

Analyzing the Dimensions of Sustainable Urban Neighbourhood: Case of Gurugram, India

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Abstract: This research paper explores the dimensions i.e. population, optimal size and radius of sustainable urban neighbourhood (SUN), with a focus on achieving inclusivity and diversity, better economic opportunities and reducing environmental impact. The study employs a mixed-methods approach, incorporating surveys, case studies, and literature reviews to gather comprehensive data. Gurugram, a rapidly developing urban area over the past few decades, serves as the primary case study location. The case study of Gurugram provides practical insights into the implementation of sustainable practices in urban planning. Additionally, a thorough literature review contextualizes the findings within existing research on sustainable urban development. 92% of the respondents said that they would prefer to send their kids to school that are within 5-10 minutes of walking distance. The results of this study will contribute to the development of guidelines for designing urban neighbourhoods that are environmentally sustainable, socially inclusive and economically productive.

Keywords: Sustainable Urban Neighbourhood, SUN, Optimal Size, Neighbourhood Radius, Urban Planning, Neighbourhood Dimensions

1. Introduction

Sustainable Urban Neighbourhood (SUN) is a small-scale (Moroke et al., 2019), urban area within a city that comprises social (Zetterberg, 2023), economic and environmental sustainability (Rudlin and Falk, 1999). Sustainable development focuses on these three factors or pillars i.e. Social, Environment and Economy (Ricee, 2019). Governance is also an important factor in achieving sustainability (Moroke et al., 2019). Social sustainability can be achieved by unity, diversity, social integration, quality of life, etc. (Moroke et al., 2019; Polese and Stren, 2000; UK Gov, 1999) etc. Environmental sustainability can be achieved by reducing carbon emissions (Raihan et al., 2022), density, mixed land use, green space, sustainable transportation, etc. (Bibri et al., 2020). Economic sustainability can be achieved by innovative technology, employment opportunities, green jobs (Dell'Anna, 2021), economic growth, etc., (Mahtta et al., 2022; Raihan et al., 2022) which requires mixed land use (Bibri et al., 2020). Coordination and interaction of these factors are key issues for achieving sustainable urban neighbourhood (Li and Yi, 2020).

All the above three parameters, i.e. social, environment and economy have two different dimensions i.e. tangible and intangible. Tangible and intangible dimensions of the neighbourhood can be compared with a human body and soul. Our body being the physical or material aspect of the neighbourhood and soul, the immaterial and emotional dimension (Kourtit et al., 2022). Briggs (Souza Briggs, 2005) talks about the intangible nature of the city, i.e. form, culture and people's habits and how it is affected by the



advancement of communication technology.

This paper aims to provide the dimensions of sustainable urban neighbourhood in Gurugram as per the three pillars of sustainability i.e. social, economic and environment (Khatibi et al., 2023; Ricee, 2019). This paper is part of the PhD thesis on Sustainable Urban Neighbourhood and focuses on fulfilling its second objective i.e. optimizing neighbourhood size. This study will focus on tangible and intangible attributes of a neighbourhood that are environmentally sustainable, socially inclusive and economically productive. Earlier sections talk about sustainable urban neighbourhood, definitions, pillars of sustainability and give a brief background of the study area i.e. Gurugram. Later the study presents study area, methodology, and moves on to the literature study which focuses on dimensions of the sustainable neighbourhood through literature review and case studies. This paper concludes with the recommended physical and spatial dimensions of urban neighbourhood for Gurugram.

2. Background

Gurugram (formerly known as Gurgaon) is one of the nearest satellite towns of the national capital, Delhi and leading financial and industrial center (Nirmal, 2014; Rani et al., 2022). Satellite towns are planned to alleviate the pressure on the bigger cities which is Delhi in this case, but Gurugram is marred by increasing congestion, escalating land prices, and divided communities (Nirmal, 2014). Gurugram has been divided in 5 different administrative structures called sub-divisions which are Gurugram, Sohna, Badshahpur, Pataudi and Manesar (District Gurugram, 2024). There is total 36 wards (administrative units) which are further divided into blocks (DULB Haryana, 2023; GMUC, Gurugram, 2011). Globalization and the development in the city led to additional sectors in Gurugram and now it has about 150 sectors which are further divided into small blocks. There is no actual classification of neighbourhood in Gurugram and so case study of few group housing and other residential areas will be conducted to identify different neighbourhood and their dimensions.

