

## Sustainable Urban Development of Smart Cities in India-A Systematic Literature Review.

Desarrollo urbano sostenible de ciudades inteligentes en India:  
una revisión sistemática de la literatura.

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### ABSTRACT

The current accelerated urbanization in India will result in a growth of another 140 million over the current status of 450 million people living in the urban area. This signifies that around 40 percent of India's population will reside in urban areas of the country. Among the 17 sustainable development goals (SDGs) one important goal is to have Sustainable cities and communities in agenda 2030, hence cities have immense potential to contribute to fulfilling sustainable development goals. In India responsible institutes at the state and national level have applied the concept of sustainability with sustainable urban development. The present study aims to analyze works of literature available on both environmental sustainability and smart city concepts and also to understand the relationship between these two. The research methodology used for the objective stated would be qualitative, through a systematic review of the literature using R as a statistical tool. The study intends to provide detailed information on the most recent articles focusing on smart cities and how they would lead to sustainable development. Further, the scope of the current study would give important input to policymakers and researchers seeking information for further investigation and implementation of policies.

Keywords: Smart Cities, Urban Development, Sustainable development

## RESUMEN

La urbanización acelerada actual en India dará como resultado un crecimiento de otros 140 millones sobre el estado actual de 450 millones de personas que viven en el área urbana. Esto significa que alrededor del 40 por ciento de la población de India residirá en áreas urbanas del país. Entre los 17 objetivos de desarrollo sostenible (ODS), un objetivo importante es tener ciudades y comunidades sostenibles en la agenda 2030, por lo que las ciudades tienen un inmenso potencial para contribuir al cumplimiento de los objetivos de desarrollo sostenible. En India, los institutos responsables a nivel estatal y nacional han aplicado el concepto de sostenibilidad con el desarrollo urbano sostenible. El presente estudio tiene como objetivo analizar los trabajos de literatura disponibles sobre los conceptos de sostenibilidad ambiental y ciudad inteligente y también comprender la relación entre estos dos. La metodología de investigación utilizada para el objetivo planteado sería cualitativa, a través de una revisión sistemática de la literatura utilizando R como herramienta estadística. El estudio tiene la intención de proporcionar información detallada sobre los artículos más recientes que se centran en las ciudades inteligentes y cómo conducirían al desarrollo sostenible. Además, el alcance del estudio actual brindaría información importante a los encargados de formular políticas e investigadores que buscan información para una mayor investigación e implementación de políticas.

Palabras clave: ciudades inteligentes, desarrollo urbano, desarrollo sostenible

## INTRODUCTION

Sustainable development in India has always been a widely discussed topic amongst the government and even the students. In context with the concept of smart cities, sustainable development is the key for the project to succeed. The ever-growing population of a country like ours and the increasing demand for the resources along with it has been a major area of thought for the committee set up for the project by the government. (Mougeot, L. J. (2006))<sup>1</sup>.

To begin with the concept of sustainable development in the smart cities of the country, it is essential to state that people or citizens of the whole nation need to pay heed to the efforts and see this as an opportunity for the cities to grow in terms of economic conditions, infrastructure, cultural practices, facilities, etc rather than seeing this as a problem to their ongoing work. Every project initiated by the government already has a blueprint available including the follow-ups in case of any change or such, which can only be put into effect with the support and our help, i.e. by the citizens of the country. Together

we can make sure, that the smart cities are not only those which are under renovation but also, we can make new smart cities by implementing urbanisations in those cities which have the potential to be transformed. Reid, D. (2013).<sup>2</sup>

As the word suggests, sustainable means to improve the present for a better tomorrow/future. This is important in view of the renewal of the cities in order to employ more of environment friendly measures and leading to an economically stable financial condition that is viable for the citizens of the cities. The mission of the government that is focusing on the smart cities aims to transform 100 cities across the nation into smart cities which would be sustainable for the future along with being citizen friendly in the present too. This mission/project is one step towards our nation towards being amongst the developed nations in the world. The main protocol developed by the state and the central government to achieve the aim of developing the smart cities is by providing a financial aid to the cities for the infrastructural and other helps. The results were earlier sought to be achieved by a part by 2022, but now it has been said that the project would surely see results by 2030. Rai, S., Deshpande, M., & Thakur, G. (2020).<sup>3</sup>

