

An Assessment on Key Performance Indicators for Top Cities

(with special reference to top cities in Karnataka)

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ABSTRACT

Innovation, institutional changes, administrative changes, and various contributions to nationals were focused by smart thoughts. However, any well-planned infrastructure development requires adequate water supply, assured electric supply, sanitation including solid waste management, efficient urban mobility and public transport, affordable housing for poor family, robust IT connectivity, digitalization, good governance, safety and security of citizen especial women, children and elderly, health & education and so on. These have become highly vital and essential for any smart city and increase challenges to city municipal leaders to create awareness and implement changes in most of the cities. At present, the Indian population density was 319 per km² and 38.67% of the people lived in urban areas. The literacy rate was 75.36% with 82.47% of males and 68.08% of females being literate. These numbers are quickly expanding, with half of India's populace anticipated to live in its urban areas by 2030. India's financial development rate will gradually quicken to 8% by monetary year finishing March 2019, driven by the continuous execution of basic changes, higher extra cash and change in economic activity. Under smart cities mission the government plans to develop 100 cities as smart cities with advanced infrastructure and facilities. In this study, there are twenty-four key performance indicators or parameters to test each city to compete and get crowned as smart city of India. The study adopts convenience sampling design has been selected to choose cities and municipal leader from Karnataka viz., Bengaluru, Mysuru, Mangaluru, Shivamogga and Tumukuru. The structured questionnaire has been carried out for survey and data has been analysed using Mann-Whitney U test.

Keywords: Smart City, Urban Development, Infrastructure, Municipal Leaders

INTRODUCTION

A smart city, an idea that is essential to develop the nation into greater heights, where each life will be innovatively determined. Karnataka state six littler urban areas Mangaluru, Shivamogga, Belagavi, Hubballi-Dharwad, Tumakuru, and Davangere have deserted their greater partners for consideration in the rundown of brilliant urban communities. As per Urban Development Minister Vinay Kumar Sorake. The low recuperation of property duties, water cess, deficient review, delay in execution of Jawaharlal Nehru

National Urban Renewal Mission (JNNURM) activities and inability to use JNNURM reserves, wasteful waste transfer.

Bengaluru - A Reality

Bengaluru, the start-up capital of India, has now developed as the No. 2 city. It is base, techies and cosmopolitan society, more than 100 R&D focuses and the biggest number of VC's and tutors make Bengaluru most good area for sprouting Start-ups. Hoskote is an arranged township close settled assembling and auto centre points and has world class availability to International air terminal, metro station and real IT centres in Whitefield and Electronics city. World class civilities are being arranged inside the intricate like 5-star & 3-star lodging, administration flats, multi-forte healing facility, tradition and business focus; preparing focus, multiplexes and theatres, retail shops, sustenance courts and eatery, exercise centre and Olympic size swimming pool and indoor and open air sports offices.

Tumukuru in Future

With various immeasurable mechanical groups in its kitty, Tumukuru ensures something which each monetary master needs to tune in 'high rentals and capital appreciation'. The Bengaluru-Mumbai Industrial Corridor (BMIC) undertaking is required to be the advancement driver for this business area in the coming years. Other physical establishment exercises were Peripheral Ring Road and Metro Rail.

Shivamogga in Future

Shivamogga City is the head quarter of Malnad area situated on the Western Ghats. Essentially Shivamogga City is known for its way of life, training and trade. Shivamogga City Corporation, Shivamogga in Karnataka State has been chosen by the Ministry of Urban Development as one of the 100 savvy urban areas to take an interest in the Smart City Challenge Stage-2 by the Ministry of Urban Development, Government of India.

Mangaluru in Future

Mangaluru city with a motto “Smart City for People and a City with Smart People”, agriculture and fisheries have been one of the many pillars of the Mangaluruan economy, educational hub blessed with educational institutions St. Aloysius Institutions, KMC, NITK, Canara Group of Institutions. Tourism hub, Beach tourism, Religious tourism, Udupi, Dharmastala, Subramanya, Sports, yoga, martial arts must be given special consideration. Infrastructure consists wider and well maintained roads, satellite towns, waste management (recycling plants, bio-fuel plants, bio fertilizer plants), renewable energy (encourage people to

produce electricity locally and contribute excess to the grid; solar energy), water management (rain water harvesting, replenishing the water bed with excess rain water).

