

Current Status of Smart Cities Mission in India-An Overview

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The accelerating wave of urbanization in India may be a great chance for the development of a country but also a great challenge to improve a resident's standard of living in cities. To overcome the giant barriers in the development of cities, the Government of India launched a smart strategic plan called Smart Cities Mission. The main objective was to support the sustainability of cities that offer basic infrastructure and a reasonable, healthy standard of living for residents by implementing smart solution strategies. Although it is at the starting stage, intelligent monitoring towards its success is essential. The present work describes its fundamental motives, current status, and analyses the involved issues/challenges to give possible suggestions for the improvement of its implementation. From this analysis, the authors recommend the important factors to be considered for the success of the mission. Some of the main aspects are focusing on the capacity building programs for the skilled workforce to make strategic cost-effective implementation or to motivate the fundraising agencies, possibility of great benefits like raising the fascination and level of funds from the convergence of smart city-related Centre/State government schemes to smart cities commission, effective integration of advanced "information and communication technology" in most of the works/services.

Keywords: Smart Cities, Smart Cities Mission in India, Current status.

Introduction

Cities are large and permanent human settlements where people can live, invest, and work freely. Cities provide better education facilities, more career-oriented options, and jobs/employment, proper infrastructure and public utilities, better business and entrepreneur opportunities, and better health care and public transport, more availability of attractions and entertainment facilities, etc. Due to these opportunities, the rural population is converging with the urban population. An enormous migration of people from rural to cities with complex congregations led to the condition of the cities being disorganized. It creates different kinds of problems such as shortage of resources, unbalanced ecosystem, difficulty in waste management, health-related problems, social and political complications, etc. However, cities are the large driving source of the economy. The economy will only be enhanced when the cities have proper technological, industrial, environmental facilities for the citizen. This is only possible when the cities make themselves "smarter" by providing better sustainable, efficient, and livable resources [1]. According to Harrison et al. [2], a smart city denotes an instrumented, linked, and efficient city. Instrumented denotes the capture and integration by personal equipment, appliances, cellphones, medical devices, real-world live information, internet, and social network. Interconnection refers to utilizing this information into a corporate computing platform, as well as communication between the many city agencies. To make better operational decisions, intelligence implies incorporating complicated analytics, modeling, optimization, and visualization into operational business processes.

According to Institute for Management Development (IMD) [3], Indian cities Hyderabad, New Delhi, Mumbai, Bangalore appeared at 85, 86, 93, 95th places in the 2020 "Smart City Index". The "Smart City Index" is based on city

economic and technical statistics, as well as public assessments of their cities' smartness. However, India is the world's second-most populous country., its most of the Gross domestic product (GDP) is dependent on urban development. To boost the GDP growth of India, it is critical to concentrate on urban growth. So the "Government of India" (GoI) was started the "Smart Cities Mission" (SCM) on 25th June 2015 to upsurge more GDP and the residents' quality of life in India. The "Union Ministry of Urban Development (MoUD)" is in charge of putting the smart city mission into action in conjunction with the various cities. The main strategies of the mission are area-based development through retrofitting (improvement), redevelopment (new developments), Green field development (city extension), and Pan-city initiative (applying smart solutions). Smart cities are chosen based on a smart city challenge program considering well-defined competitive proposals from a different city. This mission covers "100 smart cities" during the financial year 2015-16 to the financial year 2019-20. The main features of the SCM are to provide adequate electricity and water supply, appropriate sanitation, and waste management, effective transportation and transit, low-cost housing, effective internet access and digitization, excellent governance, an environmentally friendly environment, and the safety and security of all

residents are just a few of the issues that need to be addressed especially for women and children, affordable and efficient health and education [4].

In the literature, a large number of studies have been carried out to investigate the policy of SCM [5], the evolution of smart cities agenda [6], planning and governing mechanism to be required [7], smart funding option for the success of SCM [8]. However, the current status of the SCM needs to be analyzed for the identification of the most influencing elements that need attention. The present work describes SCM's fundamental motives, current status, and analyses the involved issues/challenges to give possible suggestions for the improvement in its implementation.

Characteristics of the smart cities

Smart city features differ from one city to the next. However, Giffinger et al. [9] classified smart cities into six dimensions, which are depicted in Fig.1. The smart economy (innovation and competitiveness), smart mobility (transport and infrastructure), smart environment (sustainability and resources), smart people (creativity and social capital), smart living (quality of life and culture), and smart governance are the elements to consider (empowerment and participation).



