

A grounded theory approach for the assessment of urban development policies in Indian cities

Sanjeev Kumar* and Krishna Kumar Dhote

Department of Architecture and Planning, Maulana Azad National Institute of Technology, Bhopal 462 003, India

Urbanization in India has led to the development of new urban centres and an increase in the number of million-plus cities. The planning principles keep on evolving with time. In India, these principles are implemented through development plans. This study examines the extent to which Indian urban planning policies address contemporary urban planning principles in the perspective of rapidly evolving global urban policies. Development plans of 13 million-plus state capital cities across India have been analysed following grounded theory. The study reveals that Indian cities are not completely embracing global contemporary urban planning principles in their development plans, and the provision of these principles also differs among cities. The study proposes suggestive planning measures which might be incorporated in the urban planning process to address the challenges arising out of complexities of urbanization. The study explores how development plans endorse and implement particular urban development strategies and more generally, contributes to enforcement of contemporary urban planning principles. The goal of the study is to establish a link between contemporary urban development principles articulated through the development plans.

Keywords: Development plans, grounded theory, million-plus cities, urban planning principles.

URBAN planning researchers globally deal with the issues pertaining to congestion, haphazard development, overcrowded spaces, encroached walkways, limited transport options, avoidance of public facilities, biased housing promotion, lack of awareness regarding new technologies, inadequate infrastructure, exploitation of natural resources, degradation of heritage, etc. These issues might be addressed to a large extent by enforcing contemporary urban planning principles through statutory provisions. Modern town planning initiatives like comprehensive mobility plan, land transport integration, transit-oriented development, urban renewal, transferable development rights, public-private partnership, inclusive development, compact city, smart city, sustainable planning, medi-city, heritage

city, sports city, green city, industrial city and liveable city have been introduced in many cities worldwide. These cities have adopted contemporary principles of urban planning to regulate urban issues and mandating their urban plans to integrate alternate liberal policies.

Urban research discusses planning issues and proposes innovative solutions. These studies highlight the necessity to formulate appropriate planning policies to effectively regulate the urban planning issues. Current Indian practices and policies of urban development are incompetent to handle the situation efficiently. The sheer magnitude of urbanization calls for devising innovative urban planning systems with solutions for the new era. The national economic growth has a direct bearing on the efficient and productive guidance of the urbanization process, with emphasis on housing and basic infrastructure development which need to be addressed in priority¹. The urban development process needs to be efficient as well as ensure equity of urban development benefits for improving liveability².

Research responds to the need for working on such urban issues by evaluating development plans (DPs) and identifying the challenges which India is experiencing in addressing sustainable-smart growth. The key question is whether or not urban development plans in India promote contemporary urban principles through their policies.

Urbanization in India

The world's population is anticipated to grow by 9.6 billion by 2050, while the urban population is projected to grow by 2.5 billion, showing concentration of growth in urban centres³. According to the Census of India 2011, the population of the country was 1.21 billion, of which 31.1% lived in urban areas⁴. The urban population has increased from 290 to 377 million, while the number of cities and towns has increased from 5161 to 7935 in 2011 compared to 2001. The number of million-plus cities has increased from 35 in 2001 to 53 and 3 megacities in 2011. These million-plus cities (53) together hold 42.63% of the total urban population⁵. It has also been projected that the urban population will exceed 600 million, distributed unevenly in 87 metropolitan centres within the next

*For correspondence. (e-mail: sanju.spa@gmail.com)

two decades⁶. India's urban population is expected to reach about 810 million by 2050 (ref. 7) and the number of metropolitan cities would be more than 100 (ref. 5). The statistics confirms India's rapid urbanization⁸.

The urbanization issues have been ranging from the local to global level⁹. High population growth, rural–urban migration, reclassification of urban centres and expansion of cities have been identified as the root causes for urbanization¹⁰. The challenges of rapid urbanization necessitate provision of infrastructure¹¹ and urban facilities⁵. There are serious concerns regarding the negative impacts of urbanization on the environment, transportation, public health and deficiency in urban infrastructure¹². Failure to address these issues will lead to urban decay rather than planned development⁴. The problems due to urbanization cannot be addressed with conventional approaches and need to be revisited in view of emerging planning principles. Therefore, inclusion of new principles in urban policy is a necessary precondition for undertaking planning.

A close review of urban growth pattern of Indian cities indicates the prominence of urbanization in million-plus cities. These cities have shown a population growth of over 48% and five cities have attained more than 0.5 million population¹³. These cities are facing urban issues and demand a paradigm shift in urban development strategies that would combat negative effects and brings in prosperity. In this study we propose a comparative city ranking framework incorporating urban policies drafted in the respective DP of Indian cities.

Urban planning challenges in India

Urban planning is an envisioning process which provides alternatives for sustainable–smart development^{14–16}. These alternatives are an outcome of strategies adopted after due consideration of the demographic, environmental, socio-economic, administrative and financial aspects¹³. The planned development of towns and cities has witnessed a sea change since independence. During 1950s, the focus was on rehabilitation of refugees. In the sixties, a new era began for agricultural and industrial infrastructure, and many public sector townships were established. With the green revolution in the seventies, efforts were made to develop trading towns and infrastructure was augmented in small and medium towns. The eighties saw a spurt in employment opportunities, thereby leading to unprecedented migration to large cities. The nineties were marked with the initiation of reforms in the form of liberalization and globalization, which is still being continued, backed by the information and communication technology (ICT) revolution⁵. New urban challenges insist on a more proactive planning approach which could justify the contemporary themes of urban planning and development¹⁷. It is evident that despite several initiatives by the government

towards the contemporary concept of urban development, the results are not according to expectations.

