

# Spatial Pattern of High Rise Buildings (HRBs) in Urban Areas with Special Reference to Jaipur City



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## Abstract

The paper deals with the spatial pattern of high-rise buildings (HRBs) in the Jaipur city examined at the ward level using empirical data gathered through a field survey. The vertical growth of cities in the 21st century is imperative in consequent upon the urban inertia but supposedly to solve housing problem as well as overcome in response to the scarcity of space in fast growing urban areas. The study concludes that intensive high-rise buildings are expected to develop extensively in the future, particularly in the core and inner-ring areas. We examine and summarise the evidence on how government policies, institutions, and public investments have influenced the spatial allocation of apartmentalization within the municipal boundary and how these factors affect welfare, growth, and development i.e. a research agenda for the future. The results support empirical evidence of the spatial dispersal of high-rise buildings, indicating an initial process of gentrification in the Jaipur metropolitan. Research questions concerning the cyclic model of metropolitan region development has been well tested by employing geo spatial technology.

**Keywords:** High Rise Buildings (HRBs), Geo Spatial Technology, Gentrification, Ward, Apartmentalization.

## Introduction

The development of High-rise buildings follows closely the growth of the city. They are a natural response to dense population concentrations, scarcity of land, and high land costs. Unfortunately the land available to keep pace with man's needs in strictly limited and sometimes prohibitively expensive. Many urban areas in India have already reached the limits of horizontal growth and as a result the only alternative left is vertical development. The age and deterioration of structures produce lack of financial profitability. Generally in the central areas of the city the demand is growing and people who can afford high rentals and construction costs try to locate their business and residences in these areas. Residential deterioration does not affect commercial development seriously in these areas but as the result of high demand the commercial redevelopment inculcates the residential development and because of the space problem vertical development takes place slowly.

Redevelopment was first attempted in the U.K. and U.S.A. In the form of a federal programme the redevelopment of urban areas as a planning requirement, enacted by the U.S.A. government in Housing Act in the late 1940s. The concepts of urban redevelopment are of a recent origin and in India it is still in the infant stage. The term involves in rejuvenating the urban areas where such areas are in the process of degeneration or decline due to a variety of factors. Rebuilding of the inner parts is essential as the deterioration and decay has set in with obsolescence of the cities.

The concept of urban renewal and redevelopment in India can be traced to the year 1965 when the committee on urban land policy of the Ministry of Health, Government of India mooted urban renewal to tackle the programme of congestions and overcrowded areas. It considered three alternatives, viz., (i) wholesale demolitions and through redevelopment, (ii) selective urban renewal, and (iii) gradual improvement. The process of wholesale demolition and thorough redevelopment was rejected outright and the gradual improvement is approved considering the financial and social implications. The committee also envisaged the role of the local bodies in evolving a systematic policy of long term redevelopment schemes. The recommendations of the committee had been followed by

few local bodies of the metropolitan cities in a piecemeal manner. However, the redevelopment process in the Indian cities was a sporadic and gradual development. A schematic representation of redevelopment process is shown in Fig. 1.

A detailed analysis has been made regarding the number and distribution of different storied high-rise buildings in different parts of the city during the recent time (2011-2017) in Jaipur city region and it has been found that all types of high rise residential buildings are much greater in number in the central part of Jaipur. The city has been gradually expanding its municipal frontiers to meet the demands of the increasing population. It is obvious that the walled city can no more provide additional housing facilities to a very large number of people as its area is restricted by the enclosing wall. Resultantly many new colonies have come up in the outlying areas.

