

## Smart Neighbourhood: A way to Sustainable Development

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### Abstract

This paper is a scholastic attempt to examine the concept of smart neighbourhood. It traces efforts to define and operationalize the concept of sustainable development in the context of urban area, observing that these efforts are divided into two broad clusters of work: to find the parameters to achieve smart neighbourhood and to incorporate policy pathway for sustainable growth of cities. This paper argues that to be successful, sustainable smart cities policy must avoid the haphazard development and common conventional policies. In Indian context it can be said that there is no such smart neighbourhood located here because of lack of implementation of basic concepts of smart neighbourhoods to build a smart city. A smart neighbourhood leads to a smart city. For this purpose, a study of the smart neighbourhood in Bhopal was undertaken. This study reveals the parameters of smart neighbourhood in Indian context. Finally through the case study, it discusses the scope of sustainable development through different parameters and policy to achieve smart cities.

**Keywords:** smart neighbourhood, policy pathway, sustainable growth, smart cities

### INTRODUCTION

Neighbourhoods are one of the basic building blocks of cities, modest size physical units that make up the residential portion of the urban area and form the environment that we all inhabit every day. Planning and design at the neighbourhood scale affects our daily lives, determine what facilities are available locally, how far we need to travel, and much about our opportunities for interacting with our neighbours. Relatively small design and planning decisions such as the width and design of streets, the size of blocks, the mix land use and the location can have huge implication in urban liability and sustainability.

Arnold Whittick in 1974 defined Neighbourhood unit is an integrated, and planned urban area related to the larger community of which it is a part, consisting of residential districts, a

school or schools, shopping facilities, religious buildings, open spaces, and perhaps a degree of service industry (Osborn & Whittick, 1978).

Neighbourhood is a subjective term which refer few blocks around neighbouring houses or buildings. It includes a small area containing blocks and few hundred residents with some basic amenities. It is a place with its own unique character and function, where people can live, work, shop, and interact with their neighbours. The most sustainable neighbourhoods tend to exhibit high levels of walkability, a sense of place, social cohesion and stability, and neighbourhood resiliency amidst changing economic and socio political conditions.

### **CONCEPTUALIZATION OF NEIGHBOURHOOD**

In 1920s Clarence Arthur Perry proposed a model of neighbourhood Unit. Perry described the neighbourhood unit as that populated area which would require and support an elementary school with an enrolment of between 1,000 and 1,200 pupils. This would mean a population of between 5,000 and 6,000 people. Developed as a low density dwelling district with a population of 10 families per acre, the neighbourhood unit would occupy about 160 acres and have a shape which would render it unnecessary for any child to walk a distance of more than one-quarter mile to school. About 10 percent of the area would be allocated to recreation, and through traffic arteries would be confined to the surrounding streets, internal streets being limited to service access for residents of the neighbourhood. The unit would be served by shopping facilities, churches, and a library, and a community centre, the latter being located in conjunction with the school (Gallion & Eisner, 1982).

Perry's idea of neighbourhood was further carried out and forwarded by different others. Clarence Stein made certain extension to Perry's Idea. He increased the number of steps in the hierarchy, advocating small neighbourhoods, groups of neighbourhood or districts uniting to form the city. He extended the concept of neighbourhood beyond city into the region. In 1930 Walter Gropius developed the organic series: house, street, neighbourhood, and town; and in relation to his tall apartment block, the parallel series: dwelling, apartment block, neighbourhood and town. In 1961 Geogi Minervin introduced a new chapter of residential area called "micro district". These micro-districts, which had populations of from 6000-8000 people, were equipped with schools, shops and social facilities, and were separated from main roads by stretches of greenery, and were apparently similar to the neighbourhood unit.

Neighbourhood planning is still at an early stage of development. It is meaningful and produces the best outcomes – both in helping improve the quality of the local built environment and creating an economic growth, improving people’s quality of life, and protecting the natural environment.

### **PRINCIPLES OF SMART NEIGHBOURHOOD THEORY**

Many urban form elements contributes to the feel and function of a neighbourhood. Based on the concept of neighbourhood there are certain parameters which will define the growth of smart neighbourhood.

