# Preparedness of Indian cities for the implementation of urban planning schemes

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The implementation of global, modern urban planning principles has influenced India's new urban planning and development schemes, which are outlined in statutory development plans. This study assesses the level of preparedness of Indian cities to implement these schemes by evaluating the extent to which their development plan policies address global, modern urban principles. The policies were graded for each principle, and the cities were ranked based on their total grade. The study reveals that Indian cities have not fully adopted modern urban principles in their development plan policies, and there are significant variations in the implementation of these principles across different cities.

RESEARCH on urban areas focuses on issues related to disorganized and chaotic development, insufficient infrastructure, overcrowding, limited transportation options, traffic congestion, obstructed walkways, inadequate public facilities, exploitation of natural resources, degradation of heritage sites, and a disregard for new technology. To address these urban concerns, modern urban planning principles (UPPs), can be implemented through statutory provisions in development plan policies (DPPs)[1]. Many cities around the world have introduced modern town-planning initiatives and adopted UPPs to regulate urbanization and mandate the use of liberal urban policies in their development plans.

By 2050, it is predicted that the global population will increase by 9.6 billion, with an estimated growth of 2.5 billion in the urban population[1,2]. According to data from 2011, approximately 31.1% of the Indian population resided in urban areas, with 42.63% of them living in 53 million-plus cities[3–5]. Such statistics underscore India's rapid process of urbanization, which has resulted in issues ranging from local to global levels[6]. The causes of urbanization have been identified as high population growth, rural–urban migration, and the expansion of urban centres[6–9]. However, this rapid urbanization has had a negative impact on cities and has led to a deficiency in urban infrastructure[10–12]. The conventional approaches to addressing this problem are insufficient, and it is necessary to revisit them in light of emerging modern planning principles. Therefore, it is essential to include modern UPPs in DPPs to undertake effective planning actions.

Cities with a population of one million or more have witnessed population growth of over 48% (ref. 12). However, these cities are grappling with urban issues and require a significant shift in urban development strategies to counteract their negative impacts. The current urban practices and DPPs in India are inadequate for efficiently addressing the situation and implementing the necessary measures for improvement. Given the scale of urbanization and the growth of million-plus cities, it is imperative to devise innovative urban planning systems with modern solutions[13]. The urban development process must be efficient while also ensuring equitable distribution of benefits for public welfare[14].

This study aims to address urban issues by examining DPPs and identifying the challenges faced by India in achieving sustainable–smart growth under the scope of selected urban development schemes. The primary question that the study seeks to answer is whether DPPs of Indian cities promote modern UPPs. To achieve this, a comparative city-ranking framework incorporating DPPs of Indian cities has been proposed. This study is a response to the need to address urban issues and promote sustainable–smart growth in India.

## Literature background

Urban planning is a visionary process that offers possibilities for sustainable–smart development[1,15,16]. The development of towns and cities has undergone significant transformation since independence[5], with new urban challenges requiring a more proactive planning approach that aligns with modern urban planning and development themes[1,17]. Despite numerous initiatives by the Government of India (GoI) towards modern urban development, the outcomes have been unsatisfactory.

Indian urban policies employ various ranking systems, such as the Swachh Survekshan Ranking and City Ranking for the most livable and best-performing cities, under the Swacch Bharat Mission (SBM) and Smart City Mission by the Ministry of Housing and Urban Affairs (MoHUA), GoI[18], to compare city development and progress in the implementation of urban schemes. However, measuring the progress of city development is complex, and many ranking

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systems rely on proxy indicators to determine city ranking. While Indian cities are ranked to assess the success of urban schemes, the preparedness of these cities for implementing urban development schemes is not evaluated.

### Urban planning schemes

The current approach to urban planning and development in India is far from achieving its goal of improving the welfare of society by creating more convenient, equitable, healthy, efficient, and sustainable places for present and future generations[1,19]. In India, urban planning is pursued through comprehensive planning, and its statutory form is a development plan[20]. The urban planning policies in India are aligned with global institutions, which has resulted in a change in the role and reach of the government at different levels[21,22]. Cities worldwide are striving to transform themselves into sustainable–smart places by integrating modern global concepts of social, economic and environmental development and adopting sustainable–smart strategies[15,16,23]. Therefore, urban planning needs to align with these concepts and strategies for the betterment of society[1].

Aspects such as inclusion[15,24,25], sustainable habitat[26,27], land use and transport integration[24,26], service-level benchmarks[19,26,28], disaster management[27] and governance reforms[18] have brought a new dimension to the planning process[12]. Modern urban schemes are based on development principles such as mixed land use[16], compact and transit-oriented development, walkable neighbourhoods[16], alternate transport options[27], creating a sense of place[15,24], community facilities[27], inclusive affordable housing[15,26], adequate infrastructure[28], inner-city redevelopment, urban renewal, preserving open spaces[16,26] and protecting natural[27,28] and built environment[28]. Therefore, modern UPP initiatives aim to encourage more compact development, greater transit use, and improved environmental protection. The scope of this study includes an assessment of the Smart City, PMAY, AMRUT, HRIDAY, NULM, SBM and U-Transport schemes for their successful implementation.