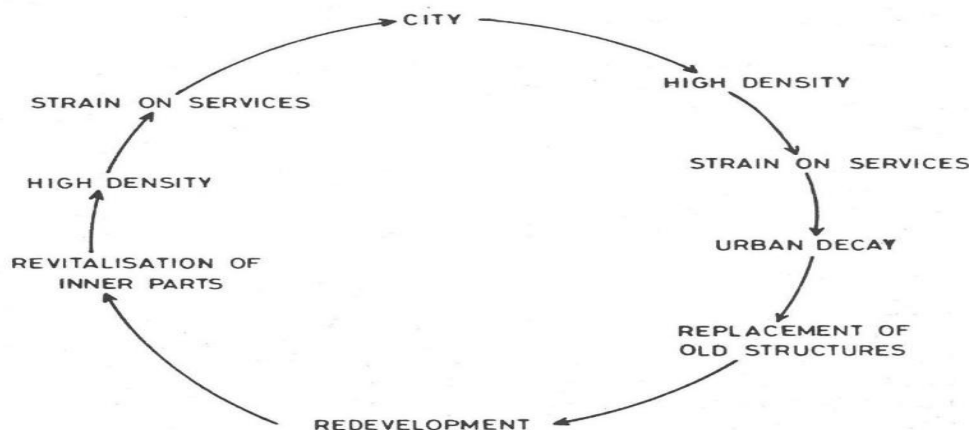
This process of rehousing or reconstruction is the part of urban redevelopment process in Jaipur. Thus, the skyline of Jaipur is drastically changing with the passage of time. It has also been observed that such tall residential apartments are changing not only the land use and skyline of Jaipur but also modifying the socio-economic structure, environmental quality,

individual perception, psychological outlook of the city dwellers as well as the city itself.

Huge concentration of population in tall residential apartments is creating tremendous pressure on the small plot of land and it has been observed that increasing number of high rise buildings are giving rise various environmental problems of Jaipur city like, shrinkage of solid waste disposal area and free flow of rainwater outlet, water logging problems, restriction of free air and water flow, excessive withdrawal of groundwater and formation or ground water trough etc

Another important proposal in this respect can be made for inclusive urban growth. It means infrastructural improvement within the city proper together with new infrastructural facilities provided to the added areas around the city. Modification, augmentation, modernization of the existing infrastructure, integrated urban planning, competitive governance, social inclusion, organized building programs are a few sectors which need to be taken care. High residential density can be achieved only through high rising living, so their vertical growth is the time tested demand of the recent time. But their best utilization with least environmental degradation.

**Fig. 1: Urban Redevelopment Process (Schematic)**



## Review of Literature

Tom Hancock (1976) examined the cost benefit analysis in terms of replacement of old and obsolete housing through redevelopment.

Scott Greer (1980) discussed conurbation and included it in his study on urban renewal and American cities.

William Lim (1975) expresses concern over differences in purchasing power parity and the relative poverty of urban population with special reference to ASEAN.

Satish Sinha (1985) attributed preservation, rehabilitation of property or environment and redevelopment as important elements of urban renewal.

Ravindra Prasad (1989) has stressed on redevelopment in terms of socio-physical infrastructure.

Jaswant B. Mehta (1978) has tried vividly aspects of high-rise buildings on socio-economic platform.

Robert C. Williamson (1978) studied the social aspect taking into account sites, the special reference to floors, community participation, kinship bondage and indices of satisfaction and dissatisfaction.

Jane Darke and Roy Darke (1979) investigated the housing crisis and put impetus on the purchasing power for home procurement.

Land H. Kendig and Bret C. Keast (2010) stated that skyline is the function of height i.e. four to five stories to twenty stories contain ten times to forty-four times respectively the human height

