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Assessment of Quality of Built Environment in the Urban Villages of Delhi

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ABSTRACT

The Urban Villages are integrated part of the development in the cities. In the process of Urbanization, the villages of Delhi have been engulfed and as a result the rural villages are transformed to urban villages. The Urban Villages in Delhi are growing fast and haphazardly. This necessitates systematic understanding and a structure for measuring the quality of built environment specifically acceptable to Urban Villages. In the existing situation, there is no structure for measuring and assessing the built environment of these villages. This nonexistence of assessment structure has resulted to the unmanageable growth of these villages, which has triggered a sequence of environmental, social, and economic issues.

This paper firstly analyses prevailing assessment methodologies, reviews the theories on Quality Assessment of built environment and proposes an Assessment Structure that is appropriate to this area and similar areas. The structure is specially made for urban villages to address its characteristic issues. The structure is built on a quality assessment model for urban villages that highlights the physical aspects; and considers the environmental and social conditions of urban villages into explanation. The assessment structure is tested in the two urban villages of Delhi as the development pace is very high in these villages and the infrastructure development is low in comparison. Finally, the factors liable to the degraded urban quality of the Urban Villages are validated which can help architects, planners and other professionals in ascertaining innovative and challenging development regions.

1. Introduction

The built environment should light the basic necessity of human and humankind, provide a sociable environment and add on to the sustainable development. The Quality of Built environment depends on our livelihood. Our livelihood impacts the environment in numerous ways. Every activity of human beings impacts the environment it includes leisure, travel as well as day to day

activities. As buildings account for one sixth of world's fresh water withdrawals, one quarter of wood harvested and two fifths of all material and energy flows (Emmanuel, 2004). This may be accountable to the non-availability of environmental assessment tools to measure the quality of built environments for better living. It is for this objective that a structure for the assessment of the quality of the built environmental is necessary.

Hence, the study proposes a structure for assessment of the quality of the built environment for urban villages. The assessment structure emphasizes at the neighborhood level of the Urban Village.

2. Methodology

The key objectives of the research are as follows:

1. To find out what are the indicators for Urban Quality Assessment of built environment through extensive literature study and propose an Assessment Structure that emphasizes physical dimension at Neighbourhood level in the Urban Villages
2. To recognize the factors leading to degradation of Built environment in Urban Villages
3. To evaluate the structure of assessment in the selected case study Urban Villages of Delhi

To achieve the objectives the Research methodology followed was:

i) The theoretical basis for the selection of the indicators was formed through literature review

ii) Data collection from primary survey as well as secondary survey

iii) Developing an Assessment structure to assess the quality of Built environment with its indicators emphasizing Physical dimension at new level in Urban Villages

iv) Evaluation of the structure in the urban villages with the same context

v) Analysis of the results to recognize the factors causing degradation of quality of Built environment.

3. Concept Of Urban Villages

Urban village is not a new concept. Creating urban neighbourhoods or villages was a focal point of urban design and planning in the early twentieth century, as advocated by Ebenezer Howard in Garden City Concept, and Clarence Perry in Neighbourhood unit, among others (Landman, 2003).

Industrial revolution had its first impact on England. In towns like Birmingham and Bradford workers dwellings were built back to back with no direct daylight

and ventilation. There were no open spaces. Eventually this concentration led to the deteriorating condition of the city, such as the over population of residential areas, high-level pollution, and increase in crime (Mumford 1989). In 19th century industrial development and crowding of metropolises became chronic. The use of machinery and factories led to mass production, which in turn led to the development of numerous environmental hazards (Singh, 2015). Horrified by the disorder, disease, and crime of the contemporary industrial metropolis, British planner Howard (1902) advocated the creation of "garden cities" on the suburban periphery. These self-contained towns, with a population of roughly 30,000, would have their own employment base as well as neighbourhoods of pleasant cottages and would be surrounded by rural areas.