The present urban planning and development approach is far from its goal 'to improve the welfare of the society by creating more convenient, equitable, healthy, efficient, sustainable and attractive places for the present and future generations'¹⁸. Urban development in India is pursued through comprehensive planning and its statutory form is a DP¹⁹. The policies of urban planning in India are aligned with global institutions. This has brought a change in the role and reach of the government at different levels²⁰. Based on the first few decades of urban planning in India, it was pointed out that the DPs are too high in standards and had no flexible regulations for acceptance of new changes²¹. Urban planning needs to integrate with the modern global concept of social, economic and environment development and adoption of sustainable–smart strategies.

In order to address land scarcity^{22,23} and response to the impact of socio-economic and environmental changes, alternative approaches of urban planning are the need of the hour^{13,24}. Keeping the city compact by mixed land use to an optimum level¹⁶, decreasing trip generation^{14,18,25,26} and high population density^{23,27} making mass rapid transit systems technically and economically viable is the solution. Urban planners should encourage best-designed pedestrian safety^{23,25}, protection of natural features^{14,22,28} and environmentally sensitive areas^{25,27}. Cities worldwide are attempting to transform themselves into sustainable–smart cities^{14–16,29}. The emerging aspects like inclusion^{15,27,30,31}, sustainable habitat^{22,25,30} land use and transport integration^{22,27}, service-level benchmarks^{18,22,24}, disaster management^{25,30} and governance reforms¹⁶ have given a new dimension to the planning process¹³. Modern urban development strategies mainly focus on mixed land use¹⁶, taking advantage of compact and transit-oriented development²⁶, creating walkable neighbourhoods¹⁶, alternate transport options^{14,25,28}, developing a strong sense of place^{15,26,27}, attractive community facilities^{24,26}, inclusive affordable housing^{15,16,22}, adequate infrastructure^{24,30}, inner-city redevelopment, urban renewal¹⁴, preserving open spaces^{16,27} and environmental areas²² and protection of natural^{24,25} and built development^{24,32}. Hence contemporary urban planning principles are intended to encourage more compact development, greater transit use and enhanced environmental protection.

Contemporary urban planning principles

There is a significant change in urban development principles of different eras. The literature classifies the urban development trend has been discussed differently with reference to development in centuries, world wars and institutionalization of planning process. Figure 1 depicts the idea of urban planning and its development with their

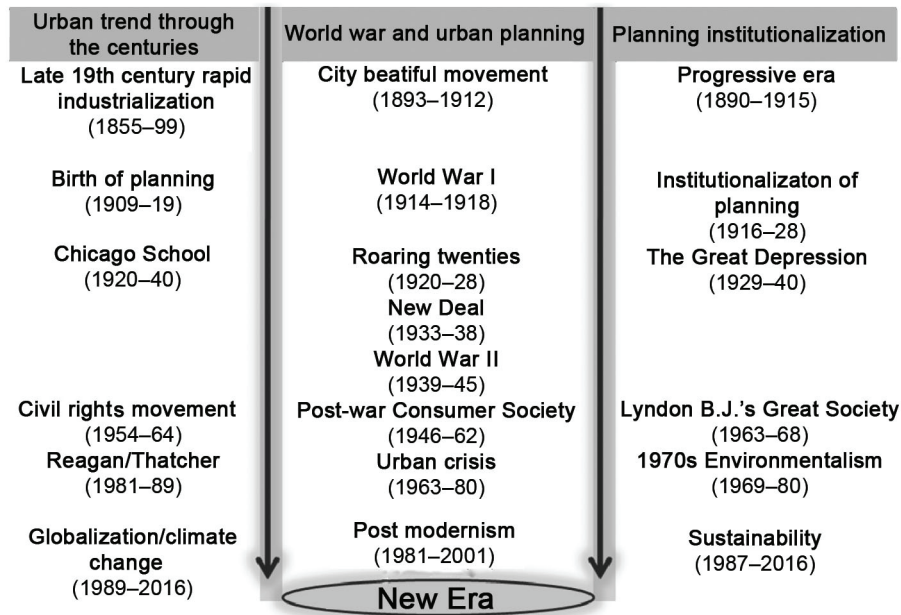


Figure 1. Urban development trends.

progress and advancement. A combined review of urban researches, schemes and programmes and growth of cities helps to understand the change in development principles. Figure 1 also presents the classification of development trends in various eras, which is helpful in identifying the contemporary urban development principles.

The literature review reveals a significant change in urban development principles. The principles are directed with global economic development, environmental change and social response. Township during the 18th century was perfectly perpendicular roads and square farms. The urban density was very low and each family was living on an acre of its own. The grid iron pattern was also followed in the 19th century ignoring the city's irregularly shaped coastline and topography. 'Garden cities of tomorrow' was the important milestone in the early 20th century. It designed an alternative to the overcrowded and polluted industrial cities. 'Towers in the park' was the outcome of building towards the sky concept, surrounded by green space which is a delineation between different uses. Mile-High Tower is a planned skyscraper which is the world's first tallest building and centre piece.

Before industrial revolution the population was evenly distributed in the suburban areas and countryside. Development of regular cities took place irrespective of land-forms. Urban pollution and overcrowding problems were fixed by working on horizontal expansion of settlement. Later, the same problem was addressed by developing high-rise building. Thus the urban development trend changed from layout and footprint of neighbourhoods at the street level to the volume of building towards the sky. This brought a paradigm shift from classical, low-density towns to compact, high-density mixed-use buildings

along transit corridors. The future city aims to delve into details of various models and determine the best model depending on the strategic criteria^{33,34}. The challenges after the Industrial Revolution and world wars were of developing new cities which largely follow classical principles. In the present context, the development principles focus on accommodating the global community leading towards sustainable-smart growth. The list of contemporary urban principle categories for sustainable-smart growth could be prepared with respect to their physical, social, environmental and regulatory behaviours which were clearly different from the conventional development principles. A total of nine contemporary urban development principles and their indicators were identified (Table 1). It follows the initial stage of grounded theory analysis that pertains to the formation of categories and their properties. The coded indicators are categorized into sustainable-smart urban principles which are delineated in terms of their similarity and differences.