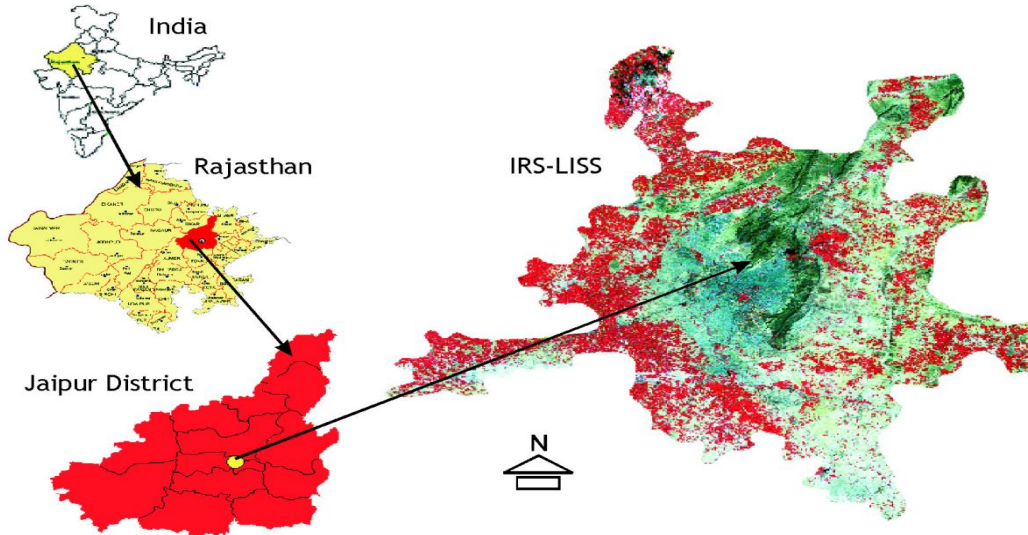
Bertaud (2002) points out, FSI regulations in India tends to reduce in central city as regulated FSI is often lower in the city than the periphery.

Bertaud (2011) Urban sprawl is the result of low FSI policies in India as the city region is an outcome of decrease in rent and prices in contrary to limiting regulation of FSI and land use.

David R. Godschalk and David C. Rouse (2015) offers planners a detailed guide to creating **Study Area**

comprehensive sustainable plans.

**Fig.2: Location Map of Study Area**



Source: IRS-LISS-4

Jaipur is situated amidst the Aravali hill ranges at an altitude of about 430 metres above mean sea level and lies on latitude 26°55' north and longitude 75°50'. Koeppen climate classification BSh. The greenery around the city belies the fact that this is the capital of Rajasthan – a desert state. The hill ranges girdle the city from three sides, thus leaving only the southern region for further expansion.

Jaipur is directly linked with several large towns inside and outside Rajasthan by road, rail and air. It is an important railway junction on the Delhi-Ahmedabad railway line. Besides, National Highways Eight and Eleven run through the city of Jaipur, while Highway One links Jaipur with Kota- the industrial city of Rajasthan.

The climate of the city is dry and the temperature fluctuates between 25 °C to 41 °C in summer and between 6.5 °C to 25 °C in winter. The average annual rainfall is 62 cm. While the average humidity in July is 80%. This approximately 240 years old city has been known for its splendid architecture, christened as Pink City.

### Objective of the Study

To analyze the spatial distribution and growth of High Rise Buildings within jaipur municipal region between 2011-12 to 2016-17.

### Data and Methodology

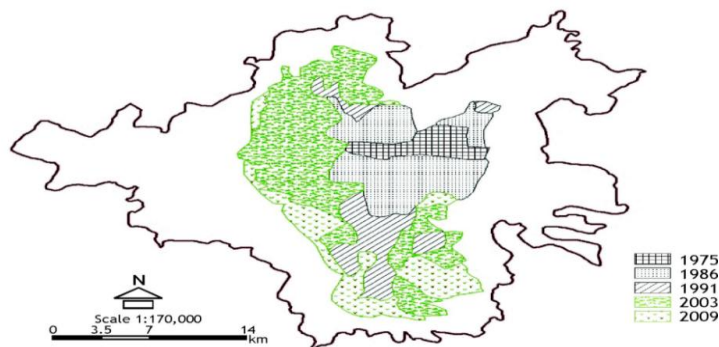
Both secondary and primary data has been used. Classified decadal record of the ward wise residential and commercial buildings constructed between 2012-13to 2016-17 from Jaipur Municipal Corporation and Jaipur Development Authority

Initially Google Earth application followed by LISS-4 /PAN -temporal and multi-resolution satellite data for the interpretation of images pertaining to 2012-13 and 2016-17. Segmental changes were observed with Arc GIS 10.2 and Erdas Imagine 2011 to generate ward boundary and the superimposition of classified buildings there upon.

