

# A Review Paper on Effect of Urban Sprawl on The Development of Emerging Smart City.

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**Abstract:** Aristotle once wrote that men come together in cities to live, but stay with them to live the good life. But now “cities are junctions in the flows of people, information, finance & freight. They are less and less places where people live and work” (Ellis and Harris, 2004). The historic definition was changed due to excessive metropolitan decentralization or suburbanization. Urban Sprawl occurs over time when a larger percentage of metropolitan areas for residential and/or business activity starts evolving outside of its dominant locations. Sprawl can be stated as a matter of degree not an absolute form. Sprawl has become an umbrella term. Its definition changes according to countries and situations. As the population increases the density of the main city area increases, resulting in the migration of people towards the city’s periphery areas. Thus, resulting in extension of unplanned, undesired and uncontrolled growth of the cities. The major consequences of urban sprawl are, reduced open spaces, loss or rural character and culture, increase in air and water pollution, increase in travel time or Vehicle Miles Travelled (VMT), also resources losses increased and urban decay. Many attempts have been made to reduce the extent of Urban sprawl. Many different models and techniques are being developed for the same. A brown field development, improving mass transit, smart growth, Galactic city model, CBD improvement etc. are some of the examples. Smart city models are being designed by authorities to sustainable develop city so that reduction of pollution, efficient transportation, promote mixed land use, more and more green infrastructures development. The paper is the review of different literatures studied to analyse the term urban sprawl and smart growth.

**Key words:** CBD, development, infrastructure, smart city, urban sprawl

## I. INTRODUCTION

The three basic necessities of humans are mainly Food, Clothing & Shelter. However, clothing is considered less important than the others. Food and shelter have created major problems in the last 100 years due to excessive consumption of resources to rapid increase in population. Major consequences are security of housing, large scale rural to urban migration, lack of resources, traffic congestion in the core city areas, increase in travel time, increase in pollution etc. Many efforts are being made to overcome the problems, both at mass and individual level.

In ancient time the population grew around the banks of the river. This provided ease of transportation for humans and goods. Now cluster of people is formed where employment is generated and also in order to increase the standard of living. Development has led to considerable change in historical, social & political conditions. Small settlements slowly go through various stages and eventually evolve into city or town.

## II. URBANIZATION

Urbanization is an umbrella term, there is no universally accepted definition to describe it. Generally, it may be defined as moment to people from rural to urban settlement. Different countries have different criteria for defining urban settlement. They can be differentiated on the basis of demographic features and available infrastructure. In India, according to 1961 Census it defines urban centres as “Places having a minimum population of 5000 with at least 75 percent of male workers being engaged in non-agricultural activities and the density of population should be 400 persons per square Kilometres”.

According to Trewartha, the level of urbanization can be described as the proportion of urban population to total population residing in urban places by shifting population from village to city and the process of transformation of villages into city is called urbanization. Urbanization leads to growth of a country’s towns and cities due to social, economic and natural progress.

Major transformations, socio-psychological change affecting both people and places due to urbanization are:

1. A gradual concentration of people and events in towns and cities, increasing the general measure of settlement
2. An amendment in the economy of a country or region, whereby non-agricultural activities become prevailing
3. A change in the “structural” properties of population (Lower birth rates, higher death rates, positive migration balances etc.
4. A change in the social, psychological and behavioural patterns of the people overtime to implement an ‘Urban Way’ of life i.e. Urbanism as the way of life and the degree of urbanism past the built-up areas of towns and cities, thereby inducing rural dilution
5. The transmission or circulation of change (Economic, social and technological) down the urban order and into rural areas, urbanization does not always take the same system, nor does its progress at the same rates everywhere.

Urbanization is often regarded as a complex process. It points society towards the industrial and technological augmentation. The understanding of the growth dynamics of urban settlements at different levels becomes the basic requirement for any explanation of emerging pattern. These trends may lead to Urban Sprawl.

### III. URBANIZATION TRENDS IN INDIA

India can be termed as an agricultural biased economy. Since medieval times has rested its economy over agriculture. Due to its geographical location and favourable climate for variety of different crops can be cultivated throughout India. As industrialization started due to arrival of East India Company around 17th century towns and cities started to develop near industries and according to type of industries cities started to emerge. Rural population started to migrate to these towns and cities for better opportunities. Post-independence Indian economy was very weak so newly elected government started developing basic infrastructure. Many new industries started to emerge, towns and cities started to expand. However, majority of population stayed in villages. In 1900’s when economic barriers were removed, many MNCs started to invest in India. Huge industries were set up as result. This increased the demand of labour and skilled technicians. A large rural population started migrating towards urban areas. The major trends in migration along with future projections are:

- In the year 1951, 5 cities had population over 1 million, in 2011 it increased to 53 and it is estimated that by 2031 it will be around 70.
- Similarly, 3 cities were having more than 10 million population in 2011, estimated that by 2031 10 cities will cross 10 million.
- By 2031 urban population will be 610 million which will be 40% of total population.

### IV. URBAN SPRAWL

The term was first coined by Earle Draper in 1937 who was a city planner. Sprawl may be a relatively new term for India but in other developed countries like United States of America where industrial revolution took place way before other countries. Here it was observed that people in search of employment moved towards core city areas. However, as population increased people in need for security, ease of mobility, less populated lands started moving towards the outer periphery of the city. So, the boundaries of the cities grew horizontally.

Sprawl is not an absolute form rather it can be stated as a degree or relative term. Basic problems occurring due to change in spatial dynamics are:

- The decline of central core cities which are historical origins of growth.
- Cities have a core where all the zones like residential, commercial and public coexist. Due to over burden on these cores the populations start to move towards outer boundaries. So new semi clusters are formed which work independent so the value of core also decreases with time.