Gurugram, the millennium city of India went to standstill in several downpours including July 26, 2016, which caused massive traffics jams, waterlogged roads, clogged drains, etc. (Anand, 2017) and around 25% of the area gets inundated under 1-2 m deep water (Saini and Mujtaba, 2002). It is interesting to note that the Final Development Plan 2031 of Gurgaon – Manesar Urban Complex (TCP Haryana, 2010) developed by Town and Country Planning Department proposed that the residential areas should be developed on the concept of neighbourhood but hardly describes or give any framework for residential neighbourhood development. GMUC 2031 only mentions two things for neighbourhood development, i.e. community facilities & services and a net residential density of 250 people per hectare in any sector (TCP Haryana, 2010). GMUC 2031 also mentions special zones which will comprise recreation, entertainment, commercial, group housing and institutional uses. Special zones have been allotted 114 Hectares and are situated near Sector 16 and Sector 20 (TCP, Haryana, 2010a). Until now not much progress has been made. The major focus in Gurugram has been on the development of new group housing and most of which are gated communities. There have been a lot of politics on golf focused gated group housing communities near golf course road (Waldman, 2022). Gurugram Manesar Urban Complex (GMUC) projected population for the year 2031 is 58,36,991 which is an increase of 1400% from the year 2001 (TCP, Haryana, 2010b). The urbanisable land area in GMUC has increased at the rate of 383% from 9881 Ha in 2001 to 37,872 Ha in 2031 (Civil Engineering Department, 2024).

3. Methodology

This paper utilizes mixed-methods approach, incorporating literature reviews, case studies, and surveys to gather comprehensive data. With the help of the literature review three pillars of sustainability i.e. social, economic and environment were identified in respect to different dimensions of urban neighbourhood. Main parameters studied were density, diversity, distance, etc. Case study of ten different neighbourhood was carried out in Gurugram to identify the different tangible and intangible aspects of the neighbourhood. Case studies were selected on the basis of Local Climate Zones of Gurugram which was identified with the help of WUDAPT (World Urban Database and Access Portal Tools) using training areas generated on Google Earth. All the dimensions were compared to the existing neighbourhood concepts, established benchmarks, and guidelines like UN-Habitat, TOD (Transit Oriented Development), Master Plan, Case Studies, Town and Country Planning Guidelines, etc. An online survey of school going students aged between 0 to 18 was carried out to understand the community's needs and preferences in terms of commute time and distance to the school by the students everyday. Sample size for the survey was calculated using Cochran's formula (143) as well as Taro Yamane's formula (144). Survey was conducted online using google forms. Questions asked in the survey were related to school commute time, distance, mode of transportation, or challenges faced by the students. Total 151 responses were collected. Survey data was analyzed using gemini flash 3.5. (Gemini,

4. Tangible and Intangible Dimensions of Neighbourhood

Every neighbourhood has measurable and immeasurable attributes which can be termed as tangible and intangible attributes respectively. Tangible attributes in a neighbourhood are mainly physical attributes (Corrado et al., 2013), territory (Dzurek, 2005) or building morphology (Bonet et al., 2020) while intangible attributes are social interaction (Bonet et al., 2020; Parkes et al., 2002). While tangible attributes is mainly the physical or structural components of a neighbourhood, intangible attributes are qualities that give the sense of community and make people feel at home in the neighbourhood. Tangible attributes or physical attributes in a neighbourhood include variables like land use, environment, density, infrastructure, etc. Intangible or social attributes in a neighbourhood includes sense of community, safety and security, cultural diversity, local identity, etc. (Spoormans et al., 2023). Social infrastructure has both tangible and intangible dimensions. Its tangible dimensions include physical infrastructure like schools, religious buildings, community centers, health centers, fire stations, post offices, police stations, crematoriums, etc. that support socio-cultural interaction.

5. Local Climate Zones in Gurugram

To understand the Local Climate Zones (LCZ) of Gurugram a tool called WUDAPT (World Urban Database and Access Portal Tools) was used to generate level 0 data (Bechtel et al., 2019). It helps in identifying different built types and land cover types of urban areas as shown in Figure 1. WUDAPT has identified a total of 10 different built types also called urban classes and 7 different land cover types called natural classes that can be found in any urban areas (Bechtel et al., 2019; Demuzere et al., 2021).