Demand to get away from the city became more imperative and undeniable. Suburbs flourished around towns with a more mixed population with its infiltration of rural aristocracy and leisured people. The theories were given by the various planners for the different perspectives of planning. Doxaidis (1968) considered the central problems of settlements to originate from their inability to adapt to the continuous and rapid process of urban expansion. Compact cities, decentralization and dispersion of a dense city with satellite settlements were for Doxiadis dangerous solutions that did not address the organization of urban functions, the needs of the region, nor the spatial expansion needs of the central city (Middleton, 2009). Geddes introduced a second evolutionary theme, in which the city was itself an environment: a built environment, of course, whose design could positively influence the social organism it contained (Batty and Marshall 2009). For Mumford, contemporary developments suggested a growing shift towards regionalism. Industries were exiting from the large metropolitan centres whilst small communities were forming within the big cities. (Critchley, 2011). Thus, the concept of urban villages has revived through the years, the various theories given by different planners show this concept is not a completely new concept.

In the current scenario, urban villages of Developing countries and developed countries give complete contrasting scenarios. The latest version of the Urban Economics Dictionary (O'Sullivan 2005), defines 'urban village' as a sub-centre of suburban districts around the modern city. It points out that the urban village developed from suburbanization and concentrated in retail and office buildings in suburbs. Urban villages in developed countries are compact, walkable, mixed-use neighbourhoods and towns that are a pleasure to live in (MPD 2021).

A. Urban Villages in Developing Countries

Urbanisation in developing countries is marked by large increases in population and has consequences such as sprawl. As a physical phenomenon, urbanisation takes two paths: through expansion of existing urban bodies by engulfing adjoining villages into their territory and through the independent transformation of rural areas into urban areas (Agarwal, 2003). Since the

introduction of economic and social reforms in the late 1970s, China has encountered a massive flow of people into its cities coupled with massive urban expansion. Hao (2012) says their development is not regulated by any form of centralized urban planning due to the rural status of urban village land. Many urban villages are heavily populated, overdeveloped and lacking infrastructure.

The rapid socio-economic development and the transformation of the Indonesian economy during the last three decades have significantly transformed many rural villages into urban villages (Otsubo, 2016). The lack of government surveillance of house construction has created many clustered slums urban village. It signed with unorganized urban spatial structure, such as building orientation, height and width of building and street width (Paramita, 2011).

B. Evolution and Growth pattern of Urban Villages in Delhi

In India, an area demarcated for habitation and administered by the Gram Panchayat is known as *abadi* (settlement). It is essentially a residential component of the community (Kumar & Bhaduri 2018). In the process of urbanization, cities extend their geographical area and nearby villages *abadi* (settlements) get engulfed (Fig.1). These *abadi* are commonly known as Urban Villages/*Lal dora* as circumscribed in red ink on *shijra* map, a detailed village map that is used for legal (land ownership) and administrative purposes (Development Plan and Policy Document for GNIDA.).

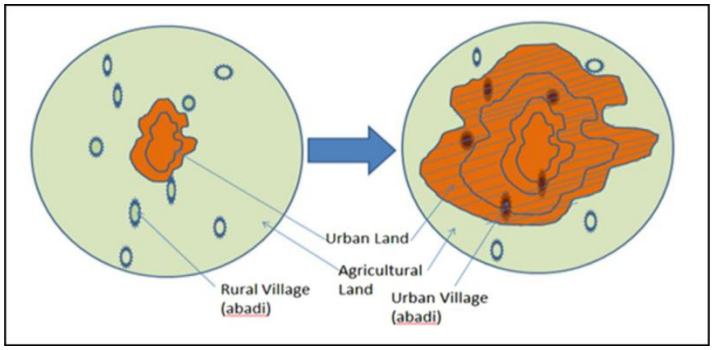


Figure 1: Engulfment of villages in the process of urbanization
Source: Kumar and Bhaduri, 2018

An urban village can be defined as a village which has acquired urban characteristics due to reduction in its agricultural base by the process of acquisition of land holdings for public purpose or by its transformation into residential or industrial colonies (Tyagi, 1982). During the groundwork for the Master plan for Delhi, 1961 the scheme of urban villages was a plan for relocation and envisaged the development of villages on the outskirts of the city to act as receiving centres for industries having a rural character and people engaged therein. There were distinct advantages in this scheme.

However, in the later years the Delhi Development Authority (DDA) did not use the term in the specific sense. DDA have notified building regulations for village *abadis* 2010. In the current situation the residents of the urban village violate the building byelaws. The authorities also do not take the proper measure for implication of the building byelaws. Gallion and Eisner (1980), states that "as people, buildings, and traffic pile higher, the upper crust slides down the sides and outward to the suburbs". Similarly, over the years the population of the villages had increased many times. The needs for the individuals have also increased resulting in an overspill of the population on available and suitable land as an extension to the existing village *abadi*.

