influence the behaviour of a large population through a citizen-centred design, inclusivity, and mobility planning. Both demonstrate that with a long-term political intent, investments in systems and performance-based governance, the Indian cities can become the beacons of sustainability and livability.

Impact

In the case of Smart Cities, this implies that effective funds allocation is a major source of investment increase, where funds are opted to the best in terms of infrastructure, digital transformation, and sustainability projects, which results in faster urbanisation and enhanced government services. When applied to Smart Cities, this outcome implies that the effective use of funds directly increases the overall investment so that the infrastructural quality, governance and technology could be improved, as well. As there is a great correlation between the model, strategic allocation of funds will help to maximise returns, improve the development of urban areas, and speed up the smart city project so that sustainable development and better living in the city can be guaranteed.

Policy Recommendations to address the governance challenges in the Smart Cities Mission (SCM)

Table 3: Policy Recommendations

Governance Challenges	Policy Recommendation	Implementation Strategy
Bureaucratic Obstacles & Delays	Establish a Single-Window Clearance System for smart city projects to reduce approval delays.	Create an integrated digital platform where approvals from multiple government bodies are streamlined, ensuring real-time tracking of project status.

Governance Challenges	Policy Recommendation	Implementation Strategy
Lack of Local Government Empowerment	Increase financial and administrative autonomy for Local Urban Bodies (LUBs).	Amend municipal laws to allow cities to raise their own revenue through local taxes, municipal bonds, and smart city funds.
Insufficient Public Involvement	Institutionalise Participatory Urban Planning mechanisms.	Conduct regular public consultations, town hall meetings, and digital governance initiatives where citizens can directly influence smart city policies.
Conflicts Between Economic Growth and Environmental Sustainability	Implement Green Urban Development Policies that mandate sustainability standards.	Enforce eco-friendly zoning laws, mandatory environmental impact assessments (EIA), and incentives for green infrastructure.
Delays in Sustainability Projects	Create a Smart City Sustainability Task Force at the municipal level.	Assign a dedicated team to monitor and fast-track sustainability projects, ensuring that delays are minimised and sustainability goals are met.
Digital Divide in Smart City Benefits	Introduce Smart City Digital Inclusion Policies to ensure equitable access to technology.	Provide subsidised internet access, digital literacy programs, and public Wi-Fi in low-income urban areas.
Weak Implementation of Data-Driven Governance	Mandate Real-Time Data Integration in Urban Decision-Making.	Develop city-level Data Command Centres that integrate AI and IoT solutions for urban planning, traffic management, and waste disposal.
Limited Public-Private Partnerships (PPP)	Strengthen PPP Models for Sustainable Urban Infrastructure.	Offer incentives such as tax breaks and regulatory support to private companies investing in smart city projects, particularly in waste management and renewable energy.

Source: Compiled by the authors.

These policy recommendations provide a strategic roadmap for overcoming governance challenges in India's Smart Cities Mission (SCM) and ensuring efficient, inclusive, and sustainable urban development.

Conclusion

The SCM is a vision for India's urban future, focusing on technology to create efficient, sustainable, and livable cities. It also focuses on AI, IoT, and big data to restructure urban governance and services. Though, the top-down approach of the mission tends to ignore the organic, diverse and layered history of an Indian urban space. The dependence of the mission on futuristic technology and high-tech infrastructure is

potentially further contributing to urban fragmentation and marginalising underserved groups of people. Also, the emphasis on smart technologies and data-based governance tends to ignore concerns of inclusion, equity, and social justice in Indian cities. As rapid urbanisation in India is going on, the SCM will need to be rectified. The key to a sustainable urban future is the understanding of the social, cultural and historical conditions that govern urban life. The mission should be context-based to stay true to its commitment, be inclusiveness-based, community-based and technology-oriented in planning and, in addition, be context-based

The Smart City Paradigm, AMRUT, ODF and Digital India have changed urban India. The governance has been too preoccupied with the concept of performance measures and competition to consider concern with issues like accountability, the right of people to privacy, safety, security, traditional occupations, the disappearance of urban fabrics, social dislocations and displacement among people and their surroundings. A transformation from technology-based to people-based might assist in building more inclusive and sustainable smart cities. To achieve this target of being an intelligent city, we need a socially and culturally sensitive, environmentally responsible, and equitable approach that involves smart people.