Figure 1. Built Types and Land Cover Types (Demuzere et al., 2022)

Using Google Earth some training areas were defined for each LCZ class and the number of training areas ranged from 2 to 19 per LCZ class. Average surface area per LCZ class ranged from 38 sqm to 11 sq km. Total area covered ranged between 28.25° and 28.60° latitude, and 76.85° and 77.20° longitude. The total area covered was 34 sq km. Accuracy of the LCZ maps can be assessed using the accuracy metrics. The final filtered map produced as shown in Figure 2 has overall accuracy (OA) of 0.87 and overall accuracy for the urban LCZ classes only (OAu) is 0.87. Overall accuracy of the built vs. natural LCZ classes only (OAbu) is 1.00 while weighted accuracy (OAw) is 0.97 (Alam, 2023). The overall accuracy of 0.87 is much higher than the minimum overall accuracy of 0.5 suggested by Bechtel et al. (Bechtel et al., 2019). The LCZ map generated shows that 68% of the area is built and the rest 32% is land cover. In the built type, compact mid-rise covers 23% of the area followed by sparsely built which is 20%. Compact low-rise is 18% followed by the compact high-rise which is 11%. The average area of the urban class in Gurugram was found to be 77.6 Acres.

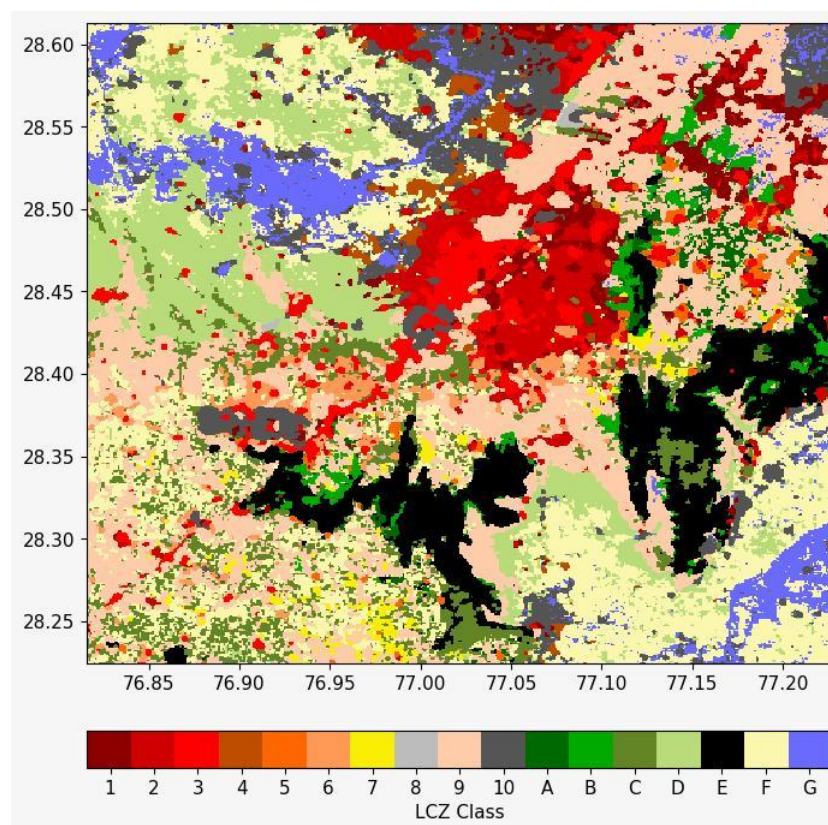


Figure 2. LCZ Map of Gurugram generated on WUDAPT (Demuzere et al., 2022)

6. Dimensions of Urban Neighbourhood in Gurugram

Urban Neighbourhood is defined in terms of various elements like size of neighbourhood, population, structural form, density, road hierarchy, layouts, height of buildings, type of buildings, single or multifamily units, land use, economic activity, open spaces, etc. (Bramley et al., 2006). All the above elements of an urban neighbourhood can have their own dimensions which have different units and may not be greater than the sum of its parts. Some of the tangible elements may intermingle with each other and may not be distinctly contributing to the physical dimensions of the urban neighbourhood.

If a neighbourhood can be seen as a local climate zone (LCZ) its average area in Gurugram came out to be 77.6 acres. If we compare this with different LCZ class, then LCZ 9, which is sparsely built, has the largest average area which is around 187 acres. LCZ 7 i.e. lightweight low-rise has the least average area which is around 30 acres. Gurugram's compact high-rise or LCZ 1 has an average area of 81 acres. Literature study of different neighbourhood unit models suggest that the area of an urban neighbourhood should be around 160 acres (Table 1) which is more than double the area of the LCZs identified in Gurugram. This could be easily understood by the lack of non-residential areas in different neighbourhood of Gurugram.