- a) Density- The term associated with large, impersonal apartment buildings, public housing projects, or physical environments. In an official term instead of using density it should be compact development or smart growth. Most of the residents in urban area preferred higher density because these include more attractive streetscapes, local shops and a greater diversity of housing choice.
- b) Infill Development- The most fundamental feature of Sustainable Urban Neighbourhood is its location- the fact that it is located within towns and cities. It not only create attractive new buildings and housing units in existing urban area, but entire neighbourhood that are more pedestrian-oriented, vibrant, diverse and ecological.
- c) Mixed-use development- The new urbanism and sustainability oriented design in general is to include this variety of land uses within communities once again, typically within neighbourhood centres or along main-street. If jobs, housing, shops, and recreational facilities are closer together, the theory goes, then people will need to drive less and neighbourhood will be more vibrant and liveable. This after, all, is the model of the traditional town before the age of the automobile.
- d) Streetscape design- Arterial corridor within almost any city or town offer extensive opportunities for infill development. Luckily, there are well-established traditions of large streets in many countries that both carry substantial volumes of vehicle traffic and are green pedestrian-friendly places to be.
- e) Traffic calming- As automobiles multiplied rapidly in industrialized nations in the early and mid-twentieth century, many observers realized that they were degrading neighbourhood quality. Traffic calming mechanism fall into two main categories:

those that seek primarily to reduce vehicle speeds and those that focus on lowering traffic volumes. The other main approach to traffic calming- focusing on traffic volume rather than speed.

- f) Parks and open spaces- A better connection between human and natural environments is a central challenge of sustainable development, neighbourhood planning should seek to create a variety of open spaces and natural areas. Creating a range of attractive open space needs to become a much more integral part of neighbourhood planning.
- g) Improving neighbourhood equity- Equity concerns are present at the neighbourhood level, as at others. Sustainability at the neighbourhood level implies making every neighbourhood accessible to all. The objective of sustainable development is not green enclaves in upper middle class area, but well-rounded neighbourhoods that are diverse and equitable as well as ecological and liveable.
- h)

### **Neighbourhood Planning: Indian Context**

India's urbanisation is a paradox of sorts. The country's urban population is undoubtedly vast at 377 million (2011 Census). India's urban population increased from 17.3 per cent in 1971 to just 23.3 per cent in 1981, and 27.78 per cent in 2001. The 2011 Census figures reveal that just over 31 per cent of the country's population is presently living in urban areas.

India needs to start thinking more pro-actively on sustainable solutions to its cities' problems. Sustainable cities present a challenge that needs to address social, environmental and economic sustainability concerns, as well as the inter-linkages between these. The little empirical research done in this context in India does not taken into account features of urban form, such as layout and density, in examinations of sustainability. This has led to significant gaps in knowledge: there is no existing evidence in India that can explain if tenets of sustainable cities are affected by, for example, residential density, transport accessibility and layout (Ray & Vaidya, Planning for Sustainable Urban form and for Indian Cities, 2011).

The scenario of India is different from western world. Density play an important role in India, post-independence urban planning in India has either ignored density or deliberately discouraged it. This has led to sprawls or even worse, densification without the supporting infrastructure. Higher income category populations prefer to stay away from city centre in

low to moderate density areas. Lower income category prefer to stay near city centre because of job opportunity.

Land use is one of the parameters which define the layout of neighbourhood in Indian context. Land use is an important determinant of public transportation and sustainable urban form and plays at city, zonal and neighbourhood scales. Effective land use planning in India suffers from incongruous regulatory structures at the three levels of government, as well as from other critiques of Master Plan preparation. There is lack of clarity on which services and facilities are to be provided at what scale, and this requires further elaborate exercises. Many cities in India are now formally moving towards mixed land use and implications of this on sustainable urban form are still unknown. Most cities (mainly metros) fail to take into account the possibility of providing services/facilities to residents vertically thereby leading to more horizontal sprawl (Ray & Vaidya, *Planning for Sustainable Urban Form for Indian Cities*, 2011).

Access and transportation infrastructure are closely associated with density and land use and layout characteristics; this determines the ease with which spaces and places can be reached. Accessibility levels are defined on ability of users to reach their destinations (work areas, market places, recreational places, etc.), as well as extent to which they have the means to access places, services and facilities outside their local area (Ray & Vaidya, *Planning for Sustainable Urban Form for Indian Cities*, 2011).