Fig.1- Characteristics of Smart Cities

Selection of smart cities for the Smart Cities Mission

The selection process of smart cities for SCM was conducted as a competition. The states/urban local bodies (ULBs) were asked to submit smart city proposals (SCP) that consist of a well-prepared master plan for the implementation of our strategies of SCM to develop an existing city as a smart city.

These potential cities were identified from each State and Union Territories (UTs) or a total of 4,041 statutory cities/towns in India by the "Ministry of Urban Development" (MoUD).

These cities are decided based on the urban

population of the States/UTs and the total statutory towns in the States/UTs, by giving equal weightage (50:50) to the State/urban UT's population and the number of statutory towns [10].

A total of 100 smart cities were chosen from an all-India competition in different stages where 20 "smart cities" were shortlisted in round-1 in January 2016, 13 smart cities were selected through fast track round in May 2016,

27 smart cities were selected from round-2 in September 2016, 30 smart cities were selected in June 2017 from round-3 and 10 smart cities were selected in the final round (Fig.2) [11].

All the identified “100 smart cities” are reported in Table 1. However, after two years of mission implementation, the allocation of smart cities will be evaluated.

Furthermore, some re-allocation of the remaining prospective smart cities may be done based on an assessment of state/UT performance.

Table 1 Selected cities for the Smart Cities Mission

Round	Selected Cities
Round 1	“Bhubaneswar, Pune, Jaipur, Surat, Kochi, Ahmedabad, Jabalpur, Visakhapatnam, Solapur, Davanagere, Indore, NDMC, Coimbatore, Kakinada, Belagavi, Udaipur, Guwahati, Chennai, Ludhiana, Bhopal”
Fast track round	“Lucknow, Warangal, Dharamshala, Chandigarh, Raipur, Newtown Kolkata, Bhagalpur, Panaji, Port Blair, Imphal, Ranchi, Agartala, Faridabad”
Round 2	Amritsar, Kalyan-Dombivali, Ujjain, Tirupati, Nagpur, Mangaluru, Vellore, Thane, Gwalior, Agra, Nashik, Rourkela, Kanpur, Madurai, Tumakuru, Kota, Thanjavur, Namchi, Jalandhar, Shivamogga, Salem, Ajmer, Varanasi, Kohima, Hubballi-Dharwad, Aurangabad, Vadodara.”
Round 3	“Thiruvananthapuram, Naya Raipur, Rajkot, Amaravati, Patna, Karimnagar, Muzaffarpur, Puducherry, Gandhinagar, Srinagar, Sagar, Karnal, Satna, Bengaluru, Shimla, Dehradun, Tiruppur, Pimpri-Chinchwad, Bilaspur, Pasighat, Jammu, Dahod, Tirunelveli, Thoothukudi, Tiruchirappalli, Jhansi, Aizawl, Allahabad, Aligarh, Gangtok.”
Round 4	“Silvassa, Erode, Diu, Bihar Sharif, Bareilly, Itanagar, Moradabad, Saharanpur, Kavaratti, Shillong.”

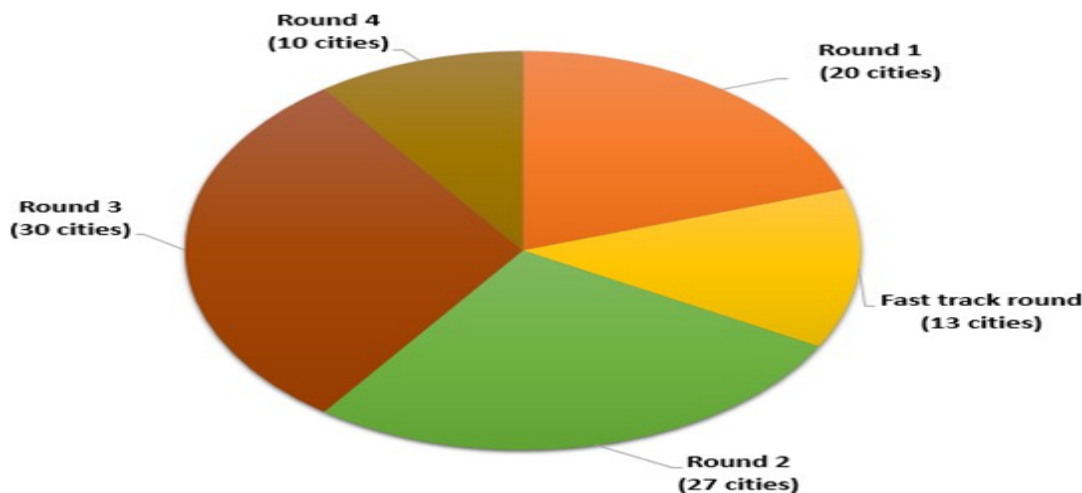


Fig.2. Number of cities selected for the smart Cities Mission

Schemes and policies in the support of Smart Cities Mission

There are various schemes and policies proposed by the Gol in parallel to SCM for the development of urban areas. These programs have objectives similar to SCM and are possible assets that can take part in the success of SCM.