4. Quality of Built Environment in the Urban Villages of Delhi

The quality of built environment of these villages are a concern. Datta (2004) states that the Rural Development Board, created by Delhi Government, proposed the rural areas under 'special zone' for planning. But their planning proposals finally needs approval from DDA and the conflict in interest of these bodies ultimately delays finalisation as well as implementation of plans. The mini master plans, as they are called, are proposed for the agricultural land (acquired by DDA) around the main *abadi.* This process ultimately gives birth to another 'urban village'.

TABLE1: Matrix for selection of the indicators

S. No	Level	Indicators	Validity	Reliability	Sensitivity	Availability	Objectivity	Inference
1	Neighborhood level	Residential density	✓	✓	✓	✓	✓	Satisfies Selection criteria
2		Mixed land uses	x	✓	x	✓	x	Do not Satisfy selection criteria
3		Parks and play areas	✓	✓	✓	✓	✓	Satisfies Selection criteria
4		accessibility	x	✓	x	✓	x	Do not Satisfy selection criteria
5		Population growth	✓	✓	✓	✓	✓	Satisfies Selection criteria
6	City level	In-migration of poor people	x	✓	✓	x	x	Do not Satisfy selection criteria
7		Industrial growth	x	✓	x	✓	x	Do not Satisfy selection criteria
8		Inefficient and inadequate traffic corridors (carriageway	✓	✓	✓	✓	✓	Satisfies Selection criteria
9		Environmental infrastructure	✓	✓	✓	✓	✓	Satisfies Selection criteria
10		Noise level	x	x	✓	x	x	Do not Satisfy selection criteria
11		Traffic intensity.	x	x	✓	x	✓	Do not Satisfy selection criteria

12	Building level	Built mass	✓	✓	✓	✓	✓	Satisfies Selection criteria
13		Levels of litter	x	x	✓	x	x	Do not Satisfy selection criteria
14		The extent of trees and greenery	x	x	✓	x	✓	Do not Satisfy selection criteria

5. Built Environment Assessment Methods

Since 1990s, there has been extensive development of building environmental assessment methods, many of which have subsequently gained considerable success (Cole, 2005). The Building research Establishment Assessment Method (BREEAM) in UK, 1990 was the first real attempt and various schemes such as Building Environmental Performance Assessment Criteria (BEPAC) was developed at the University of British Columbia and launched in 1993 (Cole et al., 1993). Sustainable Building Assessment Tool (SBAT) in Canada, 1998, Leadership in Energy and Environmental Design (LEED-ND) in US, 1998 and Comprehensive Assessment System for Building Environment Efficiency (CASBEE) in Japan, 2001 have subsequently emerged. Almost all environmental assessment methods have been designed to suit a specific territory.

The existing assessments have limited applicability, hence there is a need for a complete structure to credibly measure the sustainability of built environment in these areas address the issues which are specific to the Urban Villages in Delhi.

A. Indicators for the Assessment of the Quality in the built environment

Indicators are quantitative tools that simplify synthesis of data that are related to the relevant state or the development of some phenomena. They serve as tools for communicating, evaluating, and making qualitative or quantitative decisions (Elgadi and Ismail, 2015.

The quality of the built environment can be examined at multiple scales, including the individual dwelling, building, housing development, street, and neighbourhood and beyond (Carmona & Magalha˜es, 2007). This can have an influence on the indicators or parameters selected for assessment. Panda et. al. has assessed the social sustainable development quality of Built environment with a Composite Index and obtained comprehensive sustainability structure under different dimensions viz. Social, Economic, Environmental and Institutional. Each of the dimensions are a co-equal component for sustainable growth. They should not be considered in isolation and each must be integrated from the start in developing a sustainability structure (Von Hauff et al., 2013). Rahman et. al. (2011) emphasizes population growth and in-migration of poor people, industrial growth, inefficient and inadequate traffic corridors, poor environmental infrastructure, etc. are the main factors that have deteriorated the overall quality of the city environment.

The quality of spaces can also be measured objectively, though, for example, assessments of building construction (Atkinson, 1995), levels of litter, and the extent of trees and greenery (Dempsey, 2006). Oktay and Marans (2010) suggested that to make a neighbourhood an appropriate place to live and to raise children, with easy availability of things to do there, such facilities as parks and play areas should be provided in accessible locations. Further they examined other physical attributes such as cleanness, noise level and traffic intensity. Smith et al. (1997) also developed specific criteria to measure the physical qualities of the neighbourhood environment. These included livability, character, connection, personal freedom and diversity.

