



Role of Information Technology in Sustainable Smart City Development

Author: Seema¹

¹Assistant Professor, Department of Commerce, Government College, Sidhrawali, Gurugram

Email:seemajangra119@gmail.com

Abstract:After independence, ministry of Housing and Urban Development is trying to provide the basic civic amenities to every citizen of India. Department of Urban Local Bodies is playing an important role for the development of small towns and cities in the country. But in the present age of Information Technology, basic amenities and infrastructure is not sufficient to handle the burden specially in the highly populated cities like metro cities. So information technology plays an important role in developing smart cities so that bottlenecks can be handled with technology and smart solutions can be implemented by using available resources. This can be a long-term goal and cities can work towards developing such comprehensive infrastructure incrementally, adding on layers of ‘smartness’.

Keywords:GPS, Pan-city, IIT, SVM, SBT

Introduction:To fulfill the needs of urban citizens,urban planners ideally aim at developing the entire urban eco-system, which is represented by the four pillars of comprehensive development-institutional, physical, social and economic infrastructure.

In the approach of the Smart Cities Mission, the objective is to promote cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of ‘Smart’ Solutions. The focus is on sustainable and inclusive development and the idea is to look at compact areas, create a replicable model which will act like a light house to other aspiring cities. The Smart Cities Mission of the Government is a bold, new initiative. It is meant to set examples that can be replicated both within and outside the Smart City, catalysing the creation of similar Smart Cities in various regions and parts of the country. The core infrastructure elements in a smart city would include:

- i. adequate water supply,
- ii. assured electricity supply,
- iii. sanitation, including solid waste management (SVM),
- iv. efficient urban mobility and public transport,
- v. affordable housing, especially for the poor,
- vi. robust IT connectivity and digitalization,
- vii. good governance, especially e-Governance and citizen participation,
- viii. sustainable environment,
- ix. safety and security of citizens, particularly women, children and the elderly, and
- x. health and education.

Objective:

This paper is an attempt to find out the role of Information Technology in providing smart solutions for the development of Smart Cities.

Material and Methods:

This research paper is based on secondary data collected from various magazines, websites, journals, case studies and books.

Features of Smart Cities:

Some typical features of comprehensive development in Smart Cities are described below.

1. Promoting mixed land use in area based developments—planning for ‘unplanned areas’ containing a range of compatible activities and land uses close to one another in order to make land use more efficient. The States will enable some flexibility in land use and building bye-laws to adapt to change;
2. Housing and inclusiveness - expand housing opportunities for all;
3. Creating walkable localities –reduce congestion, air pollution and resource depletion, boost local economy, promote interactions and ensure security. The road network is created or refurbished not only for vehicles and public transport, but also for pedestrians and cyclists, and necessary administrative services are offered within walking or cycling distance;
4. Preserving and developing open spaces - parks, playgrounds, and recreational spaces in order to enhance the quality of life of citizens, reduce the urban heat effects in Areas and generally promote eco-balance;
5. Promoting a variety of transport options - Transit Oriented Development (TOD), public transport and last mile para-transport connectivity;
6. Making governance citizen-friendly and cost effective - increasingly rely on online services to bring about accountability and transparency, especially using mobiles to reduce cost of services and providing services without having to go to municipal offices. Forming e-groups to listen to people and obtain feedback and use online monitoring of programs and activities with the aid of cyber tour of worksites;
7. Giving an identity to the city - based on its main economic activity, such as local cuisine, health, education, arts and craft, culture, sports goods, furniture, hosiery, textile, dairy, etc;
8. Applying Smart Solutions to infrastructure and services in area-based development in order to make them better. For example, making Areas less vulnerable to disasters, using fewer resources, and providing cheaper services.

