

Smart People for Sustainable Smart Cities

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Abstract: India, a developing economy provides tremendous opportunities for economic development and operational efficiency. In the era of digitalisation, Smart cities have drawn attention of policy makers, communities and urban planners all over the world. The growth of information technology and innovation purveys scope for infrastructural and operational competence connecting with all utilities for a smart city. Smart City, an upcoming and a futuristic concept, is a framework that facilitates integration, builds interaction for persistent innovation, protects environment, provides for fulfilling the aspirations and needs of its citizens. This holistic concept utilizes information communication and technological tools to enhance the city's liveability, viability, visibility, workability and sustainability. Though there are plethora of opportunities available, assimilation and conversion of these opportunities into real prospects requires people's contribution through their channelized intelligence and directional efforts. The empirical study provides a conceptual framework of the parameters of a smart city and analyses people's participation in building a sustainable smart city. The study identified that proper follow-up, transparent governance and people's contribution are very crucial to build a smart city.

Keywords: Smart City, Parameters of Smart City, Smart people, People Participation, Sustainable development.

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I. INTRODUCTION

Cities play an indispensable role in generating national income, contributing towards economic growth, constant innovations and implementing change. Urban societies have always focussed and facilitated on human, social, technological, economical, intellectual and cultural advancements. Throughout the world the concept of digitalization, proliferation of technology, novel advancements and artificial intelligence has given a framework of technological perspective. Ongoing Technological developments has strengthened the communications all around the world and has increased global connectivity. Though development and improvisations in technology is an important criterion for enhancing the visibility of a city, a city will truly be a smart city only when the other parameters are fulfilled. Smart city is a holistic framework that provides a good and healthy lifestyle for its citizens. Strong network system with a good information communication technology tool is effective only when people participate, use and update their knowledge on these technologies.

Thus, the attention on a smart city development initiated a study on people's satisfaction and participation on the factors building a sustainable smart city.

II. SMART CITY CONCEPT

Smart city a holistic concept utilizes information communication and technological tools to enhance the city's liveability, viability, visibility, workability and sustainability. In short, a city is a smart city which makes effective utilisation of its available resources and also where all the residents perceive that there is something in it for them based

upon their area of interest. Though there are a plethora of opportunities available, assimilation and conversion of these opportunities into real prospects requires people's contribution through their channelized intelligence and directional efforts. Providing smart solutions in terms of retrofitting, redevelopment and greenfield development is the need of the hour. Setting up a smart city requires intense collaboration between government, technological providers, policy makers, research institutions, people and society.

III. CHANNELISING SMART CITIES

Data Driven Decision Making

Throughout the world, governing bodies are adopting data driven decision making not only to provide for citizen demands but also anticipate a problem before it leads to cataclysm. A well-designed data network blueprint proffers the government to access and analyse enormous information and thereby provide speedy services and solutions to its citizens. Its introduction enhances the lives of citizens by providing good services. Internet of things offers best possible alternatives and their outcome to enable intensified decision making.

Citizen Participation and Government Engagement

Citizen participation refers to Citizen involvement in public decision making for a better society. Citizens not only participate and initiate community development programmes but also actively involve themselves in social planning and implementation to eliminate social problems by using their smart solving abilities. Citizen participation and

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dissemination of information has remarkably increased by the burgeoning use of consumer devices. Smart interfaces devices, mobile phones and advancement in communication technology constantly act as a catalyst to magnify digital world. Making governance citizen-friendly by providing online services so that people don't have to go to the municipal offices to get the services offered by the government enhances the accountability and transparency of government working.

Improved Safety and Security

Basic amenities, Developmental patterns, education, Healthcare accessibility Climate, public transport, cost of living, cultural factors and clean & green environment are the most factors considered for choosing a place of residence. However, Safety and security plays the most influencing factors for choosing a place of Residence or place of work. hence government is taking many initiatives for providing a safer environment to its people

Minimised Environmental Footprint

Deploying air quality sensors around the city can track the quality of air. These sensors can lay foundation for reducing air pollution even in the most populated cities. Smart cities help to minimise the negative effect of pollution on the environment. It not helps in reduction of pollution but also improves the health of the citizens as today most of the problems are related to environmental conditions and also in certain cases poor air quality claims the lives of people. Reduced environmental footprint helps to maintain sustainable ecosystem.

