"REVISITING THE CONCEPT OF SMART CITIES IN THE INDIAN CONTEXT" – LESSONS FROM CONTEMPORARY SUSTAINABLE URBAN GROWTH THEORIES

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Abstract

This paper broadly aims at understanding the concept of smart city movement and development from Indian perspective. An attempt is made to review and understand the concept and definitions of smart cities in India and other foreign nations especially in the European countries in a comparative manner. Smart city movement is similar to sustainability movement. The concept of smart city aims at improving the efficiency based on intelligent management, integrated ICTs and active citizen participation. The broad components of smart city mainly include: Smart Economy, Smart Environment, Smart Governance, Smart Living, Smart Mobility and Smart People. By and large, smart city concept believes in applying Information and Communication Technologies (ICTs) to improve the efficiency of cities. Promoting smart cities is about rethinking cities as inclusive, integrated, and livable." In this paper, author makes an attempt to carry out comparative empirical study of contemporary sustainable urban growth theories mainly Smart growth, Compact city, New Urbanism and Transit Oriented development (TOD) principles. Suitable lessons are drawn from the comparative study and on the contrary author argues that, smart city movement complements sustainable development and it can be treated as refined and extended version of contemporary sustainable urban growth theories. In conclusion author states that, smart growth, new urbanism, compact city and TOD principles act as pre-requisite for sustainable urban planning and creating fundamental framework for smart city movement. The efficiency of the smart cities cannot be enhanced without considering and adopting principles of contemporary sustainable urban growth theories. Smart cities and contemporary sustainable urban growth theories complement each other in creating sustainable environment and in no way, the term smart city replaces the words smart growth, new urbanism, compact city and TOD.

Keywords: Smart City, Smart Growth, New Urbanism, Compact City, TOD.

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Introduction

In today's increasingly global and interconnected world, over half of the world's population (54 per cent) lives in urban areas, the continuing urbanization and overall growth of the world's population is projected to add 2.5 billion people to the urban population by 2050. With nearly 90 per cent of the increase concentrated in Asia and Africa and the proportion of the world's population living in urban areas is expected to increase, reaching 66 per cent by 2050 (UN, 2014). In order to meet the ongoing global urbanization challenges and to alleviate the strain on energy, transportation, housing, water, building and public spaces, there is an increasing need for "smart" city solutions which are both efficient and sustainable on one hand and can generate economic prosperity and social wellbeing on the other.

The initiative of "Smart Cities and Sustainable Development" program in Europe by European Commission (EC) and European Investment Bank (EIB) aimed to secure the EU's 2020 objectives by developing/redeveloping smart, sustainable and inclusive cities and communities in Europe. The key projected objective concerns were 75% of Europeans spend their lives in towns and cities, with 85% of GDP created in urban areas, 80% of all energy consumption and 75% GHG emissions, while facing increasing economic, social and environmental challenges. The Program supports an innovative integrated urban development approach by the committed European cities and communities of the concept of "smart cities & sustainable development", with the common purpose of improving environmental sustainability, urban and natural environment, ICT, mobility, and energy efficiency. Promoting "Smart City Global Initiative" in Europe, the program prioritizes holistic policies and strategies, comprehensive planning and management, and urban intelligent governance platform, integrating infrastructure assets and processes across Energy, ICT and Transport, to keep a global leadership in the sustainable development of cities and communities.

Various definitions have been put forth for smart cities. Some of them have been highlighted below.

"Smart Cities have been characterized and defined by a number of factors including sustainability, economic development and a high quality of life. These factors can be achieved through infrastructure (physical capital), human capital, social capital and/or Information and Communication Technologies (ICT) infrastructure" – *European Commission.*

"The Smart City is a process, or series of steps, by which cities become more "livable" and resilient and, hence, is able to respond quicker to new challenges. Thus, a Smart City should enable every citizen to engage with all the services on offer, public as well as private, in a way best suited to his or her needs" – *Department of Business Innovation & Skills, UK.*

"A city that monitors and integrates conditions of all of its critical infrastructures – including roads, bridges, tunnels, rails, subways, airports, seaports, communications, water, power, even major buildings – can better optimize its resources, plan its preventive maintenance activities, and monitor security aspects while maximizing services to its citizens." - *The U.S. Office of Scientific and Technical Information.*