The Urban and Regional Development Plans Formulation and Implementation (URDPFI) Guidelines, 2015 have been formulated keeping in view the emerging scenario in planned development of cities and towns¹³. Based on the recommended provisions and scope of URDPFI-2015, indicators for each principle were marked for the assessment of urban principles of Indian cities.

The 74th Constitutional Amendment stipulated that states should endow municipalities with obligatory powers to prepare DP focus on land-use planning and incorporate economic development, environmental protection and social justice⁸. A DP is a statutory tool to guide and channelize the growth and development of an urban area. It provides a spatial framework for the planned

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

<i>P_code</i>	Principle categories (P)	<i>i_code</i>	Indicators (i)
P1	Mixed land use	P1i1	Mixed land use within a neighbourhood zone
		P1i2	Diversity of a project's land uses
P2	Compact development	P2i1	Flexible density within the neighbourhood
		P2i2	Purchasable 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 neighbourhood
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	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 community character in architecture and historical features

development of activities which are to come up in future. The objective of a DP prepared by following URDPFI-2015 is to provide necessary details and intended actions in the form of strategies and physical proposals for various policies depending upon the economic and social needs and aspirations of the people, available resources and priorities.

This study complements the urban development goal by assessing the extent to which urban planning policies within the development plans can ensure successful implementation of contemporary urban principles. After coding and categorization of the principles according to the grounded theory approach (Table 1), development of the theme, testing and explanation of inter-relationships were followed to delineate the theory. The study reinforced a theme that 'sustainable-smart urban development can be promoted through cumulative impact of urban planning principles'. Furthermore, principles are tested by formulating the similar principle index (SPI) for sample cities. SPI ranks the cities based on performance of the adopted principles. The results of SPI explain the inter-relationship of the principles. The present study addresses whether or not DP policies target contemporary principles of sustainable smart-urban growth.

Sample frame

The research sample comprises all the million-plus state capital cities/urban agglomerations of India according to the 2011 census. The census defines million-plus cities in

terms of population, central built-up and suburb areas, local government and share of agricultural male employees³⁵.

The million-plus cities are facing rapid urbanization and need sustainable-smart growth on priority. These cities are the primary population carriers and economic centres. These are well-organized administrative jurisdictions with diverse state urban development regulations and thereby tend to be appropriate for policy analysis. There are 13 million-plus state capital cities in India according to the latest census. The research sample frame consists of DPs of these 13 million-plus state capital cities. DP is a statutory document which consists of ordinances for zoning, guiding regulations for future growth and development, policy statements to regulate functions and activities relating to land use, transport network and resources. The level of detail of each planning policy depends on the planning needs and issues of a city.

Research methodology and results

In this study, we assess the extent of urban planning policies within the DPs using a mixed method. We use content analysis to conduct an in-depth assessment of the policy framework of the sample DP and develop SPI which is theoretically conceptualized as the measure of the extent that DP policies recommend principles for sustainable-smart growth. Finally, the grounded theory approach is used to generate a theory of planning measures, which urban planners may incorporate to address contemporary urban development issues.

Literature background for conceptualizing SPI

The indices used to measure the urban development are cumulation of various aspects of sustainable, green and smart developments, which are evolved with time which have a longer history of development. For the assessment of sustainable-smart development in cities, researchers have conducted a systematic evaluation considering the social, economic, environmental, political and technological subsystems. These subsystems involve special scale and management of other subsystems in urban systems. According to the selected subsystems, the evaluation methods of sustainable-smart development in cities can be chosen³⁶.

An urban livability index is used to evaluate sustainable development in cities which target a single indicator³⁷, while the widely used Human Development Index is a measure of life expectancy, income, and education subsystems and their indicators³⁸. The urban bearing capacity uses the ecological footprint index to evaluate sustainable development. There are 24 indexes of economic development, social progress and ecological environment that can be used, when conducting a comprehensive evaluation of development in cities³⁷. To achieve urban sustainability, UN Habitat suggests different indices addressing productivity, infrastructure development, quality of life, equity, inclusion and environmental sustainability for a prosperous city³⁹. The city Development Index and the UN-Habitat City Prosperity Index are measures of average well-being and access to urban facilities⁴⁰. Zhou *et al.*⁴¹ describe the approach of building index system and principles for index screening. They propose a framework of monitoring index system hierarchy and its weighting. The Evaluation Index System of China was published to assess national-level development and guide the local government to develop its own evaluation indices.

The index formation through 'linear dimensionless' analysis is used to assess the comprehensive benefits when indicators are incommensurable. Indicator values can be converted to index values, which can be added to form comprehensive indexes of evaluated benefits³⁶. Researchers have introduced indices based new approaches to prioritize urban projects according to their planning policies in an efficient and reliable manner^{36,41,42}. The inductive research directly adopts pre-defined indices while the deductive research proposes new or modified indices to measure development aspects for urban, rural and regional growth. While some studies have been done in this area, there is no one-size-fits-all solution for assessing urban development.

The proposed SPI focuses on measuring the various plan components that collectively constitute the extent of modern strategic growth within a city. SPI for each of the sample cities is developed by adapting the indices proposed by Berke and Conroy⁴³ and Raparathi³² in their studies on sustainable and smart growth in urban development. The

sustainability index helps to evaluate the extent to which comprehensive plans advance the sustainable principles, while the smart growth index measures the extent to which urban planning policies within the DP promote smart growth in a city.

This study is broadly classified into three stages. In the first stage, a grounded theory approach of the planning policies is employed. The data are coded and categorized which consist of a set of contemporary principle indicators. In the second stage, content analysis of DP is done to evaluate for presence of the principle indicators and weighted within the range of 0, 1 and 2. Next, a quantitative mathematical approach is followed to develop SPI. Finally, the grounded theory analysis addresses the urban development policies for Indian cities.