The SCM has been struggling with issues of implementation such as bureaucratic delays, the inability of municipalities to act independently, ineffective inter-governmental coordination, and poor participation of citizens. Moreover, the clash between economic development and nature preservation remains a major factor in city planning, leading to an emphasis on business expansion rather than green infrastructure. To unleash the full power of SCM, it should provide stronger local governance, embrace inclusive urban planning, invest in green and smart technologies, and leverage data to drive decisions. To achieve lasting impact, it is essential to bolster local governance, expand public-private collaborations, and prioritise social equity.

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REVIEW NOTE

Cities Speak: Municipal Representation in India

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Introduction

Like many federations, municipalities in India are mandated for rendering essential civic services to the citizens and mainstreaming poor by providing local solutions to local problems. These local governments crept into the book of statute only after 43 years of the making of the Constitution in free India, through the 74th Amendment of 1993. With this amendment, India became a multi-order federal entity with three levels of elected governments -- union (federal), state (regional), and local governments both *panchayats* (in rural areas), and municipalities (in urban areas).

Though municipalities are elected constitutional bodies, they draw their powers from the state legislature. This legislation varies in all 28 States and eight Union Territories (UTs) in India. There are about 5000 municipalities in India, which are at different levels, i.e. municipal corporation, municipal council and *nagar panchayats*. As per Article 243Q of the Constitution, municipal corporation is for larger urban areas, municipal council is for smaller urban areas and *nagar panchayat* is for a transition area, that is to say, an area in transition from rural area to an urban area, from urban to rural areas. However, these bodies are defined in the state conformity Acts, i.e. different state municipal Acts based largely on population and areas. Their nomenclatures also vary from one state to another. As on January 2025, there were 240 municipal corporations, 2104 municipal councils, and 2489 *nagar panchayats* across 28 states and eight UTs in India.

It has been ascertained through several empirical studies that the state governments are reluctant to devolve powers to municipal bodies and try to control them bureaucratically. Where functions are devolved, concomitant finances and functionaries are not devolved. In India's current urban governance landscape, many central and state municipal schemes are implemented by state agencies or parastatal bodies, often bypassing the active participation of Urban Local Bodies (ULBs). This systemic

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exclusion has led to a critical need for municipal bodies to establish a collective and influential voice at both national and state levels to reclaim their constitutional role as institutions of self-government.

Against this backdrop, this Note presents the institutional and associative models in India that give voice to local governments within the federal system, focusing on two types of arrangements, viz. jurisdiction-based associations and thematic-based associations.

Presence of Municipal Associations in India

To grasp whether municipal associations operate in India, we first need to define their purpose and core functions. In simple terms, municipal association is an organisation or an institutional body that is formed to represent the collective interest of municipalities either through jurisdiction-based association which includes elected representatives of different municipalities and its officials/administrators, or thematic-based associations working for urban local governance, providing a platform for advocacy, knowledge sharing and capacity building. Their key role is to—(a) address matters in the realm of urbanisation, urban development, urban governance; (b) facilitate coordination among local governments, and (c) defend the interest of the municipalities before higher levels of government. Such organisations/ associations have a strong presence in countries like Brazil, the United States, etc.

In India too, many municipal associations have been formed or established at the national and state level from time-to-time, bringing up the issues concerning the municipalities and providing a stage for experience and knowledge sharing among its members. They also raise the concerns of municipalities in terms of election, development, governance and service delivery to higher levels of governments and constitutional bodies, e.g. State Election Commission and State Finance Commission and engage in dialogue with them to work towards possible solutions. However, as they work in different capacities to strengthen municipalities, prominent among them are given below:

- (a) ***All India Council of Mayors (AICM)***: A national platform of mayors from different cities, giving elected municipal leaders a collective political voice for stronger mayoral powers, financial autonomy, and effective decentralisation of functions to municipalities. It has been meeting at least once in a year since 1959. The focus is more on political advocacy.
- (b) ***Association of Municipalities and Development Authorities (AMDA)***: It works with Municipalities and development authorities to facilitate institutional coordination, urban planning, training and capacity building. It is more institutional and technical in nature. It has been working since 1983.
- (c) ***State-level Municipal Association (SLMA)***: It is an association of elected municipal representatives at the state-level which safeguards the autonomy of

municipalities and strengthens local governance. Only a few states have such association, e.g. Bihar, Maharashtra, Kerala, West Bengal and Tamil Nadu.

