JLL | Achieve Ambitions

Livability quotient

a paradigm shift in India's emerging cities

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Preface

Expected to increase to 843 million by 2050, India's urban population will account for about 50% of the total population. It to this end, that Modiji's Smart Cities Mission strategy has been implemented in order to accommodate this massive urbanisation. Hence, a definitive sharp focus on of the mission, with a budget allocation of USD 7.2 bn. In addition, private consultancies are also keenly exploring and researching this key driver of economic growth. Their views and studies have been useful in forming a master plan to conveniently empower future Smart Cities.

Real estate and urban development have a symbiotic relationship and private developers increasingly assume the role of enablers of key government strategies pertaining to large scale development. Over the past few years, we have witnessed multiple townships large enough to be called cities within themselves, with developers assuming the role of city administrators. This is clearly an evolution from their erstwhile role of simply developing and selling residential or commercial assets. Having said that, some large township developers have demonstrated expertise in successfully converting localised townships into large cities with a high livability quotient. These new age developers have increasingly focused on building infrastructure to aid - a healthy work-life balance, easy access to social infrastructure and emphasis on sustainable construction practices, etc. With a full-fledged government program enabling the roll-out Smart Cities, operating styles of conventional city administrators (such as municipal authorities) and non-conventional administrators (private entities or real estate developers) are likely to converge.

We have often seen conventional city administration trying to meet requirements of "Scale", in order to tackle issues pertaining to the exponentially increasing population density in our key cities. Resultantly, cities either expand unfettered geographically or grow vertically in order to accommodate new development needs. Going forward, the desirable outcome would be for city administrators to create infrastructure interventions able to relieve the enormous stress on our limited resources, resulting in more livable cities. Adopting best-in-class construction practices, enabling efficient usage of available resources, generating low wastage, air pollution management, etc. are the key elements which need to be introduced to achieve this objective.

This report examines the shifting sands within India's Emerging Cities, in which we believe that a balance of Skills & Scale are both required to create the most sustainable living spaces and cities of the future.

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Introduction

Being the world's fastest growing economy currently, India has been witnessing meteoric growth in activity across all sectors. New investments are coming in and more jobs are being created around existing urban centres, thereby further adding to the density of such cities. Consequently, several existing megapolises face challenges related to the extreme densification, affecting productivity, efficiency as well as the quality of life of people. Therefore, there is a need for smarter urban solutions in order to improve the liveability quotient in the future for our cities.

Several new satellite cities were born during the last few decades, situated around the existing megapolises that have successfully grown to become engines of economic growth. It is established that satellite cities or townships are undeniably the best way to stop urban sprawl from further hampering the quality of life in suburban towns. It is important for the next generation of satellite cities in India to adopt sustainable urban development practices and foster a good quality of life. In this paper, we have identified ten satellite cities that were successful in mitigating the risk of unsustainable densification of its parent city and have demonstrated certain initiatives to uphold the liveability quotient for its inhabitants. Given the future of urbanisation has a lot to do with professionally managed cities under the guise of "smart cities", we thought it would be pertinent to include also those cities that are townships managed by private developers, although large enough to be considered for comparison.

Through this paper, we evaluate ten satellite cities on the basis of various policies or market initiatives that are summed up into ten broad parameters. The findings from the study revealed there are differences of character between the traditional municipality managed cities and the privately managed cities. Interestingly, we believe that there is an opportunity for local municipalities as well as large township developers to learn from each other as far as smart city administration practices are concerned.

India's urbanization story and the challenges it poses

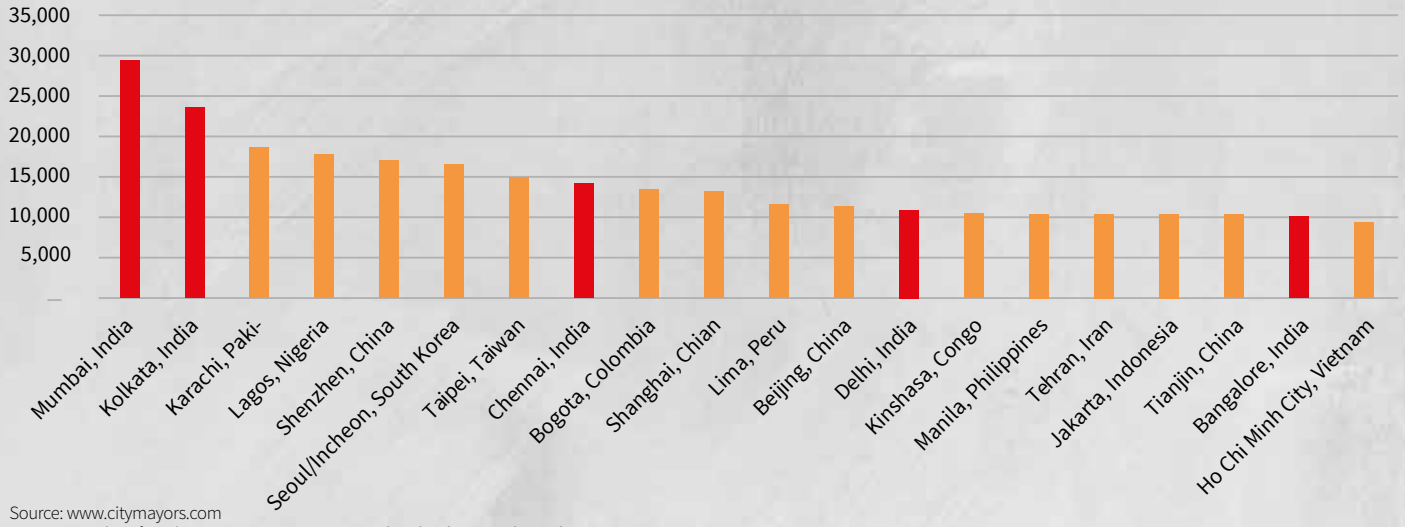
It is widely known that the next big growth drivers for the Indian economy, alongside the consumption and infrastructure story, will stem from the fast rate of urbanization. The census data on urban population for the last three periods (1991, 2001 and 2011) reveal that the rate at which population is rising in the Urban areas is more than 30%, and current market estimates point at a relatively higher rate of growth for the next few decades. While this definitely presents a great opportunity for the Indian economy and its real estate sector, there are challenges in managing this growth cycle.

At a time when Smart Cities dominate our policy disclosures, India is simultaneously also grappling with real urbanisation challenges. Inadequate infrastructure and undersupplied units of middle-class housing within accessible geographic limits has resulted into rising inequality in many parts of urban India. The consequences of this is large. For instance, a research paper presented at the Population Association of America conference in 2014 revealed that inequality and poor lifestyle/ health in urban India has resulted in reduced human capital attainment and productivity, increased social fragmentation, and it threatens sustainable development. Much of this socio-economic upheavals are potentially surmountable through initiatives such as consistent job creation, creation of good infrastructure and adopting sustainable development practices. It is in this context that one must identify the pillars of a sustainable urban dispensation.

Crude reality of the urbanization story in India

- According to UN population density figures, Indian cities are amongst the most densely populated in the world.