Calculating SPI

The index development involves three major steps. First is assigning weights to the indicators; second is to calculate standard principle (SP) scores and finally to develop SPI. The first step assigns weights to the principles in the policies of DPs based on the presence of indicators. If the indicator of a principle is not present in the DP policies, then the weight will be '0'. A weight of '1' is assigned to an indicator which addresses the respective principle, but tends to be suggestive. Words such as 'encourage, may, prefer, should and suggest' indicate the suggestive character of the policy. If the indicator of any principle is present and is a mandatory policy of the DP, then that indicator is weighted '2'. Mandatory policies usually address keywords such as 'mandate, must, shall and will'^{32,43,44}.

The ranking orders the cities on the basis of mandatory policies, suggestive policies and lack of policies present in the DP of each city, and the mandatory policy is the most important among them. Since the mandatory policy is more important than the suggestive policy, the weightage to mandatory and suggestive policies is given as '2' and '1' respectively. Similarly suggestive policy is more important than lack or absence of policies; therefore the weight assigned to lack of policies is '0'. The numerical values of 2, 1 and 0 indicate the strength of policy enforcement in a city for its development. It has been quantified to assess the combined impact of all the indicators for a principle. Likert scale is considered to quantify the qualitative indicators and the combined impact of indicators are derived through its average values. The fractional score is derived by adding the assigned weight (2, 1 or 0) of each indicator for a principle and the average of scores of all principles for each city gives the SPI value. The cities are ranked based on their respective SPI values.

The evaluation protocol is pretested for the reliability of plan evaluation process. The plans are evaluated by three independently working coders. An inter-coder reliability score is computed, referred to as a percentage

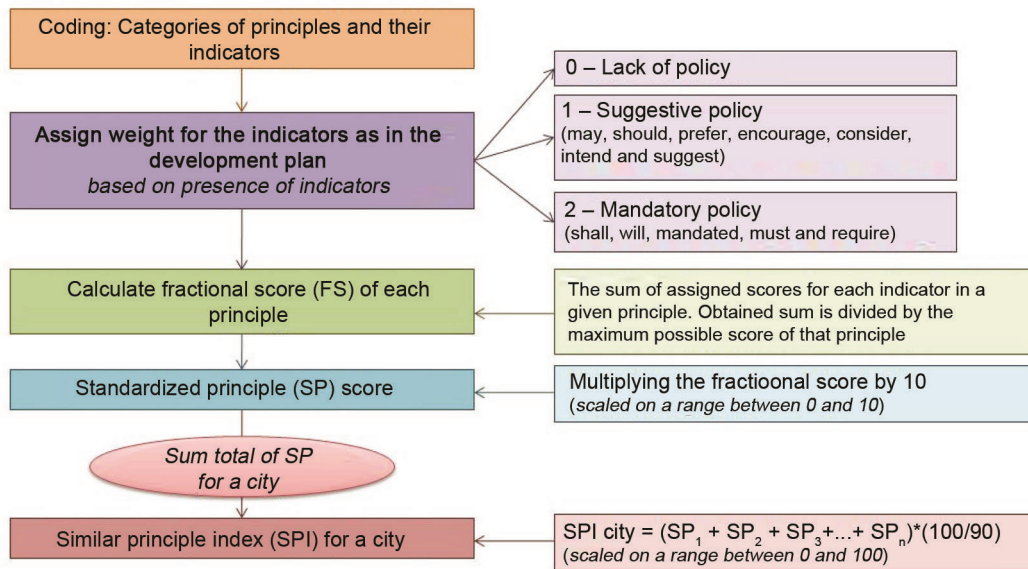


Figure 2. Method for development of similar principle index.

agreement. It is obtained by dividing the total number of disagreements received in coding by the total number of both agreements and disagreements and multiplying by 100. A percentage agreement reliability score of 84 is achieved for the plans. A score of 80% or higher is generally acceptable^{32,45}.

The second step is to compute the SP score. The sum of indicator’s weight of any principle on dividing by sum of maximum possible total weight of that principle will give its fractional score. Multiplying fractional score of each principle by 10 gives the SP for their respective principle, so that SP score for each principle can be scaled on a range from 0 to 10.

$$SP_j = \frac{10}{2m_j} \sum_{i=1}^{m_j} I_i, \tag{1}$$

where SP_j is the SP score of the j th principle, m_j the number of indicators within the j th principle and I_i is the weight of the i th principle (scale of 0, 1 or 2).

SPI has been developed to extend this range for a comparative ranking of the number of cities (Figure 2). Finally, the SPI value of a city with respect to its DP is achieved by adding the SP scores of all principles and multiplying this sum total by 100 and dividing by the maximum SP score which is 90.

$$SPI_{city'n'} = (SP_1 + SP_2 + SP_3 + \dots + SP_j) \frac{100}{90}, \tag{2}$$

where $SPI_{city'n'}$ is the SPI of the n th city, and $SP_1, SP_2, SP_3, \dots, SP_j$ are the SP scores of the j th principle in the development plan of the n th city.

The DPs of 13 cities were evaluated on nine identified contemporary urban development principles; the SPI ranged between 0 and 100. Assuming that the DP achieved a standardized score of 10 for each principle, SPI of such a DP will be 100.

Hence by calculating SPI, we can deduce whether planning policies within the DP have the ability to influence modern urban development practices in the city. This addresses a key question: do DPs of Indian cities promote urban development policies that target sustainable–smart growth based on contemporary principles?

