International Journal of Academic Research and Development
ISSN: 2455-4197
www.newresearchjournal.com/academic
Volume 1; Issue 2; February 2016; Page No. 56-59

Smart cities – A way towards urbanizing India

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Abstract
India is currently embarking in a path of high growth trajectory. High growth results in higher utilization of resources, better infrastructural facilities, and greater employment opportunities. It also results in more urbanization and creation of opportunities in the cities. As such, the existing cities face a continuous challenge of upgrading themselves to accommodate the opportunities, so created. Unless, new cities are developed to accommodate the burgeoning number of people, the existing cities would soon become unliveable. Smart City is a very interesting concept in this context. It has been proposed by Government of India to develop 100 Smart Cities, as satellite towns of larger cities and up gradation of mid-sized cities. Considering the Sustainable Development Goals (SDGs) to be achieved in next fifteen years, development of Smart Cities will play a substantial role in fulfilling the targets.
This paper has attempted to identify certain indicators or parameters required for the overall development of the city. The study deals with 12 State Capitals and 8 Religious/Heritage/Tourist Cities which have been identified to be considered for Smart Cities under Central Government. The objective of our study is to identify the pace at which the city is expected to grow and become smart. The basic assumption made here is the presence of forward and the backward linkages, which will initiate the development of the peripheral area of the city. The agglomeration of such factors defines a development of the city and its neighbouring areas.

Keywords: Cities, development, smart city, forward linkages, backward linkages, growth, SDGs

Introduction

Contextual

Every city has its own history, culture and identity. There is no doubt that we need to nurture, preserve and renew the urban fabric with changing times. However, there is also a need to build new cities. A city is an economy of agglomeration; it provides various advantages and opportunities. That is why we all flock to the cities in search of a better future. However, there would be limits beyond which things would become very difficult to sustain. What was once a village grows into a town, a metropolis, a mega polis and then slowly begins to decay into a 'necropolis'.

India's economy is expanding rapidly. By 2030 it is expected to have grown by five times, buoyed largely by the country's urban centers. Today urban population contributes over 60 percent of India's GDP and will contribute 70 percent of the national GDP in the next 15 years. It is for this reason that cities are referred to as the 'engines of economic growth' and ensuring that they function as efficient engines is critical to our economic development. With 2/3rds of GDP already generated in India's cities and rural to urban migration patterns accelerating, the country faces a critical challenge: managing this rapid urbanization in a way that enhances the livability of India's urban spaces. Hence India needs a faster pace of urbanization, as it creates conducive environment for creation of employment opportunities and economic activities while improving quality of life. But the relatively low base allows us to plan our urbanization strategy in the right direction by taking advantage of the latest developments in technology.

It is in this context that the Government has decided on developing 100 "Smart Cities" in the country. Accordingly, in his budget speech of July 2014, the Finance Minister has stated as follows:

"As the fruits of development reach an increasingly large number of people, the pace of migration from the rural areas to the cities is increasing. A neo middle class is emerging which has the aspiration of better living standards. Unless, new cities are developed to accommodate the burgeoning number of people, the existing cities would soon become unliveable. The Prime Minister has a vision of developing 'one hundred Smart Cities', as satellite towns of larger cities and by modernizing the existing mid-sized cities."

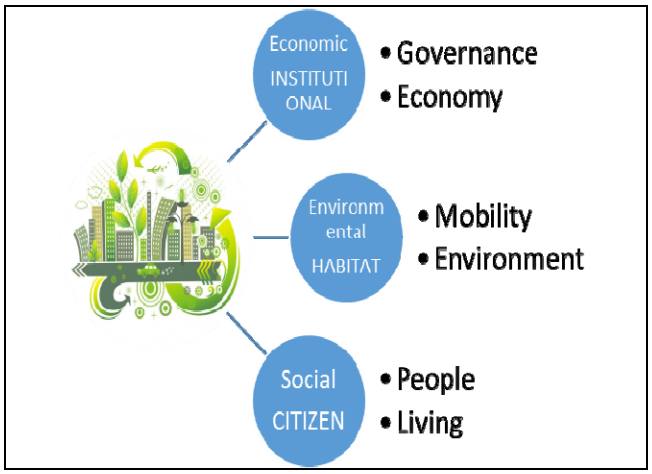
Hence we can define, in general, a smart city connects human capital, social capital and ICT infrastructure in order to address the public issues, achieve a sustainable development and increase the quality of life of its citizens.