### Modern urban planning principles

A review of the literature indicates that there has been a significant transformation in urban planning and design, with its principles aimed at fostering economic growth, environmental sustainability and social welfare[1]. A notable shift was observed from the 18th century township model, characterized by strictly perpendicular roads and square-shaped farms, to the 20th century 'garden cities of tomorrow' concept, which emerged as a response to the overcrowding and pollution problems of industrial cities[29]. The earlier approach spread out the density to the suburbs, as seen in the 'Towers in the park' idea[30], which was later modified to address urban pollution and congestion through vertical expansion[29,31]. As a result, the focus of urban development shifted from designing neighbourhoods at street level to constructing tall, mixed-use buildings along transit corridors, marking a transition from traditional low-density towns to contemporary high-density, compact communities[32].

The objective of the future city is to explore various models and determine the most appropriate one based on strategic criteria[29,31]. After the Industrial Revolution and World Wars, the focus was on developing new cities that adhered to classical principles. However, in today's context, the development principles aim to support sustainable and intelligent growth that caters to the global community. To achieve this, a set of modern urban principles has been devised that fall under categories such as physical, social, environmental and regulatory behaviours, deviating from the conventional development principles of the past. A total of nine modern urban development principles, along with their respective indicators have been identified and analysed (Table 1). The urban and regional development plans formulation and implementation (URDPFI) guidelines of 2015 were framed with the emerging scenario in mind for the planned development of cities and towns[13], and the indicators for each principle were selected based on the recommended provisions and scope of URDPFI 2015 to assess the urban principles of Indian cities[1].

URDPFI 2015 discusses modern urban planning and development with respect to modern smart cities, modern townships, modern technology, modern medical cities, modern infrastructure and equipment, etc. These urban development initiatives are the result of the establishment of NITI Aayog in 2015, replacing the erstwhile Planning Commission of India. The word 'modern' is used to define the period after the revokement of the 12th Five-Year Plan and the establishment of NITI Aayog.

### Problem formulation

According to the 74th Constitutional Amendment, municipalities are mandated to create a DPP that prioritizes land-use planning and encompasses economic development, environmental protection and social justice[7]. A DPP is a statutory tool that directs and regulates the growth and development of an urban region[1]. It serves as a spatial blueprint that outlines the planned development of future activities, providing a framework for necessary details and intended actions in the form of planning strategies and physical proposals[1]. The objective of a DPP is to offer planning guidance for various policies based on the economic and social needs and aspirations of the community, the availability of resources, and established priorities[1]. The aim of the present study aligns with the goal of urban development, which is to evaluate the effectiveness of UPPs within a DPP in achieving successful implementation of urban development schemes. Moreover, this study aims to identify the challenges that cities face in adhering to modern urban principles and offers insights into achieving

**Table 1.** List of identified urban principles and their indicators

| P_code | Principle (P) | i_code | Indicators (i) |
|---|---|---|---|
| P1 | Mixed land use | P1i1 | Mixed land use within a neighbourhood zone |
| | | P1i2 | Diversity of land uses of a project |
| P2 | Compact development | P2i1 | Flexible density within a neighbourhood |
| | | P2i2 | Purchasable floor area ratio (FAR)/FSI or TOD provision |
| P3 | Walkable access | P3i1 | Pedestrian facilities |
| | | P3i2 | Internal paths and bikeways linking different activities |
| P4 | Transport options | P4i1 | Integrated street patterns |
| | | P4i2 | Alternative parking design promotion |
| | | P4i3 | Classification and design consideration of urban roads |
| P5 | Community facilities | P5i1 | Diverse gathering places or common spaces in different land uses |
| | | P5i2 | Common public or open spaces connecting neighbourhoods |
| P6 | Housing and inclusiveness | P6i1 | Planning for affordable housing |
| | | P6i2 | People's participation in planning |
| | | P6i3 | Equitable space distribution |
| P7 | Adequate infrastructure | P7i1 | Comparison against benchmarks |
| | | P7i2 | Promoting new technology for infrastructure management |
| P8 | Urban renewal | P8i1 | Redevelopment regulation |
| | | P8i2 | Transferable development rights (TDR) techniques of land development |
| P9 | Natural and built environment | P9i1 | Green or regulated buffers in environmentally sensitive areas |
| | | P9i2 | Avoiding development on wetlands, streams, shorelines and buffer areas |
| | | P9i3 | Protecting and conserving the community character in architecture and historical features |

sustainable–smart growth by proposing a planning action that urban planners can incorporate into their processes. The primary research question that this study seeks to address is whether the DPPs of Indian cities align with the modern UPPs of sustainable–smart urban growth.

## Research methods and methodology

This study aims to evaluate the scope of DPP using a mixed-method approach. Content analysis was utilized to conduct a thorough assessment of DPPs of the sample cities, and a city ranking framework was developed to measure the degree to which DPPs incorporate principles of sustainable–smart growth. The framework is based on theoretical concepts. Finally, a list of recommended measures for DPPs is provided for urban planners to incorporate into their processes to address modern urban planning strategies.