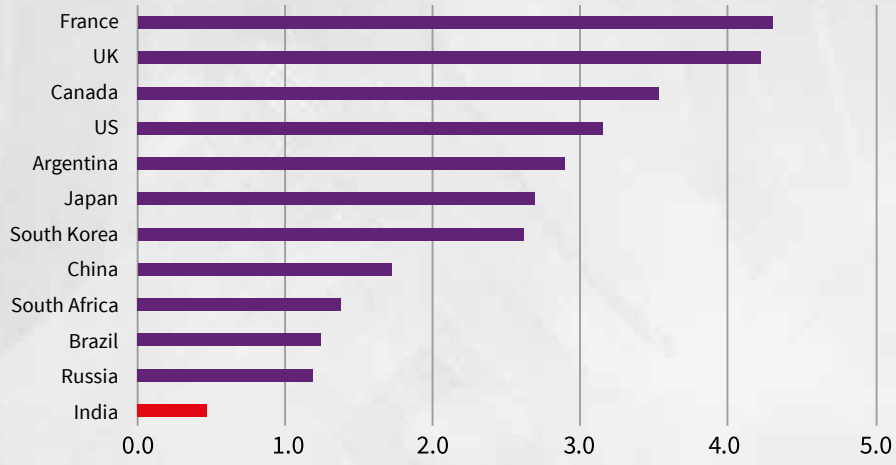
Population density of global megacities (people/Sq. Km)



Source: www.citymayors.com
Note: From a list of 250 largest cities using criteria such as land area and population

- With low productivity in agriculture, people from distressed rural areas (home to 70% of population; 830 million people) are migrating in large numbers to urban areas.
- Over 30% urbanisation rate is profligate and Indian cities will have to be equipped with the required absorption capacity in a hurry.
- Severe stress on land resources makes houses unaffordable to many – more than 90% of housing shortages in Urban India faced by economically weaker section (EWS), and also the low-income groups.
- Congestion in Indian cities have had its share of problems. 2011 census data reveals that merely 1/3rd of the urban Indians have access to proper sewerage system. Also, nearly 1/3rd urban households do not have access to piped water supply.
- State of our civic bodies remain appalling as they have no financial autonomy and are reliant on state governments for funding or grants.
- The share of property tax, a mainstay of municipal revenues in India, as a proportion of India's GDP is much lower when compared globally. Even the BRICS counterparts are better-off than Indian cities in this regard.

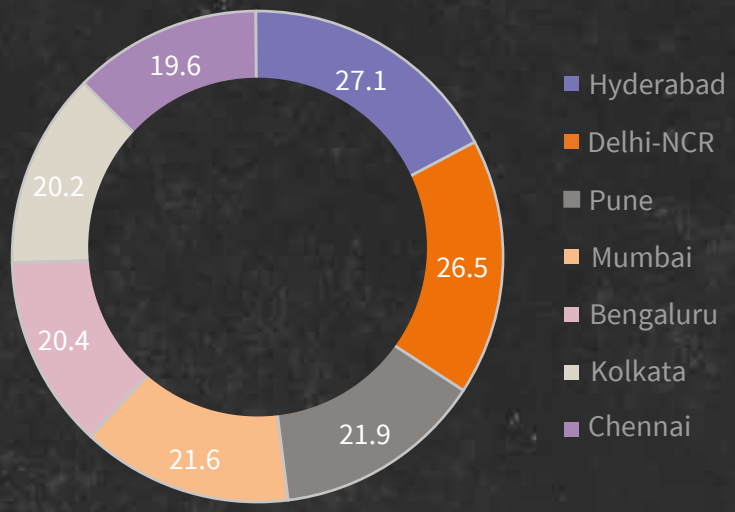
Property tax revenue as % of GDP



Source: OECD, MoF India, MoF China

- A 2016 report suggests that in the last decade, registered vehicles per million people increased by 219% while urban road infra per million increased by merely 124%.
- A 2016 report by a leading travel aggregator in India reveals that average speed of vehicle is just over 20 kms/hr during peak morning time across key Indian cities. As against that, average cycling speed is around 15-16 km/hr.

Average speed of traffic on Indian cities (kms/hr)



Source: ANI Technologies/Ola Cabs 2016 report – How India Commuted in 2016

- As per 2011 Census, share of public transport is merely 18% of total work trips
- Air pollution has greater impact on developing countries such as India, as 1.4 million people lost their life due to air pollution – World Bank study, 2016.
- A World Bank 2016 report titled 'the cost of air pollution' puts Indian and Chinese cities to be amongst the worst affected owing to rising air pollution.

Satellite Cities or Townships: a therapy to reconcile urban sprawl

The disadvantages of a disproportionately high level of population density are many, some of which have been highlighted in the previous chapter. It is important for the civic authorities to make necessary arrangements to effectively absorb the estimated rise in rural-urban migration. From a land use perspective, satellite cities and urban infill development is the best way to accommodate population growth while preserving open space and farmland.

A satellite town or city is a concept where a city is designed to house the overspill population of an adjacent major city, but located beyond the limits of that city. The satellite township would typically operate as a discrete and self-contained entity. It could be a planned city in the natural growth path of a nearby larger city, designed to stop the urban sprawl to an already-stretched suburbs.

Three ways in which urban congestion may be tackled:

Vertical expansion: Consequences include increased congestion, escalating land prices, and hurts the vulnerable community (lower income bands). E.g. Mumbai

Horizontal expansion: Consequences include increased commuting distance and time, and congestion at central nodes. It may not necessarily be better than vertical expansion. E.g. Delhi

Satellite towns: Mostly results in positive consequences - moderate land price appreciation, better spread of population, controlled level of population density, etc. In other ways too - financial, ecological, ethical, and social - satellite towns are best cure for major cities. E.g. Greater Noida, Navi Mumbai, etc.

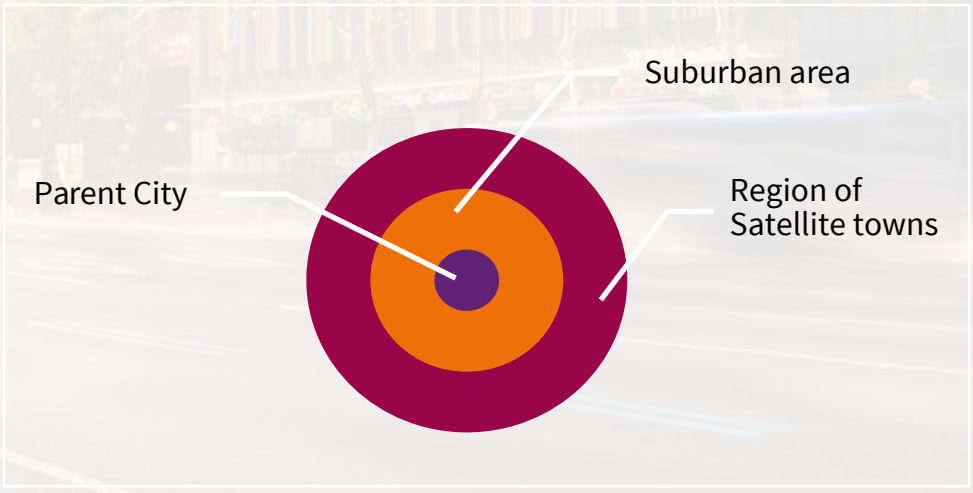


Table: Property prices in satellite cities / towns vis-à-vis the adjacent Megapolis – offers better livelihood for the vulnerable class of population

Property price comparison: as of 1Q-2017			
Megapolis	Avg. CV INR per sq. ft.	Satellite City	Avg. CV INR per sq. ft.
Greater Mumbai	18330	Navi Mumbai	7150
New Delhi	19000	Noida	4320
Pune	6270	Magarpatta*	7250
Kolkata	6250	Rajarhat#	3950

Note: * Pune's South-East micro-market data; # Kolkata's East micro-market data
Source: JLL-REIS

Satellite towns are proven to have offered better solution to the urban development problems arising in tier-I cities. **Satellite towns can enhance the livability quotient of a megapolis by providing citizens options with regards to more affordable housing, better infrastructure and public amenities, more open & green spaces, less pollution, better amenities in schools & hospitals, and also accommodate future real estate developments (residential and commercial) without constraining existing developmental framework.**

Satellite towns are nothing but initiatives taken to counter the magnetic force of a metropolitan city. The need for it arises from delivering counter magnets to stop migration to mega cities thereby contributing towards population explosion. Satellite cities could enable authorities to plan for the population it expects and provide a higher quality of life to the people. **Since the outcome from developing a satellite township is critical from a sustainability living perspective, proper planning of such boomtowns is important and a seamless integration with parent city must be established.**

Successful & emerging satellite cities or towns: a microscopic view

Over the last two decades, growing urbanization story in India has led to creation of many satellite cities in and around well-established mega cities. Some of these have managed to deliver the desired results and have added immensely to the overall livability quotient for its residents. In this paper, we identify 10 such satellite cities / townships that exhibited a prototypical format in offering relief to the growing densification problems of the adjacent major or tier-I city. By adopting certain key principles of effective township management, these cities offer its citizens good quality life, opportunities for employment within reasonable travel distance, and sense of pride. While each of these 10 cities may have specific attributes that portrays it better than others, there are also some common physiognomies that emerge which could be put into practice by all city administrators in future, if they were to improve the livability quotient for their inhabitants.