Table 1. Different Neighbourhood Size as per the Literature Study

S. No	Neighbourhood Concept	Area (Acres)
1	Traditional Suburb	640
2	Urban Village	160
3	Superblock	160
4	Transit-Oriented Development (TOD)	70-500
5	Neighbourhood Unit	160-190
6	New Urbanism	320
7	Garden City	166-1000
8	Modernism	320
9	15-Minute City	500
10	Zero Gravity City	1000+
11	Eco Urbanism	320

The case study of 10 different residential areas including group housing was done in Gurugram and the average area was found to be 143.7 acres. DLF Golfink in Sector 42 comprises the three most luxurious residential condominiums in Gurugram. The Aralias, The Magnolias, and The Camellias is the second largest neighbourhood in area which is 200 acres after the Vatika India Next township which is 388 acres. The Heritage City in Sector 25 being the smallest neighbourhood in area which is 24 acres only. The small area of a neighbourhood i.e. area below 125 acres promotes connectivity and walkability if distributed radially. 125 acres comes from the literature review which suggests that most walkable neighbourhood have a radius of 400 meters if we assume the neighbourhood as perfect circle. The area of a circle having a radius of 400 meters will be 124.4 acres ~ 125 acres. The area of a neighbourhood does not simply state the dimensions of the neighbourhood and so other dimensions as shown in Figure 3 will be discussed further i.e. Social Sustainability, Economic Sustainability and Environmental Sustainability.

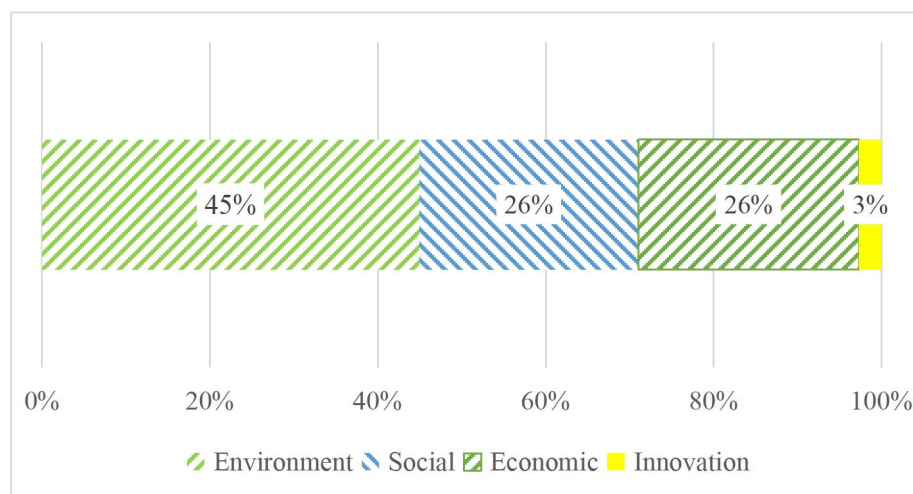


Figure 3. Three Pillars of Sustainability and its presence in rating systems (Mattinzioli et al., 2021)

7. Social Sustainability and Dimensions of Urban Neighbourhood

There are four dimensions and principles of social sustainability which are quality of life, equality & diversity, social cohesion and democracy & governance (Ricee, 2022). This section will cover the 3 D's i.e. Density, Diversity and Distance and compare the case studies accordingly. Yanamandra divides social dimensions in two different components called hard and soft infrastructure (Yanamandra, 2020). Hard infrastructure refers to the tangible attributes and soft infrastructure refers to the intangible attributes which have been discussed above. Social equity and inclusion, community engagement and participation, and access to basic services and resources are the three social factors of sustainability (KnowESG, 2023). Ogra (Ogra and Ndebele, 2014) talks about the role of 6D's i.e. Density, Diversity, Design, Destination, Distance, and Demand Management focusing on Transit Oriented Development (TOD).

7.1. Density

DDPA (Dublin Democratic Planning Alliance) describes sustainable density as the number of people in a neighbourhood that can sustain the services required for healthy life and has least environmental

impact (DDPA, 2021). Density has received the most attention due to its impact on social sustainability (Bramley et al., 2006). More people engage in various activities which cause greater social interaction in higher density neighbourhood (Dutta et al., 2023). A report by UN-Habitat which lists 5 principles for sustainable neighbourhood planning suggests the density of at least 61 people per acre (ppa) to promote high density and stop the downward density trend (U.N. Habitat, 2015).