### Sample frame

An examination of the urban growth patterns of Indian cities reveals the pressing need for sustainable–smart growth in the million-plus cities that are experiencing significant urbanization. The sample for this study included all million-plus state capital cities/urban agglomerations of India, as determined by the 2011 census. These cities serve as primary population centres, economic hubs and well-organized administrative jurisdictions with varying state urban development regulations, making them appropriate for policy analysis. According to the most recent census data, there are 13 million-plus state capital cities in India, and the research sample comprises DPPs of these cities. A develop-

ment plan is a statutory document that includes zoning ordinances, guiding regulations for future growth and development, and policy statements that regulate functions and activities related to land use, transport networks and resources. The level of detail for each planning policy is determined by the planning needs and issues of a city.

The modern UPPs of the 21st century have been extracted from the current literature. These are being incorporated into new Indian urban development policies, and government initiatives such as PMAY, AMRUT, NULM, SBM, U-Transport, Smart City, HRIDAY, etc. are being implemented to ensure sustainable–smart growth. GoI has chosen the 13 million-plus state capital cities along with several other cities as sample areas to implement these urban schemes. Compliance with modern urban principles by these cities is crucial for the success of the urban schemes. Thus, it is expected that all the sample cities will adhere to the modern urban principles identified in the study.

### City ranking method

The concept of ranking cities is inspired by the lexicographic multi-criteria (LMC) ranking approach used in the Olympic Games[33]. This method ranks countries based on the total number of gold, silver and bronze medals won by them, with gold medals carrying the maximum weight. Silver medals are only taken into account when there is a tie in the number of gold medals, and bronze medals are only used when two or more countries have the same number of gold and silver medals.

The literature presents various ranking methods for evaluating city performance in different contexts, many of

which rely on assigning weightage to different indicators. However, the justification for assigning weights to qualitative indicators is often limited. In contrast, the LMC method imposes preferences by ordering objective functions based on their relative importance or significance, rather than by assigning weights. This study focuses on qualitative indicators and explores how they can be incorporated into the LMC method.

The process of ranking cities based on their readiness to implement modern urban planning schemes involves three major steps. First, assigning grades to the indicators; second, developing a principle grade structure (PGS) and finally, preparing the total city grade (TCG). In the first step, the indicator of a principle in DPP is assigned a grade based on its presence. If the indicator is not present in DPP, the grade will be $C$. If the indicator addresses the respective principle but is suggestive, then a grade of $B$ is assigned. The policy is considered suggestive if it contains words such as 'encourage', 'may', 'prefer', 'should' and 'suggest'. An indicator is graded $A$ if it is a mandatory policy of DPP, which usually contains keywords such as 'mandate', 'must', 'shall' and 'will'. This grading system is based on qualitative indicators and can be discussed using the LMC method[33,34].

The cities are ranked based on their mandatory policies, suggestive policies and lack of policies, with mandatory policies being the most important. The grade for mandatory policies is $A$, and for suggestive policies it is $B$, indicating the descending strength of policy enforcement in a city for its development. The weight assigned to the lack of policies is $C$, since the presence of suggestive policies is considered more important than the lack of policies. In the second step, the grades assigned to the indicators for each principle are arranged into PGS to assess the combined impact of all the indicators. The third and final step involves deriving TCG by simply adding all the grades assigned to the indicators within the nine identified principles for each city. The cities are then ranked based on their respective TCG (see eq. (1)).

$$\text{TCG}_{C1} > \text{TCG}_{C2} \text{ if } \begin{cases} A_{C1} > A_{C2} \\ A_{C1} = A_{C2}, B_{C1} > B_{C2} \\ A_{C1} = A_{C2}, B_{C1} = B_{C2}, C_{C1} > C_{C2}, \end{cases}$$
(1)

where $\text{TCG}_{CN}$ is the total city grade for city 'CN' and $A_{CN}$, $B_{CN}$, $\text{rate}_{CN}$ are the total number of grades $A$, $B$ and $C$ respectively, obtained by city CN.

To ensure the reliability of the plan evaluation process, the evaluation protocol is pretested, and the plans are assessed by three independent coders. The level of inter-coder reliability is calculated as a percentage agreement, which is obtained by dividing the total number of coding disagreements by the total number of agreements and disagreements and then multiplying by 100. The achieved percentage agreement reliability score for the sample deve-

lopment plans is 84, which is considered acceptable as a score of 80 or higher is generally deemed satisfactory according to previous research[35].

The DPPs of 13 cities were evaluated on the basis of 9 modern UPPs identified following the method of city ranking (Figure 1).

In Figure 1, $x$, $y$ and $z$ are the possible numbers of grades for $A$, $B$ and $C$ respectively, for a principle. $x_{\text{Tot}}A$, $y_{\text{Tot}}B$ and $z_{\text{Tot}}C$ are the total number of $A$, $B$ and $C$ grades respectively, for a city for all principles.