B. Identification of indicators for the Assessment of the Quality in Urban Villages

To support the development of the Urban Villages and measure quality of built environments in these areas, a new assessment structure, the Urban Village Built Environment Quality Assessment System (UVBEQAS), is established.

The rigorous literature review and observations has been useful for the identification and assessment of indicators and variables.

. Table 1 presents the matrix for selection of the indicators. The matrix is based on the following criteria, given by Hahn (2003) :

1. validity - Does it measure the key element under consideration?
2. Reliability - Is it a consistent measure over time?
3. Sensitivity - When the outcome changes, will it be sensitive to those changes?
4. Availability - Will it be easy to measure and collect the information?
5. Objectivity – Can the data be reproduced under changing conditions

According to Moose (1996), data collection should guide the design of indicators. Above all, the data should measure results not just processes. Selectivity is desirable. Hence the identified indicators are placed in the matrix of selection criteria to select the final indicators (Table1)

TABLE II: MATRIX showing the relationship between different factors of indicators for UVBEQAS

S.No	Level	Indicators	Factors
1	Neighborhood level	Residential density	Built up density
		Population growth	Population density
3		Parks and play areas	Open Spaces
6	City level	Inefficient and inadequate traffic corridors (carriageway	Road Width
			Accessibility of fire engine
7		Environmental infrastructure	Water Supply
			Drainage
			Water Logging
			Electricity

11	Building level	Built mass	Ground Coverage
			Number of Floors
			Building Height
			Building Projection
			Building Age
			Condition of the Buildings

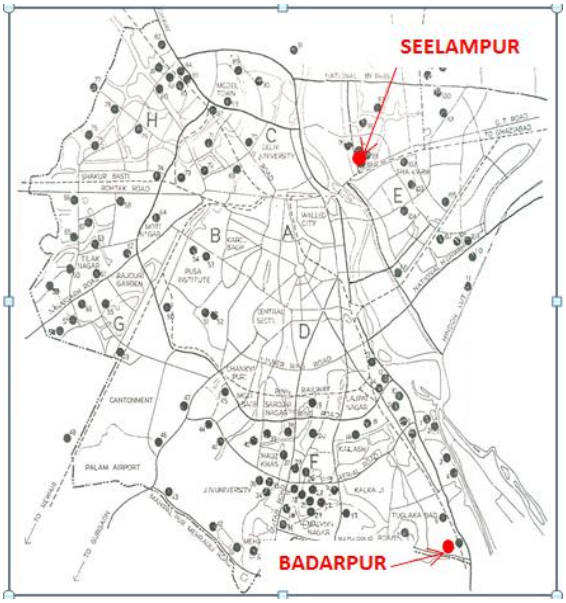
It is significant to note that the indicators and its factors are selected on the basis of matrix (Table II) which influences the quality of built environment in urban villages. The indicators selected to measure quality focus on physical aspects and take the environmental and social conditions of urban villages into consideration. The Neighbourhood level, City level and Building levels are taken into consideration.

In the Urban Villages of Delhi there has been extreme rise in the population however housing and infrastructure including both physical and social have not been able to keep pace with the prevailing urban growth rate that leads to degrading urban environmental quality. After analyzing each indicator and its factor under the various levels and aspects the indicators and its factors, are included the Assessment Structure.

6. Study Villages in Delhi

This paper presents case study of two urban villages. Badarpur and Seelampur are the two urban villages selectd for this study. Badarpur is located in South Delhi and Seelampur in North East Delhi (Trans Yamuna Area), as shown in Fig.2. Under section 507 of Municipal Corporation of Delhi in 1966 both the case study Urban villages were notified (List, of Urbanized Villages, 2013)

Figure 2: Location of Study villages Badarpur in South Delhi and Seelampur in East Delhi. Source: Author