These schemes and policies are implemented by the MoUD under the central government with the support of State/UT Governments as well as ULBs.

Some of these important schemes and policies [12] are as follows:

1. “Atal Mission for Rejuvenation and Urban Transformation” (AMRUT) is launched to lift the physical infrastructure of the cities. The Gol has

allotted 50,000 crore INR for five years for this mission.

2. Pradhan Mantri Awas Yojana (PMAY) is executed to provide housing to the “Economically Weaker Section” (EWS) and “Low Income Group” (LIG). The target of PMAY is to provide 20 million and 30 million houses in urban and rural areas respectively, by the end of the year 2022.
3. Swachh Bharat Abhiyan has done to promote sanitation and cleanliness to make India ‘open-defecation free’. The total number of 1028.67 lakhs toilets have been built since 2nd October 2020. Moreover, it targets to construct 34, 88,109 toilets in the year 2020-21[13].
4. National Heritage City Development and

Augmentation Yojana (HRIDAY) is carried out to successfully combine urban planning, economic growth, and historical conservation to maintain each legacy city's heritage identity. In the initial stage, the government has identified 13 cities and allocated 500 crores to implement this mission[14].

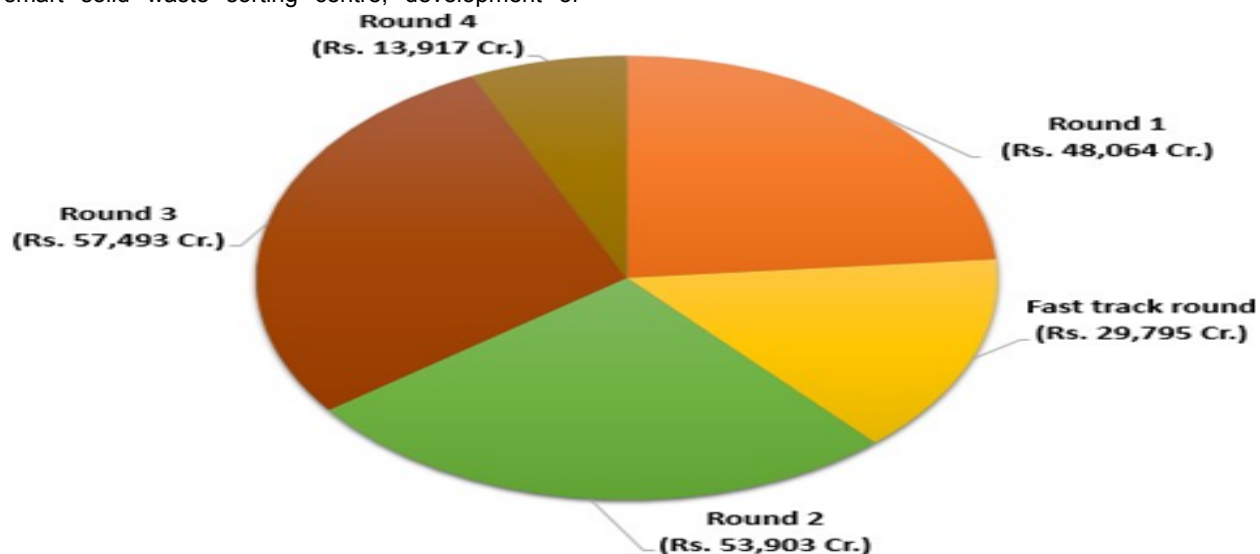
5. Digital India program focused on providing improved online access and internet connectivity to the Indian population. Under the Digital India mission, lots of programs are carried out such as E-governance, broadband roads, increased connectivity to mobile connectivity, public internet connectivity initiative, Ekranti (electronic delivery of Services), E-Pathshala program, eBiz platform, and Jeevan Praman program [15].