Mysuru in Future

The country's "cleanest city", Mysuru, is a tourism hub. It is also known for religious tourism attracting many on religious festivals, recreational and with well-maintained parks.

Karnataka Cities Index

Rank	City	District	Population (approx.)
1	Bengaluru	Bengaluru Urban	9526210
2	Hubballi-Dharwad	Dharwad	946857
3	Mysuru	Mysuru	889446
4	Kalburgi	Kalburgi	537031
5	Mangaluru	Dakshina Kannada	539487
6	Belagavi	Belagavi	520045
7	Davangere	Davangere	485128
8	Ballari	Ballari	479444
9	Tumakuru	Tumakuru	355821
10	Shivamogga	Shivamogga	392428
11	Bijapur	Bijapur	387427

DISTRICTS PARAMETER/KEY PERFORMANCE INDICATOR

PARAMETER/KEY PERFORMANCE INDICATOR					
1	CITIZEN PARTNERSHIP	9	HOUSING & INCLUSIVENESS	17	WATER MANAGEMENT
2	IDENTITY & CULTURE	10	TRANSPORT	18	WASTE WATER MANAGEMENT
3	ECONOMY & EMPLOYMENT	11	WALKABLE	19	AIR QUALITY
4	EDUCATION	12	IT CONNECTIVITY	20	ENERGY EFFICIENCY
5	HEALTHCARE FACILITIES	13	INTELLIGENT GOVERNMENT SERVICES	21	UNDERGROUND ELECTRIC WIRING
6	LAND USE	14	ENERGY SUPPLY	22	SANITATION
7	COMPACT	15	ENERGY SOURCE	23	WASTE MANAGEMENT
8	PUBLIC OPEN SPACES	16	WATER SUPPLY	24	SAFETY & SECURITY

UPCOMING CHALLENGES TO CITIES IN KARNATAKA

Civilized & Opportune	24/7 Supply of Water & Electricity, Hygiene & inexpensive public transport, Intelligent Traffic Management Zero Accidents
General	Slum Free City, Inexpensive Real Estate, Well-planned areas Hassle-free condition
Industrialization and Hi-tech	Green spaces, Encourage entrepreneur in new emerging technologies, Trading, Food Processing, Software & Hardware

Cleanliness & Quality of Life	Waste Management, Enhance Sanitation, Control Air Pollution Sewerage & Drainage Management
Edification	Increase educational Institutes, Upgradation of Schools Launch Educational/Intellectual Hub, Employment Opportunities
Healthcare	Increase Hospital (Primary Healthcare Centres), Appointments to doctors and nurses, Construction of Hospitals, Regular supply of medicines, Protection towards polio.
Mobility	Ring Road Connectivity, Public Transport
City amenities	Increase Multiplexes, 5-star and 3-star hotel, Increase Tourism Airport, Railway station, Bus stand, Intelligent signals and traffic cameras, Sports complex, Stadium, Amusement/ Botanical Parks Museum, Rehabilitation of Temples, Festive Celebration 24/7 Infrastructure

RESEARCH METHODOLOGY

Research is a structured enquiry that utilizes methodology to solve problems and create new knowledge for further purpose.

Data Collection:

Primary Data: The data has been collected from municipal leaders from Bengaluru, Mysuru, Mangaluru, Shivamogga and Tumakuru using structured questionnaire.

Secondary Data: The data has been collected from e-resources and newspapers.

OBJECTIVE OF THE STUDY

- To determine various parameter or key indicators for smart city.
- To evaluate parameters on citizen, city self and future requirements using Mann-Whitney U test.

MANN-WHITNEY U TEST: INTRODUCTION

The test is a Non-parametric alternative to two-sample t-test. Data can be ranked from highest to lowest or lowest to highest values.

Calculate Mann-Whitney U statistic

$$U = n_1 n_2 + \frac{n_1(n_1+1)}{2} - R_1$$

Sampling Techniques: A convenience sampling, a non-Probability sampling technique has been used to select the cities and municipal leader.

Sampling Frame: Municipal leaders, government of Karnataka.