The emergence of edge cities which both complete and complement the functions of core. So, when life starts to grow around the edges it needs to sustain itself so basic infrastructure starts developing around it. As daily travelling to core will result in wastage of time and money.

In order to understand the phenomenon of Urban Sprawl, various literature studies have been undertaken. In majority of the cases, urban sprawl is regarded as one of the major effects of urban growth. As a land-use phenomenon, it is typically characterized in following ways in different literatures:

- Excessive land consumption
- Low densities at peripheries in comparison with older centres.
- Lack of choice in ways to travel
- Fragmented open space, wide gaps between development and scattered appearance
- Lack of choice in housing types and prices
- Separation of uses into distinct areas
- Repetitive one-story development
- Commercial buildings surrounded by acres of parking
- Lack of public spaces and community centres

The study of urban sprawl (The Regionalist, 1997; Sierra Club, 1998) was attempted in the developed countries and recently in developing countries such as China (Yeh and Li, 2001; Cheng and Masser, 2003) and India (Jothimani, 1997 and Lata et al., 2001). Through satellite data urban sprawl over different time periods can be analytically mapped, monitored and accurately assessed from satellite data along with straight ground data. The physical patterns of sprawl on landscapes can be detected, mapped and analysed using remote sensing and geographical information system (GIS) technologies. The patterns of sprawl are being described using a variety of forms, through visual interpretation techniques, all with the aid of software and other application programs. The scientists are using techniques of statistical software to characterize urbanizing landscapes over time and to calculate spatial indices that measure dimensions such as contagion, the patchiness of landscapes, fractal dimension, and patch shape complexity. The built-up is generally considered as the parameter of quantifying urban sprawl.

Some major consequences of urban sprawl in order to understand the extent of issue can be summarized as follows:

- Loss of open space
- Increased cost of infrastructure
- Loss of rural character
- Loss of farms and forestland
- Air pollution
- Water pollution
- Increased time in traffic/increased vehicle miles travelled (VMT)
- Increased energy consumption
- Loss of urban population to non-urban areas
- Urban decay
- Increases in housing starts and building permits
- Housing location trends in once rural areas

## V. RESULTS AND DISCUSSION

Those who criticize sprawl, in general, dream about densely populated urban communities with plenty of green spaces, sharp distinctions between city and countryside, few cars, and lots of public transportation. In spite of the fact that the patterns of sprawl in developed and developing countries are very different, the solutions proposed are similar with a little bit of changes and modification to fit into the developing world since there are more important needs to be solved. For developing countries, the people living on the edge of the city are mainly rural migrants who come to the city in search of employment. In rural areas, where agriculture is most common, the activity often tends to be seasonal and therefore unreliable. The problem that needs to be addressed is, the creation of employment opportunities away from the major metropolitan areas. Industrial corridors along the major highway can drive the population away from the city. Number of small towns and cities that are closer to the vicinity could be developed as potential sources of employment for rural people. This would reduce the overall burden on bigger cities and create an alternative source of work, indirectly addressing the problems of both unemployment and urban sprawl.

### **Brownfield redevelopment or the reuse of existing land within the city and concentrating growth:**

Abandoned building sites such as old schools, industrial land and parking space may be reused providing alternatives to using virgin land outside of city limits. This attacks the problem of city sprawl encroaching on new land outside the city. The problem is that in most cases there are zoning policies that do not permit such redevelopment. Policies therefore have to be adjusted by providing incentives for developers to re-use land. Concentrating growth may be achieved through a variety of methods such as moving the concentration of population back towards the city centre

and not pushing it outward, away from the core and by promoting the reuse of land within the cities. This is the same as increasing density in already existing developments and building upwards rather than spreading horizontally.

### **Use of improved mass public transport systems:**

Poor and unplanned mass transit system increases dependency on private transport. The auto mobile has led to the sub-urbanization of the wealthy, but the solution on to this problem should be. Higher taxes on new cars, parking charges can be used to discourage the use of private automobiles. Municipalities and authority can also act on the problem by giving a lot of attention and providing the necessary funding for developing mass public transport modes. Better transportation planning relies less on new highway construction - which encourages sprawl - and more on mass transit solutions, such as light rail and commuter trains. In addition, awareness should be increased among people on the benefits of using mass transport and through time make it a culture. Some European countries such as Stockholm are good examples of mass transport culture.

### **Development and use of better and most efficient land use policies:**

Communities can grow in an efficient way by consuming existing infrastructure, or by building away from natural wildlife area and resources. For these development policies can be steered more towards an already urbanized area

### **Implement means to decrease or stop migration:**

In addition to the push factors, the pull factors that attract migrants to cities other than job opportunities need to be addressed. Improving efficiency of land use or other proposed solutions would not be effective in the long run

### **Idea of Smart Growth:**

Concentrating growth is what many planners recommend as a measure against sprawl for a sustainable city. The term 'Smart Growth' was coined to describe the response to the unchecked urban expansion in America during the past half century. Taking the seriousness of the situation, Smart Growth idea was to suggest an alternative to the problem of growth describing the application of sustainable development concept to land-use issues. The idea channels development to areas with existing infrastructure and consumes less land for roads, houses and commercial buildings. Smart Growth could mean smart management of resources in both growing and declining communities. The ultimate goals of Smart Growth to counteract sprawl are not that different from general solutions forwarded by planners and usually include following ten principles:

- Mix land uses
- Take advantage of compact building design
- Create a range of housing opportunities and choices
- Create walkable neighbourhoods
- Foster distinctive, attractive communities with a strong sense of place
- Preserve open space, farmland, natural beauty, and critical environmental areas
- Strengthen and direct development towards existing communities
- Provide a variety of transportation choices
- Make development decisions predictable, fair, and cost effective
- Encourage community and stakeholder collaboration in development decisions

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