30% of the neighbourhood studied in Gurugram have population density less than the recommended density of 61 ppa by UN-Habitat as shown in the Figure 4 below. The average density of the areas studied is 98 ppa which is much higher than the density recommended by UN-Habitat. Vatika City has the highest density of 182 people per acre (ppa) while Ambience Island has the least density of 22 ppa followed by DLF Golf Links (32 ppa) and Unitech the Residences (39 ppa) among the different neighbourhood studied in Gurugram. DLF Golf Links, which is an ultra-luxurious neighbourhood, has a low density of 32 ppa. Vatika India Next, the integrated township situated in Sector 81, 82, 82A, 83, 84 and 85 lies along the Dwarka Expressway which is part of the Northern Peripheral Road. These are newly developed areas and most of the new developments in Gurugram are coming along the Dwarka Expressway. Such a high density of 100 ppa in these areas is not at all justified due to lack of public transportation. The upcoming mass rapid transit system (MRTS) corridor to bridge old and new Gurugram is expected to be operational by 2027 (Shah, 2023). The nearest MRT station proposed in this route close to Vatika India Next is Basai Village which is around 14 km and may not be beneficial for people living in this neighbourhood (RITES, 2019).

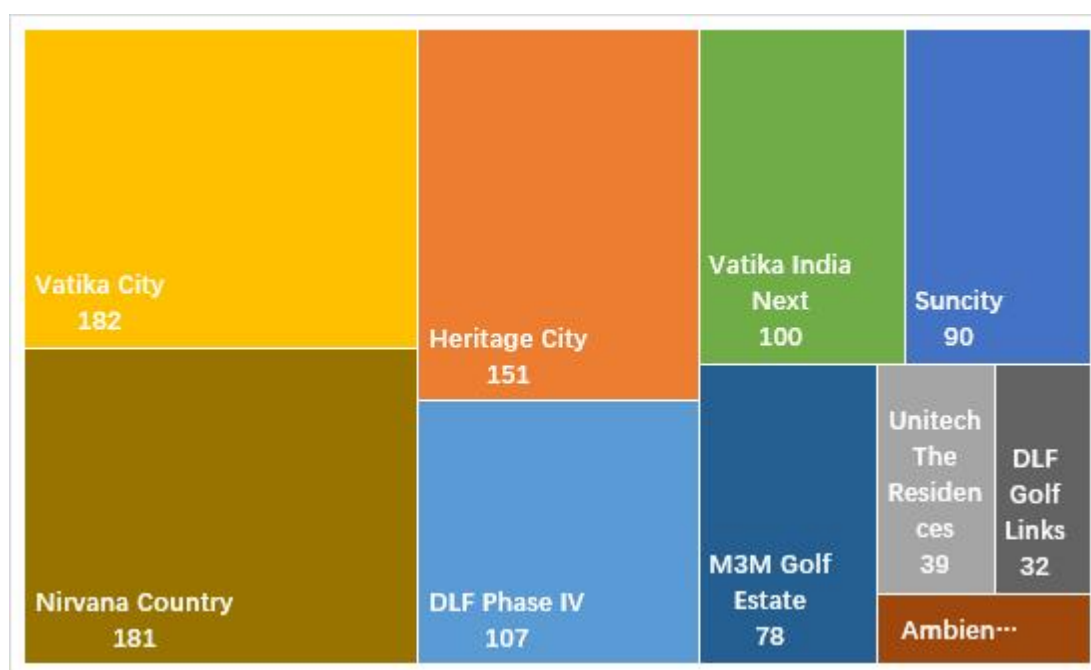


Figure 4. Treemap showing density (ppa) of different neighbourhood in Gurugram

Four out of ten areas (Heritage City, Vatika City, M3M Golf Estate, and DLF Golf Links), i.e. 25% of the area under study, has only housing and no other land uses. Poor integration of land uses and low-density development promotes a high level of automobile dependency which can be clearly observed in most of the areas in case study. Vatika India Next, which is a mixed-use township, has several group housing, independent plotted units, schools and various commercials and retail units (TCP, Haryana, 2014). Vatika City and Nirvana Country also have mixed land uses and offer various retail and commercial options. Nirvana Country, with various schools in the neighbourhood, offers better educational infrastructure.

7.2. Distance

Only 50% of the study area has connection to MRTS that too with Rapid Metro and only Heritage City is connected to the larger network of the Yellow Line. The rest 50% of the area will be connected to the proposed MRTS which will be operational in 2027. Even after that only 4 out of 10 areas will be within the walking radius of 800 meters as shown in Figure 5 below. Most of the people residing in Heritage City, DLF Golf Links, Sun City, Ambience Island which is in proximity i.e. <800 meters to the MRTS use private cars. MRTS is being used mostly by household help. Nirvana Country, M3M

Golfstate and Vatika City can be connected to the proposed MRTS/RRTS (Regional Rapid Transit System) between Gurugram and Bawal. (AECOM, 2015) This RRTS was proposed in 2015 and was supposed to be operational by 2021 but even in 2024 the construction has not even started. Neighbourhood designed to reduce travel distance tend to encourage walking, bicycling and public transportation which ultimately results in better health (Suzuki and Cervero, 2013). To ensure walkability accessibility criteria for social infrastructure and open spaces is 250 m or 3-minute walk for housing area level and 400 m or 5-minute walk for neighbourhood level as per UTTIPEC TOD policy (UTTIPEC, 2012).