"Smart City" is a high-tech intensive and advanced city that connects people, information and city elements using new technologies in order to create sustainable greener city, competitive and innovative commerce and an increase in quality of life with a straightforward administration and maintenance system of city" – *Barcelona City (2011).*

"A smart sustainable city" is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of the present and future generations with respect to economic, social and environmental aspects - *(ITU, United Nations).*

"Smart cities" make urbanization more inclusive, bringing together formal and informal sectors, connecting urban cores with peripheries, delivering services for the rich and the poor alike, and integrating the migrants and the poor into the city. Promoting smart cities is about rethinking cities as inclusive, integrated, and livable - *(World Bank, 2012).*

The broad components of the Smart City have been identified as shown in the following Figure 1.
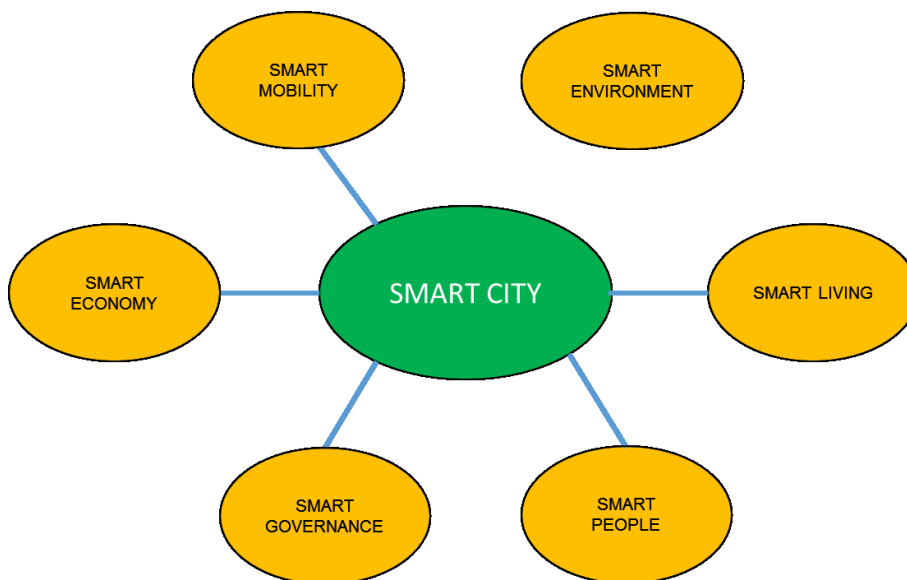
Fig. 1: Components of Smart City
Source: author based on (Giffinger, R. et.al, 2007)

From the above discussion, it is evident that, there is no single acceptable definition of Smart City and moreover it reveals that smart city approach complements sustainable development in one or the other way. Smart city concept aims for achieving sustainable development by means of balancing social, economic and environmental factors taking advantage of Information technology, good governance and citizen participation. Based on the literature review analysis, the conceptual sustainable smart city model could be represented as shown in the Figure 2.
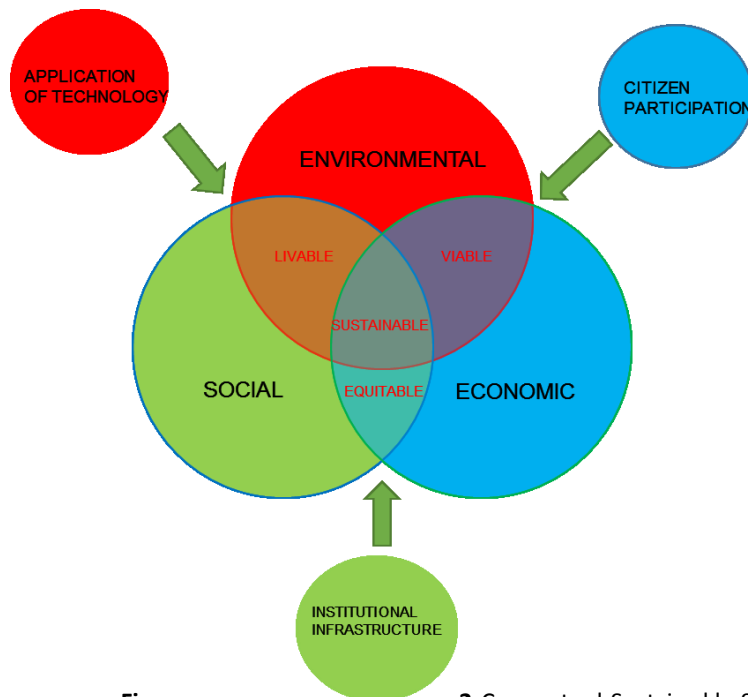
Fig. **2:**Conceptual Sustainable Smart City Model
Source: author