The country today has five mega cities which are Delhi, Mumbai, Chennai, Kolkata and Bangalore. It has been estimated that by 2030, Ahmedabad and Hyderabad shall be added to the list, then counting as 7 and being the nation with the maximum concentration of megacities in the world. Despite of this ever-growing population, India ranks second in the world in terms of the urbanization rate. The concept of smart cities would be responsible for sorting the issues relate to the developmental issues in these cities. This concept of adopting a civilised approach is sometimes referred to as Smart Growth. Smart growth doesn't have a fixed definition as its meaning differs for every city or individual depending upon the amount of previous changes and development of the area. Satterthwaite, D. (2007).<sup>4</sup>

Adding to the barriers caused by the daily life of the citizens from the work on smart cities, there are cities which face a really high risk of disaster events to take place. This may be due to the location and the continuous climatic changes happening at the spot. These risks and the strains caused due to the ever-increasing population add up to provide hindrance in the progress of the project. But it has to be noted that the governments all around the world are all putting in efforts to stand the barriers and work for the benefit of all. A question has always been asked that what should be approach to achieve a development which can be sustained for the future. The answer lies in the question itself i.e., the aim is made anything we transform as sustainable. Thus, it implies that the technology to be used has to be hand in hand with the type of strategical planning for the work. The pros and the cons have to be taken into consideration like the energy efficiency, the following pollution, the hazards which may be caused, the healthcare

facilities available and the list continues. The most important aspect which has to be taken care of which planning a strategical approach is growth which should sync with the innovation of the cities. Murray, P. (2011)<sup>5</sup>

The result would be a sustainable and smart city, which would be a place where the technologies and services will mark the quality of development. This would comprise mainly of production, services, technologies and also the smart infrastructure which would be then the "Intelligent" communicator like the sensors, etc. These all aspects can become viable when they are integrated, supported and mutually connected. Sverdrup, H. U., Koca, D., & Ragnarsdóttir, K. V. (2013).<sup>6</sup>

It is also said that this plan of smart cities would be the Urban Ecosystem where efficiency of the businesses and the people would make it a megacity of the country and the world. As discussed, the citizens are like the foundation of the project i.e. a slight lack in their support either functionally, socially or even emotionally would result in the downfall of the project and the plan would fail. Kumar, T. V., & Dahiya, B. (2017).<sup>7</sup>

## LITERATURE REVIEW

Edward Glaeser stated in his work "Triumph of the city" (2011) ..... "*humanity's greatest invention-city, is the best hope for future to make it richer, smater, greener, healthier and happier*"..... .His literature stated the evolution of city from the period of Mesopotamia ,how the Indians and the Egyptians modernize their day to day operations one example could be the use of wheels. The author had described the entire evolution in the form of a development timeline from early age to Morden day. However, the author also feels that how the increase in development in urban areas has deteriorated the urban life and decaying the purpose of cities.

City Decay has been a major concern to many policy makers and government across the globe. American Planning Association (APA) and other agencies coined the 'smart Growth' concept and Maryland became the first state to establish smart growth programme.<sup>8</sup>

The term smart growth or smart city was initially coined by the US but now it's a major concern of governments, corporates, academia and research institute. The fact cannot be denied that Globalization and trade liberalization practices by many nations had led to fast technological upgradations and increased consumptions across globe, which automatically effected the productivity of businesses. Hence these changes in business transformation has substantially affected the urban development (Thornley,2000).

Increase in industrialization and increased population has escalated the thought of the endeavour towards smart city, which can prove to be a solution to problems like population and pollution.

Urban ecologist from Harvard School of design Mitchell Joachim stated in his TED talk smart cities as 2.0 City, he emphasised on bringing the citizens role to contribute towards development of smart cities. In his talk he emphasized on innovations as the main game plan for smart city development with ecological sustainability

Hugh Green stated in his Ted talk that smart cities can be named as 'eco city', 'environmentally friendly city' and 'sustainability city'. As Mitchell stated even Green also emphasised the individual's involvement in building of smart city. He also stated that not only designing but checking its feasibility through innovative implementation is important. Many definitions given by different thoughts while defining smart city mainly emphasis on data integration, technology enabled domains cool gadgets and shiny technology. Paula Kwan in her TED talk gave the meaning of smart city as per her opinion smart cities is thinking beyond technology, its more of connecting people with people. Smart cities are about designing the advancement of a community's experience that include elements like culture, music, art and language alongside technology. Her talk stated the importance of using legacy, value and principles of people to develop smart city rather than just focusing on technology advancement.