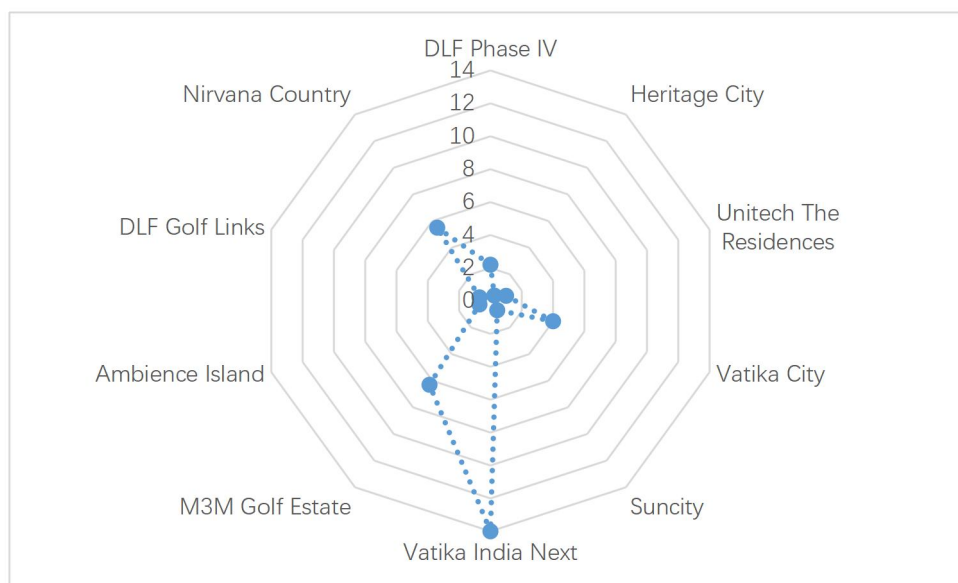


Figure 5. Radar Chart showing the distance in meter of the neighbourhood in Gurugram to the nearest MRTS

7.3. Diversity

MG Road witnessed one of the first gated communities in Gurugram which are Essel Towers, Beverly Park and Heritage city (Alkazi, 2015). Walls of these gated communities acts as a physical boundary that creates spatial segregation but results in social segregation or caste segregation or class segregation. Heritage City on MG Road is a gated community and is a complete residential neighbourhood without any retail or commercial spaces. There are no schools as well. Its proximity to the Metropolitan Mall and MG Road metro station is a great advantage. The spaces outside the gated communities are seen as foreign and dangerous (Alkazi, 2015). People belonging to lower castes, mostly Jats are seen as threats who in fact are the original inhabitants of Gurugram (Alkazi, 2015; Gupta, 2005). Many a times EWS plots which are meant for poor were sold to others. EWS policy clearly states that 20% of the plots should be reserved for EWS and another 20% for NPPL (no-profit-no-loss) but many times it does not reach the target users (Jha, 2018).

The class difference is such that the EWS (Economically Weaker Section) housing which is mandatory in group housing has been constructed on the other side of the Golf Course Road in the case of The Camellias. Sites on two sides of Golf Course Road cannot have any co-existence. The EWS in M3M Golf Estate is also on the other side of the 24 m wide road. This kind of planning defeats the purpose of social cohesion that results in social sustainability.

Housing is highly unaffordable in Gurgaon (Mishra and Foundation, 2016). A good initiative was taken for affordable housing where the upper sale price would be fixed and the entire allotment process to be done by the government (TCP, Haryana, 2010a; Waldman, 2022). But most of the affordable housing sites are isolated and limited to few sectors only. Commuting to the workplace farther away from the place of residence can add to the burden of transportation cost increasing the cost of living (Mishra and Foundation, 2016). It is interesting to note that some of the plots in Vatika India Next were allotted for setting up of Affordable Plotted Colony under DDJAY (Deen Dayal Jan Awas Yojana) but ultimately it does not reach the target users who are isolated in a planned way so as not to disturb the HIG (High Income Groups). Real Estate prices in Gurugram skyrocket by 48% in the last 5 years i.e. from 2019 to 2024 (Writer, 2024). Gurjot Ahluwalia, a management consultant recently called the India Real Estate a scam and highlighted the fact that an investment of Rs 26.8 crore (\$3 million) can buy a 4 BHK in Gurugram and 6 BHK penthouse in New York (Ahluwalia, 2024). Other headlines were 11,000 sqft

apartments in The Camellias that was sold for more than Rs. 100 crores (Ramani, 2023).