Methodology

The paper deals with broader understanding of the concepts of smart city movement from International perspective in general and Indian perspective in particular. Due to constraint of time and availability of field based primary data, the research paper is developed mainly based on empirical evidences derived from secondary source of Information. Apart from that, author has made an attempt to derive appropriate lessons from literature study and given his inputs with the help of qualitative analysis. The analysis is carried out in four deferent sections. The first section of the analysis undertakes thorough literature review of the concepts of smart cities perceived at the global and Indian perspective. In the second section, study on the review of contemporary sustainable urban growth theories has been undertaken and relevant lesson were drawn. In the third section, an attempt has been made to understand and establish relationship between smart city components and smart growth principles. Final section includes appropriate policy recommendations, concluding remarks and further scope of research study.

India's aspirations on Smart Cities

Nearly 31% of India's current population lives in urban areas and contributes 63% of India's GDP (Census 2011). With increasing urbanization, urban areas are expected to house 40% of India's population and contribute 75% of India's GDP by 2030. In order to address the complex issues associated with ongoing pace of urbanization and immense pressure exerted on the urban infrastructure, natural resources and quality of urban life, government felt the need for smart concepts and smart solutions. Government of India has thus decided to develop 100 smart cities in India, as highlighted by the Finance Minister during his budget speech of July 2014. The selection of smart cities is done based on the following classification – satellite cities of four

million plus population, cities in the population range of one to four million, all state / Union territory capitals and cities of tourism / religious / economic importance not included above.

The government believes that, there is no universally accepted definition of a Smart City. It means different things to different people. The conceptualization of Smart City, therefore, varies from city to city and country to country, depending on the level of development, willingness to change and reform, resources and aspirations of the city residents – (*Government of India, 2014)*.

In the approach to 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. Few of the smart solutions for basic infrastructure are listed in the below enclosed Figure 3.

Fig. 3: Selective list of Smart solutions for Basic Infrastructure
Source: GOI (2015)

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. Some typical features of comprehensive development in Smart Cities are as listed below:

- Promoting mixed land use in area-based developments
- Housing and inclusiveness
- Creating walkable localities
- Preserving and developing open spaces
- Promoting a variety of transport options
- Making governance citizen-friendly and cost effective
- Giving an identity to the city
- Applying Smart Solutions to infrastructure and services

Although, there is considerable gap in defining the concept of smart cities in India and rest of the countries worldwide, the focus in India was centered on providing basic infrastructure services as priority, followed with economic growth, improvement in the quality of life and creating sustainable environment. By and large, the common concerns observed both in India and other developed nations are to improve the overall quality of life and promote sustainable development. On one hand, the smart city concerns are shown towards procuring basic core infrastructure services and on the other hand, the features of comprehensive development in smart cities in India reflect very complex and vague targets addressing issues pertaining to land use, housing, transport, inclusiveness etc. It is evident from the features of comprehensive development that, the Indian government is keen to derive lessons from contemporary sustainable urban growth theories in general and smart growth principles in particular. With this inference, it is relevant to take up the review of contemporary sustainable urban growth theories and derive suitable lessons to establish relationship between smart growth and smart cities.

Review of contemporary sustainable urban growth theories
Compact city

In late 1990's the concept of compact cities was created by the idea of sustainable urban planning in the European countries.
According to Jenks et al., (1996) compact development will reduce development costs in providing infrastructure to new development sites as well as transportation costs. Compact urban form can be a major means in guiding urban development to sustainability.
According to Burton (2000), a compact city is relatively a high-density, mixed-use city, based on an efficient public transport system and dimensions that encourage walking and cycling.
Compact city refers to urban land use planning with focus on higher density and better accessibility, which reduces automobile dependency (Nallathiga, 2008). The objectives of compact cities are:
- To control urban sprawl and reduce vehicle kilometres driven by compact spatial structure.
- To support a high transit share; and
- To keep walking and cycling attractive.