Strategy to develop Smart Cities:

The strategic components of area-based development in the Smart Cities Mission are city improvement (retrofitting), city renewal (redevelopment) and city extension (greenfield development) plus a Pan-city initiative in which Smart Solutions are applied covering larger parts of the city. Below are given the deions of the three models of Area-based smart city development:

- Retrofitting will introduce planning in an existing built-up area to achieve smart city objectives, along with other objectives, to make the existing area more efficient and liveable. In retrofitting, an area consisting of more than 500 acres will be identified by the city in consultation with citizens. Depending on the existing level of infrastructure services in the identified area and the vision of the residents, the cities will prepare a strategy to become smart. Since existing structures are largely to remain intact in this model, it is expected that more intensive infrastructure service levels and a large number of smart applications will be packed into the retrofitted smart city. This

strategy may also be completed in a shorter time frame, leading to its replication in another part of the city.

- Redevelopment will effect a replacement of the existing built-up environment and enable co-creation of a new layout with enhanced infrastructure using mixed land use and increased density. Redevelopment envisages an area of more than 50 acres, identified by Urban Local Bodies (ULBs) in consultation with citizens. For instance, a new layout plan of the identified area will be prepared with mixed land-use, higher FSI and high ground coverage. Two examples of the redevelopment model are the SaifeeBurhani Upliftment Project in Mumbai (also called the Bhendi Bazaar Project) and the redevelopment of East Kidwai Nagar in New Delhi being undertaken by the National Building Construction Corporation.
- Greenfield development will introduce most of the Smart Solutions in a previously vacant area (more than 250 acres) using innovative planning, plan financing and plan implementation tools (e.g. land pooling/ land reconstitution) with provision for affordable housing, especially for the poor. Greenfield developments are required around cities in order to address the needs of the expanding population. One well known example is the GIFT City in Gujarat. Unlike retrofitting and redevelopment,
- Greenfield developments could be located either within the limits of the ULB or within the limits of the local Urban Development Authority (UDA).
- Pan-city development envisages application of selected Smart Solutions to the existing city-wide infrastructure. Application of Smart Solutions will involve the use of technology, information and data to make infrastructure and services better. For example, applying Smart Solutions in the transport sector (intelligent traffic management system) and reducing average commute time or cost of citizens will have positive effects on productivity and quality of life of citizens. Another example can be waste water recycling and smart metering which can make a huge contribution to better water management in the city.

The smart city proposal of each shortlisted city is expected to encapsulate either a retrofitting or redevelopment or greenfield development model, or a mix thereof and a Pan-city feature with Smart Solution(s). It is important to note that pan-city is an additional feature to be provided. Since smart city is taking a compact area approach, it is necessary that all the city residents feel there is something in it for them also. Therefore, the additional requirement of some (at least one) city-wide smart solution has been put in the scheme to make it inclusive. For North Eastern and Himalayan States, the area proposed to be developed will be one-half of what is prescribed for any of the alternative models - retrofitting, redevelopment or greenfield development.

Technology based Smart Solutions:

Some of the example of smart solutions are illustrated below.



Pune Municipal Corporation (PMC) envisages implementing Solid Waste Collection and Monitoring System as a city wide integrated platform for its diverse set of waste collection needs which include operations of public transportation, management of vehicles operating for other civic services like solid waste, engineering and emergency services.



1. **GPS based tracking for Garbage collection Van:** GPS based collection vehicles will help in tracking the location of nearest available vehicle and control room can direct the vehicle to attend the garbage collection call from citizen.

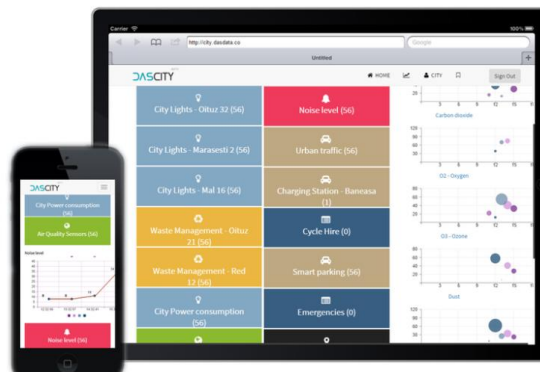


2. **Central control room for immediate response and action:** Central control room can record the calls of garbage collection from the city and provide immediate response.

