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# Drivers & Barriers for Sustainable Development of Indian Smart Cities

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**ABSTRACT:** Smart city development is gaining considerable recognition in the systematic literature and international policies throughout the world. Development of smart cities has grown to be vital in achieving sustainability in urban development. The Smart Cities Mission is an innovative and recent initiative by the Government of India to develop smart cities pan-India to enable economic growth and improve the quality of life of people by enabling local development and using smart technologies to make its citizens life better. Therefore, this study attempts to identify the key barriers and drivers of smart cities from a review of existing literature. This study could contribute to the literature and be instrumental to the government and policymakers to frame the suitable policies for eradicating the potential barriers and recognize the drivers for sustainable development of smart city in developing countries like India.

**KEYWORDS:** Smart cities, Sustainable development, Barriers, Smart city mission, Drivers

## I. INTRODUCTION

CITIES play an important role in the growth for the economy of every nation, India is no exception. INDIA is amongst the many developing countries witnessing a rapid rural to urban shift. This change is reflected by the greater decadal growth of the urban versus rural population. Close to 31% of India's current population lives in urban areas and contributes 63% of India's GDP (Census 2011). With increasing urbanization, 40% of India's population set to house in urban areas and thereby contribute 75% of India's GDP by 2030 (Ministry of Urban Development, 2015). INDIA is amongst the many developing countries witnessing a rapid rural to urban shift. This change is reflected by the greater decadal growth of the urban versus rural population. The urban population in India increased from around 27.8% (286 million) in 2001 to 31.2% (377 million) in 2011 (MoUD) and is estimated to grow to 40% by 2030 and more than 50% by 2050. The population growth in cities is accompanied by infrastructure management and service delivery challenges. The development of smart cities is one strategy being deployed to efficiently and effectively cope with these challenges.

## II. SMART CITY MISSION IN INDIA

The SCM is the first significant step towards the comprehensive implementation of the smart city concept in India. The MoUD defines a smart city as "building and promoting cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment, and the application of smart solutions". The SCM views a smart city as doing more with less, building upon existing infrastructural assets and resources, and proposing resource efficient initiatives. The mission has further defined smartness in terms of both physical and non-physical assets such as water supply, waste management, energy sources and supply, safety, citizen participation, economy and employment, and education.

## III. IMPORTANCE OF SMART CITIES FOR SUSTAINABLE URBAN DEVELOPMENT

Rapid economic growth has been beneficial to the cities as they have become centres of production, commerce, education and governance (Jago-on, et al. 2009). However, it has also created environmental problems, in air and water quality, decreasing water supply, insufficient housing and sanitation facilities, traffic congestion and increasing solid waste. Rapid increase of urbanization is an opportunity as well as a challenge to the country's effort in achieving sustainable urban development (Henderson, et al. 2009). As stated by Kagan, et al. (2018), different definitions and criteria are available for sustainable urban development depending on the population growth and on the requirements of sustainability.

**Table 1.1: Definitions of Sustainable Urban Development**

<i>Author(s)</i>	<i>Definition</i>
Bibri and Krogstie (2017)	Achieving a balance between the development of and equity in the urban areas and the protection of the urban environment
Hassan & Lee, (2015)	Strategies and processes that drive the progress in the field of sustainability within urban areas
Li et al. (2009)	Economic growth and efficiency, ecological and infrastructural construction, environmental protection and social and welfare progress
Brindley (2003)	Revalidation of urban living, in contrast with the geographically dispersed city and the high levels of personal mobility that have increasingly become the norm

Operational definition of sustainable urban development is - Achieving a balance between urban development with economic growth, efficiency, environmental protection and with social and welfare progress.

In recent years, sustainable development is a widely used term, which has an influence on urban planning and development (Dempsey et al. 2011). Moreover, ongoing concentration of the global population in urban areas, implies the increasing importance of addressing issues of sustainable development (Höjer and Wangel 2015). Sustainable urban development has become a key target due to rapid urbanization and because of social, environmental, and economic problems in cities (Hassan and Lee 2015). Nilssen (2018) stated that smart city is becoming an increasingly popular focus in achieving sustainable urban development. Recently, the concept of smart city has become important in urban development planning because, the local authorities face challenges regarding the resolving of climatic, energy and urbanization problems (Sikora-Fernandez 2018). According to Neirotti, et al. (2014), the concept of smart city has gained an increasing importance because of enhancing the quality of life of citizens. Smart cities are important in having a better environment, social and economic conditions and in improving the attractiveness and competitiveness (Trindade, et al. 2017). Hashem, et al. (2016) stated that, smart cities play a key role in enhancing human life, transportation, health, energy and education. Bello, et al. (2018) mentioned that, initiating smart cities benefits in intelligent sensing, widespread connectivity and drive effective action which is important for sustainable urban development. Moreover, Zhang, et al. (2018) also stated the importance of smart cities for achieving urban sustainability to gain a sustainable and healthy future. The above factors ascertain the significance of smart cities for sustainable urban development.