SPI of development plans

The SPI for 13 sample DPs was calculated based on the weighting and scoring method. Table 2 presents the list of 13 sample cities, their fractional score, SP score on a scale of 10, calculated SPI value and city rank. Indexes range from a low of 25.93 to a high of 95.37. Populous cities in India are more focused to adopt modern urban planning practices and promote sustainable–smart policies through their DP. Three sample cities – Lucknow, Patna and Srinagar had low SPI (below 50), and as such failed to promote contemporary principles. SPI value of seven cities ranged from 50 to 75, suggesting that majority of the cities had initiated the new theme of urban development. The remaining three cities – Mumbai, Bengaluru and Chennai had SPI value above 75, practising contemporary principles statutorily supported by their respective DP.

Table 2 shows highlights that million-plus cities lack modern urban principles in their DP. The emerging sustainable–smart growth is a model that is worth emulating, at least for the integration and adoption of fundamental

Table 2. City ranking according to similar principle index (SPI)

Similar Principle Index Calculation			Principle 1		Principle 2		Principle 3		Principle 4		Principle 5		Principle 6		Principle 7		Principle 8		Principle 9		SPI Value	City Rank					
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 (M Corp.)	1,683,200	1	0	1	2	1	0	2	0	2	0	0	0	2	0	2	0	1	0	2	2	2	44.44	10	
				Fractional Score (FS)		0.25	0.75	0.25	0.67	0.00	0.33	0.50	0.25	1.00													
				SP (FS on the scale of 10)		2.5	7.5	2.5	6.67	0.00	3.33	5	2.5	10													
2	Chattisgarh	Raipur (M Corp.)	1,010,087	2	1	1	1	2	1	1	1	1	1	1	1	2	2	0	1	1	1	1	2	2	61.11	7	
				Fractional Score (FS)		0.75	0.50	0.75	0.50	0.50	0.67	0.50	0.50	0.83													
				SP (FS on the scale of 10)		7.5	5	7.5	5.00	5.00	6.67	5	5	8.33													
3	Jammu & Kashmir	Srinagar (M Corp.)	1,192,792	1	0	1	0	0	2	1	2	0	1	1	0	1	2	2	0	1	0	2	2	2	47.22	9	
				Fractional Score (FS)		0.25	0.25	0.50	0.50	0.50	0.50	0.50	0.50	0.25	1.00												
				SP (FS on the scale of 10)		2.5	2.5	5	5.00	5.00	5.00	5.00	5	2.5	10												
4	Jharkhand	Ranchi (M Corp.)	1,073,440	1	1	1	1	2	0	1	2	1	1	1	1	2	1	2	0	1	0	1	1	1	50.93	8	
				Fractional Score (FS)		0.50	0.50	0.50	0.67	0.50	0.67	0.50	0.25	0.50													
				SP (FS on the scale of 10)		5	5	5	6.67	5.00	6.67	5	2.5	5													
5	Karnataka	Bengalore (M Corp.)	8,425,970	1	2	2	2	2	2	2	1	2	2	1	1	2	2	2	1	2	1	1	2	2	83.33	3	
				Fractional Score (FS)		0.75	1.00	1.00	0.83	0.75	0.83	0.75	0.75	0.83													
				SP (FS on the scale of 10)		7.5	10	10	8.33	7.50	8.33	7.5	7.5	8.33													
6	Madhya Pradesh	Bhopal (M Corp.)	1,795,648	1	1	1	0	1	2	2	2	2	2	1	2	1	2	2	0	2	0	2	2	2	67.59	5	
				Fractional Score (FS)		0.5	0.25	0.75	1.00	0.75	0.83	0.50	0.50	1.00													
				SP (FS on the scale of 10)		5	2.5	7.5	10.00	7.50	8.33	5	5	10													
7	Maharashtra	Mumbai (M Corp.)	1,119,477	2	2	2	2	2	2	1	2	2	2	1	2	2	2	2	2	2	2	2	2	2	95.37	1	
				Fractional Score (FS)		1	1.00	1.00	0.83	0.75	1.00	1.00	1.00	1.00													
				SP (FS on the scale of 10)		10	10	10	8.33	7.50	10.00	10	10	10													
8	Rajasthan	Jaipur (M Corp.)	3,073,350	2	2	2	0	2	2	2	2	2	1	1	2	1	1	2	2	1	0	1	1	2	73.15	4	
				Fractional Score (FS)		1	0.50	1.00	1.00	0.50	0.67	1.00	0.25	0.67													
				SP (FS on the scale of 10)		10	5	10	10.00	5.00	6.67	10	2.5	6.67													
9	Tamil Nadu	Chennai (M Corp.)	4,681,087	1	2	1	1	2	2	2	2	2	2	1	2	2	2	2	1	2	2	1	2	2	84.26	2	
				Fractional Score (FS)		0.75	0.50	1.00	1.00	0.75	1.00	0.75	1.00	0.83													
				SP (FS on the scale of 10)		7.5	5	10	10.00	7.50	10.00	7.5	10	8.33													
10	Telangana	Hyderabad (M Corp.)	6,809,970	2	2	0	2	1	1	1	1	2	2	2	2	2	2	2	0	0	1	1	2	2	66.67	6	
				Fractional Score (FS)		1	0.50	0.50	0.67	1.00	1.00	0.00	0.50	0.83													
				SP (FS on the scale of 10)		10	5	5	6.67	10.00	10.00	0	5	8.33													
11	Uttar Pradesh	Lucknow (M Corp.)	2,815,601	1	1	0	0	0	0	2	1	2	0	0	0	1	0	0	0	0	0	0	0	2	1	25.93	11
				Fractional Score (FS)		0.5	0.00	0.00	0.83	0.00	0.17	0.00	0.00	0.83													
				SP (FS on the scale of 10)		5	0	0	8.33	0.00	1.67	0	0	8.33													
12	West Bengal	Kolkata (M Corp.)	4,486,679	1	1	2	0	1	0	0	1	2	1	0	2	1	2	1	1	1	0	2	2	2	50.93	8	
				Fractional Score (FS)		0.50	0.50	0.25	0.50	0.25	0.83	0.50	0.25	1.00													
				SP (FS on the scale of 10)		5	5	2.5	5.00	2.50	8.33	5	2.5	10													
13	Delhi	Delhi (M Corp.)	110,07,835	2	1	1	1	2	1	2	1	2	1	1	2	2	1	2	2	2	1	1	1	2	73.15	4	
				Fractional Score (FS)		0.75	0.50	0.75	0.83	0.50	0.83	1.00	0.75	0.67													
				SP (FS on the scale of 10)		7.5	5	7.5	8.33	5.00	8.33	10	7.5	6.67													
Mean Standardized Principles Score				6.54	5.19	6.35	7.56	5.19	7.18	5.77	4.81	8.46															