- (d) **The City Managers' Association (CMA):** It is different from AIMC and AMDA as it brings together the officials or administrators and not elected representatives or institutions. Their members include municipal commissioners, chief officers and other senior officials of the municipalities. They act as platforms for information exchange, capacity building and advocating city/ municipal concerns with state and national policy makers. The Urban Management Centre (UMC), a legacy organisation of the International City Management Association (ICMA), has set up CMA in multiple states, including Andhra Pradesh, Gujarat, Karnataka, Maharashtra, Tamil Nadu, Madhya Pradesh, Odisha, Uttarakhand, Rajasthan, West Bengal, and Punjab. The CMA Gujarat was the first CMA in India, formed in 1997.
- (e) **All India Institute of Local Self-Government (AIILSG):** Provides advisory services, research, and training to advance understanding of urban governance and service delivery among elected representatives, municipal officials and other stakeholders. The nature is more of a support and training body than a representative association. It was formed in 1926.

Together, these associations serve as bridge between municipalities and higher tiers of government and play a role in shaping urban policy by strengthening the collective voice of municipalities to ensure that urban issues receive attention at the state and national levels.

Classification of Municipal Associations

These organisations can be classified as jurisdiction-based associations and thematic/sectoral associations. While the jurisdiction-based associations have representation from the elected officials of the municipalities and thus have more political authority, the thematic or sectoral-based associations are formed by experts. The focus of these agencies are on sectoral interest of municipal bodies, such as environment, transportation, innovation, education, etc. Table 1 lists the main municipal associations in India with a classification of jurisdiction-based and thematic/sectoral-based, along with their key activities and functions:

Table 1:

Association	Year of Inception	Headquarter at	Type	Main Activities & Functions
All India Institute of Local Self-Governments (AIILSG)	1926	Mumbai, Maharashtra	Thematic/ Sectoral	Provides training, research, and technical support; capacity building for municipal staff; publishes research on urban governance.

Association	Year of Inception	Headquarter at	Type	Main Activities & Functions
All India Council of Mayors (AICM)	1959	New Delhi	Jurisdiction-based	Represents elected mayors; advocacy for municipal autonomy; networking among city leaders; collective representation to state/central governments.
Centre for Urban Studies (CUS) at the Indian Institute of Public Administration	1966	New Delhi	Thematic/ Sectoral	Think tank for urban governance, conducting policy studies, training, research, and consultancy in municipal administration and urban development. It also organises seminars and publishes research to strengthen municipalities and public administration in India. It is funded by the Ministry of Housing and Urban Affairs (MoHUA).
Regional Centre for Urban and Environmental Studies (RCUES)	1968	Lucknow, Uttar Pradesh	Thematic/ Sectoral	Provides training and capacity building for municipal officials to improve urban governance and environmental management; conducts research and offers consultancy services to support urban development programmes. It is funded by the MoHUA.
RCUES	1968	Mumbai, Maharashtra	Thematic/ Sectoral	-Do-
RCUES	1969	Hyderabad, Telangana	Thematic/ Sectoral	-Do-
National Institute of Urban Affairs (NIUA)	1976	New Delhi	Thematic/ Sectoral	A research and policy institute that works on urban planning, and governance of cities and supports training and knowledge sharing for municipal officials.

Association	Year of Inception	Headquarter at	Type	Main Activities & Functions
Association of Municipalities and Development Authorities (AMDA)	1983	New Delhi	Jurisdiction-based	Brings together municipalities and development authorities; policy advocacy; urban planning coordination; promoting governance reforms.
Kerala Institute of Local Administration (KILA)	1990	Thrissur, Kerala	Thematic/ Sectoral	Provides training and capacity building for both rural and urban local self-government institutions. It also conducts research, consultancy, and supports decentralised planning and local governance reforms in Kerala.
City Managers' Association (CMA)	1997	Ahmedabad, Gujarat (<i>The oldest one</i>)	Jurisdiction-based	Network of municipal officials that promote good urban governance and service delivery. Support knowledge sharing, training and policy coordination to strengthen city management.
Praja Foundation	1997	Mumbai, Maharashtra	Thematic/ Sectoral	Core roles in research, accountability, capacity building and advocacy in urban governance.
Centre for Urban and Regional Excellence (CURE)	2001	New Delhi	Thematic/ Sectoral	Works on urban governance, citizen engagement, and sustainable development and provides technical support to local governments and promotes participatory governance.
Janaagraha	2001	Bengaluru, Karnataka	Thematic/ Sectoral	Focuses on citizen empowerment, governance reforms, technology tools, research, and collaboration with government to make cities more accountable and participatory.
State-level Municipal Association (SLMA)		In respective state	Jurisdiction-based	Protects local autonomy against state-level interference, coordinates demands for funding, infrastructure, and urban reforms, shares best practices, etc.