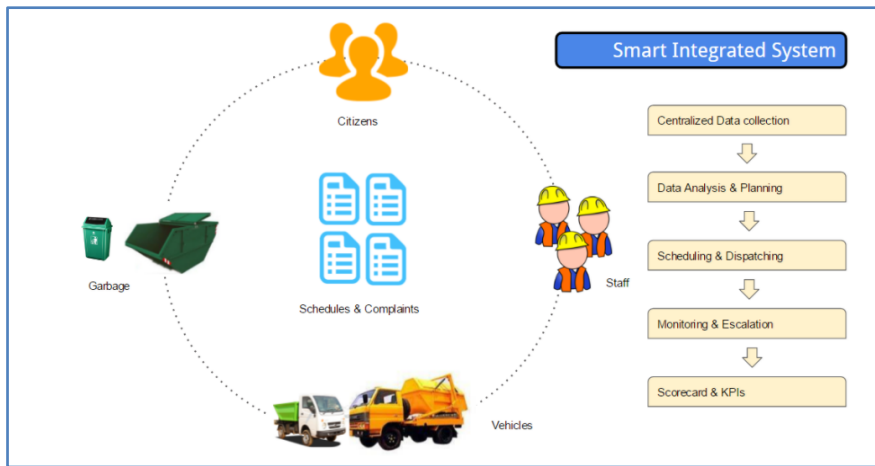


3. **Area wise dashboard monitoring system:** Displaying area wise details of Garbage vehicle, Swatch workers, bins points will be helpful for citizens.

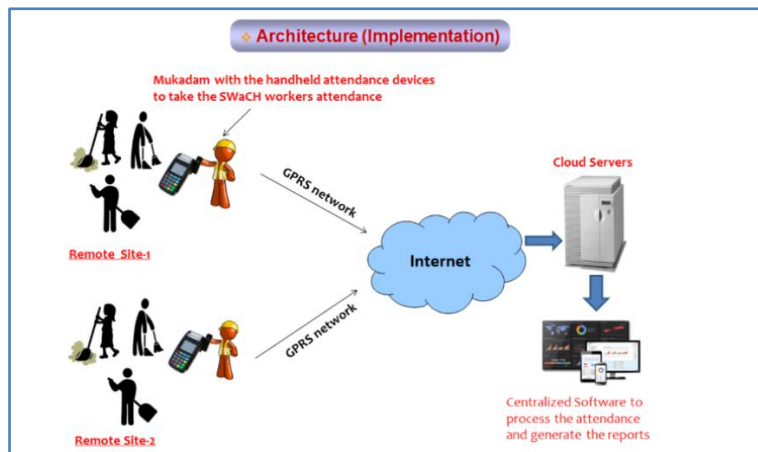
Smart Citizen Dashboards



4. **Smart Integrated System:** Smart integrated system is helpful in analysing the data of complaints in the city which enables planning to focus on specific area.



