Smart Cities in India: Features, Policies, Current Status, and Challenges

Nallapaneni Manoj Kumar [1], Sonali Goel [2], Pradeep Kumar Mallick [3]
[1] Faculty of Electrical and Electronics Engineering, Universiti Malaysia Pahang, 26600 Pekan, Pahang, Malaysia.
[2] Department of Electrical Engineering, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar-751 030, Odisha, India.
[3] Department of Computer Science & Engineering, Vignana Bharathi Institute of Technology, Ranga Reddy-501301, TS, India.
Email: *nallapanenichow@gmail.com, sonali19881@gmail.com, pradeepmallick84@gmail.com*

***Abstract*—Smart cities are the modern urban concepts that are essential for people to have quality life. It is the conceptual view of grouping various technologies to attain smart and sustainable practices. This paper proposes the smart city definitions based on the general approach and the 3-C concept that defines the core character of the smart city. Moreover, this paper also presents a comprehensive study on the smart city concept in the view of India focusing on the features, selection and evaluation criteria, and policies. Besides these, present status, and challenges in the view of smart city in Indian context is also discussed.**

Keywords—Smart city, smart city mission India, smart city defination, features of smart city, 3-C concept of smart city.

I. INTRODUCTION

Increase in the population and the essence of comfortable living gave a tremendous growth in the urban areas [1] leading to the urbanization. In the present context urban areas refer to the towns, and cities which are complex when compared to rural areas in all the aspects of life. These urban areas generally consist of complex sub systems one depending on other and vice versa [2]. If one system fails to operate then influence would affect the other. Hence in urban areas most of things are interlinked and helps for the survival of people. Considering a typical example of water, food, transport, and energy: in urban areas food, transportation, and water are completely depending up on energy. If no energy is available none of the above services works [3]. This will directly or indirectly affect the quality of people's life. In broader view, the city needs the adequate supply of water, access to energy, effective and efficient mode of transport, sense of security, and the sense of safety [3]. To manage all these, amalgamation of technology, administrative efforts, and government policies were needed. One concept which would consider all these factors is the smart city concept. This paper aims to generalize and propose the definition of smart city. Also involving the comprehensive study on smart cities in India focusing on features, policies, present status and challenges.

Paper is organized in five different sections, each section having its specific contribution related to the topic of research i.e. smart cities in India. In section-I, urban life and problems associated with it were clearly stated giving a scope for smart city developments. In section-II, authors proposed a 3-C concept of smart city highlighting its characteristics and few definitions to the smart cities based on the general approach as well as technology integration approach. Section-III, gives the over view of smart cities in India, along with their proposed features, eligible criteria for selection, and policies. In section-IV, the present status and challenges faced by the smart city mission in India is discussed. Finally, the paper is concluded in section-V.

II. SMART CITY AND ITS DEFINATION

Smart city is a concept that has no specific definition. But it only defined with respect to grouping of various resources, technologies, and administrative activities for the wellbeing of people as well as the sustainable development. The word smart city is otherwise defined as the *Urban Intelligence* or *The Intelligence in Urban Life* that enables comfort and security in all the aspects needed for people. This definition or the meaning of smart city might vary from location to location, people to people, and governments to governments depending up on their strategies, and resources.

Smart cities are generally comprising of the various sectors that needs equal development in terms of the competence, convenience, and cleverness. Here authors tried to explain the smart city physiognomies with 3-C (competence, convenience, and cleverness) concept. This 3-C concept explains the smart city core features, see in Fig. 1. Hence, we propose a definition for the smart city as *A city concentrating on the environmental, economic, and social aspects of urban life in competent, convenient, and cleaver way for attaining the quality of life with the amalgamation of intelligent and sustainable technologies.*

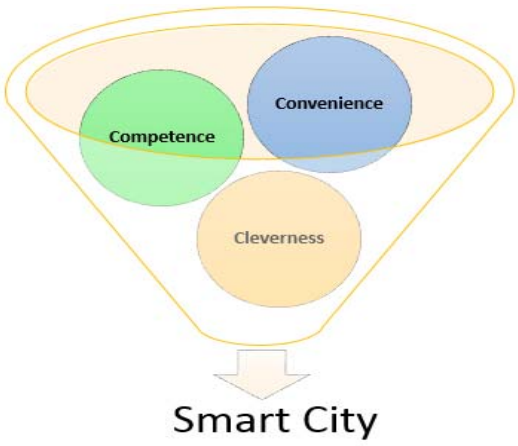

Fig. 1. Physiognomy of smart city (Concept of 3-C)

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Fig. 2. Smart city features adopted by the smart city mission in India [9].

However, in general it is said as the urban development concept with the help of science and technology especially the ICT (Information and Communication Technologies) [4] such as Internet of Things [5-7], Artificial Intelligence [8] etc. The adopted ICT will help in forming an interconnected network among the people living in the city, to various service providers making the all the systems and services happen in smart and intelligent way within the comfort levels of the citizens.