Source: Authors

Note: Only the main and important thematic based association have been mentioned in the table.

It is to be noted that most of the jurisdiction-based associations in India, both at the national and state-level, have municipal officials or administrators as its members in addition to elected representatives. The AICM is the only national-level jurisdiction-based municipal association which comprises elected mayors of municipal corporations across India. It functions as a collective forum to promote dialogue, cooperation, and knowledge-sharing among city leaders on issues of urban governance, infrastructure development, municipal finance, sanitation, sustainability and public service delivery, and engage with state and central government on urban policy matters. Further, SLMA represents elected representatives of all types of municipalities at the state-level, though limited to a few states, e.g. Bihar, Kerala, Maharashtra, Tamil Nadu and West Bengal. The other jurisdiction-based associations like AMDA at the national level, and CMAs at state level have representation from the officers or administrators of the municipal bodies. Thus, in contrast to Brazil and the USA, India lacks active functioning of jurisdiction-based associations both at national-level and the State-level. Though they do exist, they are in a dormant state and their effectiveness in bringing about the interest of local government to the higher tiers of government is low and ambiguous.

On the thematic side, there are substantial number of training and advocacy bodies such as AILSG, CURE, CUS, NIUA, RCUES, and networks of urban practitioners, civil society platforms and forums such as Janaagraha, Praja Foundation, etc. that engage in technical expertise, capacity building, specific policy areas, research, workshops, etc. to empower local governments and work in close association with union and state governments.

Significance of Municipal Associations

Though both jurisdictional and thematic-based municipal associations are involved with or connected to urban local governance in India, they play different roles and represent different interests within or around local government. While the jurisdiction-based associations represent municipal interests, focusing more on institutional/administrative aspects, the thematic-based associations provide capacity-building and research support and are not representative councils. Of these two types of associations, however, the jurisdiction-based associations tend to have greater legitimacy to represent municipal interests as these represent professional associations of municipal officials and elected heads. In India, neither AIMC nor SLMA or AMDA are statutory bodies, these associations derive legitimacy from being composed of actual municipal government officials or their elected heads, which provide them with stronger representative standing when engaging with state or central authorities. The thematic-based associations, on the other hand, are important in voicing municipal interest, but their role and autonomy to take positions on public policies is limited to advisory and technical expertise. They act on behalf of their sectoral mandate, for example, waste

management, water supply, transport, climate change, etc. and their influence is limited to only advisory in nature.

Balancing Conflicting Positions

In urban governance, different types of organisations – such as political bodies like the AIMC and SLMA, administrative bodies like CMA, institutional bodies like AMDA or AIILSG, civil society organisations like Janaagrah, etc., often have different priorities and therefore may take different positions on the same issues. When the jurisdiction-based and thematic-based associations differ in policy positions, they engage in dialogue, consultation, and workshops, etc. to understand each other's perspectives. They often try to reach a consensus which balances political priorities, administrative feasibility, sectoral interest and citizen concerns. There may be instances where they prefer to maintain their individual positions and engage in political competition, as the priorities of the sectoral groups can sometimes conflict with broader civic interests. But, eventually the process ensures that the decisions are well-informed and have taken different perspectives before arriving at final resolutions.

Usually, the Union and state governments in India interact with both types of associations, however their nature differs. They have interactions and discussions with jurisdiction-based associations (like AIMC and SLMA) when discussing policies, or reforms that affect citizens at large. As these association are representative of citizens, higher governments rely on them for legitimacy and coordination in urban governance. The exchanges with sectoral associations, on the hand, are more technical and expertise based, and are related to training programmes, policy research and execution support. For instance, MoHUA consults AIILSG, CUS or NIUA for capacity building and sector specific research, while state government may work with CMAs to implement urban reforms efficiently.

Conclusion

The 74th Constitutional Amendment was made in 1993 to empower municipalities as institutions of self-government. However, this dream seems to be far-fetched. Municipalities are plagued with low devolution of functions, finances and functionaries. Their capacity is low for resource mobilisation and execution of works assigned. This underscores the need for a collective and coordinated voice of municipal bodies at the national and state levels to advocate for greater autonomy, financial devolution and participatory governance. However, India lacks strong jurisdiction-based associations, unlike other federations where mayors' councils or municipal associations successfully voice urban reforms. For example, while the AIMC has emerged as the only elected representative based association at the national level and the fact that only few states have SLMA, its influence remained limited due to absence of statutory authority and variations in state-level political support.