Along with aforesaid important programs, many other projects have been proposed such as projects based on open spaces and riverfront development, app-based solution projects, affordable housing projects, and Public-Private-Partnership (PPP) projects. Some of the PPP funded projects are automatic fare collection system, biogas plant for organic waste, smart parking, intelligent traffic management in Surat; city gas distribution through piped network in Belagavi; mini sewerage treatment plants, rooftop solar panel, smart toilets in Delhi; automated bicycles stations in Bhopal; smart bus shelters with smart e-toilets in Kakinada; smart signaling, traffic surveillance and CCTV surveillance, public bicycling sharing system in Visakhapatnam; treatment plants, intelligent street poles in Guwahati; intelligent parking management, intelligent street poles in Indore; cycles haring system in Jabalpur; assured 24x7 electricity supply with significant improvement in sustainability and energy efficiency in Pune; Awaas- slum redevelopment projects, construction of smart multi-level car parking, urban knowledge centre in Bhubaneswar; development of smart solid waste sorting centre, development of

smart multi-level car park in Jaipur; implementation of 24x7 water supply system in Coimbatore; slum rehabilitation in Ahmedabad, etc. [16]. Apart from these PPP projects, some other initiatives have also been taken namely, National Industrial Corridor Development Programme (NICDP), Bharatmala project, Sagarmala project, "Gujarat International Finance Tec-City" (GIFT City), Kochi smart city, Mahindra world city, Nanocity, NAYA Raipur smartcity, Dholera SIR, etc. However, it might be worth mentioning that seeking convergence of the aforementioned and/or other associated Central and State Government Programs/Schemes with the SMC can provide significant benefits.

Funding sources and Fund distribution

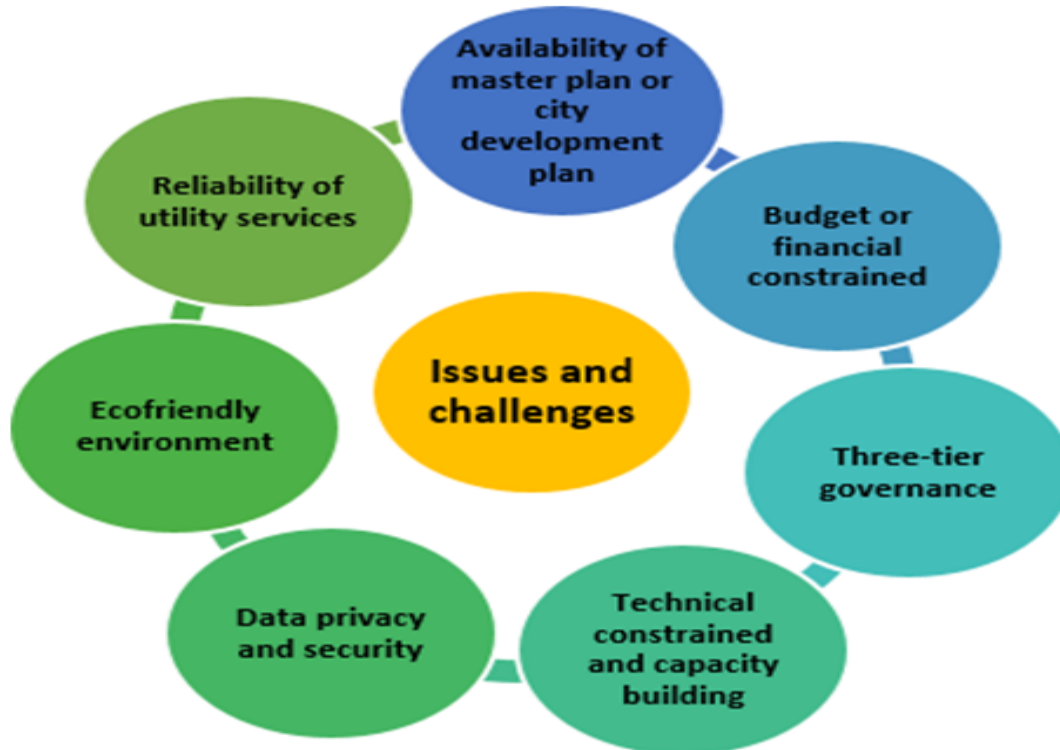
The projects under SC Mare funded by the central government, state government Sona matching basis maintaining the major shareholding of SCM. The remaining funding has to be acquired by ULBs through user charges, municipal bonds, PPPs, "National Investment and Infrastructure Fund" (NIIF), and the fusion of other government initiatives, etc. According to presently available data [17], Gol has proposed the total investments. 2,05,018 crores for 100 cities under the SCM. Figure 3 illustrates the distribution of the proposed fund for the cities selected from different rounds. However, the fund of Rs. 164,204 crores are estimated for the area-based projects and Rs. 38,914 crores for the Pan-city solution. Further, the government has allotted the fund of Rs. 7,007.70 crores for open spaces and riverfront development; Rs.2021.64 crores for app-based solution projects; Rs.17,035.95 for affordable housing projects; Rs.5,535.38 for 62 PPP projects from the total project fund. Under this mission, each city will get Rs. 500 crores from the central government for implementing various projects. The state government or ULBs are also contributed an equal amount of funds on a matching basis.