Ted talk delivered by Nigel Jacob on rethinking smart cities also emphasized on people centric city rather than technology centric city and defined smart city where the people voice can be listened and government and people should collaborate to develop the city.<sup>9</sup> Another talk by Saskia Sassen when spoke about building smart cities stated that technology enabled cities are the key feature of smart cities but the fact that technology obsolesce is too high cannot be denied and if this happens smart cities would come to crash.<sup>10</sup>

Oliver Gassmann, et al in their book title "*Smart cities Introducing digital innovation to cities*". This book answers many queries related to smart cities the book clarified with examples the real meaning of smart cities. The author stated that digital innovations have transformed every city. The concept of smart city has solved the queries of progressive urbanization in the areas of water, sanitation, security, housing infrastructure mobility through better transport facility and all possible areas that are the major concern of municipalities. This book also shared the experiences of various authors on practical administration and better economic projects to develop smart cities.<sup>11</sup>

Agarwal, Solomon (2019) study title "Smart Cities in India" in their study evaluated the funding released by the government for building in smart cities in India and the impact

of these funds in development process. This descriptive study concluded that The total investment, area-based projects, pan-city initiatives and O&M costs for smart cities ranged between Rs 133,368 and Rs 203,979 lakh crores, Rs 105,621 and Rs 163,138 lakh crores, Rs 26,141 and Rs 38,840 lakh crores, and Rs 1,604 and Rs 1,999 lakh crores, respectively, in the year 2016 (for 60 smart cities) to 2017 (for 99 smart cities), which shows an increasing trend. The study further concluded that there should be advocacy of Public Private Partnership (PPP) to attain the goal of developing smart city.<sup>12</sup>

Holubava (2019) in the paper title "Smart Cities modelling Economic Growth in Contemporary Belarus" explains that the main indicative of smart city are the quality of life where there is high degree of urban environment management, energy saving mechanism and also improving social services to improve quality of life.<sup>13</sup>

Ahvenniemi, Huovila, & Airaksinen, (2017) in their study analysed 16 cities comprising of 958 indicators to asses smart city framework. the major observation of the study to define smartness of the city was the strong focus on technology enabled operations in business and common households. The other major component of smart city framework came out to be environmental sustainability. Thus, the authors suggested to use the terminology "smart sustainable cities" rather than smart cities. They also felt the need to re define the smart city frame work by involving the concept of environmental, social and economic sustainability.<sup>14</sup>

Angelidou (2014) the author in his study gave a clear picture of strategy adopted to recommend for developing smart cities. The author recommended strategy for smart city development with referring to available literature and experiences.<sup>15</sup>

Caragliu, A., Del Bo, C., & Nijkamp, P. (2011). In their study stated that during last two decades the importance of Information Communication Technology (ICT). The study highlighted that the urbanization of any city not only depends upon ICT enabled infrastructure but by and large it also depends on quality of knowledge and social infrastructure of individuals in the area.<sup>16</sup>

Yigitcanlar et al (2018) studied the smart cities development drivers and the conveyed a clearer picture of multidimensional framework driver to establish smart city. The study highlighted that the major key drivers for establishing smart city are community, technology and policy which when linked effectively can result into desirable result namely productivity, sustainability, accessibility, wellbeing, liveability and governance.<sup>17</sup>

Macke,Casagrande,Alberto and Silva (2018) in their paper analysed (QOL) Quality of Life perception of individuals in smart cities and studied the main elements which of citizen satisfaction in the city of Curitiba (Brazil).The study methodology was in-depth

interview of 400 residents to identify the elements of QOL ,the authors concluded that socio structural relationship, environmental wellbeing .material well-being and community integration are the basic four domains of maintaining quality of life in a smart city.<sup>18</sup>

Winters (2011) investigated in his study the reason why people migrate to smart cities. As per the study the most important reason for immigration to cities is better higher education facilities that and as these cities are centre for education more and more people migrate to cities for better lifestyle.<sup>19</sup>

Christopher,Evans,et al (2019) studied the transformative criteria of smartness ,their study stated that smart cities is an answer to economic ,environmental and social challenges of any city. The study revealed majorly three elements of urban smart sustainability firstly the spatial development, Secondly, digitalization of infrastructure and thirdly collaborative experimentation for low emission of carbon pollutants. The study concluded that modernization should not be staked on ecological imbalance.<sup>20</sup>