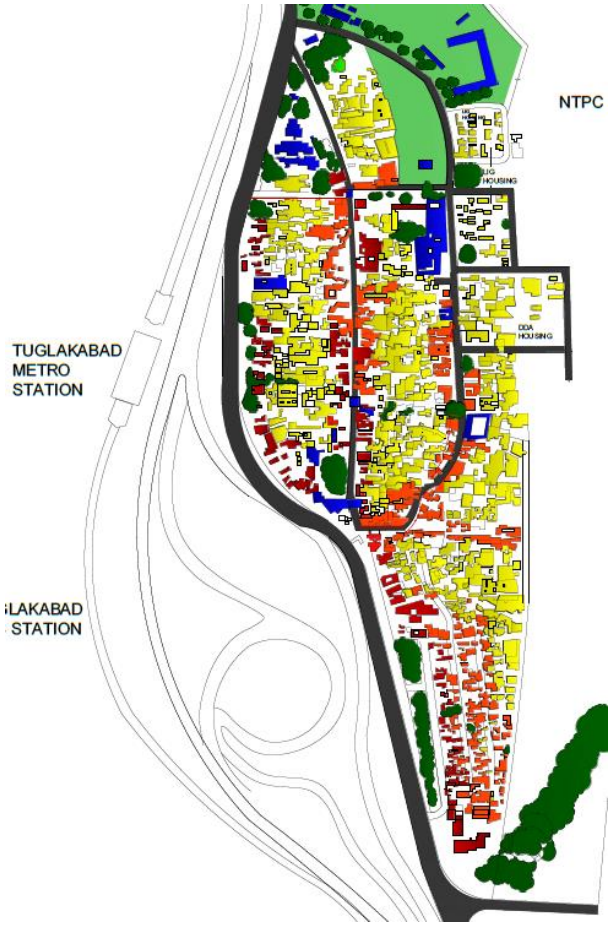


Figure 4: Land use plan of Badarpur, Source: Author

Figure 3: Location of Badarpur and its setting, Source: Author

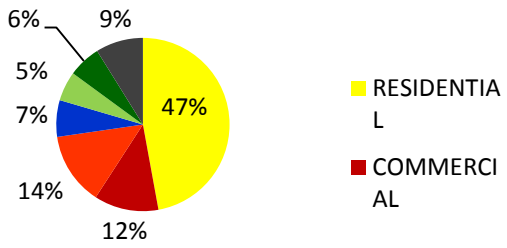


Chart 1: Land use distribution of Badarpur, Source: Author

A. Badarpur, South Delhi.

Badarpur, also known as "Badarpur Border" is situated on the National Highway 2 (Mathura Road) (Fig.3). It is a historic place, located at a distance of 17 kms. towards south east Delhi Badarpur was a rural village. As the city developed and expanded the village got engulfed within the city. The village has been subjected to many changes in social, cultural and economic attributes, and physical characteristic. High densities, congestion, overcrowding are the common characteristics of the village. The area has haphazardly grown both horizontally and vertically. With these characteristics and increasing pressure of population and lack of due attention given in their systematic planning, the character of the village is deteriorating.

The total study area considered in Badarpur was 42 Ha. According to the Census of India 1971, The population of Badarpur in 1971 was 242 where as in 2018 it has increased to 47130. The number of buildings is 2750 approx. and Dwelling Units are 8250 approx. Fig. 4 shows the Landuse distribution of Badarpur. The predominant land use of Badarpur is Residential with 47% (Chart 1)

B. Seelampur in North East Delhi

Seelampur is located approximately 15 kms. from the center of Delhi, mainly it is residential area with small market places scattered around (Fig. 5). Seelampur households a population from different religious groups and caste all living harmoniously. Seelampur accommodates population displaced following the demolition of their homes in north and central Delhi during the emergency. This settlement is densely populated. Most of the dwellings are three to four storeys high with 100 per cent built-up area on their plot.