*M. Corp., Municipal corporation; SP, Standardized principle.

contemporary principles into planning policies. From this standpoint, it is interesting to analyse SP scores of the principles. Mean SP score suggests which of the nine principles are addressed and mostly promoted in the DP.

Mean SP score of urban planning principles

To ensure an in-depth analysis of the contemporary principles in the DPs of cities, the mean SP score (eq. (1)) of all principles within the sample cities was computed. The mean standardized score of a particular principle was calculated as the average of SP for DP. The range of the mean SP scores for sample cities is significant. High mean SP suggests that the DP of cities has a number of policies which promote and address the contemporary principles.

Mean SP scores ranged from a low of 4.81 for urban renewal principle to a high of 8.46 for policies that foster protection and conservation of natural and built environment. The variation in the mean score across all principles indicates that DPs have policies that promote these principles; however, all the principles are not equally

addressed. This variation reflects the type of priority that the planner has framed for each principle and the number of policies that address the contemporary principles.

Among the nine principles, three (transport options, housing and inclusiveness, and natural and built environment) received a high SP score. Protection and conservation of natural and built environment achieved the highest score of 8.46. Alternate transport options for better communication received the second highest score.

It is encouraging to see that the coordination of infrastructure and development characterized by walkable access and compact community development offers a variety of transportation choices. The majority of cities adopted the walkability principle, although only nine sample cities included it comprehensively. On the other hand, after urban renewal, compact development and community facilities received lower scores; thus the DPs have limited policies that address these principles. The limited policies that promote compact development and mixed land use further strengthened the finding that city planners are not taking measures to implement modern policies of sustainable-smart growth in India.

Analysis

SPI reveals the rank of the cities. A higher rank indicates incorporating more number of principles. The mean SP score indicates its presence in the cities. The cumulative impact of principles was tested using the results of SPI. Rank of cities can be explained by the performance of principles. The interlinkage of performance of principles for different cities contributes towards theory delineation. Performance levels of principles outline urban development perspectives which substantiate the theory.

Performance of sample cities

- Million-plus cities in India are more focused on contemporary policies through their DPs.
- SPI ranged from 25.93 (Lucknow) to 95.37 (Mumbai) for sample cities.
- Mumbai, Chennai and Bengaluru were the top three cities which have adopted the contemporary principles.
- Lucknow, Patna and Srinagar had SPI value less than 50 and had poorly addressed contemporary principles of urban planning.
- High mean SP scores suggest that the DPs of cities have policies which address the contemporary principles like transport options, and natural and built environment.
- Low mean scores imply that DP policies do not address principles like compact development, community facilities and urban renewal in sample cities.
- DPs have policies that address contemporary principles; however, all principles are not equally addressed.
- All cities adopted the natural and built environment protection principle strongly. Ranchi, Jaipur and Delhi had liberal environmental protection policies in their DPs.
- Urban renewal received the lowest score, suggesting that DPs have limited policies that address this principle.
- Almost half of sample cities did not address the purchasable floor area ratio (FAR), transit-oriented development (TOD), promotion of new technology and transferable development rights (TDR) techniques.
- City planners have not taken proper measures while dealing with the current schemes by imposing contemporary principles and drafting new urban development policies.
- DPs of Indian cities need to revisit their development policies to make these more liberal for the implementation of urban schemes following contemporary principles.

The following discussion contrasts how and to what extent million-plus capital cities in India have incorporated the urban policies for implementation of contemporary principles for sustainable-smart growth.

- (i) Mixed land uses: Increasing density in new development has been well addressed in Indian cities by regulating the height of buildings. Promotion of commercial, residential, recreational and cultural areas in other uses has also been done in the DPs.
- (ii) Compact development: This principle is not addressed much. Compact development strategies like transit-oriented development, etc. have not been considered in the DP.
- (iii) Walkable access: This principle is strongly embedded in the DP by encouraging walkability, namely pedestrian features and internal paths, etc.
- (iv) Transport options: Alternate transport options are provided with a focus on public transit that indirectly promotes a compact city. Mean standardized scores for walkable access and providing transport options have implications of linking transportation and land use.
- (v) Community facilities: Regulatory provisions in the DP allow different community facilities in a land use for easy and safe access, which ultimately promotes compact development.
- (vi) Housing and inclusiveness: Affordable housing has been recommended in the DP. Special focus has been given to Economic Weaker Section (EWS) and Low Income Group (LIG) housing. Public participation has also been the focus during plan preparation stage. Inclusion of poor sections of society was considered in the DP by reserving land for housing in each residential colony.
- (vii) Adequate infrastructure: Provision of adequate infrastructure has been made in the DP policies, but these are not managed by new technology. Standard benchmarks for each basic civil and social service have been marked in some DPs.
- (viii) Urban renewal: Taking advantage of public investments and locating the upcoming projects within an existing urban service area are poorly addressed in the DP. Promoting urban development toward the existing urban service area helps in easy and economic access to basic services and overcoming sprawl to some extent.
- (ix) Natural and built environment: This has boundless policies, and most of them are recommended. Protection of environmental sensitive-areas is mandatory. Developments in wetlands, streams and catchment areas of water bodies are controlled. Developments around historic and architecturally important building are regulated.