Improved Transportation

Smart cities cannot be built without a smart public transportation system. As there is an increase in migration of people from rural to urban areas and also the increase in the private vehicle owners, has increased the responsibilities of urban planners to make Investments in transportation and build connected transportation systems to enhance the efficiencies throughout a city. Smart Technologies allow cities better serve citizens, optimise flow of traffic, and also relieves congestion. Strategies such as integrated metro system, Revamping city's bus system, well connected rail system.

Enhanced Digital Equity

Digital Equity is a set-up in which all individuals and communities have an access to the internet capacity needed for living a life of good standards. Public Wi-Fi Hotspots will propound authentic internet services to all citizens, increase digital equity amongst the citizens means, ensuring broadband Internet is available and affordable to everyone, and that everyone has relevant skills training to access and make use of the same.

Metamorphose & Manage Waste Using ICT

Cities in India alone generate tonnes of solid waste every year. It is evaluated that majority of municipal waste in India remains unattended. These waste if collected, segregated and

processed generate energy. Government of India has launched Swachh Bharat Mission and initiated ICT based solutions to metamorphose and manage waste.¹

IV. PARAMETERS OF SMART CITY

Table 1: Parameters of Smart City & Their Characteristics

Parameters of Smart City	Characteristics
Smart Governance	E Governance Participatory & Inclusive Government PPP- Public Private Partnership Public Policies, Strategies & Perspectives City Planning & Development Equitable Distribution of Resources
Smart Mobility	Accessibility & Availability Infrastructure, Multimodal Transport Integrated ICT, Systems & Logistics
Smart Economy	Flexibility of Labour market, Affordability Infrastructure Accessibility, Local & Global Holistic Development, Innovative Spirit Encourage Entrepreneurship, Productivity Interconnectedness, Ability to transform & Adapt to Changes, Responsible Sharing
Smart Environment	Green Building, Green Energy Green Consumption, Environmental Health & Protection, Sustainable use of Natural Resources
Smart Living	Cultural Living, Social Inclusion Educational Infrastructure, Safety & Security Health Care Facilities & Housing facilities Residential Infrastructure of everyday life Liveable communities, Quality of Life & Well-being
Smart People	Intellectuals, Think Tankers Continuous Learning, Creative, Participation in Public Life Equity, Emotional Stability & Tolerance Flexibility

V. SMART PEOPLE

Smart people are key drivers to the success of a smart city development. A city does not become smart because of its infrastructure or technology, it becomes smart when its people are able to make effective use of technology to create a healthy and comfortable living.

In a smart city development, the role of smart people is exemplary; they need not possess academical knowledge to be smart instead they need to possess the knowledge and wisdom that is applicable in the real world to be able to communicate, participate and connect with the technological developments made in the state.

VI. KEY INDICATORS FOR EVALUATION OF SMART CITY

Key indicators for evaluation of Smart City are availability of infrastructure, Information & communication tools, creativity and innovations, Co2 emission, economy, education, energy, clean and green environment, sustainable, innovative and safe public transportation, financial security, fire and emergency response, participative & transparent Government, government policies & strategies, health care facilities & accessibility, recreational facilities, people's safety, accommodation, solid waste management, wastewater management and sanitation.

¹How to transform waste management using ICT to enable Swachh Bharat Mission https://economictimes.indiatimes.com/news/science/how-to-transform-waste-management-using-ict-to-enable-swachh-bharat-mission/articleshow/47957702.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst

Empirical Study

The study is conducted with the following objectives;

- To examine the level of people's satisfaction on the elements of a smart city
- To analyse people's participation towards building a sustainable smart city.

VII. RESEARCH METHODOLOGY

Sampling Design:

The research validity depends upon the systematic collection and analyses of data in an orderly manner. Primary and Secondary data were collected to analyze and validate the results. Smart people residing in smart cities were chosen as the sample for the study. The study was designed to understand the level of satisfaction of smart people on smart city elements and the participation of people towards developing a sustainable smart city. The respondents were chosen purely on a random basis belonging to different cities. to gain a thorough knowledge of the respondent's opinion on smart city development.