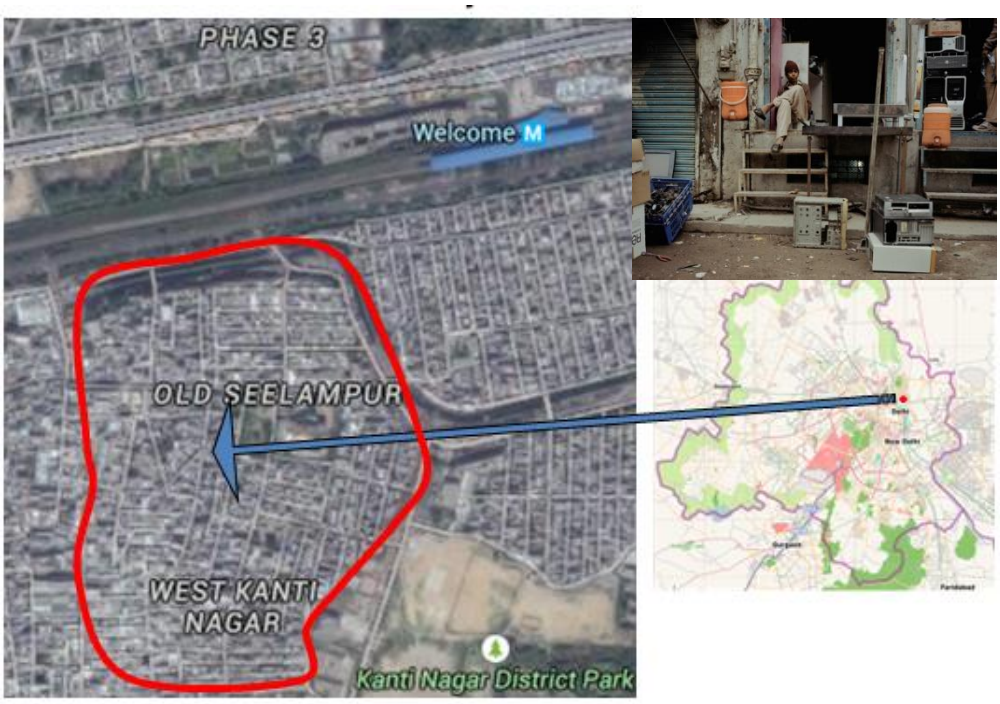


Figure 5: Location of Seelampur and its e waste market

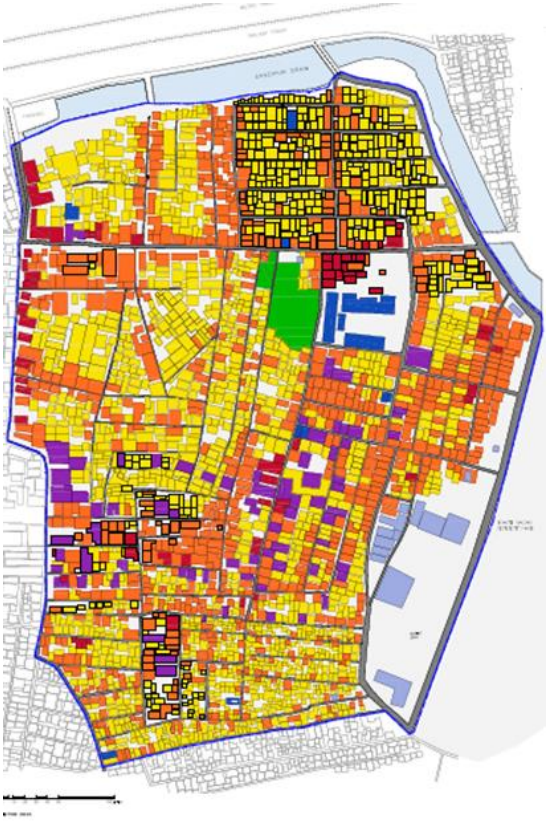


Figure 6: Landuse plan of Seelampur, Source: Author

The total study area considered in Seelampur was 22.7 Ha. The estimated population of Seelampur is 35184 in 2018 The number of buildings is 2658 and Dwelling Units are 5864. Fig. 6 shows the Landuse distribution of Seelampur. The predominant land use in Seelampur is also Residential with 56% (Chart 2)

Seelampur is the biggest e-waste (dismantling-recycling-selling) market in Delhi. Also, the waste cloth market is in Seelampur. These markets are informal and are not registered with the government.

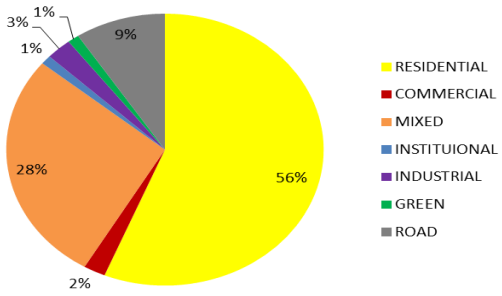


Chart 2: Land use distribution of Seelampur, Source: Author,

7. Discussion and Results

The case studies Badarpur and Seelampur both show growth with heterogeneous characteristics. There is a general sense of urbanization in these urban villages. The houses are all made of concrete but are ill maintained. There are sub-standard housing structures, lack of open space and shortage of both physical and social infrastructure. The case study villages were analyzed by cross case methodology.