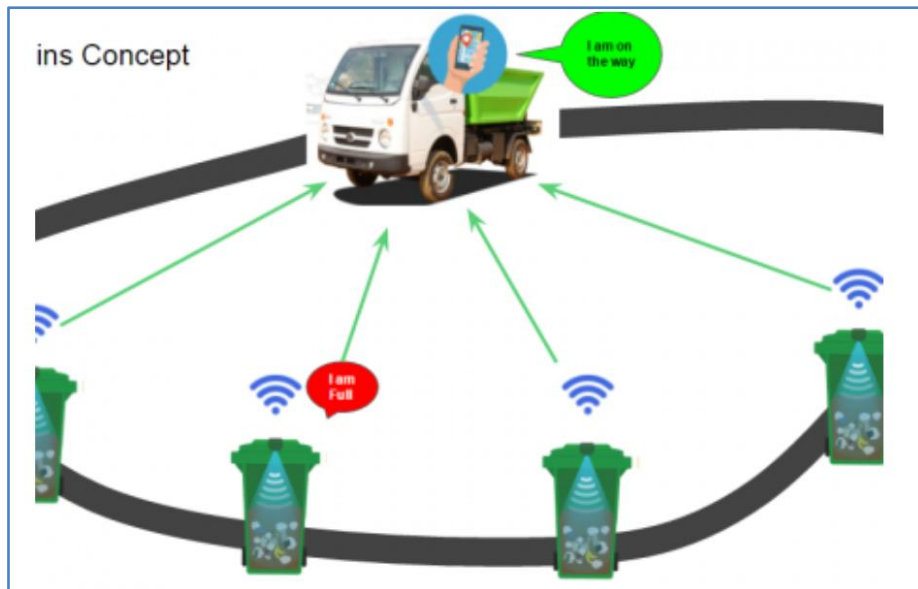
5. **Hand Held device for Swatch worker attendance:** Hand held devices can help in attendance monitoring and report keeping of swatch workers.



6. **Mobile App based Garbage collection Van:** Mobile app based Garbage collection van which can be called on request.



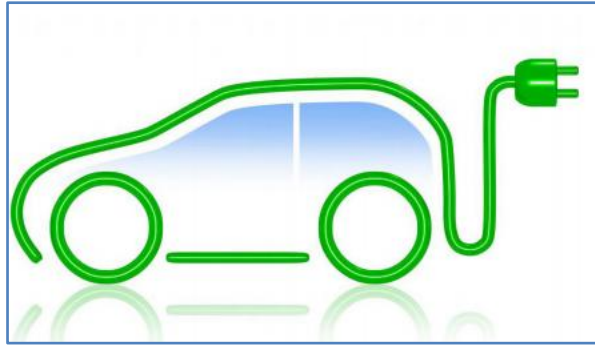
7. **Smart Garbage collection bins:** Sensor based bins so that automatic notification is sent to monitoring control room so that Garbage collection can be sent to bin location.



8. **Mobile based connect app for all basic amenities:** One mobile app solution for multiple civic amenities provided by urban local bodies



9. **Bhubaneswar E-Mobility Plan:** Bhubaneswar-Puri Transport Service Limited (BPTSL) has decided to run a pilot project to check the feasibility of using E-vehicles to save the environment.



10. Soil-Bio-Technology (SBT) based Sewage Treatment Plants: After research of almost 2 decades, IIT Bombay has developed Soil Bio-technology or (SBT) process of waste water treatment, recycling and its reuse. It is a green engineering approach and is considered as notable technology contribution from IITB to waste management. This technology has been awarded US and Indian patents. SBT is based on a bio-conversion process, maintenance free, claims non-production of bio-sludge & foul odour, consumes least energy, claims to give effluent compliant to River water disposal standards and has green aesthetics. Its operation is simple, economical & energy efficient. It claims to have served industries, housing societies, resorts, schools / universities / ashrams, hotels, municipal corporations & airports etc. Such technology driven initiatives help in maintaining clean environment for future generations.

Benefits of Smart Cities:

The purpose of the Smart Cities Mission is to drive economic growth and improve the quality of life of people by enabling local area development and harnessing technology, especially technology that leads to Smart outcomes. Area-based development will transform existing areas (retrofit and redevelop), including slums, into better planned ones, thereby improving liveability of the whole City. New areas (greenfield) will be developed around cities in order to accommodate the expanding population in urban areas. Application of Smart Solutions will enable cities to use technology, information and data to improve infrastructure and services. Comprehensive development in this way will improve quality of life, create employment and enhance incomes for all, especially the poor and the disadvantaged, leading to inclusive Cities.

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