Giorgia Nesti (2018) the study analysed four European smart cities namely Amsterdam, Barcelona, Turin and Vienna. The article tried to describe level of governance and transformational structure in these cities further the study highlights the emergent paradigm due to transformational development of these smart cities.<sup>21</sup>

Castelnovo et al (2015) reviewed literature to give a holistic approach to assess smart city governance and policy decision making. The study states that social innovation is related to public value of policy decisions. The author stated that a blended value service with public centric innovations are the important aspects of smart cities.<sup>22</sup>

Meijer, A., & Bolívar, M. P. R. (2016) The study states that smart city emphasis on smart technology, smart people and their smart collaborations further the study states that smart city governance is a complex process and requires to acknowledge visions of socio technical governance.<sup>23</sup>

Praharaj, S., Han, J. H., & Hawken, S. (2018) their study highlights that smart cities are a combination of technology and entrepreneurship, further the study states that urbanization of mega cities has developed a plethora of various state policies. The study focuses on the complexity of police framework in order to urbanize cities especially in India where government has targeted 100 to cities to be transformed to smart city. This transformation requires full support from local and institutional to frame policy and guideline for smart city development.<sup>24</sup>

Martin, C. J., Evans, J., & Karvonen, A. (2018) The study adopts a systematic literature review of smart cities pertaining to countries in Europe and North America .The

study concludes with five major challenges which are to be faced for transforming cities to smart cities. These challenges which are identified are reinforcing free market capitalism, focusing on more affluent population, disempowering and marginalising citizen, neglecting environmental protection and failing to challenge prevailing consumerist culture.<sup>25</sup>

Silva, B. N., Khan, M., & Han, K. (2018). This paper highlights on the application of internet of things as the greatest motion for Smart City Development for the paper also explains that organisation is a way of intensifying innovation that hundreds the aspects of organisation and these innovations would give minimum impact on environment citizenship and governance also the usage of information communication technology into the city operations are an important aspects of smart cities this paper also states that the high usage of ICT and IoT are the foundation stone of any Smart City further the author states that a smart city is one which has maximum digital integrations and minimum human interaction.<sup>26</sup>

Tania Ray Bhattacharya, Anindya Bhattacharya, Benjamin Mclellan & Tetsuo Tezuka (2020) In their study the authors has stated that basic requirements of Sustainable Smart City in any developing Nation can be just on the basis of the facilities provided by the policy makers it also says that the basic indicators for smart city in a developing Nations can be conceptually the dimensions of social, economic, environmental, cultural and lifestyle for the paper also states that planning for a undeveloped smart city and evaluation of performance of the Smart City in many developing country can be based on the above stated indicators.<sup>27</sup>

Randhawa, A., & Kumar, A. (2017). This paper highlights that increasing population and pollution due to over exploitation of natural resources have deteriorated the environment at large, it's very important that the policy makers focus on sustainable urbanization of cities. India has outgrown as the rapid urbanization developing nation were the government has initiated smart city mission. The benchmark of smart city in India is been well explained in this paper. the paper concludes that in India the development of smart city is with the integration of Information Communication Technology with urban planning to attain quality of life.<sup>28</sup>

The concept of smart city is not only to provide Tech enabled infrastructure and providing smart solution to our day to day activity but it is to prioritize environmental sustainability through improving quality of life of the residents. Urbanization in any developing nation is an opportunity to economic growth and this fact naturally gives the idea of developing smart cities across the nation to the policy makers. The smart city mission launched by the Government of India to attain 100 smart city by the end of 2022, this vision leads to develop cities so that we are economically strong, environmental friendly and financially viable. (Source: <https://www.financialexpress.com/>)



Raj Cherubal, CEO of Chennai Smart City Limited, in one of his TED talks describes about the meaning of smart cities. And the efforts of Government of India towards developing smart city under the mission smart city. Comparing the planning and designing of urbanization across the world by giving example of cities like London, Hongkong and Huston the speaker highlights that developing smart city is not only talking about Iot and ICT but it is more to it. The government agency and people should focus on cross functional collaborations.to boost the urban planning. The concept of solid waste management and recycling of municipal waste which is yet another attribute of smart city and the major contribution towards sustainable development. (Taneya Tom, Elba Helen George)<sup>41</sup>