Layout describes the spatial arrangement and configuration of elements at the street scale, such as grid or cul-de-sac street patterns. The layout of a neighbourhood determines its accessibility and influences pedestrian movement accordingly. More importantly, layout directly affects the social and cultural vibrancy of a neighbourhood. Streets which are well connected to services and facilities and support pedestrian access (taking lighting, paving, safety, etc. into account) are generally more frequently accessed, leading to greater concentration of multiple uses on these. This holds true at all three scales – neighbourhood, zonal and city-level (Ray & Vaidya, *Planning for Sustainable Urban Form for Indian Cities*, 2011).

Urbanization a process of city formation is a multi-stage process and involves movement of people to cities. Population growth is often regarded as the key measure of urbanization. As a result of massive increase in population, the urban areas are met with insufficient infrastructure and increased informal settlements often becoming centers for negative human

activities with hardly any residents' welfare. Concept of Smart Neighborhoods finds immense significance in answering contemporary urban issues related to safety and welfare. This is especially true in case of Tier 2 cities, which are next upcoming big urban centers.

Alpha-wise city vibrancy index by Morgan Stanley (Rathi & Desai, 2011) has considered Bhopal among "Cities of Opportunities" in 2011. Envisaging future urbanization prospects in the city, planning Smart Neighborhoods becomes expedient.

### **Case Study: Minal Residency, Bhopal**

A rapidly growing city of Madhya Pradesh, Bhopal is pursuing a sustainable development process known as Minal Residency Project. Situated in sub urban part of Bhopal, Minal Residency is a neighborhood spanning over 197 acres. It has more than 3900 dwelling units, and has a population of 20000 people (approximately). The housing typology comprises only of duplexes. However there still is diversity in dwelling units in terms of plot areas (sixteen types in total). Road hierarchy comprise of main road with 24 m row, followed by 18 m, 12 m, 9 m, and 6.5 m in row. This project is being done on two phases. Phase 1 is simply known as Minal Residency, whereas phase 2 is known as New Minal Residency. It is located from important centers of the city at the following distances.

#### a. Access

Minal residency is present at about ¼ mile north of Raisen Road which is one of the trunk routes of Bhopal. It is very well connected to BCLL buses route and other IPT and complementary service routes. Within 500 meters of walking distance, buses running on standard route can be used as public modes of travel. It is also well connected to other parts of city with IPT services. However railway station (both Bhopal Junction and Habibganj) is relatively away (not within 1/4 mile walking distance). (refer Table 1.1)

<b>Centre</b>	<b>Distance (in km)</b>
<b>Bhopal Railway Station</b>	10
<b>Habibganj Railway Station</b>	9.5
<b>MP Nagar</b>	8
<b>New Market</b>	14
<b>Bhopal Airport</b>	15
<b>Upper Lake</b>	21

Table 1.1 Distance from major centers  
Survey

Source: Primary

b. Location

By studying the span of development of past few years, ‘smartness’ in terms of location can be gauged for this neighborhood (Figure No. 1.1).





**YEAR 2002**



**YEAR 2005**



**YEAR 2009**





**YEAR 2013**

Figure 1.1 Development in Minal Residency from 2002 to 2013

It is seen that prior to developments of Minal Residency in year 2002 there existed settlements such as Narela Shangri. However it is also seen that Minal Residency in itself is not on infill. This it can be appropriately said that though it is not on a previously developed site but adjacent to existing development.