Compact city policies have often been designed primarily to reduce the use of private cars and to minimise the loss of open countryside. However, proponents of the concept claim more than just environmental benefits out of intensifying urban areas; 'higher density settlements are argued to be more socially sustainable because local facilities and services can be maintained, due to high population densities, and therefore accessibility to goods and services is more equitably distributed (Williams, 1999).

According to Tong C. O and Wong S. C (1997), a compact urban form like that of Hong Kong has a manifold advantage: the economic use of land through vertical space utilization; the high accessibility enjoyed by residents and short journeys-to-work; few roads and commercially viable public transport.

According to CPRE (Campaign to protect rural England) (2006) compact community is well designed, higher density, medium-rise housing and mixed-use developments focused on town and local centres and other public transport hubs, large enough to offer a range of social and economic amenities within walking distance of people's homes.

In the early 1990s, EU has found an advantage in the compact city approach as a sustainable urban form, which is expected to achieve maximum quality of urban life with the given resources and energy (Kaji, H., 2004). For EU, the compact city approach seemed to be appropriate to achieve the goals of:

- Saving resources and energy (land use, transportation, pollutant emission, wastes).
- Revitalization of inner city to control an infinite expansion to the suburbs of urban area resulting from automobile dependent society.

According to Pawlukiewicz and Deborah (2002) the national joint forum in the United States with a group of 40 real estate professionals, designers, developers, architects, planners, and elected officials, as well as leaders of citizens, community, and environmental organizations agreed that more compact residential development can benefit communities and the environment in many ways.

A recent study by Carruthers and Ulfrasson (2003) across 283 metropolitan areas in the US suggests that per capita spending on infrastructure declines at greater densities and increases with the spatial extent of urbanized land area.

New Urbanism

Peter Katz, who served as the first Executive Director of the CNU (Congress for New Urbanism), was responsible for bringing together Peter Calthorpe, Andres Duany, Elizabeth Moule, StefanosPolyzoides, Elizabeth Plater-Zyberk, and Daniel Solomon (all architects) to form the Congress for New Urbanism with the purpose of spreading the word about New Urbanism. These founders were interested in creating neighbourhoods that provided a high quality of life while protecting the natural environment through their buildings and designs. Founded in 1993, in Chicago, CNU today has more than 2,300 members in 20 countries and 49 states (CNU, 2003). *"Preservation and renewal of historic buildings, districts, and landscapes affirm the continuity and evolution of urban society."*
--Charter of the New Urbanism, 1996

Perhaps the most pressing concern for New Urbanism today is the re-compaction and reurbanization of existing cities and suburbs, promoting denser new development that weaves together new construction and existing buildings, transforming places without destroying their valued character.

Congress for New Urbanism (CNU) advocates the "restructuring of public policy and development practices to support the restoration of existing urban centres and towns within coherent metropolitan regions…stand for reconfiguration of sprawling suburbs into communities of real neighbourhoods and diverse districts, the conservation of natural environments, and the preservation of our built legacy" .
New Urbanist design principles have resonated and been incorporated within the goals and agendas of individuals and organizations from other fields, including environmental protection, sustainable development, historic preservation, growth management/smart growth, transit, pedestrian and bicycle planning, and main street programs. The housing field is no exception. New Urbanism is viewed as a strategy consistent with the pedestrian qualities, mixed uses, interconnected streets, and urban housing types that have historically defined the neighbourhoods and that support concepts of sustainable development based on compact, mixed-use, pedestrian-friendly environments (Bohl, 2000).

According to Hikichi (2003), New Urbanism promotes for neighbourhoods with open space for civic opportunities, sidewalks and streets based on the grid system, connectivity with developments and surrounding residential areas, and an integrated use of mixed-residential, retail, and office space within walking distance from residential units.

New urbanism, also known as "traditional neighbourhood design" and "neo-traditional neighbourhood design" is a planning principle that provides for more livable and walkable neighbourhoods in a more pedestrian friendly environment (Hikichi, 2003). Some argue that new urbanism is the answer to suburban sprawl and it's an effective way to counter communities so dependent on the automobile that every trip made is by car. New urbanism combines elements of the 18th and 19th century American and European towns to give that "neighbourhood feel where everyone knows your name" with interconnected streets, easy access to transit, and bicycle and pedestrian pathways.