The variations in mean scores suggest that compact development, provision of community facilities and urban renewal are not prioritized by most of cities.

Thus, the SP score reveals that although development plans address contemporary principles, there is a lack of sense of balance. Analysis highlights that principles vary

Table 3. Suggestive planning measures for contemporary urban development

Principles	Suggestive measures
Mixed land use	<ul style="list-style-type: none"> Conventional land-use zoning is obsolete and non-functional in Indian cities. Mixed land use should be promoted at settlement and building level
Compact development	<ul style="list-style-type: none"> High density along transit routes should be promoted. Innovative tools like purchasable FAR, TDR, etc. might be adopted
Walkable access	<ul style="list-style-type: none"> Neighbourhood amenities within walkable distance Segregation of pedestrian and motorized traffic
Transport options	<ul style="list-style-type: none"> Multimodal transport system for last-mile connectivity. Adequate transport infrastructure
Community facilities	<ul style="list-style-type: none"> Provision for multifunctional community facilities and public spaces. Improving accessibility
Housing and inclusiveness	<ul style="list-style-type: none"> Promote equitable and affordable housing Encourage public and private participation
Adequate infrastructure	<ul style="list-style-type: none"> Meet the minimum defined standard Application of information and communication technology and high-end technology
Urban renewal	<ul style="list-style-type: none"> Rejuvenation, adaptive reuse and place making of heritage area Encouraging local people using tools like heritage TDR
Natural and built environment	<ul style="list-style-type: none"> Promoting green and blue infrastructure Protection and conservation of natural and built heritage

from one city to another, and planners have to prioritize policies based on the goals of each city. Table 3 summarizes the principles with their suggestive planning measures to successfully implement modern urban projects.

Conclusion

Indian cities and towns need effective urban planning protocols, processes and institutions underpinned by effective policies to manage any transformation⁵⁰. The Government of India introduced new urban development schemes focusing on smart growth, improvizing infrastructure, strengthening urban transport, housing for all, clean India, conserving heritage city and livelihood opportunities. One of the objectives is to ensure that urbanization is effective in a discrete manner through the process of planned development with new solutions.

The grounded theory approach was used in the present study. It is an inductive method which leads to the emergence of conceptual categories, developing themes, testing, inter-relating explanations and delineation of theories at the level of analysis. The coding and categorization help in identifying mutually exclusive indicators of each principle for quantitative analysis. The theme for assessment of urban development principles helps in framing the testing approach and explanation of interpretation. City ranking and SP score explain the inter-relationship among cities and principles. Assessment of urban development policies using grounded theory argues that ‘the theme of sustainable smart urban development can be promoted through cumulative impact of urban planning principles; if there is a change in the themes of urban development the principles need to be changed accordingly’.

This study reports several findings that divulge the status of contemporary principles in the DP. A detailed study of SPI value and mean SP score reveals that much emphasis is being placed on promoting contemporary urban development policies, specifically within the zoning, housing, transportation and heritage conservation components of the DP. Policies of mixed land use, transportation options and fostering distinctive sustainable communities are being promoted. By analysing the DP policy framework, it has been concluded that Indian urban planning policies of populous cities are encouraging contemporary principles in various components of their DPs in a limited manner.

It was found that the conservation of natural and built heritage, and transport options principles had a high mean SP score, while attractive compact communities through urban renewal with a strong sense of place and modern community facilities had a relatively low score. This implies that Indian cities are locating projects within an existing urban limit and promoting distinctive, attractive communities mainly on the outskirts, and are less likely to focus on urban renewal or redevelopment. As such, cities are paying more attention to peripheral urban development as it is comparatively easy to propose new development by expanding the city limits; less interest is shown in renewing and addressing the complexity of existing core areas. This has led to sprawl in the outskirts of the city and the spaces of inner city often remain underutilized. This study highlights that although DPs directly address sustainable-smart growth partially, they tend to indirectly induce inclusion by strengthening the development principle. The recent policies on urbanization which are a reflection of sustainable-smart policies are comparatively new and the DP had been prepared before the launch of these policies.

In view of urbanization, it is necessary to focus on the compact development and mixed land use with alternate transport options. The mixed land use will lead to self-sufficient neighbourhood with available amenities within walking distance. These neighbourhoods should be connected through transit corridors. The compact development will optimize land utilization and result in efficient service delivery. Use of advanced technology integrated with ICT for infrastructure provision will enhance sustainability. The socio-cultural aspects of society are fulfilled through community facilities for recreational, educational and health amenities in view of the evolving modern society. Urbanization demands for multiple housing options at affordable prices. Dimensions of social, economic and cultural inclusivity should be included in the DPs. Cities function as living organisms; the services, building, etc. decay with time and need to be renewed after subsequent periods. In addition, development in sensitive areas must be strictly controlled to protect natural and built heritage sites and relics, thereby conserving historic landscapes of the cities. There is a need to encourage redevelopment in old city areas, urban renewal and supply of basic services in sensitive areas, thereby protecting socio-economic backward classes and the community environment.

It is evident that policies encouraging these principles promote modern planning initiatives like compact cities, land-transport integration, inclusive development and urban renewal, so that the cities can foster a social and economic development and provide a conducive environment for growth of the society. There is a need to regulate and strengthen policies pertaining to sustainable-smart growth by adopting the contemporary principles in the policies of DPs. In summary, this study highlights that limited action is being taken by urban planning authorities to accommodate emerging urban development principles. Therefore, it is vital for urban planners to promote sustainable-smart urban development policies in India.