Therefore, the calculation of TCG allows for the determination of whether UPP within a DPP has the potential to impact modern urban development practices in a city. This helps answer a crucial question: Does the DPP of Indian cities promote modern UPPs that aim for sustainable–smart growth?

## Analysis and results

TCG of 13 million-plus capital cities in India, based on the city ranking method was calculated. Table 2 shows TCG along with the grade for each indicator, PGS and city rank for each of the 13 cities. Mumbai has the highest TCG of $19A\_2B\_0C$, while Lucknow has the weakest TCG of $4A\_5B\_12C$. The TCG values suggest that populous cities in India are more inclined to adopt modern UPPs and promote sustainable–smart policies through their DPPs, while Lucknow, Ranchi and Raipur have poor TCG and fail to promote modern UPPs. Seven cities have a relatively strong TCG, indicating that the majority of the cities have begun to embrace modern themes of urban development Delhi and Mumbai, two cities with a population of over 10 million, have high TCG and practice modern principles supported by their respective DPPs. Among the remaining 11 cities with a population less of than 10 million, Chennai, Bengaluru, and Jaipur strongly adhere to modern principles, while Lucknow, Ranchi and Raipur perform poorly.

The findings indicate that the DPPs of million-plus cities inadequately address modern UPPs. The sustainable–smart growth model is emerging as worth replicating, particularly for integrating and adopting fundamental modern principles into DPPs. The city rank is determined by TCG, which reflects the incorporation of multiple principles, while PGS indicates its presence in the cities. The combined impact of principles is assessed through TCG results, and the cities are ranked based on the performance of their principles. The interconnection between the performance of principles across different cities contributes to theory development, outlining urban planning perspectives on urban development policies.

### *Performance of million-plus cities*

- Million-plus cities in India are more determined by modern policies through their DPP.
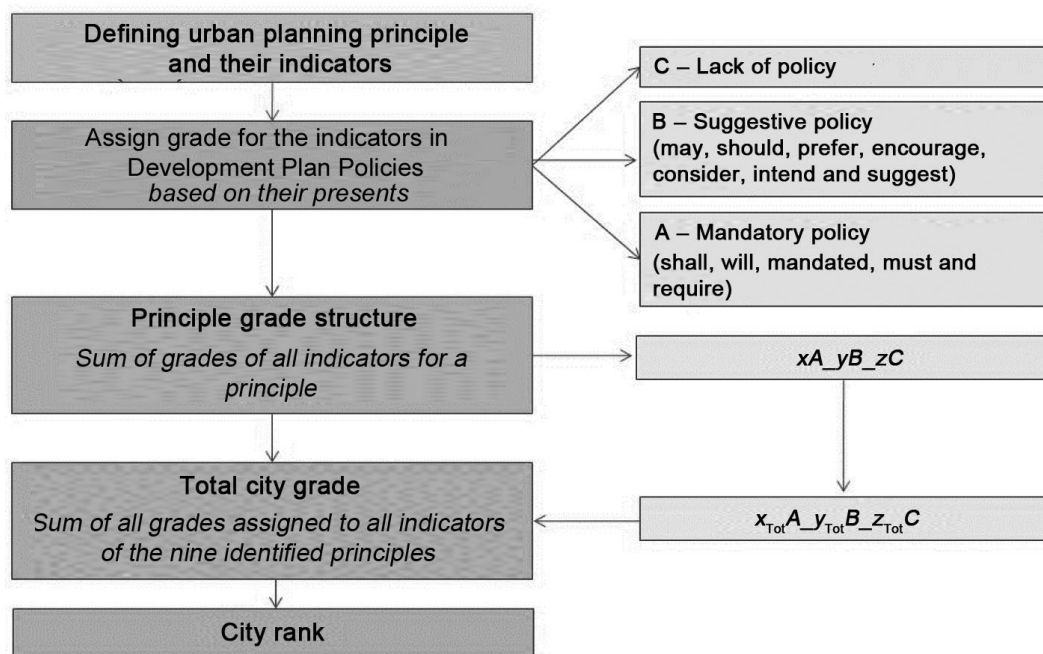
Defining urban planning principle and their indicators

Assign grade for the indicators in Development Plan Policies *based on their presents*

C – Lack of policy

B – Suggestive policy (may, should, prefer, encourage, consider, intend and suggest)

A – Mandatory policy (shall, will, mandated, must and require)

Principle grade structure
*Sum of grades of all indicators for a principle*

$xA\_yB\_zC$

Total city grade
*Sum of all grades assigned to all indicators of the nine identified principles*