III. Smart Cities in India

The word smart city became a wide spread soon after the announcement made by the Prime Minister of India to initiate and development 100 smart cities across India [2]. As an initiative, smart city mission is framed along with defined features, selection, and evaluation criteria.

A. Features of Smart Cities

Features adopted for the smart city development in India were shown in Fig. 2. These features include the sustainable practices in terms of technology usage, governing policy, economic viabilities etc. Efficient use of land area in both the planned and unplanned areas should be done. Expansion of housing and other infrastructure facilities for all those living in city could be made and such flexibilities will help in improving the quality of life. Another important feature is the creation of service facilities with in the cycling or walkable distances. This reduces the use of vehicles indirectly reducing the air pollution, and resources. Such features will help in boosting the economy of the city. Another few important features are the development of public utility facilities such as recreational, playgrounds, parks in the dedicated local housing communities. Allowing the intelligence transportation systems especially quality and affordable public transportation. Economy developmental activities such industry, tourism, education, sports facilities etc. to be improved with friendly governance policies including the public-private partnership. Administrative and the government services offered should be made transparent and faster with the use of technology. The above discussed are the few features adopted by the smart city mission or the program in India [9].

B. Eligible and Selection Criteria for Smart Cities

Eligibility and the selection criteria for the smart city depends on its features and this selection process is done truly based on the competitive challenge. In India, smart city selection includes the ideas of competitive and co-operative federalism [9, 10]. A three-step selection process is followed as per the smart city mission in India to select and allocate funds for the development [10].

Step-1: As an initial step, scanning of smart city proposals is done by substantiating the extensiveness, clarity etc. After the wetting process, a unique identification number is assignment for the respective proposal. The initial step is completely processed by Ministry of Urban Development, Govt. of India (MoUD-GoI).

Step-2: The second step is the evaluation of smart city proposals by the expert committee members from Indian as well as the Foreign.

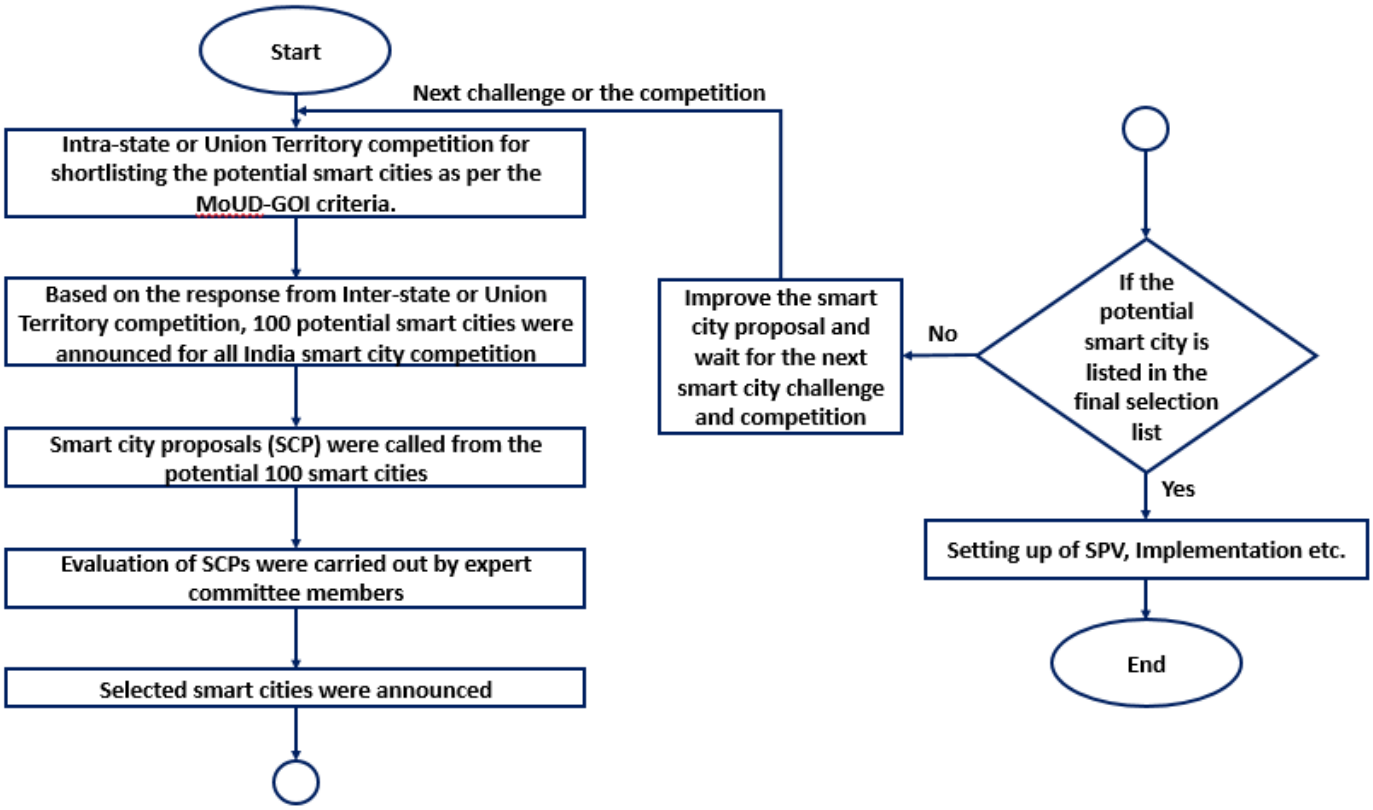

Fig. 3. Selection and eligible criteria for the smart city in India.