Dr. A Ravindra, Former Chief Secretary, (Govt. of Karnataka), Chairman Smart cities India Foundation. In his talk he insisted on smart solutions to build in smart city and not just urbanizing the cities. Azim Premji's thoughts on smart city policy implementation focuses on in India it is still on nascent stage, as per his assessment in India "smart city" concept is more talked then implemented. He further stated that contribution of Wipro towards smart city is that the company is providing IT solution in the field of lightening in the smart city projects. In his word's sustainability is practice and not just curriculum and hence Premji advocated environmental protection and emphasised on conservation of resources.<sup>28</sup>

The ministry of housing and affaire has focused on the importance of fund raising from different sources to meet the requirements of smart cities mission 2022. The joint secretary and mission director Mr. Kunal Kumar advocated the PPP (Public Private Partnership) mode of collaborations. The benchmark of this mission stands on the five pillars such as planning, technology (ICT), governance(E-Governance), services (IT enabled) and Finances (PPP and other fund-raising agencies). The ministry has published latest data net worth and expenditure of project smart city mission. As per the data the project cost is Rs 50,221Cr and till date Rs.9,981Cr has been used for the development of cities. The government further believes in the integration of 'Digital India' Campaign and the smart city mission. This integration will provide innovative solution towards surveillance system for reducing crime and improve the safety of the residents. Some other aspects like e-governance, integrated traffic management and waste management including solid waste are key components of technological integration.

To attain holistic smart city development, it is essential to focus more on sustainability and environmental issues of zero emission and waste. There is a need to develop technology-based governance and build capacity to engage the citizen to develop a holistic city development. The Ministry also emphasised that the Smart city mission has three main strategic components namely city improvement, city renewal and city

extension. The ministry for the implementation of smart city mission has developed Special Purpose Vehicle (SPV), government created SPV for planning, approving, appraising fund raising, management and evaluation of smart city development mission.

To enable smart cities to be sustainable its required that the strategic development of cities should deploy the integration of technological advancement in such a manner that the basic concept of being sustainable is fulfilled .In other words a sustainable life is one which fulfils citizens wellbeing and economic development (creation of job) with care of environmental protection like developing industries and household which are energy efficient, less polluting vehicles and manufacturing units and optimum utilization of resources. A sustainable smart city is about developing a city with utilities which are based on smart services and smart infrastructure. One of the main innovative approach to sustainable smart city is digitalization. Further it is very important that cyber security should be at its best to sustain technological advancement. (Source://www.dnvgi.com).

One of the powerful tool that is driving our lives to transformation, innovations and quality of life improvement is sustainability. The concept of sustainability is in our all works of life and hence an essential aspect in developing smart cities. Studies have shown that with increase in population each day almost 70% of the population will be living in cities, using resources without rationing and thus, its important that cities start focusing on sustainability. Big Belly company has transformed the ways of waste management by the use of smart garbage bins. Cities are equipped with knowledge and best resources and with innovative approaches a sustainable future can be casted. (Source://www.internetofbusiness.com).

Every city is established on the cyclic framework of Citizen-Economy-Business-Socio Culture. To achieve sustainable smart city with the use of technology in this framework is the biggest challenge.

## SUSTAINABLE DEVELOPMENT

As we proceed to discuss about the sustainable development, a common question arises, what is sustainable development and how can we achieve it? Continuing our discussion on the topic and its importance in the concept of smart cities, let us begin with what is represents.

Sustainable basically means to improve the present for a better tomorrow/future. It is not only viable in terms of finance and infrastructure but also ethically, and socially acceptable. That means it should be in acceptance of the basic quality of life i.e. the values, relations and the basic freedom of every individual, all together will contribute to the sustainable development ethically, spiritually, morally and socially. Keijzers, G. (2005).<sup>29</sup>

To discuss the issues of sustainable developments, there have been four summits since past three decades, each to discuss a different aspect of the issue. The main motive of the summits was that the sustainable development in this century should not be an option but is crucial to prevent the crisis in the world. It should be imperative in this century worldwide. The main/major summit among these being the Earth Summit in 1992, which brought the world's government together to discuss the strategies and the blueprint of the framework of the plan that is to be executed to attain such a development at both international and national levels. It also pointed on the funding that would be required for the project to be a success and also the sources of the funds. It was stated that "Human beings are the centre of concerns for the sustainable development." It has always been observed that the sustainability as a concept is based on four principles. Therefore, there are four pillars for this, which are the economy, society, the people and also the environment. These principles can also be represented informally as profit, social behaviour, people and the planet respectively. Germain, C. B., & Bloom, M. (1999).<sup>30</sup>