$x_{Tot}A\_y_{Tot}B\_z_{Tot}C$

City rank

**Figure 1.** Method for city ranking.

**Table 2.** Total city grade of million-plus cities for urban planning principles

| SN. | State / UT's Name | Sample Cities | Pop_2011 | P1i1 | P1i2 | P2i1 | P2i2 | P3i1 | P3i2 | P4i1 | P4i2 | P4i3 | P5i1 | P5i2 | P6i1 | P6i2 | P6i3 | P7i1 | P7i2 | P8i1 | P8i2 | P9i1 | P9i2 | P9i3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Bihar | Patna | 1,683,200 | B | C | B | A | B | C | A | C | A | C | C | A | C | C | A | C | B | C | A | A | A |
| | *Principle Grade Structure* | | | BC | | AB | | BC | | 2AC | | | CC | | A2C | | | AC | | BC | | 3A | | |
| | *Total City Grade* | | | 8A_4B_9C | | | | | | | | | | | | | | | | | | | | |
| 2 | Chattisgarh | Raipur | 1,010,087 | A | B | B | B | A | B | B | B | B | B | B | B | B | A | A | C | B | B | B | A | A |
| | *Principle Grade Structure* | | | AB | | 2B | | AB | | 3B | | | 2B | | A2B | | | AC | | 2B | | 2AB | | |
| | *Total City Grade* | | | 6A_14B_1C | | | | | | | | | | | | | | | | | | | | |
| 3 | Jammu & Kashmir | Srinagar | 1,192,792 | B | C | B | C | C | A | B | A | C | B | B | C | B | A | A | C | B | C | A | A | A |
| | *Principle Grade Structure* | | | BC | | AB | | BC | | 2AC | | | 3C | | A2C | | | AC | | BC | | 3A | | |
| | *Total City Grade* | | | 7A_7B_7C | | | | | | | | | | | | | | | | | | | | |
| 4 | Jharkhand | Ranchi | 1,073,440 | B | B | B | B | A | C | B | A | B | B | B | B | A | B | A | C | B | C | B | B | B |
| | *Principle Grade Structure* | | | 2B | | 2B | | AC | | A2B | | | 2B | | A2B | | | AC | | BC | | 3B | | |
| | *Total City Grade* | | | 4A_14B_3C | | | | | | | | | | | | | | | | | | | | |
| 5 | Karnataka | Bangalore | 8,425,970 | B | A | A | A | A | A | A | B | A | A | B | B | A | A | A | B | A | B | B | A | A |
| | *Principle Grade Structure* | | | AB | | 2A | | 2A | | 2AB | | | AB | | 2AB | | | AB | | AB | | 2AB | | |
| | *Total City Grade* | | | 14A_7B_0C | | | | | | | | | | | | | | | | | | | | |
| 6 | Madhya Pradesh | Bhopal | 1,795,648 | B | B | B | C | B | A | A | A | A | A | B | A | B | A | A | C | A | C | A | A | A |
| | *Principle Grade Structure* | | | 2B | | BC | | AB | | 3A | | | AB | | 2AB | | | AC | | AC | | 3A | | |
| | *Total City Grade* | | | 12A_6B_3C | | | | | | | | | | | | | | | | | | | | |
| 7 | Maharashtra | Mumbai | 12,442,373 | A | A | A | A | A | A | B | A | A | A | B | A | A | A | A | A | A | A | A | A | A |
| | *Principle Grade Structure* | | | 2A | | 2A | | 2A | | 2AB | | | AB | | 3A | | | 2A | | 2A | | 3A | | |
| | *Total City Grade* | | | 19A_2B_0C | | | | | | | | | | | | | | | | | | | | |
| 8 | Rajasthan | Jaipur | 3,073,350 | A | A | A | C | A | A | A | A | A | B | B | A | B | B | A | A | B | C | B | B | A |
| | *Principle Grade Structure* | | | 2A | | AC | | 2A | | 3A | | | 2B | | A2B | | | 2A | | BC | | A2B | | |
| | *Total City Grade* | | | 12A_7B_2C | | | | | | | | | | | | | | | | | | | | |
| 9 | Tamil Nadu | Chennai | 4,681,087 | B | A | B | B | A | A | A | A | A | B | A | A | A | A | A | B | A | A | A | A | A |
| | *Principle Grade Structure* | | | AB | | 2B | | 2A | | 3A | | | AB | | 3A | | | AB | | 2A | | 2AB | | |
| | *Total City Grade* | | | 15A_6B_0C | | | | | | | | | | | | | | | | | | | | |
| 10 | Telangana | Hyderabad | 6,809,970 | A | A | C | A | B | B | B | B | A | A | A | A | A | A | C | C | B | B | A | A | B |
| | *Principle Grade Structure* | | | 2A | | AC | | 2B | | A2B | | | 2A | | 3A | | | 2C | | 2B | | 2AB | | |
| | *Total City Grade* | | | 11A_7B_3C | | | | | | | | | | | | | | | | | | | | |
| 11 | Uttar Pradesh | Lucknow | 2,815,601 | B | B | C | C | C | C | A | B | A | C | C | C | B | C | C | C | C | C | A | B | A |
| | *Principle Grade Structure* | | | 2B | | 2C | | 3C | | 2AB | | | 2C | | B2C | | | 2C | | 2C | | 2AB | | |
| | *Total City Grade* | | | 4A_5B_12C | | | | | | | | | | | | | | | | | | | | |
| 12 | West Bengal | Kolkata | 4,486,679 | B | B | A | C | B | C | C | B | A | B | C | A | B | A | B | B | B | C | A | A | A |
| | *Principle Grade Structure* | | | 2B | | AC | | BC | | ABC | | | BC | | 2AB | | | 2B | | BC | | 3A | | |
| | *Total City Grade* | | | 7A_9B_5C | | | | | | | | | | | | | | | | | | | | |
| 13 | Delhi | Delhi | 11,007,835 | A | B | B | B | A | B | A | B | A | B | B | A | A | B | A | A | A | B | B | B | A |
| | *Principle Grade Structure* | | | AB | | 2B | | AB | | 2AB | | | 2B | | 2AB | | | 2A | | AB | | 2BA | | |
| | *Total City Grade* | | | 10A_11B_0C | | | | | | | | | | | | | | | | | | | | |