India instead has a number of advisory forums, civil society organisations, training, advocacy and consultancy bodies representing a substantial presence of thematic-based associations. Such thematic-based associations negotiate, hold discussions and work closely with the union and state governments. They provide a platform to the voice of the local government. Though their opinions or views remain suggestive and not binding.

BOOK REVIEW

**Sustainable Rural Development and Agriculture, Ashok Kumar Jain,
Discovery Publishing House, New Delhi (2026), pp. 304,
ISBN 978-93-6224-221-1, Rs. 4000/-**

The book '*Sustainable Rural Development and Agriculture*' by Ashok Kumar Jain projects an important role of rural development and agriculture in making India a developed nation (Viksit Bharat). In India, a population of 956 million (out of its total of 1447 million) lives in 6,40,930 villages. The agriculture sector contributes about 17.4 per cent of GDP and engages 55 per cent of India's workforce. This indicates the dichotomy of rural income, which is about one-fourth of the per capita urban income. In 2047, it is projected that the population of India would be 1640 million, of which the rural population would be 820 million. According to the author, the paradox is that India with its 328 million hectares of land, the largest cultivable landmass on the planet, the agricultural production is too low as compared to other countries. The agriculture sector in India uses 85 per cent of country's freshwater with irrigation efficiency of 20 to 25 per cent only.

The author emphasises that in the context of climate change, it is time to focus on climate resilient precision agriculture, together with timely weather forecasts, and efficient water and fertiliser use. The multi-faceted optimisation strategies should focus not only on crop production and quality, but also on reducing the inputs, labour, time and resources. This involves leveraging new technologies such as GPS mapping, soil sampling, satellite/drone imagery and artificial intelligence.

The mandate of self-governance under the 73rd Constitutional Amendment Act (73rd CAA) is still to be fully realised. As a result, the rural areas often suffer from a lack of jobs, education, linkages, livelihoods, health amenities and sustainability. According to A.K. Jain, the author, the rural-urban gap is not only in incomes, but also in education, health care, sanitation, infrastructure services, roads, transport, water, energy, and technology. This paradox is discernible in the plans and programmes, investments and research. As a result, the issues of rural development, governance and financing remained neglected.

According to the author, on an average rural women spend 5 hours a day cooking and suffer from respiratory, lung and other ailments due to smoke, reflecting environmental and gender injustice. This necessitates a deep concern and paradigm shift towards rural development.

The Central Government has launched several flagship schemes of rural development and agriculture, such as Viksit Bharat Ram-G-Ram (that had recently replaced the MGNREGA), Jan Jeevan Mission, PM Awas Yojana, Livelihood Mission, Poshan, Ayushman Bharat, SBM-Rural, Watershed Programme, Solar Power, Fisheries,

Lakhpatri Didi, Telecom Infrastructure, Gram Swaraj, Agro-Infra Fund, Handloom Development, Shyama Prasad Mukherjee Rurban Mission, Svamitra, and Adi-Adarsh Gram Yojana. Under the Pradhan Mantri Awas Yojana (Gramin), the construction of 29.5 million PMAY (Gramin) houses was taken up during 2016-24. The PMAY 2-0 (Gramin) has committed to build additional 20 million houses. The author emphasises the need to establish linkages between rural and urban development, between incomes and social transformation and between traditional agriculture and new technologies.

The book '*Sustainable Rural Development and Agriculture*' in its 11 chapters covers a wide range of issues, viz. Challenges of Rural Development, Sustainable and Climate Resilient Agriculture, Spatial Surveys, Mapping and Analytics. Rural Development Planning and Infrastructure, Rural Housing, Sustainable Energy, Sustainable Water Management, Biodiversity, Landscape and Urban Farming, Environmental Services, Conservation of Rural Heritage and Disaster Resilience. These have been explained in a simple language. The pragmatic examples provide reference points for understanding the nuts and bolts of the sustainable rural development and climate-resilient agriculture.

As summed up by K.J. Alphons in his Foreword, '*Ashok Kumar Jain's book juxtaposes the phenomenon and positionality of evidence, economy and ecology. It weaves commonalities strand by strand in what emerges as a rich array of interconnected themes under one cover. The author has integrated the diverse issues of rural development and agriculture comprehensively, concisely and clearly. The text has been lavishly illustrated, which lightens its density and makes the reading easier and interesting.*'

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