#### IV. DRIVERS IN INITIATING SMART CITIES DEVELOPMENT

Technology, actors, policies, goals, vision and governance are identified as drivers of smart city development (Dameri 2013). Moreover to Dameri (2013), the main driver for smart city birth and development is technology. Anttiroiko, et al. (2014) also identified the importance of smart use of ICTs as a driver in initiating smart cities. Physical capital, natural capital, social capital and digital capital are the drivers of smart cities identified by Abdoullaev (2011). VanWinden and Van Den Buuse (2017) stated that, smart city projects require support from municipalities and run in partnerships with funding from subsidies.

#### V. BARRIERS IN INITIATING SMART CITIES DEVELOPMENT

According to Hernández-Muñoz, et al. (2011), lack of ICT infrastructure and knowledge related for technological advancement is a challenge in adopting smart cities. Moreover, Elmangoush, et al. (2013) also highlighted the requirement of knowledge and competence in initiating smart cities. The need for policy changes, limited capital availability, political uncertainties and disorganized funding structures prevent investment in initiating smart cities (Vilajosana, et al. 2013). Scuotto, et al. (2016) mentioned that, building knowledge and creating relationships with external stakeholders is a barrier in initiating smart cities. Initiating smart cities require consideration of the stakeholders who need to be involved in the planning and governance of the city. Hence, it is also considered as a barrier for adopting smart cities (Höjer and Wangel 2015). Furthermore, modelling, understanding, and influencing human behaviour, and creating trust in technologies act as key challenges (Naphade, et al. 2011). Bakıcı, et al. (2013) identified lack of skilled human capital, funding and global connectivity as barriers in a smart city development project.





## VI. STRATEGIES TO OVERCOME THE BARRIERS IN INITIATING SMART CITIES

### i. Role of Better Governance and Effective Decision-Making

The role of governance is prominent in developing smart cities within a country. Better governance will help to better co-ordination between central, state governments and parties involved in smart cities development to increasing the effectiveness of smart cities related policy decisions and involvement of the public. Government policymakers and practitioners may promote e-governance services to bring about accountability and transparency in decision-making process, which will help smart governance in developing smart cities.

### ii. Provision of Higher Resources and Infrastructure

This is important for the management of resources, such as equipment and humans required for performing the intended functions in developing smart cities. Funding and developing infrastructure for smart cities projects remains a challenge, therefore governments must focus on creative solutions and participation by both the public and private sectors. Consequently, having adequate funds and resources allocated are crucial in smart cities initiatives.

### iii. Technological Advancements

In a truly smart city of the future, hyper connection and automation will be paramount. This capability will be dependent on integrating advanced information technologies such as Internet of things (IoT). It will help to a) manage infrastructure decisions; b) improve service level of the end users; c) enhance levels of cross-sector collaboration and d) map government policies to deal with climate change related problems.

### iv. Awareness among Community

In developing smart cities, smart community development is necessary. Currently, the involvement of community is less integral in smart cities development, particularly in India. It is important to develop an efficient IT infrastructure by aligning the skills and expertise of people involved in the system. Therefore, practitioners and policymakers must focus on smart community planning to act as a catalyst in solving key issues such as environment, transport and security.

### v. Higher Ecological Performance and Sustainable Development

Smart city development puts greater pressure on resource consumption, infrastructure, and development practices, which may have a negative impact on the environment. Therefore, it is crucial to measure and assess/evaluate policies, infrastructure, socio-economic factors, resource use, emissions and any other processes that contribute to quality of life. Hence, logical planning is needed to address social and ecological sustainability challenges in smart city development.

## VII. CONCLUSION

In the present scenario, Cities are facing complex challenges in attaining sustainable development within the context with the rapid urbanisation. Verdicts of the critical literature survey prove that cities are getting more condensed in the future. Therefore, an emerging requirement of smart cities can be determined. Though the requirement of initiating smart cities is getting increased, there are barriers, which are required to be overcome and drivers which are required to be recognized. While techno-financially, a Smart City does not seem to be much of an issue, the biggest challenge is to fuse it with the existing urban, governance and the social fabric of the country. This could be fulfilled effectively if new Smart Cities initiative focus on sustainable urbanization, good governance, transparent metrics and reporting.

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