c. Land Use

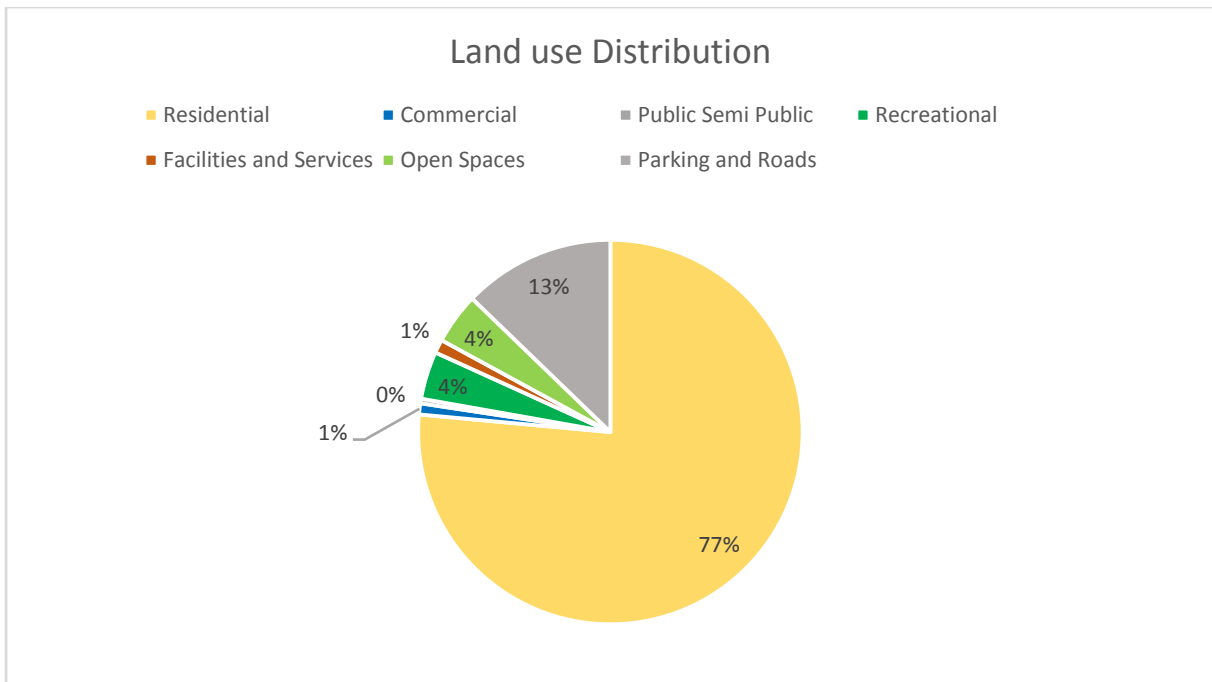
The total area of Minal residency is about 799352 square meter (197 acres) which is divided under the given land uses (refer Table: 1.2). However if percentages of the above land uses are considered and compared with the guidelines of UDPFI than it produces unsatisfactory responses. There is a significant difference in the Land use standards given by UDPFI and the percentages of land use allocated in the neighborhood.

<b>Landuse</b>	<b>Area covered on ground (in sqm)</b>	<b>Percentage allocated on site</b>	<b>UDPFI STANDARD (%)</b>	<b>Remarks</b>
<b>Residential</b>	611241	76.47	45-50	More
<b>Commercial</b>	7438	0.93	5-10	Less
<b>Public and semi-public</b>	3100	0.39	5-10	Less
<b>Recreation</b>	32050	4.01	10-15	Less
<b>Facilities and services</b>	9074	1.14	5-10	Less
<b>Open spaces</b>	34297	4.29	10-15	Less
<b>Parking and Roads</b>	102150	12.98	10-15	Correct
<b>Total</b>	799352	100.00		

Table: 1.2 Land use Distribution in Minal residency



Figure 1.2 Land use map of Minal Residency



**Figure 1.3 Land Use Distribution of Minal Residency**

### Physical and Social Infrastructure

According to UDPFI guidelines following are mandatory infrastructure requirements (Table 1.3).

The information in the table is actual and prescribed for mandatory social infrastructure in the neighborhood. Since the population of neighborhood is more than 5000, following social infrastructure is necessary in Minal Residency.

Infrastructure		URDPFI Guidelines	Minal Residency
15000	Amenities	Area ( in square meter)	Area ( in square meter)
	School	47955	1434
	Commercial	19991	7438
	Community room	2000	4423
	Religious sites	16187	1666
	Dispensary	1214	
	Post office	80.93	
	Recreational	10000	32050
	Parking	2 (ECS) in plots of size 250-300 sqm	102150

**Source: UDPFI Guidelines 1996**

It is seen that area dedicated for schools is 1434 square meters. This is equivalent to 0.35 acres. It is clear that the required area for schools is 11.85 acres. The area dedicated to educational facilities is less.