- TCG of sample cities ranges from weakest ($4A\_5B\_12C$) in Lucknow to strongest ($19A\_2B\_0C$) in Mumbai.
- The top three cities that have adopted modern UPPs in their DPPs are Mumbai, Chennai and Bengaluru.
- Lucknow, Ranchi and Raipur have weak TCG and have not adequately addressed modern principles of urban planning.
- A strong TCG suggests that the DPPs of cities address modern principles such as transport options, and natural and built environments.
- Poor TCG implies that the DPPs do not focus on addressing principles such as compact development, community facilities and urban renewal in the sample cities.
- While the development plans contain policies that address modern principles, not all principles are equally addressed.
- All cities have strongly adopted the natural and built environment protection principle. Ranchi, Jaipur and Delhi have liberal environmental protection policies in their DPPs.
- Urban Renewal received the lowest grade, suggesting that the development plans have limited policies that address this principle.
- Almost half of the sample cities do not address purchasable floor area ratio (FAR), transit oriented development (TOD), promotion of new technology and transferable development rights (TDR) techniques.
- City planners have not taken measures to implement modern principles and draft new urban development policies.
- The development plans of Indian cities need to revisit their DPPs to make room for the implementation of urban schemes following modern UPPs.

The subsequent discourse compares and contrasts how much and to what extent the million-plus capital cities in India have incorporated urban policies to implement modern principles for sustainable–smart growth.

(i) Mixed land uses: Indian cities have addressed increasing density in new development by regulating building heights. Additionally, the promotion of commercial, residential, recreational and cultural areas for other uses has also been encouraged in the DPPs.

(ii) Compact development: This principle has not been significantly addressed in the DPPs. Compact development strategies like transit-oriented development have not been taken into consideration.

(iii) Walkable access: The DPP strongly emphasizes walkability by encouraging pedestrian features and internal paths, among other aspects.

(iv) Transport options: The provision of alternative transport options with a focus on public transit that indirectly promotes a compact city has been made. PGS for 'walkable access' and providing 'transport options' has implications for linking transportation and land use.

(v) Community facilities: Regulatory provisions in the DPPs allow for different community facilities in land use for easy and safe access, which ultimately promotes compact development.

(vi) Housing and inclusiveness: Affordable housing has been recommended in the DPPs, with a particular focus on economic weaker section and low income group housing. Public participation has also been emphasized during the planning stage. The inclusion of poor sections of society has been considered in the DPPs by reserving land for housing in each residential colony.

(vii) Adequate infrastructure: The provision of adequate infrastructure has been made in the policies, but these are not managed by new technology. Standard benchmarks for each basic civil and social service have been established in the DPPs of a few cities.

(viii) Urban renewal: The utilization of public investments and locating upcoming projects within an existing urban service area are not well-addressed in the DPPs. Promoting urban development in the existing urban service area helps provide easy and economic access to basic services and overcomes sprawl to some extent.

(ix) Natural and built environment: It has extensive policies and most of them are recommended. The protection of environmentally sensitive areas is mandatory. Developments in wetlands, streams and catchment areas of water bodies are regulated. Developments around historic and architecturally significant buildings are also regulated.

Hence, the differences in overall grade indicate that compact development, community facilities and urban renewal are not given much importance by the majority of cities. Overall, PGS suggests that while the development plans address modern principles, there is a lack of balance. The analysis indicates that principles differ from city to city, and planners must prioritize policies based on the objectives of a city. Table 3 summarizes the principles along with suggested planning measures to effectively implement modern urban projects.

## Conclusion

Efficient urban planning protocols, processes and institutions with effective policies are crucial for managing the transformation of Indian cities and towns. To this end, GoI has introduced several new urban development schemes. These schemes aim to promote smart growth, improve infrastructure, strengthen urban transport, provide housing for all, ensure cleanliness, conserve heritage cities and provide livelihood opportunities. The objective is to ensure that urbanization occurs systematically through planned development that leverages modern solutions.