New urbanism advocates sidewalks, grid network, an integration of housing, retail and office, a neighbourhood/town center within walking distance to residents, and bicycle paths. Residential areas that are gated or have "tree-like street system" do not constitute new urbanism. New urbanism promotes connectivity with "surrounding neighbourhoods, developments, or towns, while also protecting regional open space." Land use designated for single use, whether it's for just residential or retail or office does not constitute new urbanism. In addition, new urbanism supports having a neighbourhood/town center that is within walking distance from all residential units in the neighbourhood, and has open space for public use (Hikichi, 2003).

By reducing vehicle use and using land more efficiently, walkable neighbourhoods provide a higher quality of life. Transit-oriented development has various definitions, but it is basically a "mixed-use community that encourages people to live near transit services and to decrease their dependence on driving (TOD, 2003).

According to Vuchic (1999), "Transit" is the most effective mode and, for many trips, the only feasible alternative to the car, transit must be included in the basic decision about the form and character of the city and its metropolitan area. The availability of transit adds to the diversity of transportation options and can help create more livable cities...congestion and environmental problems could be mitigated by the availability of competitive transit...by increasing accessibility to retail, office, and civic spaces, congestion can be reduced.

Smart Growth

Though origin of smart growth is unclear, the credit goes to Maryland USA as the pioneer of smart growth. In 1996, following an extensive listening campaign, many meetings, and frequent forums, the Governor's office of Maryland developed five initiatives that made Maryland the undisputed leader of smart growth policy reforms.

The Surface Transportation Policy Project (STPP) was established in 1990 in Washington and it was instrumental in the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA), which in turn led to the creation of the UEDD (Urban Economic Development Division) within the U.S. Under the leadership of Harriet Tregoning, the UEDD created the Smart Growth Network and provided funding for a variety of smart growth activities. Members of the network are active all over the nation, but the headquarters of most are located in Washington.

Smart Growth Network (2002) defined Smart growth as development that serves the economy, community, and the environment. It provides a framework for communities to make informed decisions about how and where they grow. Smart growth makes it possible for communities to grow in ways that support economic development and jobs; create strong neighbourhoods with a range of housing, commercial, and transportation options; and achieve healthy communities that provide families with a clean environment. Smart growth looks forward to provide solution for the wide range of concerns faced by many communities mainly impact of dispersed development patterns, economic costs of abandoning infrastructure, travel costs and time, conservation of prime agricultural land etc.

Smart growth is an urban planning and transportation theory that concentrates growth in the center of a city to avoid urban sprawl; and advocates compact, transit-oriented, walk able, bicycle-friendly land use, including neighbourhood schools, streets that work for everyone, mixed-use development with a range of housing choices.

The smart growth movement aspires to transform the way cities grow and function. In response to congestion, environmental degradation and high infrastructure costs, it proposes urban forms and dynamics that are more compact and less reliant on the automobile (Filion, 2007). Increasing residential density and transit use is uppermost on the list of smart growth objectives.

According to Smart Growth Network (2002), the ten smart growth principles to be put into practice are as mentioned below:

1. Mix land uses
2. Evolve compact building design
3. Create a range of housing opportunities and choices
4. Create Walkable Communities
5. Foster distinctive, attractive communities with a strong sense of place
6. Preserve open space, farmland, natural beauty, and critical environmental areas
7. Strengthen and direct development towards existing communities
8. Provide a variety of Transportation choices
9. Make development decisions predictable, fair and cost effective
10. Encourage community and stakeholder collaboration in development decisions.

Lesson drawing from contemporary sustainable urban growth theories and establishing relationship between smart city components and smart growth principles

The Indian metropolitan cities, particularly the mega cities, hardly adopt any of these characteristics, whereas these are applied successfully at different scales of planning and development mainly in revitalizing the old congested city areas as well as preserving heritage buildings and zones, agricultural land and other resources at regional level, in American and European cities. The three urban development concepts mentioned in the foregoing paragraphs are not just theoretical utopia, but workable ideas of alternative patterns of urban development which have evolved in response to the increasing need for a resource-conserving, sustainable, and people-centric city ensuring high quality of urban life. These possible alternative patterns have already found enthusiastic supporters among governments, urban development agencies, planners and urban designers. Though the important characteristics of compact, mixed use development, pedestrian and bicycle friendly environment, walkable communities and transit-

based development are common there are a few distinctive differences among the three concepts as shown in Table 1 below.