It is also seen that area dedicated to commercial activities is 7438 square meters. This is equivalent to 1.83 acres. It is clear that the required commercial area is 4.94 acres. The area dedicated to commercial facilities is less.

In similar manner it is seen that area for community hall is 4423 square meters. This is equivalent to 1.09 acres. It is clear that the required commercial area is 0.49 acres. The area dedicated to community hall is more. Since it has been included in facilities and services, which itself is in shortage.

### **Smart neighborhood results Smart Cities**

A city is an interconnected network of systems; a living and dynamic work in progress. Smarter cities have the tools to analyse data for better decisions, anticipate problems, resolve them proactively and coordinate resources to operate effectively.

The concept of the smart city still focuses mainly on the role of infrastructure, but much research has also been carried out on the role of human capital, social and relational capital and environmental interest as important drivers of urban growth. Several innovative

companies have created an eco-friendly smart neighbourhood model for sustainable living. When there is no traffic on the streets, street lights turn themselves off. There are air-quality meters in lamp posts to monitor pollution trends. Spanning from a sustainable platform that allows neighbours and friends to safely rent their cars to each other to sustainable neighbourhood (Cullen, n.d.). Community member interactions in a neighbourhood within a smart city may lead to the emergence of more intelligent global behaviour.

### **Current Indian Government Initiative**

The Nagar Raj Bill Act is a solution that tries to address this situation by directly empowering people from the grassroots level of the local society, in urban and rural areas. Introduced in 2006, the model Nagar Raj Bill – meaning “town governance bill” – aims to enable people at the grassroots level of society to make decisions for themselves in terms of physical infrastructure planning. Under the Nagar Raj Bill Act, the Government of India has come out with a model Neighbourhood Planning Policy.

Chennai metropolitan Development Authority taken an initiative to develop 300 Residential plots and 20 other plots on 20 acres of land in Edayanchavadi Village near Manali, Chennai City under A neighbourhood scheme. After announcing a whopping Rs 7060 crore in the Union Budget on July 10 for developing 100 smart cities across the country, the NDA Government under Prime Minister Narendra Modi. The guidelines for recognising a city as the smart city will be prepared by the department of industrial policy and promotion. The criteria for being recognised as a smart city is – it must have three of the five infrastructure requirements – energy management, water management, transport and traffic, safety and security and solid waste management (Kumar, 2014).

### **Recommendation**

Based on learnings from the case study following measures are devised with hope to develop a prototype model of neighborhood planning which leads to smart city in Indian scenario. These measures are:

1. **Neighborhood planning programs should result in a more equitable distribution of public goods.** Many have criticized municipal government for failing to distribute public resources equally among all areas of the city. Neighborhood planning programs should help to diminish these inequities, whether they be related to income or ecological characteristics, by providing opportunities for those who have traditionally

been underrepresented to analyze the level of service provided and engage in the necessary political action to rectify the situation.

2. **Neighborhood planning will result in a wider range of problems being addressed by the planning process and an improvement in public services.** The objective of physical planning is to emphasis physical development. The programs are often designed to encourage the consideration of social and public service delivery problems as well as physical problems. Moreover it encourage the development of self-help projects designed to supplement the service provided by the city.
3. In anticipation of future infill and redevelopment, the City shall prepare Infill Pre-Plans for areas in the community according to an annually reviewed priority sequence based on the following criteria:
  - Community need
  - Proximity to City Centre District and designated Neighborhood Centers
  - Availability of infrastructure
  - Proximity to community services and amenities
  - Development interest and/or market demand
4. Amendment of development regulations (density, floor area ratio, height, land use, building codes) as per Urban development plans formulation and implementation and other planning norms to achieve sustainable urban form.
5. Density: medium-to-high density (200-250 PPH) with options proposed taking into view cost for providing and maintaining utilities, and reducing energy consumption – Urban blocks (1-2 sq.km. area) of about 4 to 7-storey with density around 4000-8000 people per sq.km.is recommended at the neighborhood level.
6. Accessibility and transport: pedestrian focused within the neighborhood supported by linked public spaces; strong (public) transport access on edges; restricting motorized vehicular movement within neighborhoods.
7. Layout: Conical massing promoted (high density high rise in the center - be it neighborhood or district or city - tapering out towards the edges); provide play areas and public spaces next to taller building and using of solar panel; and vertical randomization of buildings coupled with low coverage (higher FAR).
8. Technology Innovations: Use of solar power, wind power and biogas power whichever is feasible for the project.(Smartnet GPS) will transmit location data and established motion priority to the central software at the service center.The range of



technologies that could be accommodated and the policies needed to encourage their development in the right places. Promoting green buildings, start using GPS and Bluetooth devices can enhance the neighborhood concept and encourage the development of smart city.