The development plans of Patna and Srinagar lack provision for mixed and diverse land use, which could be included to promote schemes similar to SCM, PMAY, NULM and UT. Pedestrian facilities and cycle pathways are

**Table 3.** Suggestive planning measures for modern urban planning principle

| Principle | Suggestive measures |
|---|---|
| Mixed land use | The traditional approach of land-use zoning is outdated and ineffective in Indian cities. Instead, mixed land use should be encouraged at both the settlement and building levels. |
| Compact development | The promotion of high-density development along transit routes is recommended. It is suggested that innovative tools such as purchasable FAR and TDR be considered for adoption. |
| Walkable access | Neighbourhood amenities should be located within walking distance. |
| | Separation of pedestrian and motorized traffic should be implemented. |
| Transport options | A multimodal transportation system should be implemented for efficient last-mile connectivity. Sufficient transport infrastructure should also be provided. |
| Community facilities | Provision of multifunctional community facilities and public spaces. |
| | Improving accessibility. |
| Housing and inclusiveness | Encourage the development of affordable and equitable housing. |
| | Encourage participation from both public and private sectors. |
| Adequate infrastructure | Integration of information and communications technology and implementation of advanced technology to meet the minimum defined standard. |
| Urban renewal | Revitalization, adaptive reuse and place-making of heritage areas. |
| | Promoting community participation by utilizing tools such as heritage TDR. |
| Natural and built environment | Encouraging the development of green and blue infrastructure. |
| | Safeguarding and preserving natural and built heritage. |

useful for traffic segregation and to reduce congestion. Lucknow, Patna and Kolkata are densely populated cities that need more regulations for smart streets and parking, as they lack walkable access. The planning principle of housing and inclusiveness' covers affordable housing and public participation. Lucknow and Patna require more schemes like NULM, AMRUT, PMAY and SCM to improve their housing conditions. Benchmarking systems are an effective way to compare service levels in urban areas. The cities of Hyderabad, Lucknow and Kolkata need a robust benchmarking system to enhance their infrastructure services and ensure efficient implementation of the next phase of the AMRUT, PMAY and SCM schemes.

This study presents various findings regarding the application of modern principles in the UPPs of Indian cities, particularly in their DPPs. Examination of two major components of DPP, viz. TCG and PGS, shows that modern principles are being prioritized, especially in the areas of zoning, housing, transportation and heritage conservation. Policies that promote mixed land use, transportation alternatives and sustainable communities are being promoted. However, analysis of the DPP framework reveals that the incorporation of modern principles in various components of DPP is limited.

This study found that while the principles of conserving natural and built heritage and offering transportation options have strong PGS, the creation of attractive compact communities through urban renewal with modern facilities has a relatively weak grade. This suggests that Indian cities are concentrating on developing new projects outside of the existing urban limits rather than redeveloping and revitalizing core areas. Thus, cities are expanding their limits, leading to sprawl, while the potential of existing core areas remains untapped.

Although DPPs partially address sustainable–smart growth, they indirectly promote inclusion by reinforcing UPPs. The recent policies on urbanization adopt a sustainable–smart approval, which is new, and the DPPs were developed even before their launch.

To address the problems of urbanization, it is crucial to prioritize compact development and mixed land use alongside alternate transportation options. A mixed land-use strategy can help self-sufficient neighbourhoods where amenities are within walking distance and connected through transit corridors. Compact development can optimize land utilization and service delivery, while integrating advanced technology with ICT infrastructure can enhance sustainability. Providing community facilities for recreational, educational and health amenities can fulfil the socio-cultural needs of an evolving modern society. Inclusive housing options at affordable prices must be made available, considering the dimensions of social, economic and cultural inclusivity. The city functions as a living organisms, the services, buildings, etc. decay with time and needs to be renewed after subsequent periods. It is vital to control development in sensitive areas to protect natural and built heritage sites and relics, thus conserving the historic landscapes of cities. Encouraging redevelopment in old city areas, urban renewal and providing basic services in sensitive areas can protect the socio-economically backward classes and community environment.

It is clear that policies which promote modern planning initiatives such as compact cities, integrated land and transportation, inclusive development and urban renewal are essential for the social and economic growth of cities, and for creating a conducive environment for society. In order to promote sustainable–smart growth, there is a need to regulate and strengthen policies by incorporating modern

principles into development plans. Overall, this study suggests that urban planning authorities are taking limited action to accommodate emerging urban development principles. It is therefore imperative for urban planners to promote sustainable–smart policies for urban development in India.

Further research on the topic could help add more principles and rank cities based on criteria such as green, smart, compact, healthy, industrial or sustainable growth, with the corresponding principles. The ranking of cities could be further elaborated using quantitative indicators for the identified set of principles.