We have seen the different sustainable development goals which have been listed by the government. All these are for the benefit of the current and the future generation. India also have certain schemes under these SDGs which are Swachh Bharat Abhiyaan, Beti bachao beti padhao, smart cities, Deen Dayal Upadhyay Gram Jyoti Yojana etc. which are being carried on in the country with a simple aim to achieve SDGs. A survey conducted has revealed that India stands at 11<sup>th</sup> position in the world for the Sustainable Finance Arena and it has also been observed that India has accounted for almost 33 percent of the total number of certified climate bonds in the emerging markets.

#### BRIEF ON SMART CITIES OF INDIA

Let us begin with the definition of smart cities. There is no particular definition for what a smart city could be. A smart city has different meanings for different individuals, or countries or even states or cities within a same country. It is defined in a relative manner where it is observed related to the previous aspects of development and the recent changes incorporated. Though the definition of a smart city may differ for each area, the concept or the boundaries are more or less decided i.e. there is a wish list established about what an ideal or the acceptable smart city would include in terms of infrastructure, services or the facilities. To idealise each smart city, the planners plan upon the four pillars of sustainable development i.e. social, physical, institutional and even economic levels.

The smart city does not have an actual destination for the concept or the goals. It means that through various attempts or the ways to improve the facilities, layers of what is called 'smartness' can be added upon the smart city. There is no particular set limit for the smart cities which therefore have only a minimum or optimum condition to be called

as a smart city. The government has named the project which would embark upon the cities to make them smart, as Smart Cities Mission. This mission was launched in the country on 25 June 2015. The sustainable development goals go hand-in-hand with the smart cities mission. The idea behind the mission is to basically focus on the compact areas of the country and transform it into a model for the executing plan which would then act as a light house for the other developing cities. This would provide us with the pros and the cons of our ideas and the effects it would be showing in the compact form will certainly be looked after while executing on a large scale.

As discussed, there is a certain wish list for the concept of smart cities which has certain principles which should certainly be present in a smart city. They can be listed as follows:

- a. Providing an identity to the city all over the country. Kong, L. (2007).<sup>31</sup>
- b. Water supply should be safe and adequate with sustainable water usage. Ghosh, S. (2018)<sup>32</sup>
- c. Electricity supply at cheap and affordable prices for all. Brouwer, A. S., van den Broek, M., Zappa, W., Turkenburg, W. C., & Faaij, A. (2016).<sup>33</sup>
- d. Waste management system and sanitisation. Owusu, G. (2010).<sup>34</sup>
- e. Efficient public transport system including clean transport. Fabbri, G., Medaglia, C. M., Ippolito, M., Saraceno, E., Antonucci, M., Fiorentino, L., ... & Gallarate, M. (2016)<sup>35</sup>
- f. Housing at an affordable price, especially for the poor. Shamsuddin, S., & Srinivasan, S. (2020)<sup>36</sup>
- g. IT technology should reach each corner of the city with digitalisation. Al Nuaimi, E., Al Neyadi, H., Mohamed, N., & Al-Jaroodi, J. (2015).<sup>37</sup>
- h. E governance which includes a high citizen participation level. Kumar, T. V. (2015).<sup>38</sup>
- i. Health care facilities for the citizens. Hossain, M. S., Muhammad, G., & Alamri, A. (2019)<sup>39</sup>
- j. The most important being the safety of the citizens especially the women and the children of our country. Ismagilova, E., Hughes, L., Dwivedi, Y. K., & Raman, K. R. (2019).<sup>40</sup>

These are the minimal requirements for a city to be listed under the smart cities. At present, over a hundred cities of the country are listed under the Smart Cities Mission.

It has been observed that transforming a city may take either of the three components i.e., the retrofitting, the greenfield development or the redevelopment. The pan-city development is always considered to be an additional feature to the development.

## RATIONALE OF STUDY:

Redesigning cities to suit new and improved technological capabilities can only be accomplished by integrating various socioeconomic, human, legal, and regulatory reforms in emerging countries' long-term development trajectories. A systematic review of literature will give the insight on the major components which are prerequisites for the smart city development. the current study highlights all the available and proven components of smart city which can be a major input for the policy makers to implement smart city concept in India.