In most cases there is no sense of the place and lacks local identity, local connection. Livability in a neighbourhood depends on the local context related to local identity, local culture, attitudes and preferences of the residents and can be influenced by the local built environment. (Mouratidis and Yiannakou, 2022)

8. Economic Sustainability and Dimensions of Urban Neighbourhood

Gurugram is the city with the 3rd highest per capita income in India (GMDA, 2017). It hosts 50% of the Fortune 500 companies (GMDA, 2017) and these new developments have caused gentrification which affects low-income populations and loss of diversity in neighbourhoods (Macassa, 2026). Purely residential neighbourhood do not offer many job opportunities or help in local economy. 30% of the neighbourhood (Heritage City, M3M Golf Estate, and DLF Golflinks) studied in Gurugram is only residential in nature and does not have any commercial land use zone. Unitech The Residences has commercial areas proposed in the neighbourhood but has not been developed till date. Ambience Island has the maximum land cover under non-residential use which is 40%. This is because Ambience Mall is part of the neighbourhood. Vatika City, Sun City, Nirvana Country and DLF Phase IV have similar amounts of land cover under non-residential use, which is 11%, 9.8%, 9.7% and 9% respectively. Vatika India Next has only 4% of land use under commercial.

DDPA (Dublin Democratic Planning Alliance) recommends a minimum population of 25,000 in a neighbourhood to sustain social, physical and environmental infrastructure (DDPA, 2021). Only 2 (Nirvana Country, Vatika India Next) out of 10 Case Study has population above 25,000 which is just 20% of all the neighbourhood. Average population is 12,447, which is just below 50% of the population recommended by DDPA. UN-Habitat recommends minimum population density of 61 ppa for sustainable economic activities in a neighbourhood but only 70% of the neighbourhood studied have population density higher than 61 ppa. Even the Haryana Building Code does not give any figure for the density of mixed land use. The Haryana Building Code suggests density of residential colonies from 300 ppa-900 ppa and not even a single neighbourhood studied has population density in that range. Vatika City has the highest density of 182 ppa and this too is not even close to the lower range recommended by Haryana Building Code.

Third principle of UN-Habitat recommends a minimum of 40% of floor space for economic activities in a neighbourhood. Only one neighbourhood studied in Gurugram i.e. Ambience Island have floor space for economic use equal to 40% considering the fact that it has maximum 40% land use under commercial and it will be equal to or more than the 40% floor space as both the commercial as well as residential (group housing) land use have FAR (Floor Area Ratio) of 175% but residential buildings have FAR lower than 175% (Haryana Government, 2017). Less floor space for economic activities means less job creation in the neighbourhood which negatively impact the local economy and increase mobility as residents commute a long distance for work.

9. Environmental Sustainability and Dimensions of Urban Neighbourhood

The URDPFI Guidelines (URDPFI, 2014) recommend community open space of 2.97–3.46 acres/1000 people or 12–14 sqm/capita. It is seen that the open community spaces have been constantly decreasing because of rapid urbanization and increase in built-up areas. DLF Golflinks and M3M GolfEstate being the ultra-luxury neighbourhood, has largest open spaces as compared to other neighbourhood. The Camellias have 35% green cover while Heritage City has the lowest green cover (SEIAA, 2013). In Gurugram, master plan was not followed and water, sewage and drainage resulting in water and sewage as the biggest problem faced by the city (Rajagopalan and Tabarrok, 2014).

4 out of 10 neighbourhood studied in Gurugram have at least one building with Green Ratings. DLF Golflinks being the only one with all the buildings with the green rating. The Camellias (U.S.G.B.C., 2019) and The Crest (U.S.G.B.C., 2022) is LEED (Leadership in Energy and Environmental Design) Platinum rated buildings. DLF Aralias is LEED Gold rated (U.S.G.B.C., 2023) while Magnolias has received Well Health-Safety Rating for facility operations in 2021 and 2022 (WELL, 2022, 2021). Vatika Business Park in Vatika City is LEED Platinum rated (USGBC, 2024a) while Vatika F3 India Next City Centre in Vatika India Next is LEED India Registered (GBCI, n.d.). Vatika Towers in Sun City is LEED Platinum rated (USGBC, 2024b). M3M has not received any green ratings but it has rooftop jogging track, 9-hole golf course and eco-friendly green landscape.