The most important public issue today is the creation of employment and to be able to attract investments. Hence the ease of being able to create employment opportunities, attract investments, experts, professionals and people is a way towards creating the quality of life. It also includes safety and security, inclusiveness, entertainment, ease of seeking and obtaining public services, cost efficient healthcare, quality education, transparency, accountability and opportunities for participation in governance. Sustainability includes social, environmental and financial sustainability which are the pillars to build a developed economy or nation.

Mechanisms

For a city to be smart, we have tried to identify certain instruments which can also be used interchangeably as indicators or parameters required for the overall development of the city. Those are listed below.

SMART CITIES: GADGETS



Each of the above broad indicators listed above are the basic minimum requirement for a city to take off and sustain itself in a growth trajectory which would eventually lead to the concept of Smart City.

These instruments can be further classified as a combination of several parameters working in collaboration with each other. The table below gives the possible combination of parameters or indicators defined under each broad category.

Table 1: Major Instruments and Sub Instruments

Major Instruments	Sub Instruments
Governance	Participation
	Public and Social Service
	Transparency
Economy	Innovation
	Entrepreneurship
Mobility	Traffic
	Public Transport
	ICT Infrastructure
	Logistics
Environment	Network and Environmental Monitoring
	Energy Efficiency
People	Digital Education
	Creativity
Living	Tourism and Culture
	Health and Safety
	Technology and Accessibility

Good Governance definitely incorporates people. Participation of the general public in the decision making process determines the efficacy of the system of Governance. For India- the largest democracy in the World, people's participation is a necessity in the policy making process. Voter's turn out in any election can be used as a determinant to judge participation.

Transparency is another important pillar on which governance stands. A government is basically for the people, by the people and of the people and so the onus is on the governance to be transparent and answerable to its citizen. Government of India has launched schemes such as e-pragati, e-smeeksha to regularly monitor the working of different departments under its aegis. RTI is one of the tools which ensure transparency.

Easy access to Public and Social Services by the citizens is an important aspect of good governance. In India, where the essential needs are provided by the Government itself, the availability of the same at any instant speaks about the efficacy of the governance. Public and social services can be anything; it can range from availability of drinking water and sanitation to access to internet and digital connectivity. What is important is just not the provision of such amenities but the generation of awareness about the same.

Issues like Traffic, Public Transport, ICT Infrastructure, Logistics, Digital Education etc. are driven by demand supply dynamics where Government is responsible for creating conducive environment for the promotion and application of these amenities and the society or the citizens are responsible to access the same and create a basis for better more improved infrastructural possibilities.

Innovation takes a city forward. The economy should provide enough scope for innovation and skill development which eventually culminate into better jobs, higher income and a self-sustained growth path.

Cities will be smarter once the environmental hazards are properly controlled and treated. Pollution control and provision of safe air for breathing is an important benchmark on which cities can be evaluated. Pollution control accounts for better health conditions for the citizens.

Objective and Methodology

Our study deals with 12 State Capitals and 8 Religious/Heritage/Tourist Cities which have been identified to be considered for Smart Cities under Central Government. The objective of our study is to identify the pace at which the city is expected to grow and become smart. This is done by using the following hypothesis.

Hypothesis 1 = the population growth is directly proportional to Literacy rate.

Literacy rate is been chosen because it is one of the most important parameters for determination of educational inclusiveness in any economic study.

Hypothesis 2 = more strong the relation (in hypothesis 1), higher will be the pace of a city to become smart.

For testing our above stated hypothesis we will be using the simple correlation coefficient between decadal growth rate of population and decadal growth rate of literacy for each category of the chosen cities.

The 12 State Capitals are:

Table 2: Category "A" - State Capitals

State Capital	State
Agartala	Tripura
Aizawl	Mizoram
Dehradun	Uttarakhand
Dispur	Assam
Gangtok	Sikkim
Imphal	Manipur
Itanagar	Arunachal Pradesh
Jammu(summer capital)	Jammu and Kashmir
Kohima	Nagaland
Shimla	Himachal Pradesh
Shillong	Meghalaya
Srinagar(winter capital)	Jammu and Kashmir

These cities apart from being State Capitals have one more thing in common, they are the capitals of 11 "Special Category

States" where the Central Government funding have been more compared to other States, considering certain economic and geographical factors.