The list of 10 satellite townships that we will study in detail for their livability quotient

Sr. no.	Satellite City / Town	Adjacent megapolis
1.	Navi Mumbai	Greater Mumbai
2.	Pimpri-Chinchwad	Pune
3.	Magarpatta City	Pune
4.	Palava City	Thane / Greater Mumbai
5.	Greater Noida	Delhi / Noida
6.	Manesar	Gurgaon
7.	Mohali	Chandigarh
8.	Rajarhat	Kolkata
9.	Technopark	Trivandrum
10.	Mahindra World City (Mahindra World City)	Chennai

A list of 10 broad parameters were identified to scrutinize the performance of these satellite towns from an urban planning and development management perspective, and each of the broad parameters were further broken-down to 39 sub-parameters.

Broad Parameters- for Livability scoring	Weightage	Sub-parameters
Planning	10	4
Connectivity	10	5
Utilities & Daily Needs	10	5
Leisure & Recreation	10	2
Smart Governance	10	5
Safety & Security	10	3
Access to Jobs	10	2
Environment & Sustainability	10	5
Real Estate Performance	10	3
Future Expansion / Outlook	10	5
Total	100	39

The era of Smart Cities

City administrators will need to demonstrate 'Skill' as well as 'Scale' to enhance the livability quotient

For the first time, an attempt has been made to compare performances of cities managed traditionally by a local municipal authority with those cities that are being managed by private developers. At a time when Indian government is trying to alter the way its cities would function going forward under the guise of Smart Cities initiative, we thought it would be pertinent to include privately-managed townships that are large enough in size to qualify as independent jurisdiction. As more and more satellite townships and large integrated mixed-use developments are now being built through public-private partnerships or by individual developers, **the role of a township developer can now be equated with that of a city administration or corporation**. Put together, these 10 cities have illustrated to a great extent that any development would require a holistic approach towards urban planning and it has to incorporate sustainable practices in order to continuously stay relevant and livable.

A detailed scorecard for each of the ten identified cities is given in the chapter that follows, although a snapshot of ranking across all the ten broad parameters discussed is presented below to make an important point on Skill versus Scale argument with respect to city administration –

Ranking - Overall as well as individual parameters										
Overall	**Planning**	**Connectivity**	**Utilities**	**Leisure**	**Smart Governance**	**Safety & Security**	**Access to Jobs**	**Environment / Sustainability**	**Real Estate performance**	**Future expansion**
Palava City	Palava City	Mohali	Palava City	Palava City	Palava City	Magar-patta	Navi Mumbai	Mahindra World City	Palava City	Greater Noida
Navi Mumbai	Navi Mumbai	Navi Mumbai	Navi Mumbai	Mahindra World City	Pimpri	Palava City	Mahindra World City	Magar-patta	Navi Mumbai	Mohali
Mohali	Mahindra World City	Rajarhat	Mahindra World City	Greater Noida	Mahindra World City	Mohali	Pimpri	Palava City	Rajarhat	Manesar
Mahindra World City	Pimpri	Pimpri	Magar-patta	Navi Mumbai	Magar-patta	Mahindra World City	Rajarhat	Techno- park	Pimpri	Palava City
Pimpri-Chinchwad	Rajarhat	Techno- park	Techno-park	Pimpri	Techno- park	Navi Mumbai	Palava City	Rajarhat	Mohali	Navi Mumbai
Rajarhat	Greater Noida	Mahindra World City	Mohali	Rajarhat	Mohali	Techno-park	Mohali	Mohali	Mahindra World City	Pimpri
Technopark	Magar-patta	Magar-patta	Pimpri	Mohali	Navi Mumbai	Greater Noida	Magar-patta	Navi Mumbai	Manesar	Rajarhat
Magarpatta	Mohali	Greater Noida	Rajarhat	Magar-patta	Rajarhat	Manesar	Techno-park	Pimpri	Greater Noida	Techno- park
Greater Noida	Techno-park	Palava City	Manesar	Techno-park	Manesar	Rajarhat	Manesar	Manesar	Techno- park	Mahindra World City
Manesar	Manesar	Manesar	Greater Noida	Manesar	Greater Noida	Pimpri	Greater Noida	Greater Noida	Magar-patta	Magar-patta
Focus on -	Skill	Scale	Skill	Skill	Skill	Skill	Scale	Skill	Scale	Scale

Each of the 10 broad parameters highlighted in the table above, we believe, corresponds to the need for skill (intelligent planning, delivering right set of utilities based on evolving needs, providing for the right leisure options, designing an intelligent security system, and implementing sustainability elements) or scale (growing cities need better connectivity, more jobs, larger real estate developments and clear expansion strategies) on the part of the city administrator. **One of the observations from the above table is the ability of conventionally-managed cities to deliver on parameters that correspond to scale, as against those parameters that correspond to skill where private developers appear to be doing better.**

We strongly believe that while the two types of city authorities have a differentiated sort of approach to managing a city, a combination of both Skill as well as Scale is required in order to create futuristic, sustainable and livable cities. This calls for a cross-learning exercise on the part of both, large private township developers as well as the city municipal councils.

What local governments can learn from private township developers?

- Technology is one of the key differentiators between conventional city authorities and township developers.
- The difference is clearly visible in the Utilities, Smart Governance and Safety factors, where adoption of better technology devises helps rationalise consumption of natural resources.
- Townships score higher because developers have equipped residents with better monitoring & surveillance devises, enabling them to take quick action against observed inefficiencies.
- Adoption of sustainability measures is yet another differentiator and residents would increasingly demand for it – rainwater harvest, solar energy, bio-gas plant, water treatment plant etc.

What private township developers can learn from local government authorities?

- Most cities score higher than townships on factors such as connectivity, access to jobs and future expansion scope.
- Township developers must realize that integrated townships with mixed-use development is increasingly going to be preferable to residents, and scale of development would matter a lot.
- Concepts like 'walk-to-work', 'last mile connectivity', 'inclusiveness' etc. are going to be decisive factors in choosing the right integrated township development.