Data Collection

- **Primary Data & Secondary Data:** Structured questionnaire was designed to study the level of satisfaction of the smart people and their perception on the contributors of smart city development using seven-point likert scale. The primary data is supplemented with enough supportive information collected from secondary sources
- **Reliability test:** The Cronbach alpha test value for the research data was 0.929.
- **Sample Size:** A research survey was conducted using google forms and responses were collected from people residing in smart city. 244 completed questionnaires forms were used for analysis of the study.
- **Statistical Tool:** Percentage Analysis was used to study the level of satisfaction of people towards their local government's initiatives towards the elements of smart city. Multiple Regression analysis and Correlation was carried out to investigate the people's participation on building a sustainable smart city.

VII.1 RESULTS OF OBJECTIVE 1: LEVEL OF SATISFACTION OF PEOPLE TOWARDS THEIR LOCAL GOVERNMENT'S INITIATIVES TOWARDS THE ELEMENTS OF SMART CITY

Percentage Analysis

- 71% of the respondents are moderately contented with smart governance initiatives taken by their local government pertaining to public utility services like smart ration card, EB Bill Automation, information-based services, government policies, participatory decision making and transparent governance etc.
- 67 % of the respondents have exhibited moderate to high

level of satisfaction to the smart living initiatives taken by their local government pertaining to educational facilities, health and safety conditions, cultural facilities, social well being

- 65 % of the respondents have exhibited moderate to high level of satisfaction to the smart economy initiatives taken by their local government pertaining to driven by innovation, opportunities for entrepreneurship, economic conditions, productivity, international collaborations
- 67% of the respondents are discreetly contented with the smart mobility initiatives taken by their local government pertaining to infrastructure, availability of ICT's, innovative transport, local, national and international accessibility
- 70% of the respondents are moderately contented with the smart environment initiatives taken by their local government pertaining to sustainable resource management, controlled pollution levels, clean and green environment
- 75 % of the respondents have expressed moderately high satisfaction to the smart people initiatives taken by their local government pertaining to qualification, affinity to lifelong learning, open mindedness, creativity, adaptability, participating in building smart city.

VII.2 REGRESSION ANALYSIS

The regression analysis model contains predictor variables which that represents the outcome variable (Dependent variable): Sustainable Smart City. There are five predictor variables used in the model: Participation towards Smart Environment (X1), Participation towards Smart living (X2), Participation towards Smart Technology (X3), Participation towards Smart Society(X4), Participation towards Smart Mobility(X5) and Participation towards Smart Healthcare(X6).

Regression Analysis Results

The model summary values are as follows

Multiple R value	0.728
R Square value	0.530
F value	44.475
P value	<0.001

The multiple correlation coefficient R value = 0.728 measures the degree of relationship between the sustainable smart city (Dependent Variable) and all the predictor variables combined. The predicted regression scores are obtained as a direct combination of Participation towards Smart Environment (X1), Participation towards Smart living (X2), Participation towards Smart Technology (X3), Participation towards Smart Society(X4), Participation towards Smart Mobility(X5) and Participation towards Smart Healthcare (X6). The coefficient R Value 0.728 signifies that the association between smart sustainable city and the 6

independent variables is moderately strong and positive and the model is comparatively a good predictor of the outcome. The R square value signifies that 53% of the variance in the data can be explained by the predictor variable. The results indicate that the model is a significant predictor of sustainable smart city, $F = 44.475$, $p = .001$ (significant at 1 % level).

Table 2: Table showing the weights in Multiple Regression Analysis

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error			
Constant	0.387	.352		1.101	0.272
Smart Environment (X1)	0.080	.015	.310	5.505	0.000
Smart Living (X2)	0.044	.032	.091	1.370	0.172
Smart Technology (X3)	0.028	.024	.065	1.175	0.241
Smart Society (X4)	0.109	.022	.337	4.911	0.000
Smart Mobility (X5)	0.140	.048	.158	2.921	0.004
Smart Healthcare (X6)	-0.029	.043	-.042	-.681	0.496

The multiple regression equation is

$$Y = 0.387 + 0.080X_1 + 0.044X_2 + 0.028X_3 + 0.109X_4 + 0.140X_5 - 0.029X_6$$

Keeping other variables constant, the coefficient of X1 0.080, X2 0.044, X3 0.028, X4 0.109 X5 0.14, X5 0.029 signifies the partial effect of the variables on sustainable smart city at 1% significant level. The estimated positive sign implies that such effect is positive such that sustainable smart city would increase for every one-unit increase of X1, X2, X3, X4 and X5.