8 Tourist/Religious Heritage Cities for our study are as follows:

Table 3: Category "B" - Tourist / Religious Cities

Name of the City	State
Amaravati	Andhra Pradesh
Ajmer	Rajasthan
Badami	Karnataka
Dwarka	Gujarat
Gaya	Bihar
Mathura	Uttar Pradesh
Puri	Odisha
Warangal	Andhra Pradesh

All the 8 cities mentioned above have been part of an initiative named Heritage City Development and Augmentation Yojana (HRIDAY) undertaken by Ministry of Urban Development, Government of India. These initiatives shall include development of sanitation facilities, roads, public transportation & parking, citizen services, information kiosks etc. by March 2017 with a total outlay of Rs 500 crore. And hence provides a conducive environment to make a city smarter.

Analytical Support

We have divided the scope of the study i.e. the cities and state capitals in two different categories to make the results comparable and hence meeting the set objective of the study.

Category A: 12 State Capitals; and

Category B: 8 Religious Cities.

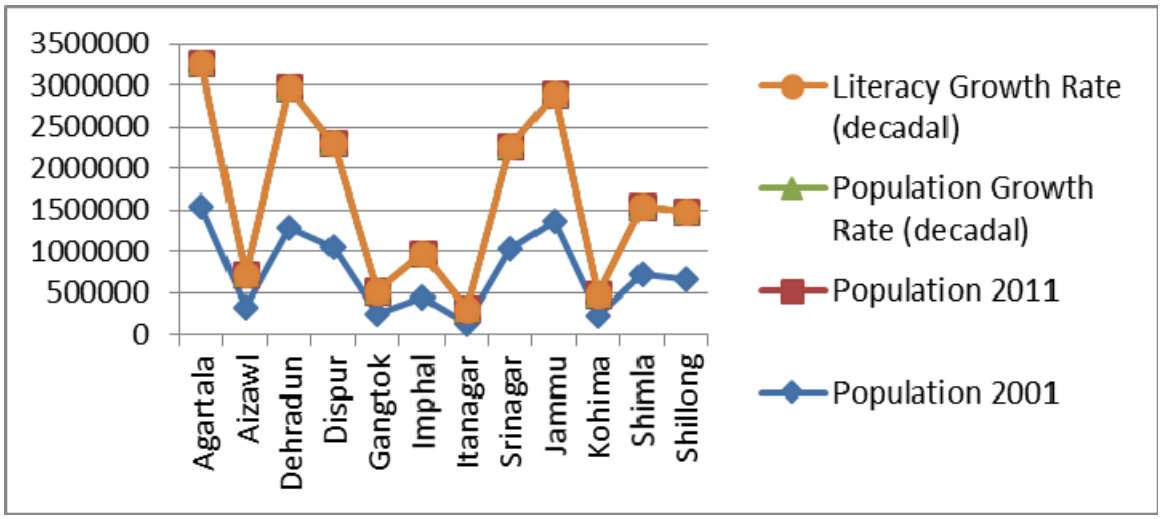
We propose a simple correlation between decadal growth rate of population and decadal growth rate of literacy for each category to evaluate the pace of becoming smarter.The data has been considered for the corresponding districts where the State Capitals or the Religious Cities lie. The basic assumption we have made here is the presence of forward and the backward linkages, which by playing their respective roles will make the peripheral area of the city develops. And that is why we call that the agglomeration of factors defines a development of the city and its neighboring areas.

Category A

Table 4: Population and Literacy Growth Rate (decadal) for Category "A"

Districts	Cities	Population Growth Rate (decadal)	Literacy Growth Rate (decadal)
West Tripura	Agartala	12.57	14.79
Aizawl	Aizawl	22.92	1.43
Dehradun	Dehradun	32.33	6.67
Kamrup Metropolitan	Dispur	18.34	6.61
East Sikkim	Gangtok	15.73	12.29
Imphal West	Imphal	16.56	7.30
Papum Pare	Itanagar	44.73	15.33
Srinagar	Srinagar	20.35	9.95
Jammu	Jammu	12.74	7.59
Kohima	Kohima	21.86	9.27
Shimla	Shimla	12.67	5.71
East Khasi Hills	Shillong	24.96	10.62