Table 1: Matrix showing comparison between Contemporary Urban Development Theories

Theories / Attributes / Characteristics	Smart growth	New urbanism	Compact city
Mixed use	√	√	√
Compactness	√	√	√
Pedestrian/ Bicycle friendly environment	√	√	√
Public Transport / Transit oriented Development	√	√	√
Easy Accessibility / Walkable Neighbourhood	√	√	√
Compact Spatial / Building Design	√	√	√
Affordable Housing choices	√	√	
Sense of place / community	√	√	
High Density Development	√		√
Preserving Farmland	√		√
Reduction in Infrastructure Development costs	√		√
Community / stakeholder collaboration in development decisions	√		
Connectivity / Grid Network		√	
Conservation of Natural / Built Environment		√	

Source: Author

All of the above discussed theories, fundamentally focus on achieving and promoting overall sustainable development by means of addressing issues related to redevelopment of existing central city core areas including historic preservation and as well new towns. In order to address the current key urban development issues and challenges mainly land scarcity, infrastructure services, housing, transportation etc. faced by metropolitan and mega cities of India, it is need of the hour to rethink, adopt and implement the above discussed principles in an integrated manner with little modification to suit to the local context. The relationship between smart city components and smart growth principles could be established as shown in the following Table 2.

Table 2: Linking Smart City components with Smart Growth Principles

Smart City Components	City Challenges / Indicators	Smart Growth Principles (Attributes / Benefits/Advantages)
SMART GOVERNANCE	Flexibility, Transparency, Co-ordination, Citizen participation	Community / Stakeholder collaboration in development decisions.
SMART ECONOMY	Unemployment, Economic Decline	Compact development helps in efficient utilization of land and resources reducing the infrastructure development costs.
SMART MOBILITY	Sustainable Mobility, Traffic Congestion	Multi-modal transportation and land use patterns that support walking, cycling and public transit.
SMART ENVIRONMENT	Energy saving, Urban sprawl, Pollution	Increased energy efficiency, preserve open space, farmland, natural beauty, and critical environmental areas.
SMART LIVING	Affordable Housing, Health, Social Cohesion	Improved housing options, community cohesion, Increased physical exercise and health.
SMART PEOPLE	Poverty, Education, Slum Population	Infill and redevelopment strategies help creating new housing stock and rehabilitate existing slum population. Compact development and easy access to public transportation reduces unemployment and enable community to reach standardized schools and colleges within their neighbourhoods at a walkable distance.

Source: Author

Analysis from the above table clearly indicates that, there is close interdependent relationship exists between smart city and smart growth principles. Although, smart growth principles address the sustainability issues in an integrated and comprehensive manner, they are redefined once again with the introduction of new term smart city giving special focus on application of Information technology to various urban sub-sectors specially addressing concerns pertaining to governance, economy, environment, mobility, living and people.

Recommendations and Concluding Remarks

It is evident from the above discussion that, smart city and smart growth share similar objectives and on the other hand all the smart city challenges are addressed by smart growth principles. Although, contemporary urban growth theories have lot of potential and universal applicability, most of the countries including India have ignored and paid little attention to perceive those ideas and principles comprehensively from the grass root approach. The theories have the ability to address complexity associated with all kinds of urban developmental issues linked to sustainability and provide appropriate solutions to suit to the local needs and context with suitable modifications. It is clear

from the comparative study and understanding that, just merely by replacing the word "smart growth" by "smart city" without having understood their dimensions and application potential, it won't help much in fixing core developmental issues, which in turn influence and hinder sustainable urban development process. As far as achieving sustainable growth in India is concerned, it requires an integrated and comprehensive approach to address and tackle issues step by step in a planned manner from grass root level. It is practically difficult to address and meet the challenges associated with complexity and diversity. Therefore, from the above discussion and understanding few of the recommendations applicable to India in particular and other similar countries in general are outlined as listed below:

- The overall primary objective for the nation would be to initiate measures taking the development on the path of sustainability.
- It is not advisable to get carried away blindly with the new international concepts/models, without having analyzed its feasibility and direct application potential in the local context.
- The hierarchy and relationship between various theories and concepts related to sustainable development should be studied and analyzed thoroughly.
- Without addressing and fixing basic developmental issues categorically, there is no point in focusing on advanced IT applications, governance and economic growth.