Compilation of Scores: Livability quotient in Satellite Cities / Towns

No.	City parameters	Action areas	Palava City	Navi Mumbai	Mohali	Mahindra World City	Pimpri	Rajarhat	Magar-patta	Techno-park	Greater Noida	Manesar	Description / Methodology
			Score card (1=Lowest; 10=highest)						Score card (1=Lowest; 10=highest)				
1	Planning	Open & Green spaces	10	9	5	5	7	9	7	3	6	4	% of total land area
		Climate responsive buildings	9	7	5	10	8	7	9	9	8	6	Initiatives for clean construction technologies
		Provision for EWS housing	7	10	8	6	6	5	0	4	8	4	Efforts taken to accommodate the vulnerable
		City cables/wires safety & aesthetics	10	6	6	9	8	7	10	7	5	5	Overhead / Underground - aesthetics of the city
		Average score	9	8	6	8	7	7	7	6	7	5	
2	Connectivity	Distance / travel time from nearest major business & shopping destinations	7	8	9	9	9	8	9	10	9	9	
		Public bus connectivity	10	9	9	9	10	9	9	9	7	7	Major bus depots and intercity bus stations in close proximity
		Train connectivity	7	10	8	9	7	6	6	5	5	5	Local and long-distance train stations in close proximity
		Metro connectivity	4	9	8	4	7	9	4	7	10	6	Whether access to new-age metro transportation
		Airport connectivity	6	7	10	6	7	9	8	9	5	6	Distance & time taken to reach nearest airport
		Average score	7	9	9	7	8	8	7	8	7	7	
3	Utilities & daily needs	No. of schools in close vicinity	9	10	9	10	8	10	9	8	8	8	No. of schools in close vicinity / density of school etc.
		Power Supply situation	9	9	8	10	9	9	9	9	4	8	Demand-Supply scenario / Instances of frequent power outages
		Water Supply situation	10	9	9	10	9	8	9	10	5	7	24X7 water supply / Drinking water /
		No. of hospitals in close vicinity	9	10	7	8	6	7	8	7	9	8	No. of hospitals in close vicinity / density of hospitals etc.
		Telecom signal strength	10	7	9	6	9	7	9	10	8	6	Telecom signal strength reading derived from online data aggregator (opensignal.com) website
		Average score	9	9	8	9	8	8	9	9	7	7	
4	Leisure & recreation	Sports & other amenities	10	8	7	9	9	8	8	8	9	7	Availability of avenues for recreation beyond shopping
		Shopping & entertainment options (or retail areas)	9	10	10	10	9	10	8	7	10	7	Avenues for shopping / retail / retail area per person
		Average score	10	9	9	10	9	9	8	8	10	10	
5	Smart governance	Promoting participative citizenship / Redressal mechanism	10	6	7	7	9	5	8	6	3	5	Platforms created by civic authorities for interacting with citizens and managing expectations
		Organised events or festivals	10	8	8	8	6	7	6	9	5	5	
		Efficient city management practices followed	9	8	8	9	10	6	10	8	6	8	Any recognition received by civic authorities / any case study to appraise city management
		Centralised concierge, single-window help desk, online support systems	10	5	7	5	9	5	5	7	5	5	
		Solid waste management (SWM) system	9	9	7	10	6	8	10	9	4	8	Provisions made by the civic authorities for effective SWM
		Average score	10	7	7	8	8	6	8	8	5	6	
6	Safety and security	Fire stations in close proximity	10	8	8	6	6	5	9	7	10	9	Nos. of fire stations in the vicinity
		Police stations in close proximity	6	8	9	10	6	6	9	7	8	7	Nos. of police stations in the vicinity
		Monitoring systems for prevention of crime and for safety	10	7	8	8	4	7	9	9	5	4	Surveillence cameras / surveillance room and data recording history
		Average score	9	8	8	8	5	6	9	8	8	7	
7	Access to jobs	Job opportunities within city or in close proximity - Services	7	10	8	9	8	9	9	9	6	7	"Estimated employment using Grade-A office stock + SEZs Thumb rule: 100 sqft / employee"
		Job opportunities within city or in close proximity - Manufacturing	9	9	8	10	10	8	5	5	8	7	Identifying major industrial clusters and employment strength
		Average score	8	10	8	10	9	9	7	7	7	7	
8	Environment / Sustainability	Installed capacity for water treatment and recycling practices	9	8	7	9	7	9	10	8	3	7	Water treatment capacity and efforts towards conservation
		Solar power generation	8	7	6	9	7	7	10	7	5	4	Efforts towards renewable / solar energy usage
		Rain water harvesting and ground water recharging	9	6	9	10	7	8	10	6	5	6	Efforts towards rain water harvesting
		Garbage segregation and waste-to-energy conversion	9	7	7	9	7	7	10	8	4	6	Efforts taken towards garbage segregation and reducing wastes
		Air Quality - measured using So2, No2, and RSPM levels	9	6	8	9	6	7	6	10	9	7	Central Pollution Control Board approved environmental reports for nearest localities in the last 2 years
		Average score	9	7	7	9	7	8	9	8	5	6	
9	Real Estate	Sales rate / absorption trend in last 4-5 years	10	7	8	5	7	10	4	4	4	6	Sales rate / micromarket performance in terms of sales (5-years hindsight)
		Price appreciation trends in last 4-5 years	10	9	6	7	8	8	4	5	5	5	Price appreciation witnessed in the last 5 years
		Residential inclusiveness - ticket size & configuration range	7	10	8	7	9	8	5	5	8	7	Various configurations available
		Average score	9	9	7	6	8	9	4	5	6	6	
10	Future expansion / Outlook	Density of population in the coming 5-years	7	5	10	3	7	7	0	8	9	9	Depending on in-migration, future housing development, job creation etc.
		Future development plans - residential	8	8	8	3	6	7	0	5	10	8	Under-construction property (to be ready in 5 years)
		Future development plans - commercial	8	9	8	3	7	7	3	4	10	10	Under-construction property (to be ready in 5 years)
		Future development plans - infrastructure	8	10	9	6	7	7	4	7	8	8	Likely infrastructure upgrade in next five years
		Available land for development	10	8	8	5	9	7	0	6	8	8	Whether capable of absorbing future development needs
		Average score	8	8	9	4	7	7	1	6	9	9	
		Sumtotal of all average scores	87	82	79	78	77	76	69	71	69	66	

Dissecting performances of all cities

/ Planning

This parameter weighs a city administrator's ability to design a holistic township, keeping in mind elements such as sustainability and quality living, aesthetical appeal, as well as elements of inclusiveness.

Given the rejuvenating qualities offered by open & green spaces, city and town planners have realised its importance and are trying to accommodate sufficient space for it. Leading in this effort are cities such as Palava, Navi Mumbai and Rajarhat, having allocated a high proportion of land area for the purpose, as per their development plans. Cities such as Technopark, Manesar, Mahindra World City and Mohali will have to substantially improve their allocations for green & open spaces.

Townships such as Mahindra World City, Magarpatta, Technopark and Palava, managed by private developers, appear to have taken a lead in terms of adopting sustainable construction practices. Energy conserving techniques in order to provide heat insulation, ventilation and maximizing utility of natural lighting are gaining momentum. Usage of fly-ash instead of conventional bricks, buildings designed to enable natural flow of wind, glass walls that deflect sunlight and heat, etc. are techniques adopted by pro-active city administration. City administrators in Navi Mumbai, Greater Noida, Manesar and Pimpri have laid out the basic framework through policies that incentivize implementation of sustainable practices.

While inclusiveness comes as a policy mandate for the local municipal administration, increasingly, private developers of large townships feel the need to promote the same. It helps in breaking away from homogeneity to a great extent and also encourages larger community building. Given that governments have started to incentivize developers for constructing apartments for the underprivileged, developers could eventually take note.

The livability quotient of any city will have to take into consideration aesthetics too, as people would want to take pride in being associated with cities that they reside in. One of the areas where we believe Indian cities need maximum improvement, at least to begin with, is the overhead cables. Local municipal administrators have a lot to learn from private developers as many of them have managed to do away with the overhead cables by laying them inside ducts mostly running underground. Pimpri is the only municipal-managed city that has taken concrete initiatives to do away with overhead cables and go underground.