### Results and Discussion

The spatio-temporal expansion of Jaipur city region is depicted in Fig: 3. Initially during 1960s the entire municipal area of Jaipur city covers about 27 sq. miles while the area of the walled city remains 3 sq. miles only. In 2016-17 the municipal area has expanded 200 times.

**Fig. 3: Urban Growth 1975-2009**



In 1961 Census, Jaipur was physically divided into ten wards, out of which the first eight were within the walled city and the remaining two covered the area outside the walled city. These outlying wards, when compared with the rest, are larger in size and

population. In the 1971 the number of wards increased from ten to thirty-eight. Ward-wise population in Jaipur city during 1961 and 1971 is given in the Table 1.

**Table 1: Wardwise Distribution of Population in Jaipur City in 1961 and 1971**

| Sl. No. | Name of Ward          | 1961           |                                    | 1971           |                                    |
|---------|-----------------------|----------------|------------------------------------|----------------|------------------------------------|
|         |                       | Population     | Percentage of the total population | Population     | Percentage of the total population |
| 1.      | Purani Basti          | 53,077         | 13.2                               | 72,991         | 12.0                               |
| 2.      | Topkhana Desh         | 47,293         | 11.7                               | 59,302         | 9.7                                |
| 3.      | Visheswarjee          | 22,812         | 5.7                                | 27,589         | 4.2                                |
| 4.      | Modikhana             | 20,346         | 5.0                                | 23,375         | 3.8                                |
| 5.      | Ramchanderji          | 38,436         | 9.5                                | 49,424         | 8.1                                |
| 6.      | Gangapole             | 20,829         | 5.2                                | 33,294         | 5.5                                |
| 7.      | Ghat Gate             | 43,952         | 10.9                               | 52,802         | 8.7                                |
| 8.      | Topkhana Hazuri       | 27,348         | 6.8                                | 36,755         | 6.0                                |
| 9.      | Jawali Shahhar Janubi | 48,146         | 11.9                               | 105,144        | 17.2                               |
| 10.     | Hawali Shahhar Garbi  | 81,205         | 20.1                               | 151,696        | 24.8                               |
|         | <b>Total</b>          | <b>403,444</b> | <b>100.00</b>                      | <b>610,572</b> | <b>100.0</b>                       |

*Source: Compiled on the basis of Census data, 1961 and 1971.*

Thus, the population of the eight walled city wards increased from 2,74,093 in 1961 to 3,53,732 in 1971, recording 29.2 per cent increase over the decade under review. On the other hand, the population in the two outlying wards, Hawali Shahar Janubi and Hawali Shahar Garbi which was 1,29,351 in 1961 shot up to 2,56,840 in 1971, thus registering a notable 99.2 per cent increase. The new localities of Jaipur, developed outside the walled city inhabited 32 per cent of city's population in 1961, while in 1971, the figure had gone up to 42 per cent.

**Table 2: The yearly addition of the new colonies**

| S.no | Year | Name of colonies  |
|------|------|---|
| 1    | 1930 | Adarsh Nagar, Ashok Nagar, Bani Park, New Colony, Civil Lines |
| 2    | 1948 | Bapu Nagar, Gandhi Nagar                                      |
| 3    | 1950 | Tilak Nagar   |
| 4    | 1970 | Jawahar Nagar, Nahar ka Naka                                  |