The calculated standardized coefficient signifies that citizens participation towards smart society (0.337) is the predominant factor contributing towards building a Sustainable Smart City, followed by citizens participation towards smart environment (0.310). Most of the respondents have exhibited their participation towards smart society by alert Police on crimes occurring in streets, cooperate with sanitation workers to maintain my city clean, report irregularities in public distribution system (Smart Card) and participate in resolving societal issues. Most of the respondents have also expressed their participation towards smart environment by regularly purchase Eco-friendly Products, use public transportation / car pool, practice waste segregation/waste sorting, engage in optimized energy consumption (For instance switch off electronic equipment that is not in use, using five star energy equipment etc) and do not waste water.

VII.3 CORRELATION ANALYSIS BETWEEN THE ELEMENTS OF SMART CITY

A correlation Analysis was tested to identify the relationship between the elements of smart city. Table 3 signifies the effect of the relationship between all the elements of a smart city.

Table 3: Pearson Correlation Coefficient between factors of smart city

		Correlations					
		Smart Governance	Smart Living	Smart Environment	Smart Economy	Smart Mobility	Smart people
Smart Governance	Pearson Correlation	1	.709**	.660**	.536**	.567**	.176**
	Sig. (2-tailed)		.000	.000	.000	.000	.006
	N	244	244	244	244	244	244
Smart Living	Pearson Correlation	.709**	1	.666**	.590**	.668**	.253**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	244	244	244	244	244	244
Smart Environment	Pearson Correlation	.660**	.666**	1	.571**	.509**	.240**
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	244	244	244	244	244	244
Smart Economy	Pearson Correlation	.536**	.590**	.571**	1	.645**	.217**
	Sig. (2-tailed)	.000	.000	.000		.000	.001
	N	244	244	244	244	244	244
Smart Mobility	Pearson Correlation	.567**	.668**	.509**	.645**	1	.281**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	244	244	244	244	244	244
Smart people	Pearson Correlation	.176**	.253**	.240**	.217**	.281**	1
	Sig. (2-tailed)	.006	.000	.000	.001	.000	
	N	244	244	244	244	244	244

** .Correlation is significant at the 0.01 level (2-tailed).

The correlation coefficient between all factor's smart governance, smart economy, smart governance, smart environment, smart mobility, smart living and smart people are positively associated and impact each other in building up a sustainable smart city and all factors are significant at 1 % level.

VIII. CONCLUSION

Information and Communication Technology (ICT) has become an indispensable part of our lifestyle. Internet, networking & connectivity, digital technology and artificial intelligence are the most essential tools for building a smart city. The regression and correlation analysis indicates that people participation towards smart society is the predominant factor contributing towards building a Sustainable Smart City. Most of the respondents have exhibited their participation towards smart society by alerting Police on crimes occurring in streets, cooperate with sanitation workers to maintain my city clean, report irregularities in public distribution system (Smart Card) and participate in resolving societal issues. Respondents have also expressed their participation towards smart environment by regularly purchase Eco-friendly Products, use public transportation / car pool, practice waste segregation/waste sorting, engage in optimized energy consumption etc. ICT enabled services have made it easy for people to participate and live safe in smart cities. Government, think tankers, Corporates, techies, researchers and other professionals should coordinate to

frame policies for making the city economically attractive and liveable. Thus, smart people are a boon to the nation and esteem to the society. Every person has a major role to play in the development of the state. It's more a reflection on morality and ethics.

IX. REFERENCES

Journals

1. Baehr, J. (2011). The Structure of Open-Mindedness. *Canadian Journal of Philosophy*, 41(2), 191-213. doi:10.1353/cjp.2011.0010.
2. Estevez, Elsa & Janowski, Tomasz & Dzhusupova, Zamira. (2013). Electronic Governance for sustainable development - How EGOV solutions contribute to SD goals?. ACM International Conference Proceeding Series. 92-101. 10.1145/2479724.2479741.
3. Graziano, W.G., & Eisenberg, N. (1997). Agreeableness; A dimension of personality. In R. Hogan, S. Briggs, & J. Johnson, (1997). *Handbook of Personality Psychology*. San Diego, CA: Academic Press.
4. Gupta, Shruti & Mustafa, Syed Ziaul & Kumar, Harish. (2017). 3: Smart People for Smart Cities: A Behavioral Framework for Personality and Roles: Smarter People, Governance, and Solutions. 10.1201/9781315156040-4.