In conclusion, smart growth including other similar contemporary sustainable urban growth theories act as pre-requisite for creating fundamental framework for smart city movement.

Approach towards smart city movement is contextual. The scope and complexity will be different for both developed and developing world.

Smart city movement and contemporary sustainable urban growth theories are interdependent hierarchies.

The efficiency of smart cities cannot be enhanced without considering and adopting principles of contemporary sustainable urban growth theories.

- Smart city movement is more than application of ICT.
- Smart city movement is dynamic process.
- Smart cities must be Livable.
- Smart city concept is advanced and extended version of contemporary urban growth theories, emphasizing on the application of ICT to make cities more livable.
- Smart cities and contemporary sustainable urban growth theories complement each other in creating sustainable environment and in no way, the term smart city replaces the words Smart Growth, New Urbanism and Compact City.

Further scope of research

As further scope of research work, detailed investigation could be carried out to demonstrate relationship and bridge the gap between smart growth and smart city concepts and also to evolve new ideas and concept as a result of blending.

References

Burton E. (2000). *'The Compact City: Just or just compact? A preliminary analysis'* Urban Studies, 37(11): 1969-2007.

Bohl, Charles C. (2000). *New Urbanism and the City: Potential Applications and Implications for Distressed Inner-City Neighbourhoods,* Housing Policy Debate, Vol. 11, Issue 4, Fannie Mae Foundation.

CPRE (2006). *Compact Sustainable Communities,* Campaign to Protect Rural England, London.

Carruthers, J. and Ulfarsson, G. (2003). *'Urban sprawl and the cost of public services,'* Environment and Planning B: Planning and Design, 30: 503-522.

CNU (2003). *Congress for New Urbanism,* Available at http://www.cnu.org,

Filion, Pierre and McSpurren, Kathleen (2007). *Smart Growth and Development Reality: The Difficult Co-ordination of Land use and Transport objectives*, Journal of Urban Studies, Vol. 44. No. 3, pp. 501-523, March 2007.

Giffinger, R., Fertner, C., Kramar, H., Kalasek, R., Pichler-Milanović, N., &Meijers, E. (2007). Smart Cities: Ranking of European Medium-Sized Cities. Vienna, Austria: Centre of Regional Science (SRF), Vienna University of Technology. Available from http://www.smartcities.eu/download/smart_cities_final_report.pdf.

Hikichi, Lynda (2003). *New Urbanism and Transportation*, University of Wisconsin.

Jenks, M., Burton, E. and Williams, K. (1996). "*Compact Cities and Sustainability: An Introduction",* in Jenks, M., Burton, E., and Williams, K. (eds.), *The Compact City: A Sustainable Urban Form?* London: E &FN Spon, pp. 11-12.

Kaji, H. (2004). *Compact City and Sustainable Urban Form: Is compact city approach appropriate as an urban development policy for cities in developing countries?* Available at http://web.sfc.keio.ac.jp/unodb/fasid/lec_note/1201p.pdf

Nallathiga, R (2008). Contradictions of Sustainable Urban Development: The Choice of Compact City Development approach, ITPI Journal, 5: 2 (2008) 55-59.

Pawlukiewicz, Michael and Myerson, Deborah L. (2002). ULI / NMHC / AIA Joint Forum on Housing Density, Urban Land Institute, Washington, D.C.

Smart Growth Network (2002), Getting to Smart Growth: 100 Policies for Implementation, International City / County Management Association, New York.

Tong, C.O. and Wong, S.C. (1997). The advantages of a High density, mixed land use, linear urban development, Journal of Transportation, 24, pp. 295-307.

TOD(2003). Transit-Oriented Development. Available fromhttp://www.realtor.org/SG3.nsf/Pages/transitdev?OpenDocument.

UN (2014). World Urbanization Prospects – The 2014 Revision Highlights. Available from https://esa.un.org/unpd/wup/Publications/Files/WUP2014-Highlights.pdf

Vuchic, V.R., (1999). Transportation for Livable Cities, pg. 253, Center for Urban Policy Research, Rutgers University, New Brunswick, New Jersey.

Williams, K. (1999) 'Urban intensification policies in England: problems and contradictions', Land Use Policy, 16(3): 167-178.