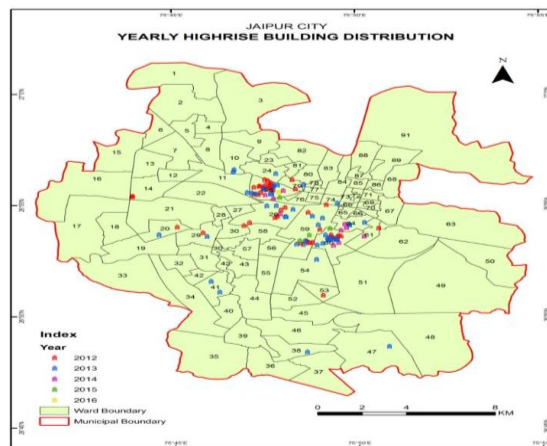
*Source: Jaipur, profile of a changing city pp 3-4*

Table 2 depicts the further addition of urban habitation in consequent upon the increase in number

of wards further. The subsequent expansion of residential and commercial areas lead to the number of legislative wards to be 77 to 91 in 2011 to 2018 respectively. It is interesting to note that the region out of the walled city that developed during pre and post independence still reveals the fidelity of vertical growth. These new colonies because of their spaciousness, have, a special attraction for the middle income and higher income groups of population.

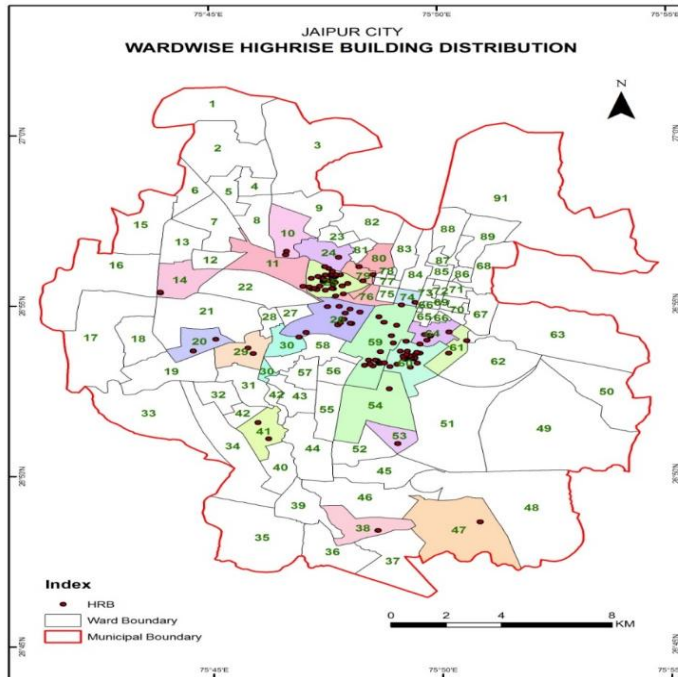
The ward wise segregation and growth of High Rise Buildings (≥15m) is presented in Fig. 4 and Fig. 5 for the time span of 2011-2017 and astonishingly wards no. 25,26,59,60 comes out to be Bani Park, Civil Lines, Bapu Nagar and Tilak Nagar respectively (Graph 2). Moreover, the real estate boom got manifested in Graph 1 showing the maximum construction in the year 2013 followed by 2012. The reasons for deaccelerated growth after 2014 may be ascribed to the change in real estate policies viz, demonetization, Real Estate Regulation and Development Act 2016 (RERA) etc.

**Fig. 4: Yearly Distribution of HRBs**



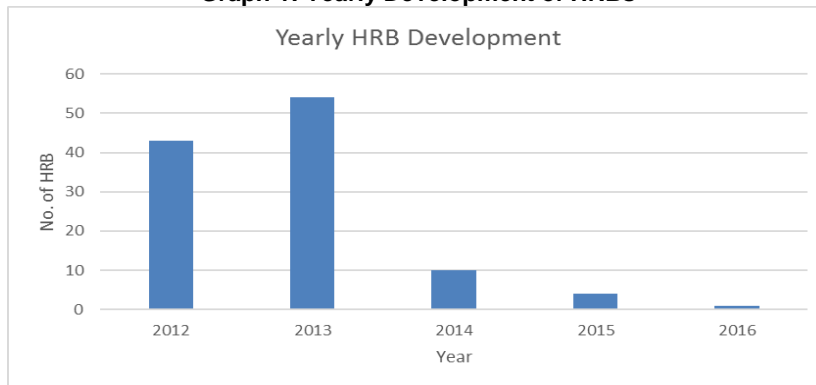
*Source: self compilation by the authors*