Issues, challenges, and recommendations for the success of Smart Cities Mission

SCM is facing many issues and challenges for its successful implementation. Some of the major issues and challenges are illustrated in Fig. 4. These include lack of master plan or city development plan, insufficient fund or budget, improper governance, lack

in the use of technology and skilled persons, weak data privacy and security, unbalanced eco-friendly environment, reliability of utility services, etc. [5,7].



Issues and challenges for the Smart Cities Mission.

It is observed from the literature that most of the projects under SCM are unable to complete within the proposed time due to the unavailability of a master plan or city development plan and insufficient funds or budget. Hence, the development of a master plan and implementing well-designed strategies of “SCM” (retrofitting, redevelopment, Greenfield development, Pan-city development) may be of primary importance. While funding from Gol is an ideal chance for its states, timely availability of the fund became an issue due to its major dependency on the fund to be raised from State/ULBs. Hence, citizen cooperation against fundraising through user charges, inspiring/motivating the fundraising agencies, research, and development of innovative finance mechanisms (PPP models, municipal funds, borrowing from bilateral and multilateral, land-based financing instruments) is necessary. Focusing on international funding is also essential due to the interest of many leading economic countries like the USA, Spain, Japan, Sweden, France, and Singapore to invest or take part in the development of smart cities. Moreover, effective coordination among the central government, state government, and the ULBs are important for timely approval of funds and clearances, and successful implementation of smart solutions.

The proper development and implementation of plans became difficult due to the lack of recruitment of a skilled workforce. Hence, it is required to encourage capacity-building programs to recruit and strengthen the workforce and to focus research on cost-effective development and planning methods. Besides, the lack of advanced technologies and IT infrastructure led to the use of huge manpower, time, and funds. Hence, to optimize cost-effective development and services to citizens, the massive integration of Information and Communication Technology (ICT) with devices of the Internet of Things (IoT) is necessary. At the same time, cybersecurity needs to be strengthened to protect against cyber-attack, online fraud, and data theft. However, it is also required to give attention to the reliability of utility services such as telecommunication, water, electricity, mobility, and health care services.

Apart from these challenges, maintaining an eco-friendly environment is also one of the challenges for the SCM to control global warming, earthquakes, floods, solid/liquid waste, and population growth. Thus, the cities need to promote renewable energy resources, green buildings, green transport, solid/liquid waste management to reduce the consumption of fuel/electricity and to control pollution.

Aim of the study

Study focuses on analyzing the current status of smart cities and providing possible suggestions to improve the current status of smart cities in India.

Conclusions

By 2030, urban regions are anticipated to house 40% of India's population and provide 75% of the country's GDP. The Smart Cities Mission is an urban city development effort in India. Through its numerous projects, the government is putting innovative goods and ideas to the test to properly execute 'Smart Cities.' Initiatives like the Smart Cities Forum bring together collaborative perspectives from all relevant sectors to facilitate efficient project design and implementation. In addition, private-sector companies are partnering with cities to create innovative goods and services that address local requirements.

This work systematically examines the most influential factors that need to be focused on by introducing characteristics of a smart city, city selection and funding for SCM, policies, and schemes which can be converted into SCM, and issues/challenges facing in the implementation of SCM. Thus, mainly an overview of the current status of SCM is presented. The various features of SCM are adequate electricity and water supply, appropriate sanitation and waste management, effective mobility and transit, cheap housing, efficient internet access and digitization, excellent governance, an environmentally friendly environment, and the safety and security of all residents are all priorities. From this work, it is observed that the development of a master plan and implementing well-designed strategies of SCM may be of primary importance. Due to the major dependency of projects on the fund to be raised from State/ULBs, focusing on the capacity building programs for the skilled workforce to inspire/motivate the fundraising agencies, research, and development of innovative finance mechanisms, the citizen cooperation against fundraising through user charges, focusing on international funding from leading economies and effective coordination among the governing bodies are necessary. Further, the effective integration of advanced information and communication technology in most works/services has great potential to bring smartness to the city. Moreover, the eco-friendly environment and utility services are essential for developing a healthy and decent life for citizens.

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