Sample Size: Five municipal leaders of Bengaluru, Mangaluru, Mysuru, Tumukuru, and Shivamogga

HYPOTHESIS**A: The Citizen and City Self Assessment**

H₀: Citizen and City Self Assessment are same across the districts like Bengaluru, Mysuru, Mangaluru, Shivamogga and Tumukur

H_a: Citizen and City self assessment are same across the districts like Bengaluru, Mysuru, Mangaluru, Shivamogga and Tumukur

B: The citizen and Future Requirement

H₀: Citizen and Future requirements are same across the districts like Bengaluru, Mysuru, Mangaluru, Shivamogga and Tumukur

H_a: Citizen and Future requirements are same across the districts like Bengaluru, Mysuru, Mangaluru, Shivamogga and Tumukur.

ANALYSIS & INTERPRETATION

CITIZEN ASSESSMENT: Descriptive Statistics					
Bang/Mys/Man/Shv/Tum	N	Mean	Std. Deviation	Minimum	Maximum
Citizen Partnership	5	2.80	0.447	2	3
Identity & Culture	5	2.60	0.548	2	3
Economy & Employment	5	2.80	0.447	2	3
Education	5	2.80	0.837	2	4
Healthcare Facilities	5	2.80	0.837	2	4
Land Use	5	2.80	0.447	2	3
Compact	5	2.00	0.000	2	2
Public Open Spaces	5	2.40	0.548	2	3
Housing & Inclusiveness	5	2.60	0.548	2	3
Transport	5	2.40	0.548	2	3
It Connectivity	5	2.60	0.548	2	3
Intelligent Government	5	2.40	0.548	2	3
Energy Supply	5	2.60	0.548	2	3
Energy Source	5	2.60	0.548	2	3
Water Supply	5	2.60	0.548	2	3
Water Management	5	2.60	0.548	2	3
Waste Water Management	5	2.60	0.548	2	3
Air Quality	5	2.60	0.548	2	3
Energy Efficiency	5	2.40	0.548	2	3
Underground Electric Wiring	5	2.60	0.548	2	3
Sanitation	5	2.60	0.548	2	3
Waste Management	5	2.20	0.447	2	3
Safety & Security	5	2.40	0.548	2	3

City Self Assessment					
Citizen Partnership	5	3.40	0.548	3	4
Identity & Culture	5	3.20	0.447	3	4
Economy & Employment	5	3.20	0.447	3	4
Education	5	3.60	0.548	3	4
Healthcare Facilities	5	3.60	0.548	3	4
Land Use	5	3.40	0.548	3	4
Compact	5	2.40	0.548	2	3
Public Open Spaces	5	2.80	0.837	2	4
Housing & Inclusiveness	5	3.20	0.447	3	4
Transport	5	3.60	0.894	3	5
It Connectivity	5	3.20	1.095	2	5
Intelligent Government	5	2.80	0.447	2	3
Energy Supply	5	2.60	0.548	2	3
Energy Source	5	2.80	0.837	2	4
Water Supply	5	3.20	0.447	3	4
Water Management	5	3.20	0.447	3	4
Waste Water Management	5	2.80	0.447	2	3
Air Quality	5	3.20	0.447	3	4
Energy Efficiency	5	2.80	0.837	2	4
Underground Electric Wiring	5	2.80	0.837	2	4
Sanitation	5	3.20	0.837	2	4
Waste Management	5	3.20	0.447	3	4
Safety & Security	5	3.40	0.548	3	4
Future Requirement					
Citizen Partnership	5	5.00	0.000	5	5
Identity & Culture	5	5.00	0.000	5	5
Economy & Employment	5	4.60	0.548	4	5
Education	5	4.60	0.548	4	5
Healthcare Facilities	5	5.00	0.000	5	5
Land Use	5	5.00	0.000	5	5
Compact	5	4.60	0.548	4	5
Public Open Spaces	5	5.00	0.000	5	5
Housing & Inclusiveness	5	5.00	0.000	5	5
Transport	5	4.80	0.447	4	5
It Connectivity	5	4.80	0.447	4	5
Intelligent Government	5	5.00	0.000	5	5
Energy Supply	5	5.00	0.000	5	5
Energy Source	5	5.00	0.000	5	5
Water Supply	5	5.00	0.000	5	5
Water Management	5	5.00	0.000	5	5
Waste Water Management	5	4.80	0.447	4	5
Air Quality	5	4.80	0.447	4	5