## Conclusion

The paper is an endeavor to uncover the truth and encounter the real challenges that are lying in implementation of neighborhood planning in India. Neighborhood comprise of both physical and social relationship in the society. The concept of the neighborhood is well established as a basic unit of planning the cities. Further, it is a popular and accepted element of social and physical organization in the minds of most people. Besides good planning and design decisions, the application of these principles also require supporting legal frameworks, an analysis of the local society and economy, appropriate infrastructure technology and capacity, and the institutional capacity to enforce decisions. Although the scenario of India is different from western world, these parameters are highly interrelated and support each other. High density provides the population and activity basis for a sustainable neighborhood; adequate street density is the material basis; mixed land-use and social mix shape the land use and social life in the neighborhood; and limited land use specialization is the first step towards mixed neighborhoods.

## References

- Cullen, P. (n.d.). *New European Economy*. Retrieved from <http://www.neweuropeaneconomy.com>:  
<http://www.neweuropeaneconomy.com/home-mainmenu-51/briefing-mainmenu-86/537-the-worlds-smartest-cities>
- Gallion, A., & Eisner, S. (1982). *The Urban Pattern: City Planning & Design*. John Wiley & Sons.
- Green, G. P., & Haines, A. L. (2011). *Asset Building & Community Development*. SAGE Publications.
- Hiraskar, G. (2012). *Fundamentals of Town Planning*. Dhanpat Rai Publications.

- India, G. o. (1996). *Urban Developments Plans Formulation & Implementation*. New, Delhi: Ministry of Urban Affairs & Employment.
- Kumar, M. (2014, August 19). *NIIT Central*. Retrieved from <http://www.niticentral.com/>: <http://www.niticentral.com/2014/08/19/smart-city-project-modi-government-invites-bids-for-greater-noida-dmic-236148.html>
- MacDonald, M. (2014). *Urban and Regional Development Plans Formulation & Implementation Guidelines*. Ministry of Urban Development Government of India .
- Meenakshi. (2011). Neighborhood Unit and its Conceptualization in the Contemporary Urban Context. *Institute of Town Planners*, 82-83.
- Osborn, S. F., & Whittick, A. (1978). *New Towns: The Answer to Megalopolis*. Blackie Academic & Professional.
- Peterman, W. (1999). *Neighborhood Planning and Community-Based Development*. SAGE Publications.
- Phillips, R., & Pittman, R. (2009). *An Introduction to Community Development* . Routledge.
- Rathi, S., & Desai, R. (2011). [linkback.morganstanley.com](http://linkback.morganstanley.com). Retrieved January 29, 2014, from [https://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CCUQFjAA&url=http%3A%2F%2Flinkback.morganstanley.com%2Fweb%2Fsendlink%2Fwebapp%2FBMServlet%3Ffile%3Dp8njstu-3o4l-g000-bf29-d8d3855ac300%26store%3D0%26user%3Ddu2n7fso2h1-35%26\\_\\_gda\\_\\_%3](https://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CCUQFjAA&url=http%3A%2F%2Flinkback.morganstanley.com%2Fweb%2Fsendlink%2Fwebapp%2FBMServlet%3Ffile%3Dp8njstu-3o4l-g000-bf29-d8d3855ac300%26store%3D0%26user%3Ddu2n7fso2h1-35%26__gda__%3)
- Ray, S. I., & Vaidya, C. (2011). *Planning for Sustainable Urban form and for Indian Cities*. Urban India Journal .
- V.Narad, A. A., & V.Gupta, A. (2014). Role of Sustainable Neighbourhood in Urban Built Environment. *IOSR Journal of Mechanical and Civil Engineering*, 27-29.