City parameters	Action areas	Palava City	Navi Mumbai	Mohali	Mahindra World City	Pimpri	Rajarhat	Magar-patta	Techno-park	Greater Noida	Manesar
		Score card (1=Lowest; 10=highest)									
Planning	Open & Green spaces	10	9	5	5	7	9	7	3	6	4
	Climate responsive buildings	9	7	5	10	8	7	9	9	8	6
	Provision for EWS housing	7	10	8	6	6	5	0	4	8	4
	City cables/wires safety & aesthetics	10	6	6	9	8	7	10	7	5	5
		9	8	6	8	7	7	7	6	7	5

2 Connectivity

City parameters	Action areas	Palava City	Navi Mumbai	Mohali	Mahindra World City	Pimpri	Rajarhat	Magar-patta	Techno-park	Greater Noida	Manesar
		Score card (1=Lowest; 10=highest)									
Connectivity	Distance / travel time from nearest major business & shopping destinations	7	8	9	9	9	8	9	10	9	9
	Public bus connectivity	10	9	9	9	10	9	9	9	7	7
	Train connectivity	7	10	8	9	7	6	6	5	5	5
	Metro connectivity	4	9	8	4	7	9	4	7	10	6
	Airport connectivity	6	7	10	6	7	9	8	9	5	6
		7	9	9	7	8	8	7	8	7	7

Daily commuting for work or leisure (shopping) is an important factor in determining location for stay, and city administrators have to ensure a positive commuting experience. Providing last mile connectivity to ensure maximum usage of public transport and discourage private vehicle movement is important. Similarly, improving connectivity through modes such as trains or new-age metro rail is an advantage as not only are they unaffected by traffic snarls but they are also time efficient, convenient and non-polluting.

Cities such as Navi Mumbai, Mohali, Rajarhat and Magarpatta scored high on factors that measured distance and time taken to travel, given their close proximity to work districts as well as convenience offered to residents in terms of the available public transportation. Among these, many cities have business districts located within the city that employs a large share of the working population. Cities such as Technopark, Greater Noida, Palava, Manesar and Pimpri score a tad lower due to longer distances, although time taken is still within acceptable travel time limits across Indian cities – approximately one hour one-way.

Pimpri and Palava have a very good network of public/shared buses connecting residential nodes to all important business and shopping districts. Palava is a case in point that can be highlighted because of the manner in which the developer privately manage a quality bus transportation for residents travelling to key business destinations across Mumbai and Navi Mumbai, and also to nearby transportation hubs. Manesar, Magarpatta and Greater Noida could do a little more to improve the public transportation (bus and train) is concerned. As far as train connectivity is concerned, Navi Mumbai and Mahindra World City score higher as a large number of people rely on trains for daily commute.

As far as metro-rail is concerned, no city in our comparable universe offer its residents direct access to metro. Greater Noida and Navi Mumbai residents will soon get access (expected by 2018) though, that will help bring down road congestion to a great extent. Airport is another major mode of travel that people feel the need to access more frequently these days. Besides, airports are important infrastructure asset as far as business commute is concerned. Mohali, Technopark and Rajarhat have scored high on the airport accessibility front as residents can reach the nearest airport in 25-35 minutes.

3 Utilities & Daily Needs

Through this parameter, we intend to scrutinize the ability of city administration to provide interrupted provisions of basic necessities such as schools, hospitals, clean water, 24x7 power, telecom services, and also healthy air quality. As people in cities have aspirations to become more productive given the time constraints, interruption in the delivery of daily utilities could increasingly act as a deterrent in deciding on a location for stay.

In determining the availability of schools and hospitals, we found it wise to look at the density rather than count. Navi Mumbai, Mahindra World City and Rajarhat had enough schools to conveniently accommodate children living in the city. Having said that, other cities are not falling far behind in terms of availability of schools. Similarly, with regards to hospitals, Navi Mumbai, Palava and Greater Noida lead with a healthy penetration. We found some scope for improvement in cities such as Pimpri, Mohali, Technopark and Rajarhat in terms of hospital penetration.

We looked at the water supply and power supply situation to gauge at the uptime recorded on each administration's websites. In most cities, these are issues which cease to exist as of today, an exception being Greater Noida where many instances of power failures were cited in the media.

As far as telecom network is concerned, we have used the signal response data^ (source: www.opensignal.com) to measure the extent of coverage offered by leading telecom players in the city. The best performing cities in terms of telecom service coverage were Palava (operational Phase-1) and Technopark, which showed 99% and 97% coverage, respectively, followed by Magarpatta, Mohali and Pimpri-Chinchwad, all falling in the range of 81-88% coverage.

City parameters	Action areas	Palava City	Navi Mumbai	Mohali	Mahindra World City	Pimpri	Rajarhat	Magar-patta	Techno-park	Greater Noida	Manesar
		Score card (1=Lowest; 10=highest)									
Utilities & daily needs	No. of schools in close vicinity	9	10	9	10	8	10	9	8	8	8
	Power Supply situation	9	9	8	10	9	9	9	9	4	8
	Water Supply situation	10	9	9	10	9	8	9	10	5	7
	No. of hospitals in close vicinity	9	10	7	8	6	7	8	7	9	8
	Telecom signal strength	10	7	9	6	9	7	9	10	8	6
		9	9	8	9	8	8	9	9	7	7