Websites

1. An app that makes citizen participation in Smart Cities mission easier”<https://india.smartcitiescouncil.com/article/app-makes-citizen-participation-smart-cities-mission-easier>
2. Brundtland Report for the world commission on environment, <http://www.globalfootprints.org/sustainability>
3. CHAP- Lukaszewski, Aaron, Extraversion 2016/01/01, 10.1007/978-3-319-28099-8_1071-
4. Definitions& Overviews, <https://smartcitiescouncil.com/smart-cities-information-center/definitions-and-overviews>
5. How to transform waste management using ICT to enable Swachh Bharat Mission https://economictimes.indiatimes.com/news/science/how-to-transform-waste-management-using-ict-to-enable-swachh-bharat-mission/articleshow/47957702.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst
6. <https://doi.org/10.1016/j.paid.2008.06.013>.www.sciencedirect.com
7. <https://iesgeneralstudies.com/ict-applications-and-government-schemes/>
8. <https://india.smartcitiescouncil.com/article/see-how-coimbatore-benefit-ict-based-smart-intervention>
9. <https://nrega.nic.in/netnrega/Janmanrega.htm>
10. <https://smartcitiesinfosystem.eu/technologies/ict#:~:text=ICT%20plays%20a%20significant%20role,and%20smart%20services%20for%20citizens>
11. <https://www.123test.com/personality-neuroticism/@22/7/20>
12. <https://www.bbc.com/news/world-asia-india-34421419>
13. <https://www.indeed.com/career-advice/career-development/how-to-be-conscientious>
14. <https://www.india.gov.in/spotlight/smart-cities-mission-step-towards-smart-india>
15. <https://www.plantemoran.com/explore-our-thinking/insight/2018/04/thinking-about-becoming-a-smart-city-10-benefits-of-smart-cities>
16. <https://www.stl.tech/sterlite-live/pdf/whitepapers/smart-cities-in-india-creating-a-smarter-nation.pdf>
17. <https://www.unilever.com/sustainable-living/enhancing-livelihoods/opportunities-for-women/promoting-safety-for-women/>
18. IEEE Smart Cities, <https://www.ieee-pes.org/pes-communities/ieee-smart-cities>
19. Kerala becomes country's first digital state <https://www.financialexpress.com/industry/technology/kerala-becomes-countrys-first-digital-state/216948/>
20. Nilanjana Sen, Oct 28, 2015, Sustainable cities of the Future, <https://www.fairobserver.com/more/environment/sustainable-cities-of-the-future-66587/@22.7.2020>
21. Paul Hawken, Sustainable solutions Government, @23/7/2020 <http://www.learningsustainability.com/government.html>
22. Rajkot: Loaded mobile app helps cops reduce crime by 24% http://timesofindia.indiatimes.com/articleshow/71678344.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst
23. Smart Cities in Europe, A. Caragliu, C. Del Bo, and P. Nijkamp, "Smart Cities in Europe," *Journal of Urban Technology* 18: 2 (2011) 65–82. <http://smartcities.gov.in/content/innerpage/what-is-smart-city.php>
24. Smart City <http://www.businessdictionary.com/definition/smart-city.html>
25. Smart city mission transformation [http://smartcities.gov.in/content/innerpage/strategy.php#:~:text=Redevelopment%20will%20effect%20a%20replacement,ULBs\)%20in%20consultation%20with%20citizens](http://smartcities.gov.in/content/innerpage/strategy.php#:~:text=Redevelopment%20will%20effect%20a%20replacement,ULBs)%20in%20consultation%20with%20citizens)
26. Smart Road Technologies of The Future, <https://www.hongkiat.com/blog/smartroadtechnologies/#:~:text=%2005%20Smart%20Road%20Technologies%20Of%20The%20Future,the%20Electric%20Priority%20Lane%20where%20electric...%20More%20>
27. 8 powerful yet simple lifestyle changes to reduce India's carbon footprint <https://yourstory.com/2016/02/reduce-carbon-footprint>