1. MoUD, Model Guidelines for Urban Land Policy, Ministry of Urban Development, Government of India (GoI), 2007.
2. Edadan, N., Structural determinants of unregulated urban growth and residential land pricing: case of Bangalore. *J. Urban Plann. Develop.*, 2015, **141**(4), 1–9.
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 imbalanced 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, Delhi, 2013, pp. 119–127.
6. Jothilakshmy, D. N. and Arulmalar, R., Inclusive and integrated strategies for cost effective sustainable habitat – an effective paradigm for housing the marginalised in Indian context. In 61st NTCP Congress, Ahmedabad, ITPI, Delhi, India, 2013, pp. 219–221.
7. KPMG, Decoding housing for all by 2022, KPMG International Cooperative, Delhi, 2014.
8. Sudhira, H. S. and Gururaja, K. V., Population crunch in India: is it urban or still rural? *Curr. Sci.*, 2012, **103**(1), 37–40.
9. Taipale, K., Challenges and Way Forward in the Urban Sector, European Union, Brussels, Belgium, 2012.
10. MoHUA, National Urban Transport Policy, Ministry of Housing and Urban Affairs, GoI, 2011.
11. Tiwari, P. and Rao, J., *Housing Markets and Housing Policies in India*, Asian Development Bank Institute, Tokyo, Japan, 2016.
12. 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.
13. MacDonald, M., Urban and Regional Development Plans Formulation and Implementation, Town and Country Planning Organization, MoUD, GoI, 2015.
14. Corrigan, M. B., Dunphy, R. T., Gabel, N. M., Levitt, R. L., McMahon, E. T. and Pawlukiewicz, M., *Ten Principles for Smart Growth on the Suburban Fringe*, Urban Land Institute, Washington, 2004.
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. ITPI, Town and Country Planning, 2015; www.itpi.org.in/pages/planning-as-a-career (retrieved on 7 January 2015), Institute of Town Planners, Delhi.
19. Pandey, S. C., The challenges of contract/project implementation. *J. Def. Stud.*, 2010, **4**(1), 65–78.
20. 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, National Resource Centre, Ahmedabad, 2009.
21. Sarin, M., *Urban Planning in the Third World: The Chandigarh Experience*, Mansell Publ Ltd, London, UK, 1982.
22. Minea, E. M., Overview on urban development through urban planning principles. *Trans. Rev. Admin. Sci.*, 2008, **24**(E), 77–86.
23. Matt, L., Prince Charles' 10 Principles of Urban Planning. *Arch. Rev.*, 2014; <http://www.architecturalreview.com> (retrieved on 7 December 2018).
24. UN-Habitat, International Guidelines on Urban and Territorial Planning, Nairobi, Kenya, 2015.
25. 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.
26. Valluri, Modern Principles of City and Town Planning, 2017; www.valluriorg.com/blog/category/city-planning-and-town-planning/ (retrieved on 29 January 2019), City Planning and Town Planning, Smart Infrastructure.
27. Beltrão, G., India: Promoting Inclusive Urban Development in Indian Cities, MoHUPA, New Delhi, 2013.
28. Entrepreneurial Urbanism and Design, 10 Principles of Intelligent Urbanism in City Planning and Urban Design, 2015; <http://eud.leneurbanity.com> (retrieved on 7 January 2019).
29. Lim, C., Kim, K.-J. and Maglio, P. P., Smart cities with big data: reference models, challenges, and considerations. *Cities*, 2018, **82**, 86–99.
30. UNICEF, Urban Planning Principles, 2017; <http://www.behance.net/> (retrieved on 7 December 2018).
31. Charles, A., *General Principles of Successful Strategic Urban Planning*, RTPI, Leusden, The Netherlands, 2017.

-
32. Raparathi, K., Assessing smart-growth strategies in Indian cities: grounded theory approach to planning practice. *J. Urban Plann. Develop.*, 2015, **141**(4), 05014031_1-10.
 33. Zhao, Z., Lacono, M., Lari, A. and Levinson, D., Value capture for transportation finance. *Soc. Behav. Sci.*, 2012, **48**, 435–448.
 34. Saaty, T. L. and Sagir, M., Choosing the best city of the future. *J. Urban Manage.*, 2015, **4**(1), 3–23.
 35. Census of India, Registrar General and Census Commissioner, Ministry of Home Affairs, GoI, 2011.
 36. Yang, B., Xu, T. and Shi, L., Analysis on sustainable urban development levels and trends in China's cities. *J. Clean. Prod.*, 2017, **141**, 868–880.
 37. Li, F., Liu, X. S. and Fu, R., Evaluation method and its application for urban sustainable development. *Acta. Ecol. Sin.*, 2007, **27**(11), 4793–4792.
 38. UNDP, Human Development Report 2009 – Overcoming Barriers: Human Mobility and Development, UNDP, New York, USA, 2009.
 39. UN-Habitat, State of the world's cities 2012/2013. Prosperity of cities, Nairobi, Kenya, 2012.
 40. UN-Habitat, Global urban indicators database version 2, Nairobi, Kenya, 2002.
 41. Zhou, X., Yang, Z. and Xu, L., Eco-security monitoring index system for urban development zone. *Proc. Environ. Sci.*, 2010, **2**, 1199–1205.
 42. Schlör, H., Venghaus, S. and Hake, J.-F., The FEW–nexus city index – measuring urban resilience. *Appl. Energy*, 2018, **210**, 382–392.
 43. 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.
 44. Portney, K., *Taking Sustainable Cities Seriously: Economic Development, the Environment, and Quality of Life in American Cities*, MIT Press, Cambridge, MA, USA, 2003.
 45. Miles, M. B. and Huberman, A. M., *Qualitative Data Analysis: An Expanded Sourcebook*, Sage Publications, USA, Newbury Park, CA, 1994, 2nd edn.
- Received 18 August 2021; revised accepted 12 October 2021
doi: 10.18520/cs/v121/i12/1561-1571
-