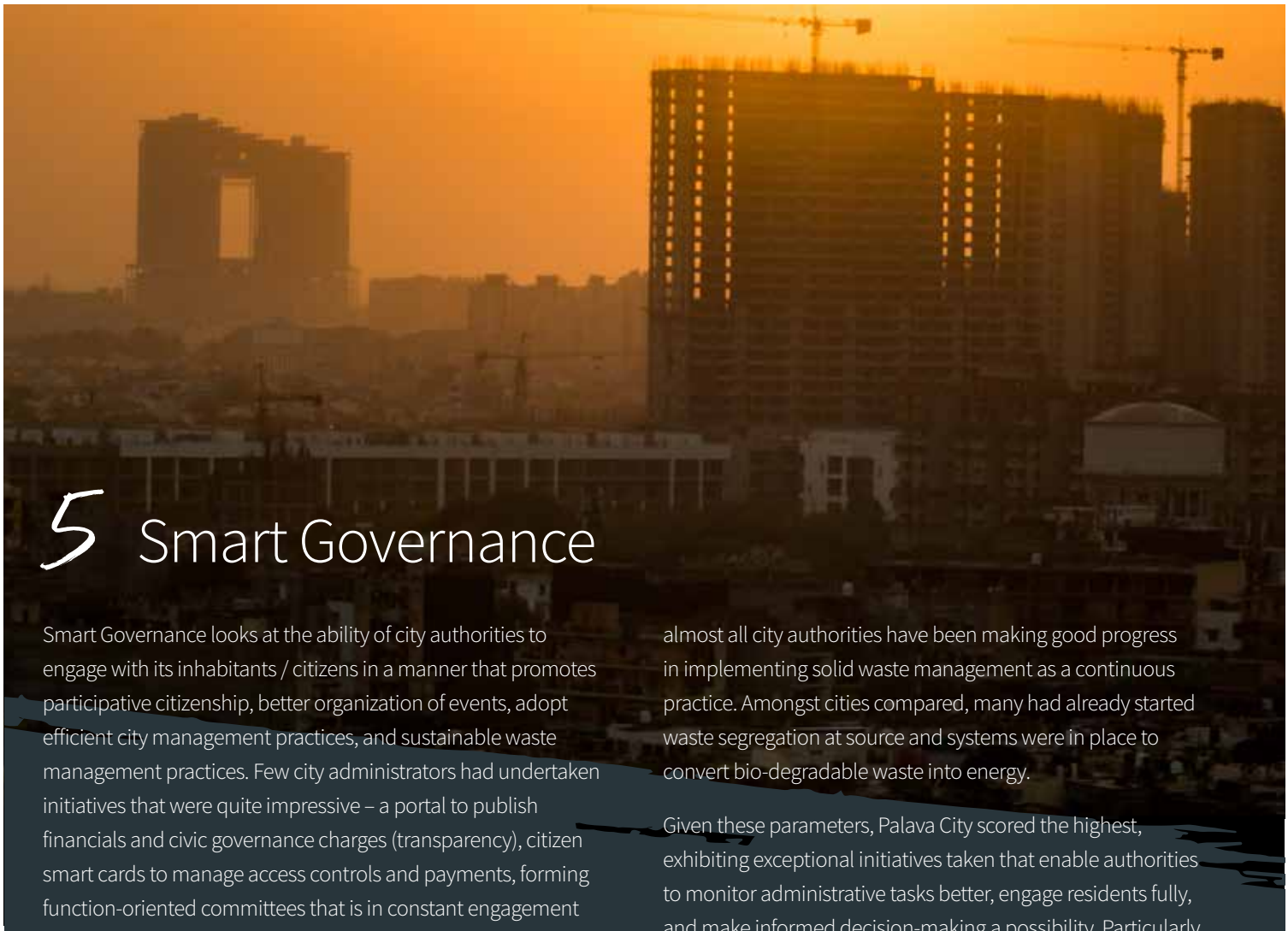
4 Leisure & Recreation

City parameters	Action areas	Palava City	Navi Mumbai	Mohali	Mahindra World City	Pimpri	Rajarhat	Magar-patta	Techno-park	Greater Noida	Manesar
		Score card (1=Lowest; 10=highest)									
Leisure & recreation	Sports & other amenities	10	8	7	9	9	8	8	8	9	7
	Shopping & entertainment options (or retail areas)	9	10	10	10	9	10	8	7	10	7
		10	9	9	10	9	9	8	8	10	10

A balanced lifestyle contributes highly to the livability quotient of a city or township. Amenities for leisure and recreation such as sports facilities, gymnasium, club houses, malls and shopping streets are considered lifestyle amenity and are much-appreciated by users. Here, townships managed by private-developers have an advantage over cities managed by local governments. The high level of interaction that happens between a township developer and customers naturally enables a focused delivery of services. Therefore, it is important for the local government bodies to engage with citizens more often through multiple platforms in order to better recreational quotient for their cities.

Private developers have done well in terms of providing diverse sports amenities such as gymnasium, swimming pool, tennis & badminton courts, cricket-football grounds etc. in order to foster a fitness conscious regime amongst inhabitants. Palava City scored the highest for not just offering these amenities but also making them accessible to all parts of the large township. Mahindra World City and Magarpatta, too, have been able to provide residents with large clubhouses that houses all popular sports activities under one roof. Cities such as Greater Noida and Pimpri have ample public open spaces dedicated for sports amenities. Besides, these two cities are adorned with many private clubhouses and other sports centers.

Shopping is increasingly becoming a lifestyle activity for citizens and in that regard, accessibility to organised retail malls is much-appreciated by citizens. Cities such as Navi Mumbai, Rajarhat, Pimpri and Palava provide access to grade-A retail malls within the city that caters to the shopping & entertainment needs of inhabitants. Malls in these cities are not only new-age in terms of design but houses a plethora of international and popular national brands. The retail area per person in these cities is healthy and it can accommodate future growth in population.



5 Smart Governance

Smart Governance looks at the ability of city authorities to engage with its inhabitants / citizens in a manner that promotes participative citizenship, better organization of events, adopt efficient city management practices, and sustainable waste management practices. Few city administrators had undertaken initiatives that were quite impressive – a portal to publish financials and civic governance charges (transparency), citizen smart cards to manage access controls and payments, forming function-oriented committees that is in constant engagement with other citizens to organize various events or festivals, common platform as a redressal mechanism etc. Some cities have been toying with the idea of organizing annual or periodic celebrations, either during religious festivals or otherwise, as an effort towards community building. Under the guidance of central government initiative on Swaccha Bharat Abhiyaan, almost all city authorities have been making good progress in implementing solid waste management as a continuous practice. Amongst cities compared, many had already started waste segregation at source and systems were in place to convert bio-degradable waste into energy.

Given these parameters, Palava City scored the highest, exhibiting exceptional initiatives taken that enable authorities to monitor administrative tasks better, engage residents fully, and make informed decision-making a possibility. Particularly impressive is the technology interventions made in order to automate a large part of the initiatives taken. For instance, a resident can raise a ticket through mobile app for resolving his individual apartment problem and the response time of vendors or service providers can be tracked through the app.

City parameters	Action areas	Palava City	Navi Mumbai	Mohali	Mahindra World City	Pimpri	Rajarhat	Magar-patta	Techno-park	Greater Noida	Manesar
		Score card (1=Lowest; 10=highest)									
Smart governance	Promoting participative citizenship / Redressal mechanism	10	6	7	7	9	5	8	6	3	5
	Organised events or festivals	10	8	8	8	6	7	6	9	5	5
	Efficient city management practices followed	9	8	8	9	10	6	10	8	6	8
	Centralised concierge, single-window help desk, online support systems	10	5	7	5	9	5	5	7	5	5
	Solid waste management (SWM) system	9	9	7	10	6	8	10	9	4	8
		10	7	7	8	8	6	8	8	5	6

6 Safety & Security:

Accessibility of help when in distress or under threat and a robust monitoring system in order to dissuade or prevent crime were the key parameters considered when evaluating cities for safety & security. Proximity to fire stations and police stations, and the density given the city population were taken into consideration. There were no specific pattern found in terms of the government-provided safety measures. However, when it comes to installation of preventive measures such as CCTV cameras and monitoring devices, developer-managed townships were at the forefront in most cases.

We particularly like MWC and Magarpatta for having close proximity of police and fire stations, and we liked the state-of-the-art preventive measures installed inside Palava with professional help from IBM. Cities such as Greater Noida, Mohali, Navi Mumbai and Pimpri, on the other hand, has shown good penetration of police stations and fire stations. However, usage of technology for monitoring and crime prevention is weak .

There may not be a strong correlation between numbers of police stations in cities to reduced crime rates, the case in point being Greater Noida where crime rates have been on the rise despite having the highest penetration of police stations. Our research also revealed that many police stations in the city face problems of being understaffed. However, we did not find such instances near townships where monitoring systems were good. Therefore, emphasis could be higher on installation of better monitoring and prevention systems.

City parameters	Action areas	Palava City	Navi Mumbai	Mohali	Mahindra World City	Pimpri	Rajarhat	Magar-patta	Techno-park	Greater Noida	Manesar
		Score card (1=Lowest; 10=highest)									
Safety and security	Fire stations in close proximity	10	8	8	6	6	5	9	7	10	9
	Police stations in close proximity	6	8	9	10	6	6	9	7	8	7
	Monitoring systems for prevention of crime and for safety	10	7	8	8	4	7	9	9	5	4
		9	8	8	8	5	6	9	8	8	7

7 Access to jobs

It is strongly believed that sustainability in growth of the residential real estate market strongly depends on the ability of a city to start creating enough jobs independently. This would be the most natural growth path any satellite city would aim to achieve. Under this parameter, we considered factors such as available jobs in the services sector and also in the manufacturing sector in order to ensure there is livelihood available for people with diverse educational background or skills.