The tables below present a summary of the changing aspects in the two urban villages; it explains the assessment of Quality of Built environment based on the identified parameters. Table III shows that the population density in the case study villages have increased to almost 200 times in Badarpur and 60 times in Seelampur. The population density increased to 100 times in Badarpur and 45 times in Seelampur. Whereas the open space decreased by 50% in Badarpur and by 60% in Seelampur.

Table III: Neighborhood level characteristics

Factors	**Population Density**		**Built Up Density**		**Open Space**		**Built-Open Ratio**
Year	1971	2018	1971	2018	1971	2018	2018
Badarpur	6 P/Ha	1122 P/Ha	2 DU/Ha	197 DU/Ha	60% of Total area	30% of Total area	80:20
Seelampur	26 P/Ha	1550 P/Ha	6DU/Ha	260 DU/Ha	55% of Total area	20% of Total area	70:30

Table IV: Building Level Characteristics						
	Ground Coverage	**Number of Floors**	**Building Height**	**Building Projection of The**	**Building Age**	**Condition of the Buildings**
Badarpur	93% of the buildings have 100% gr.coverage	40%of buildings are more than G+2	80% building heights are more than 1.5 times road width plus front open space	80% of the Buildings have projections beyond the building line	30% of the buildings are built during the last ten years	35% of the buildings were badly maintained
Seelampur	92% of buildings have 100% gr.coverage	43%of buildings are more than G+2	90% building heights are more than 1.5 times road width plus front open space	85% of the Buildings have projections beyond the building line	20% of the buildings are built during the last ten years	40% of the buildings were badly maintained

Huge number of tiny dwelling units have emerged in the urban villages as they are mostly occupied by poor and migrant labors. These migrant labors living in Delhi is absorbed in the informal sector which is unorganized in nature in the urban villages. 30% of the buildings are built in these Urban villages during the last ten years increasing the built-up density and decreasing the open spaces (Fig. 9). Also, the house hold size has increased from 5 to an average of 10.

Figure 7: Relationship of built and open in Seelampur, Source: Author

The Fig.7 and Fig.8 shows the ratio of built versus open which 80:20 in case of Badarpur whereas 70:30 in case of Seelampur

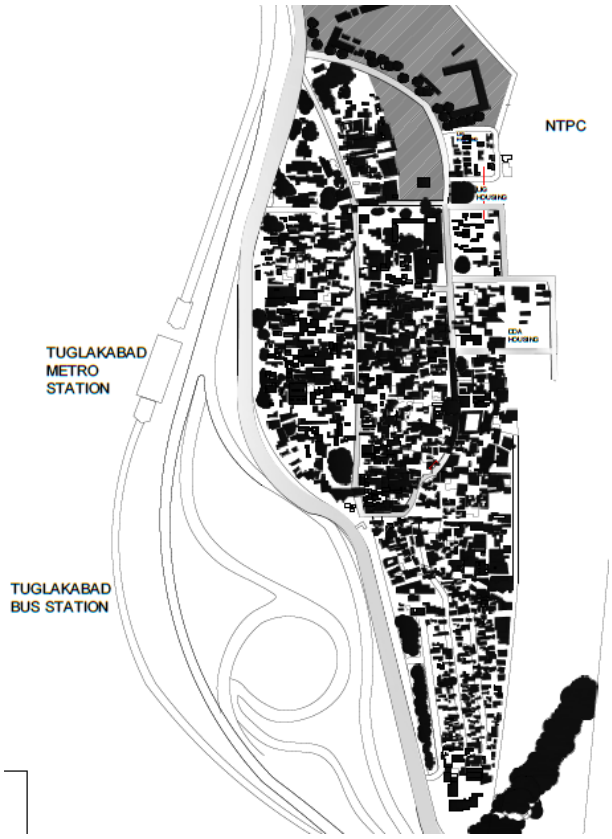


Figure 8: Relationship of built and open in Badarpur Source: Author

According to fire regulations in Master Plan for Delhi 2021 the maximum height of building shall not exceed 1.5 times the width of road abutting plus the front open spaces; every building meant for human occupancy shall be provided with exits sufficient to permit safe escape of occupants in case of fire or other emergency; all exits shall be free of obstructions. Table IV shows that the present scenario in the case studies depict that most of the buildings cover 100% of the plot. Buildings have projections beyond the building line. Also, most of the buildings are more than G+2 as a result the height of the buildings are 9-10 metres whereas the road widths are less than 6.0 metre (Table V). Fig. 12 shows the comparison between existing situation of the buildings in these Urban villages and the ideal situation. Also the roads are encroached by two-wheeler parking lots further reducing the passage width which gives access to many dwelling units.