## METHODOLOGY

The study adopts exploratory research design particularly literature review .The study aims to analyse literatures available on both environmental sustainability and smart city concepts and also to understand the relationship between these two.Further,the research methodology used for the objective stated would be qualitative in nature, through a systematic review of literature available in different journals, websites(Ministry of Urban Development), TED talks of different philosophers and CEO of different countries. In total forty main stream literature was studied. The Analysis of literature will be done using R as statistical tool. The study intends to provide detailed information on most recent articles focusing on smart cities and how it would lead to sustainable development. An attempt was made to form a word cloud of the most frequently occurring terminologies related to sustainability and smart cities development.

## ANALYSIS

A systematic analysis of the literature review was done using Text analytic feature in R software as an open source of data analysis is a convenient tool not only in quantitative but qualitative research as well (Fox J (2009)).<sup>42</sup> After extraction of words from the text data the software worked on 27227 words excluding the blank space, special characters and stop words in RStudio software. A word cloud was attempted to build in by the software and the most frequently used words pertaining to topic is reflected in the figure below (Figure 1)



achieved if a well-planned and realistic proposal which is backed with digitalization and good governance can be implementation. Various TED talks quoted in the literature review show that the smart city mission in India is more on paper rather than implementation ,only digitalization is not only the way to be smart basically it requires good governance supported by Public Private Partnership (PPP) .The role of big business houses like Wipro ,Reliance ,TATA and others cannot be denied these are the firms which create and innovate to develop new technology which can be a major support to not only business operations but for manufacturing, services like banking and education. Infrastructure development is also an important principle of smart city development which is a big challenge in a developing country like India where there is over population in cities, which is a big challenge because providing all basic amenities to everyone with advance services is a big challenge for the government and other policy making agencies.

#### THEORITICAL IMPLICATION

The study intent to give an in-depth insight to the theoretical components of the phenomenon namely smart city and sustainable development with special reference to developing countries and the steps taken by the policy makers. Further, this would be an import input in further quantitative research with the use of various modelling technique analysis.

#### CONCLUSION

To realize the smart city mission in India and other developing nation it is important to identify the challenges and accumulating resources that are the pillars of any smart city. As per the discussions and literature review in the present we have identified that the objective of sustainable smart city can only be established with the help of change in socio behaviour, environment awareness and Economic viability. The most important aspect that we can say for the city being smart is that the city equipped with all the basic amenities such as electrification, sanitation, clean drinking water and other infrastructure like road, rail and air connectivity. For the purpose these developments its necessary to raise fund collaborate for Foreign Direct investments (FDI) joint hands with big business houses for Private public Partnership (PPP), such efforts would lead to multidimensional development of infrastructure development. Another major aspect for a sustainable city is the intervention and regulation of good governance, E-governance plays important role in changing the socio cultural and socio economical attribute of citizens. Changing socio

culture behaviour of citizen, the role of developing Internet of Things, digitalization of services, improving information literacy, interpreting big data are few of the changes that need to be implemented at individual, institutional and societal level. Developing an ecosystem which is supportive and collaborative in nature is the key to attaining sustainable smart city. An ecosystem which has subsystems and all are interdependent is also applicable to urbanized citizenship because only developing system would not enable to fulfil the dream of mission smart city, the government and policy makers should always facilitate and encourage trails and start-ups of novel ideas of which can be used for better integration of sustainable practices to achieve smart city target.

Finally, with the help of systematic literature review we can conclude that the dream of smart city can be realized only when the citizens, government and other agencies come together to implement the strategy of smart city. The concept of sustainability is in fact not only a term but its related to practices which facilitate our present and make our future secure. Various efforts related to environmental sustainability is the very first step towards protecting our environment. There exists a strong relationship between sustainability and being smart. Sustainability is to preserve our resources so that not only present but also the future generation can avail the benefits of present resources.

The role of government in establishing a well-planned regulatory for sustainability cannot be denied. Technology is an important driving instrument for sustainability and implementing smart city operations. Technology has equipped us with digitalization of all works of our lives. The services related to Electronic commerce, Banking services, Educations, Entertainment, Big data analysis, smart vehicles, household equipment which are energy efficient is also possible through Technology.

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