Discretion had to made in merely using the jobs generated within a city as a parameter, given that we were dealing with satellite cities as opposed to Tier I cities. Since we also had a mix of townships where some were generating jobs higher than the resident population, dealing with such diversity was a challenge. We definitely gave a high score to cities that created more jobs than resident population, and examples include cities such as Magarpatta, Mahindra World City and Technopark. With the phase-II getting operational soon, Palava City may also soon join the ranks, although residents of the presently operational phase-I currently have reasonably good access to business districts in Navi Mumbai, Thane and Suburban Mumbai (BKC). Cities such as Manesar, Rajarhat and Navi Mumbai offer its citizens plenty of job options within the city, and only a minor proportion may have to travel outside for work. With Pimpri and Mohali, the official job statistics may appear low in comparison to the population numbers, although a thriving manufacturing sector in Pimpri or adjacent Chandigarh (in case of Mohali) offer a great deal of option in IT and manufacturing which goes unaccounted from the stats. In keeping with the anecdotal evidences through local knowledge, the scoring was adjusted to its perceived appropriateness.

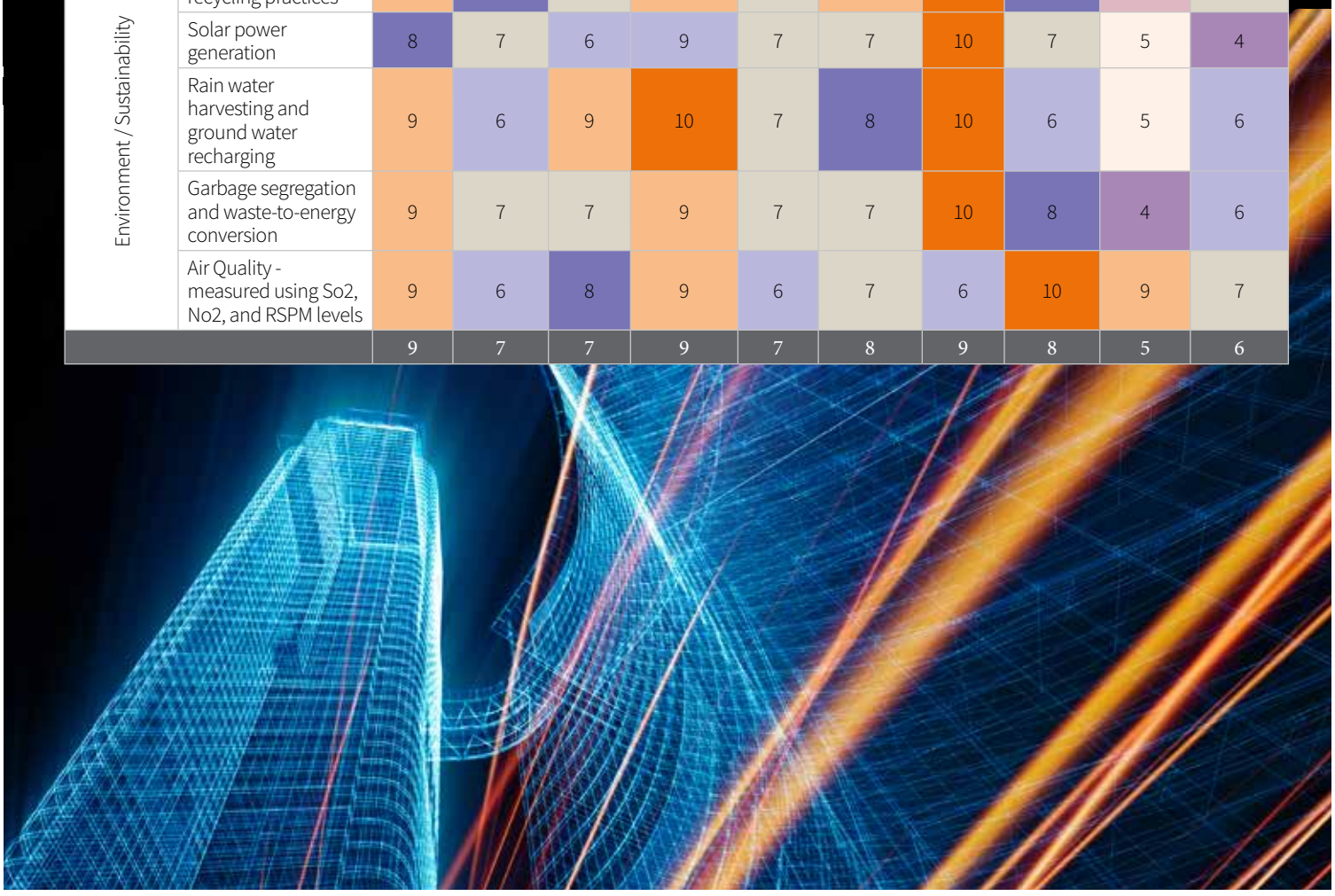
City parameters	Action areas	Palava City	Navi Mumbai	Mohali	Mahindra World City	Pimpri	Rajarhat	Magar-patta	Techno-park	Greater Noida	Manesar
		Score card (1=Lowest; 10=highest)									
Access to jobs	Job opportunities within city or in close proximity - Services	7	10	8	9	8	9	9	9	6	7
	Job opportunities within city or in close proximity - Manufacturing	9	9	8	10	10	8	5	5	8	7
		8	10	8	10	9	9	7	7	7	7

8 Environment & Sustainability

Under environment & sustainability parameter, besides a few indicators such as installed capacity for water treatment, solar power generation capacity and air quality measurement, quantifying the performance of each city was difficult. An alternative was to look at the initiatives taken by the city authorities in order to encourage environment sustainability and the measures that have been implemented already. We were quite encouraged by the initiatives taken by few private developers in cities such as Magarpatta, Mahindra World City and Palava with regards to installations of water treatment plant that treats 100% of waste water, garbage segregation at source, rain water harvesting, and solar panel installations. These three cities were proactive in taking necessary steps in that direction. Having said that, initiatives taken by cities such as Navi Mumbai, Pimpri, Rajarhat and Technopark are worth appreciating for the good initiatives taken towards few environmental aspect and also receiving acknowledgement for it by government or agencies of repute.

As a measure for air quality, we looked at the most recent publicly-available environment reports (approved by the Central Pollution Control Board) to look for So2, No2, and RSPM levels in the air. Technopark readings were lowest in this regard and, therefore, it scored the maximum as far as clean air is concerned. It was followed by Greater Noida, Palava City, and Mahindra World City. Possibly owing to presence of industrial base in close vicinity, Navi Mumbai, Pimpri and Magarpatta scored relatively lower despite having reasonably good amount of green spaces.

City parameters	Action areas	Palava City	Navi Mumbai	Mohali	Mahindra World City	Pimpri	Rajarhat	Magar-patta	Techno-park	Greater Noida	Manesar
		Score card (1=Lowest; 10=highest)									
Environment / Sustainability	Installed capacity for water treatment and recycling practices	9	8	7	9	7	9	10	8	3	7
	Solar power generation	8	7	6	9	7	7	10	7	5	4
	Rain water harvesting and ground water recharging	9	6	9	10	7	8	10	6	5	6
	Garbage segregation and waste-to-energy conversion	9	7	7	9	7	7	10	8	4	6
	Air Quality - measured using So2, No2, and RSPM levels	9	6	8	9	6	7	6	10	9	7
		9	7	7	9	7	8	9	8	5	6



9 Real Estate Performance

Price appreciation and sales rate over the last 3-5 years gave us a good indication of how each of the cities have been performing in terms of real estate growth. The period is typically marked by phases of slow growth in real estate and a late recovery of the same in few good markets. From the governance perspective, however, we added a parameter on inclusiveness by looking at the ticket size or configuration of apartments available for sale.