Step-3: Final step is the review of the expert committee comments and selection by the Apex Committee, with in the Ministry of Urban Development, Govt. of India (MoUD-GoI).

A detailed selection process for a city to be included or selected for the smart city development program in India is shown in Fig. 3.

C. *Smart City Mission, Policies and Schemes in India*

Smart Cities Mission (SCM) in India was introduced and flung by the honorable Prime Minister of India. 25th June 2015 is the flagship day for the five-year smart cities mission in India [9, 10]. The main intensions of the SCM is to have urban renewal and retrofitting programs with a strong motive of developing 100 smart and sustainable cities. The ministry responsible for implementing the SCM is The Ministry of Urban Development (MoUD) under the Govt. of India (GoI) with the active involvement of state governments as well as the union territories [9-12].

Few policies or the schemes that were seen to be helpful in the Smart City Mission Program are as follows [10]:

- Atal Mission for Rejuvenation and Urban Transformation (AMRUT).
- National Transit Oriented Development (TOD) Policy
- PPP Models for Affordable Housing
- National Urban Sanitation Policy
- National Urban Transport Policy
- National Mission on Sustainable Habitat
- Public-Private Partnership (PPP).
- Pan City Initiatives.
- Schemes for developing Special Purpose Vehicle (SPV) and Urban Local Bodies (ULBs).

IV. CURREN STATUS AND CHALLENGES

In this section, the present status of smart cities that were selected for the development in the evaluation phase of smart city mission were discussed. Along with the status, few challenges faced by the smart city mission were also defined.

A. *Current Status*

The total of INR 189155 Cr is estimated to be total investment towards the smart city development across [9]. This estimated investment was approved by the cabinet, and if extra budget is needed for the smart city development, then the state governments must raise the funds to develop their plans.

This estimated investment is distributed in the two categories that is a sum of INR 152499 Cr only for the specific areas-based projects identified and approved under the smart cities mission program. Remaining INR 36656 Cr is invested on the promotion of smart initiatives under the pan city initiative scheme [10].

As per the smart city mission program, a list of potential smart cities for the state level as well the All India Level Smart Cities Competition were selected based on the eligible and selection criteria shown in Fig. 3.

The final list of eligible smart cities for "100 new smart cities in India" were released in the three consecutive rounds. In the selection list of Round-I, 20 cities were shortlisted, also 13 more cities were selected under the fast track round program of smart cities mission. Another 63 potential smart cities were shortlisted in the Round-II, and in Round-III, 30 smart cities were identified and selected. All these selected and finalized cities were asked to form a special purpose vehicle (SPV) resembling as limited company with in the city where the smart city is planned under the Companies Act, 2013. This company would be responsible for implementing the smart city plans and develop the city as per the proposal design [10].

Considering the present scenarios of the Indian cities, mostly are in the race of developing concentrating major thrust fields of the economy such as Banking, Information Technology, Energy, Power, Hotels, Media and Television, Film Industry, Food, Tourism, Cultural heritage, Telecom, Textile etc. Among the development race, few cities like Delhi, Hyderabad, Pune, Mumbai, Bangalore, Chennai, Kolkata were showing extreme progress in terms of various sectors [13].

B. Challenges

There are few challenges which needs to be addressed, up on which the progress of smart cities would be much better. These challenges were listed below:

- Lack of strong interlinked and interdepended work culture between the states and central.
- Lack of smart leadership and vision.
- Lack of ability to plan and frame the smart city success defining factors.
- Less understanding over the technological aspects of smart city elements.
- Less awareness over "retrofitting, redevelopment and greenfield development concepts.
- Lack of smart city vision-oriented policy makers, implementers, evaluators, and stakeholders.
- Lack of investments
- Lack of good partnership with private or other interlinked regulatory bodies.
- Less awareness over the resource management.
- Lack of smart people who actively participate in governance and reforms.
- Less support from the citizen or the people.
- Less improvements in the strategic development activities.

V. CONCLUSION

Over view of smart cities in India focusing on the features, policies, status, and challenges were presented in this study. Definition for the smart city in general context as well as technology integration is explained and proposed. Selection and evaluation criteria for smart cities in India were clearly stated. This paper, will be a useful reference or the material for the people who are working in research elements of smart city.

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