1. Kumar, S. and Dhote, K. K., A grounded theory approach for the assessment of urban development policies in Indian cities. *Curr. Sci.*, 2021, **121**(12), 1561–1571.
2. Singh, S., Dhote, K. K. and Kumar, S., Assessment framework for public satisfaction on the urban water management attributes in Central India. *Curr. Sci.*, 2023, **124**(5), 591–598.
3. Turok, I., The evolution of national urban policies: a global overview. Cities Alliance, Nairobi, Kenya, 2014.
4. Shaban, A., Kourtit, K. and Nijkamp, P., India's urban system: sustainability and imbalanc growth of cities. *Sustainability*, 2020, **2941**(12), 1–20.
5. Kshirsagar, J. B. and Srinivas, R., Inclusive urban planning and development: emerging issues and challenges. In 61st National Town and Country Planners Congress, Ahmedabad, Institute of Town Planners, India (ITPI), Delhi, 2013, pp. 119–127.
6. KPMG, Decoding housing for all by 2022, KPMG International Cooperative, Delhi, 2014.
7. Sudhira, H. S. and Gururaja, K. V., Population crunch in India: is it urban or still rural? *Curr. Sci.*, 2012, **103**(1), 37–40.
8. Taipale, K., Challenges and way forward in the urban sector, European Union, Brussels, Belgium, 2012.
9. MoHUA, National urban transport policy, Ministry of Housing and Urban Affairs, Government of India (GoI), 2011.
10. Tiwari, P. and Rao, J., Housing Markets and Housing Policies in India, Asian Development Bank Institute, Tokyo, 2016.
11. Zope, M. R., The planning strategies for urban land use pattern: a case study of Pune City, India. *Int. J. Innov. Res. Sci., Eng. Technol*., 2013, **2**(7), 2682–2687.
12. MacDonald, M., Urban and regional development plans formulation and implementation. Town and Country Planning Organization. Ministry of Urban Development, GoI, 2015.
13. MoUD, Model guidelines for urban land policy, Ministry of Urban Development, GoI, 2007.
14. Edadan, N., Structural determinants of unregulated urban growth and residential land pricing: case of Bangalore. *J. Urban Plann. Dev*., 2015, **141**(4), 1–9.
15. Saliba, S., Ten urban planning principles every humanitarian should know, 2015; https://www.iied.org/policy-planning (retrieved on 7 December 2018).
16. Livingston, A., What is smart growth – urban planning principles, benefits and examples, 2017; http://www.moneycrashers.com/category/lifestyle/ (retrieved on 7 December 2018).
17. Banerjee, S. and Dhote, K. K., Exploring inclusive dimension for the assessment of level of inclusion. *Res. J. Eng. Sci*., 2015, **4**(7), 1–9.
18. MoHUA, National urban policy framework, Ministry of Housing and Urban Affairs, GoI, 2018.
19. ITPI, Town and country planning, 2015; www.itpi.org.in/pages/planning-as-a-career (retrieved on 7 January 2015).
20. Pandey, S. C., The challenges of contract/project implementation. *J. Def. Stud*., 2010, **4**(1), 65–78.
21. Mahadevia, D., Joshi, R. and Sharma, R., Integrating the urban poor in planning and governance systems, India. Workshop Report, Centre for Environmental Planning and Technology (CEPT), National Resource Centre, Ahmedabad, 2009.
22. Sarin, M., *Urban Planning in the Third World: The Chandigarh Experience*, Mansell Publ. Ltd, London, UK, 1982.
23. Lim, C., Kim, K.-J. and Maglio, P. P., Smart cities with big data: reference models, challenges, and considerations. *Cities*, 2018, **82**, 86–99.
24. Beltrão, G., India: Promoting inclusive urban development in Indian cities, MoHUPA, Ministry of Housing and Urban Poverty Alleviation, 2013.
25. Charles, A., General principles of successful strategic urban planning. RTPI, Leusden, The Netherlands, 2017.
26. Minea, E. M., Overview on urban development through urban planning principles. *Transylv. Rev. Admin. Sci.*, 2008, **24**(E), 77–86.
27. Soltani, A. and Sharifi, E., A case study of sustainable urban planning principles in Curitiba (Brazil) and their applicability in Shiraz (Iran). *Int. J. Dev. Sustain.*, 2012, **1**(2), 120–134.
28. UN-Habitat., International guidelines on urban and territorial planning, Nairobi, Kenya, 2015.
29. Webster, C., Gated cities of tomorrow. *The Town Plann. Rev.*, 2001, **72**(2), 149–170.
30. Keil, R., Towers in the park, bungalows in the garden: peripheral densities, metropolitan scales and the political cultures of post-suburbia. *Built Environ.*, 2015, **41**(4), 579–596.
31. Saaty, T. L. and Sagir, M., Choosing the best city of the future. *J. Urban Manage.*, 2015, **4**(1), 3–23.
32. Mello, J. C., Meza, L. A. and Lacerda, F. G., A DEA model with a non discriptionary variable for Olympic evaluation. *Pesqui. Oper.*, 2012, **32**, 21–29.
33. Berke, P. R. and Conroy, M. M., Are we planning for sustainable development? An evaluation of 30 comprehensive plans. *J. Am. Plann. Assoc.*, 2000, **66**(1), 21–33.
34. Portney, K., *Taking Sustainable Cities Seriously: Economic Development, the Environment, and Quality of Life in American Cities*, MIT Press, Cambridge, MA, USA, 2003.
35. Miles, M. B. and Huberman, A. M., *Qualitative Data Analysis: An Expanded Sourcebook*, Sage Publications, Newbury Park, CA, USA, 1994, 2nd edn.