Energy Efficiency	5	4.80	0.447	4	5
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BANG/MYS/MAN/SHV/TUM Citizen Assessment	CITIZEN PARTNERS HIP	IDENTIT Y & CULTUR E	ECONOMY & EMPLOYME NT	EDUCATIO N	HEALTHCA RE FACILITIES	LAND USE	COMPA CT	PU O S
Mann-Whitney U	0	0	0.5	0	0	0.5	0.5	
Wilcoxon W	1	1	1.5	1	1	1.5	1.5	
Z	-1	-1	0	-1	-1	0	0	
Asymp. Sig. (2-tailed)	0.317	0.317	1	0.317	0.317	1	1	

a Grouping Variable: MUNICIPAL CORP

BANG/MYS/MAN/SHV /TUM	INTELL IGENT GOVER NMENT	ENERG Y SUPPL Y	ENERGY SOURCE	WAT ER SUPP LY	WATER MANA GEMEN T	WASTE WATER MANAGE MENT	AIR QUALI TY	ENERGY EFFICIEN CY	UNDERG ND ELEC WIRING
Mann-Whitney U	0	0.5	0.5	0.5	0.5	0.5	0	0	
Wilcoxon W	1	1.5	1.5	1.5	1.5	1.5	1	1	
Z	-1	0	0	0	0	0	-1	-1	
Asymp. Sig. (2-tailed)	0.317	1	1	1	1	1	0.317	0.317	

a Grouping Variable: MUNICIPAL CORP

Underground Electric Wiring	5	4.80	0.447	4	5
Sanitation	5	5.00	0.000	5	5
Waste Management	5	5.00	0.000	5	5
Safety & Security	5	5.00	0.000	5	5
Municipal Corp	5	3.00	1.581	1	5

CITIZEN ASSESSMENT

INTERPRETATION : Citizen Assessment reveals that the parameters such as citizen partnership, identity & culture, education, healthcare facilities, public open spaces, transport, IT connectivity, intelligent government services, air quality, energy efficiency were found developing in Bengaluru, Mangaluru, Shivamogga, Tumukuru, and Mysuru. The survey among municipal leaders conveys that they are trying to overcome some of the issues faced in cities include transport, air quality, healthcare facilities, education and intelligent government services.

CITY SELF ASSESSMENT

BANG/MY/MAN/SHV/TUM	CITIZEN PARTNERSHIP	IDENTITY & CULTURE	ECONOMY & EMPLOYMENT	EDUCATION	HEALTHCARE FACILITIES	LAND USE	COMPACT	PUBLIC OPEN SPACES
Mann-Whitney U	0	0.5	0.5	0	0	0.5	0.5	
Wilcoxon W	1	1.5	1.5	1	1	1.5	1.5	
Z	-1	0	0	-1	-1	0	0	
Asymp. Sig. (2-tailed)	0.317	1	1	0.317	0.317	1	1	0.3

a Grouping Variable: MUNICIPAL CORP

BANG/MY/MAN/SHV/TUM	INTELLIGENT GOVERNMENT	ENERGY SUPPLY	ENERGY SOURCE	WATER SUPPLY	WATER MANAGEMENT	WASTE WATER MANAGEMENT	AIR QUALITY	ENERGY EFFICIENCY	UNDERGROUND ELECTRIC WIRING
Mann-Whitney U	0.5	0.5	0	0.5	0.5	0	0.5	0.5	
Wilcoxon W	1.5	1.5	1	1.5	1.5	1	1.5	1.5	
Z	0	0	-1	0	0	-1	0	0	
Asymp. Sig. (2-tailed)	1	1	0.317	1	1	0.317	1	1	

a Grouping Variable: MUNICIPAL CORP

INTERPRETATION: City self assessment reveals that the parameters such as citizen partnership, education, healthcare facilities, public open spaces, housing & inclusiveness, transport, IT connectivity, energy source, waste water management, underground electric wiring, and sanitation are required continuous improvement in Bengaluru, Mangaluru, Shivamogga, Tumukuru, and Mysuru.