Figure 9: Present scenario in Badarpur, Source: Author

Figure 10: Dark and narrow passages of Badarpur, Source: Author

Figure 11: Congested and narrow passages of Seelampur, Source: Author

The two urban villages show homogeneous characteristics. After the notification the population density increased in short time span due to their strategic location and well connectivity with the rest of the city.

They are mainly functioning as cheap residential accommodation provider (Fig. 14). This coupled with non-application of the building bye laws has resulted in an unbalanced and unsustainable process of development. The urban villages are developing however the basic amenities are not improving. The roads are narrow, with no drainage or open drains. In Badarpur open spaces have turned into dump yards (Fig 13). With narrow lanes, lack of open paces and poor infrastructure (Fig. 10), the urban village illustrate degraded quality of the Urban Villages.

The condition of Seelampur is also equally depraved, congested with cycle rickshaws and other older transportation means. Roads in Seelampur are narrow and institutional set up is very poor (Fig 11). As the village density

increased the village population spilled on low lying areas which are highly prone to floods.

Table 5: City level characteristics

	Road Width	Accessibility of fire engine	Drainage	Extent of Water Logging	Electricity	Water Supply
Badarpur	< 6.0m.	No	Drains are either not present or open Drains exist	Choking of drains and flood in case of excessive rains	Illegal tapping of electricity	Sufficient for domestic purposes
Seelampur	< 6.0m.	No	Drains are either not present or open Drains exist	Choking of drains and flood in case of excessive rains	Illegal tapping of electricity	Sufficient for domestic purposes

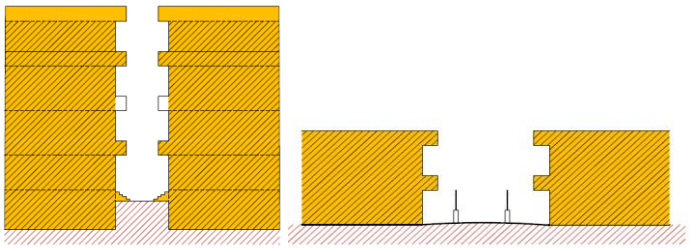


Figure 12: The existing and ideal situations in urban villages

Figure 13: Open space in Badarpur, Source: Author

Figure14: Poor housing condition and unhygienic living condition in Badarpur and Seelampur, Source: Author

Figure 15: Illegal tapping of electricity in Badarpur and Seelampur, Source: Author

The land area of the urban villages, was limited as a result settlements area was also limited however the continuous growth of population increases the load on the existing facilities. Thus, there is shortage of electricity and water supply. To overcome the shortage of electricity, the most common practice was to tap electricity using substandard wiring (Fig. 15)

8. Conclusion

The study attempted to focus on changing aspects of Quality of Built Environment in the urban villages of Delhi. The identification of indicators and factors responsible for the Quality of Built Environment has been identified and the structure of assessment is evaluated in the selected case studies of Urban villages of Delhi. This identification and evaluation will suffice the policy makers in the planning process. The paper concludes that in the context of fast-paced urbanization, the uncontrolled growth in built up density as well as increase in the population density have encroached upon the open spaces. So, the rapid growth greatly increases the degradation of quality of Built Environment and lack of urban amenities has added to the severity of the situation in large scale.

9. Way Forward

The present Corona virus crisis has posed new issues on the quality of built environment. Urban Villages are important and integral part of the urban environment, enabling the movement of people and property, assets and basic services. Post-pandemic, the new normal in our cities need to be more humanitarian and comprehensive and built environment must be designed to enhance the quality at building level, neighbourhood level as well as city level. The Urban villages will continue to attract people for livelihood. Hence, there has to be a deeper understanding quality of built environment that can be more resilient, safe, healthy and hygienic.

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