Source: Authors' own calculation from census of India 2001 and 2011



Source: From table 4

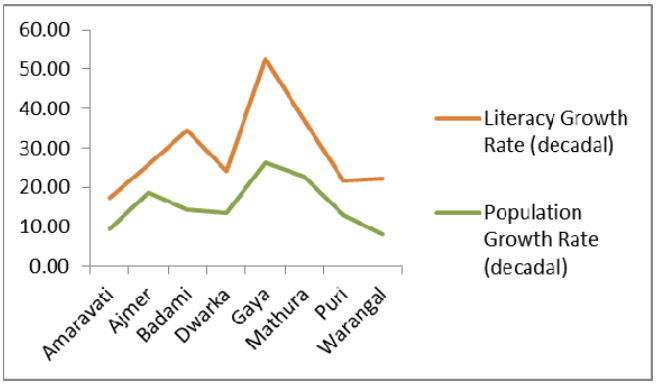
Fig 1: Graphical Representation of table 4

Category B

Table 5: Population and Literacy Growth Rate (decadal) for Category "B"

Districts	Cities	Population Growth Rate (decadal)	Literacy Growth Rate (decadal)
Guntur	Amaravati	9.47	7.77
Ajmer	Ajmer	18.57	7.19
Bagalkot	Badami	14.40	20.10
Jamnagar	Dwarka	13.44	10.79
Gaya	Gaya	26.43	26.20
Mathura	Mathura	22.78	14.48
Puri	Puri	13.05	8.61
Warangal	Warangal	8.21	13.97

Source: Authors' own calculation from census of India 2001 and 2011



Source: From table 5

Fig 2: Graphical representation of table 5

Table 6: Correlation Coefficients

	Literacy Growth Rate	Cities in
Population Growth Rate	0.25	Category A
	0.57	Category B

Source: Authors' own calculation

The correlation between decadal population growth rate and decadal literacy growth rate in Category A is 0.25, while the same for Category B is 0.57. Both the categories yield positive correlation and hereby we accept our hypothesis 1 that higher the growth in population, for a city to develop, we have to have a higher growth rate of literacy as well. And since in the selected cities, with the increasing growth rate of population, literacy rate is also increasing we can say that the environment for the development of these cities is conducive.

Our calculation states that cities in "Category B" show a much stronger correlation between its variables i.e. population growth and literacy rate. One of the major feature of this category is that it comprises of all those cities which have a tourist attraction to its account and hence the presence of many positive externalities. Influx of tourists or pilgrims provides the people in the cities with a source of income, potion of which, assumingly, they are using towards education and literacy and hence preventing the literacy rate to fall. Also the encouragement for getting education, from the people they are interacting with, while concentrating on their tourism business, is in itself is a positive externality playing in their favour. Also these cities are the part of HRIDAY initiative, which provides them with ample funds (as listed in table 7 below) and hence have even better opportunity and possibility to grow and become a smart city at a higher pace than the cities in "category A". As per the above analysis, and our hypothesis 2, we humbly submit that the Religious Cities have a tendency to become smart faster than the state capitals chosen in "category A".

Table 7: Fund allocation for HRIDAY cities

S. No.	City	Funds (Rs. Crore)
1	Ajmer	40.04
2	Amaravati	22.26
3	Badami	22.26
4	Dwaraka	22.26
5	Gaya	40.04
6	Mathura	40.04
7	Puri	22.54
8	Warangal	40.54

Source: Press Information Bureau, Govt. of India Official Website.

Conclusion

India's struggle with number of significant barriers that continue to hamper the development of urban infrastructure like complex leadership structures, land valuation challenges, capability gaps, and funding shortfalls comprising a part of urban challenge that was effectively holding India back from new round of dramatic economic growth seems to get weakens with the proposal of development of 100 smart cities. The wave of urbanization that is sweeping across India represents one of the country's greatest opportunities. With India's awakening on the need to urbanize, many problems and challenges like good infrastructure, solid waste disposal, flood management, improved water and sewage system, traffic gridlock etc. and thereby a deteriorating quality of life for many citizens will finally have an in-build solution in the form of origin of a smart city. India has already moved on the road to build smart cities and this endeavor to transform the rapidly growing urban areas into smarter cities will surely pave a way for attainment of its dream i.e. to have cities with world-class, self-sustainable habitats with minimal pollution levels, maximum recycling, optimized energy supplies and efficient public transport.

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