FUTURE REQUIREMENT

BANG/MY/MAN/SHV/TUM	CITIZEN PARTNERSHIP	IDENTITY & CULTURE	ECONOMY & EMPLOYMENT	EDUCATION	HEALTHCARE FACILITIES	LAND USE	COMPACT	PUBLIC OPEN SPACES
Mann-Whitney U	0.5	0.5	0	0	0.5	0.5	0	0
Wilcoxon W	1.5	1.5	1	1	1.5	1.5	1	1
Z	0	0	-1	-1	0	0	-1	
Asymp. Sig. (2-tailed)	1	1	0.317	0.317	1	1	0.317	

a Grouping Variable: MUNICIPAL CORP

BANG/MY/MAN/SHV/TUM	INTELLIGENT GOVERNMENT	ENERGY SUPPLY	ENERGY SOURCE	WATER SUPPLY	WATER MANAGEMENT	WASTE WATER MANAGEMENT	AIR QUALITY	ENERGY EFFICIENCY	UNDERGROUND ELECTRIC WIRING
Mann-Whitney U	0.5	0.5	0.5	0.5	0.5	0.5	0	0	0
Wilcoxon W	1.5	1.5	1.5	1.5	1.5	1.5	1	1	1
Z	0	0	0	0	0	0	-1	-1	
Asymp. Sig. (2-tailed)	1	1	1	1	1	1	0.317	0.317	

a Grouping Variable: MUNICIPAL CORP

INTERPRETATION: Future requirements among Bengaluru, Mangaluru, Shivamogga, Tumukuru, and Mysuru cities found that economy & employment, education, compact, air quality, and energy efficiency needs importance for development and to bring set of changes among all the cities.

Findings

- Citizen Assessment reveals that the parameters such as citizen partnership, identity & culture, education, healthcare facilities, public open spaces, transport, IT connectivity, intelligent government services, air quality, energy efficiency were found developing in Bengaluru, Mangaluru, Shivamogga, Tumukuru, and Mysuru. The survey among municipal leaders conveys that they are trying to overcome some of the issues faced in cities include transport, air quality, healthcare facilities, education and intelligent government services.
- City self assessment reveals that the parameters such as citizen partnership, education, healthcare facilities, public open spaces, housing & inclusiveness, transport, IT connectivity, energy source, waste water management, underground electric wiring, and sanitation are required continuous improvement in Bengaluru, Mangaluru, Shivamogga, Tumukuru, and Mysuru.
- Future requirements among Bengaluru, Mangaluru, Shivamogga, Tumukuru, and Mysuru cities found that economy & employment, education, compact, air quality, and energy efficiency needs importance for development and to bring set of changes among all the cities.

Suggestion

- Even though Bengaluru consisting highest number of education institutions, convenient transportation facilities like metro-rail, buses, train and shuttle services, Bright employment opportunities, IT connectivity, and Healthcare facilities but suffers and has drawbacks in safety and security, waste management, air quality, water supply, high slum areas and sanitation. The identity like smart city wouldn't be easy to achieve by the Bengaluru until unless the citizen partnerships rises. Similarly, Mangaluru is also a part of developing city with higher population required future development towards transport, waste water management and safety. Therefore, the awareness among the citizen to increase their partnership to improve upon various field bring good culture & cleanliness and to increase more safety and security in the city.
- The city like Mysuru well-known for his cleanliness but still suffers in IT connectivity, underground electric wiring, transportation, compact and energy efficiency. Therefore, the city has to enhance its capability among all these fields in such a way that it could get recognised as smart city of Karnataka.

- Tumukuru and Shivamogga are developing cities need to focus towards infrastructure facilities. Education, employment, housing and inclusiveness, healthcare, and underground electric wiring.

Conclusion

Smart cities mission, a government plans to develop 100 cities as smart cities with advanced infrastructure and facilities are a brainchild of our esteemed Prime Minister Mr. Narendra Modi and his government and Urban Development Minister Venkaiah Naidu. The idea behind the smart cities in India to encourage our citizen to have good livelihood and to get recognized in global. As this study revolves around some of top cities of Karnataka include Bengaluru, Mysuru, Mangaluru, Shivamogga and Tumukuru excluding smart cities of Karnataka i.e., Davangere and Belagavi.

As the study highlighted some of the areas include transport, air quality, healthcare facilities, education, intelligent government services, economy & employment, compact, energy efficiency and safety & security. The infrastructure and its development were found common in these cities and required a continuous improvement with the above identified fields. There are chances of tremendous improvement in these cities, so that municipal leaders should rigorously work in their periods and confirm change. However, the well-planned cities and upcoming changes will lead to the crown of smart city among the top cities of Karnataka.

Reference

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