During the last 3-5 years, while many cities witnessed stagnancy or fall in real estate sales rate, Palava City and Rajarhat defied this trend to some extend and witnessed a marginal rise in sales rate. This enabled the two cities to score higher assuming demand remained strong given the competitive price offered in a promising market. The price growth during the same period also reflected this trend to some extent as both Palava and Rajarhat witnessed a healthy 15% and 6-8% rise, respectively. However, price growth was also witnessed in Navi Mumbai and Pimpri during the period to the tune of 8-10%, which is good.

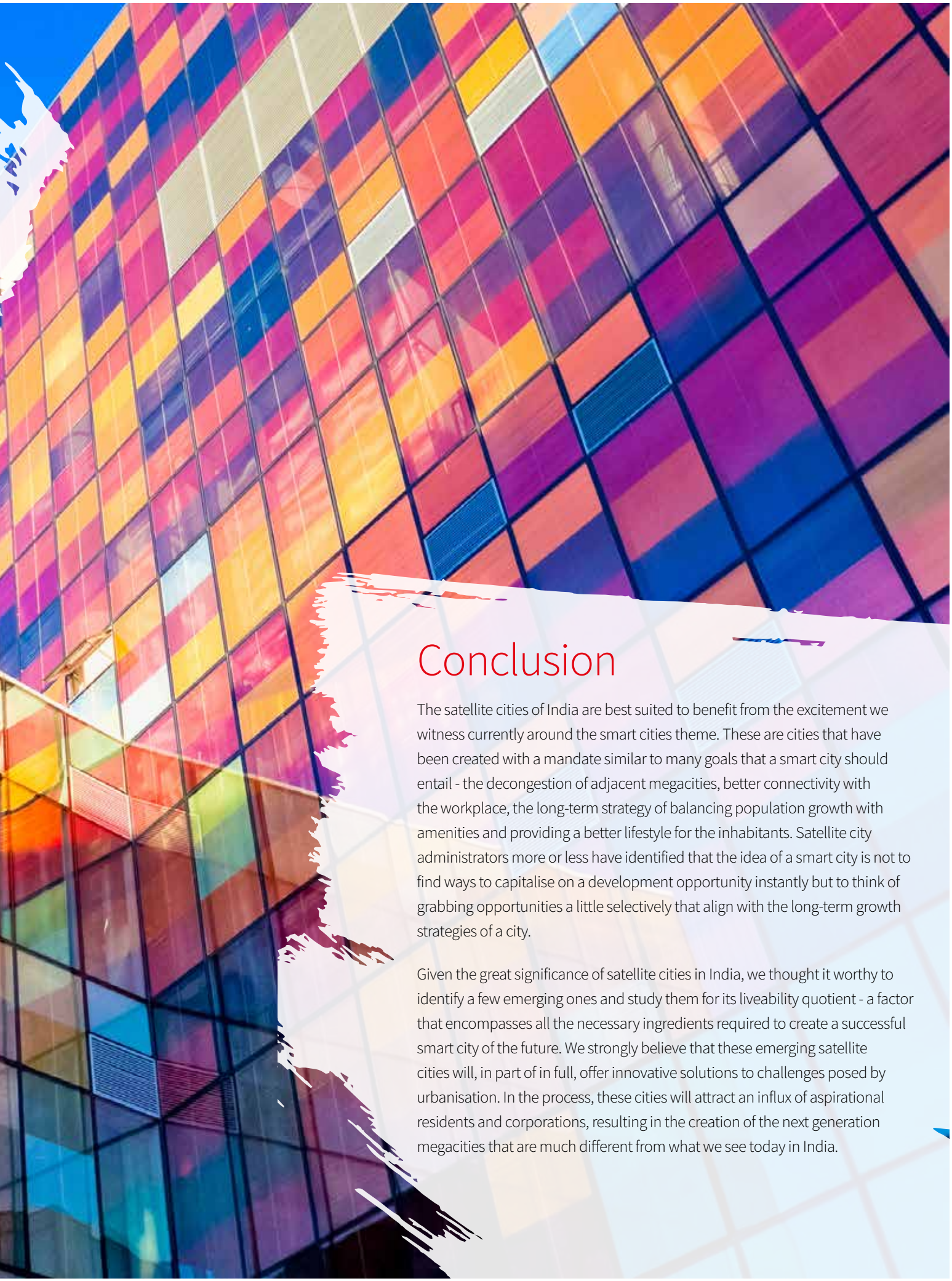
The inclusiveness parameter, considering the ticket-size or configuration, was clearly in favour of the municipal cities, largely owing to mandates for providing housing for all. On the contrary, only few townships scored a decent score as they had a clear purpose of building homes for the middle-to-high income categories of households. An exception to the trend was made in Palava and Mahindra World City, where a sizeable portion of the overall supply falls in the affordable housing category. Private developers, who will now be increasingly looking at participating in development of smart cities, should learn from local governments about accommodating diverse categories of households for building in order to build large-scale sustainable cities.

City parameters	Action areas	Palava City	Navi Mumbai	Mohali	Mahindra World City	Pimpri	Rajarhat	Magar-patta	Techno-park	Greater Noida	Manesar
		Score card (1=Lowest; 10=highest)									
Real Estate performance	Sales rate / absorption trend in last 4-5 years	10	7	8	5	7	10	4	4	4	6
	Price appreciation trends in last 4-5 years	10	9	6	7	8	8	4	5	5	5
	Residential inclusiveness - ticket size & configuration range	7	10	8	7	9	8	5	5	8	7
		9	9	7	6	8	9	4	5	6	6

10 Future Expansion / Outlook

The purpose of adding an outlook parameter was clear - while cities may offer healthy livability quotient, it also needs to grow in order to accommodate developments in future, thereby offering existing residents a feeling of living in a fast growing city. Cities such as Palava, Navi Mumbai, Greater Noida, Manesar and Mohali have plans to accommodate more commercial, residential and infrastructure developments given a moderately rising population expected and availability of enough land parcels. On the other hand, with limited land parcels available or owing to near saturation, many privately-developed townships are constrained in terms of accommodating future developments. A case-in-point is Magarpatta, where no
land parcels are currently available to accommodate future developments.

City parameters	Action areas	Palava City	Navi Mumbai	Mohali	Mahindra World City	Pimpri	Rajarhat	Magar-patta	Techno-park	Greater Noida	Manesar
		Score card (1=Lowest; 10=highest)									
Future expansion / Outlook	Density of population in the coming 5-years	7	5	10	3	7	7	0	8	9	9
	Future development plans - residential	8	8	8	3	6	7	0	5	10	8
	Future development plans - commercial	8	9	8	3	7	7	3	4	10	10
	Future development plans - infrastructure	8	10	9	6	7	7	4	7	8	8
	Available land for development	10	8	8	5	9	7	0	6	8	8
		8	8	9	4	7	7	1	6	9	9



Conclusion

The satellite cities of India are best suited to benefit from the excitement we witness currently around the smart cities theme. These are cities that have been created with a mandate similar to many goals that a smart city should entail - the decongestion of adjacent megacities, better connectivity with the workplace, the long-term strategy of balancing population growth with amenities and providing a better lifestyle for the inhabitants. Satellite city administrators more or less have identified that the idea of a smart city is not to find ways to capitalise on a development opportunity instantly but to think of grabbing opportunities a little selectively that align with the long-term growth strategies of a city.

Given the great significance of satellite cities in India, we thought it worthy to identify a few emerging ones and study them for its liveability quotient - a factor that encompasses all the necessary ingredients required to create a successful smart city of the future. We strongly believe that these emerging satellite cities will, in part of in full, offer innovative solutions to challenges posed by urbanisation. In the process, these cities will attract an influx of aspirational residents and corporations, resulting in the creation of the next generation megacities that are much different from what we see today in India.

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