**Fig. 5: Wardwise Distribution of HRBs**



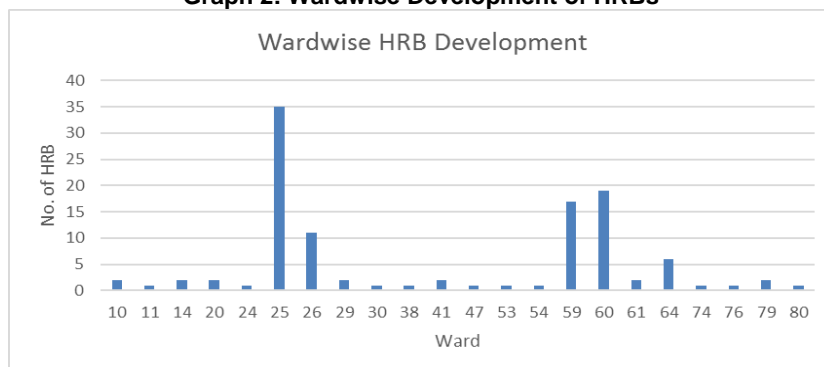
Source: self compilation by the authors

**Graph 1: Yearly Development of HRBs**



Source : Jaipur Municipal Corporation 2018

**Graph 2: Wardwise Development of HRBs**



Source : Jaipur Municipal Corporation 2018

**Spatio-Temporal Growth and Expansion of Jaipur City**

Residential area has higher rate of expansion after 1975, the major expansion is observed in the western, southern and south-eastern

parts and along the national highways 8, 11 and 12. Towards the south it has expanded about 20 km from Ajmeri Gate covering Sanganer town and even along the Tonk road. Towards western direction it has almost reached to Bagru town, which is about 35 km



away from the city. The city has expanded towards southern and western directions engulfing productive cropped area, fallow land, and degraded forest land. The urban area has covered the surrounding towns, which are developing as the satellite towns like Sanganer, Bagru, Chomu, Achrol, Kanota, etc. Jaipur city is putting heavy pressure on the ecologically sensitive areas by way of deforestation and mining in Nahargarh and Jhalana reserve forest areas.

### Conclusions and Suggestions

A few proposals relevant for policy making have been suggested to maintain the urban environmental balance. Renowned developers or organized real estate builders should be given priority for high rise projects. Concerned authority should be strict regarding the implementation of rules and regulations for tall buildings construction act. No compromise should be made due to political or monetary influence. Carrying capacity of the land should be examined meticulously in terms of the infrastructural facilities and municipal civic services before construction of any multi-storied tall residential apartment on a plot of land. Greenery norms, fire safety, structural accuracy, environmental aspects could be given priority during the high rise construction. Above all the viability of the multi-storied construction activity should be studied taken in consideration all the environmental, social and economic factors together with the carrying capacity of the land.

A few norms should be followed carefully by the builders, for example, road alignments and building lines, height of the building in relation to the width of the road on all sides, structural safety and scrutiny of the building plan, minimum open space at ground in relation to the height of the building, parking provision, earthquake resistance, fire services within the building premises etc. In this respect, the developers can introduce a few measures within the

tall building sectors to maintain the quality and serve the dwellers at optimum level. For example, the multi-storied residential buildings can be served by their own water treatment plant, sewerage treatment plant (STP plant) for hygienic disposal of sewerage, gas bank, own power station, provision for re-cycling of waste water, rain water harvesting, development of solar power panel, landscape gardening, imaginative layouts etc. It will not only reduce the pressure on the municipal civic services but also can serve the building dwellers at their satisfactory level and above all can maintain urban environmental quality

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