10. Results

The survey results shows that the school bus is the most dominant mode of transportation accounting for the over half (53.2%) of all the selections in the survey. The most common distance interval is

1km-3km as per the 34.44% respondents. One way commute time of 5-10 minutes received the highest responses which is around 28%. A significant portion of respondents (41.72%) are located within 1km (either less than 500m or between 500m - 1km. Infrastructure issues dominate the survey feedback. The lack of safe pathways is the single greatest concern, making up nearly half (47.2%) of all responses. Commuters find physical delays, such as traffic jams and long travel durations (40.8% combined) to be a significantly larger issue than financial factors like the high cost of transportation (8.8%). There is an overwhelming consensus where students would prefer neighbourhood school, with Yes accounting for nearly 92% of all total responses. Less than 5% of the respondents use cycle to go to school. Around 17% of the students walk to the school and 100% of these schools are located in the neighbourhood. Maximum students voted their daily commute time as very easy and easy and again most of them went to neighbourhood schools.

11. Conclusion

This study shows that the community and social networks are prioritized over other tangible and intangible attributes by majority of the stakeholders. Literature reviews also highlights that social is the most used term for measuring the sustainability of a neighbourhood followed by energy, quality, public and economic. None of the 10 case studies studied in Gurugram showed standard physical dimensions in all the three pillars of sustainability i.e. social, economy and environment. Most of the case studies failed miserably to work on social dimensions. Economic and environmental dimensions of neighbourhood were considered slightly but still lacked sustainable goals. Most of the neighbourhood were planned as gated colonies which are isolated development and should not be preferred. Neighbourhood planning should be clustered environment where new development continues along the street and supports public transit and has also been highlighted in various guidelines.

Social difference is such that one can't even locate EWS housing in any of the ultra-luxury neighbourhood. Although EWS has been made mandatory, it is never planned or thought of as an integral part of the neighbourhood. DLF Golflinks and M3M Golf Estate are beyond the reach of the common people. Most of the outdoor activities have been restricted indoors, which doesn't give residents enough space and time to interact with each other. A survey conducted by the author shows that most of the neighbourhood in Gurugram does not have Schools within walking distance and students need to take buses, private cars, etc. to go to school every day and bus being the dominant mode of transportation (53%). The survey also shows that less than 22% of students walk or use cycles to go to school every day and the rest uses bus or private cars. Lack of safe pathway remains the most challenging issues during school commute as per 47% of all the respondents. More than 25% of the respondents said that traffic congestion is the most challenging issue they face while commuting to school. The average distance of the school from the neighbourhood is 4 km and so the daily travel distance is 8 km, which takes around 40-45 minutes of commute time every day. The survey also showed that most of the students, i.e. 92%, would prefer to go to school in the neighbourhood area if available.

Preserving intangible heritage can instill the feeling of identity and continuity as well as promote cultural diversity and creativity in a neighbourhood. Web of attributes on different scales from home to urban areas highlights their importance for the residents. Web of attributes for urban areas highlighted key attributes like small scale, village atmosphere, view from terraces, playing with friends, buying food or candy, etc. Residents of the Gurugram are missing these attributes as the neighbourhood here lacks local identity and sense of community.

There is a need for policies that can promote fiscal equalization. Quality of life is also an important aspect of social sustainability. Literature study also identified health and education as the predominant infrastructure issues in Gurugram, while public safety and recreational issues were also highlighted. An important aspect of sustainability is the continuous growth and development in the three pillars of sustainability for which a neighbourhood needs research and innovation center which is completely absent in all the neighbourhood studied in Gurugram. This study focused mainly on the different dimensions of sustainable neighbourhood and compared it with 10 different case studies in Gurugram. When we design our neighbourhood inclusive, safe, resilient and sustainable it also supports SDG 11 which is Sustainable Cities and Communities (UN, 2015).

Further research needs to be carried out to find out the energy use, solid waste management, wastewater treatment, use of renewable energy and various other services to understand if a neighbourhood is a sustainable neighbourhood in terms of zero energy or zero carbon. Upcoming neighbourhood should not only be designed and restricted to net zero energy or zero carbon neighbourhood, but it should push the boundary to achieve a positive energy neighbourhood.

This study involved an online survey conducted using Google Forms. Prior to participation, respondents were clearly informed about the research objectives and assured that the collected data would be used solely for academic purposes. Participation was voluntary and respondents were free to withdraw at any point. As the study involved anonymous data collection through an online survey with adult participants and did not involve any sensitive personal information or potentially harmful procedures, formal ethics approval was not deemed necessary according to the institutional guidelines. However, all procedures were conducted with respect for participant privacy and data confidentiality.

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Author Contributions

Alam wrote the main manuscript text. Brar and Kamal as my PhD supervisor, played a crucial role in the conceptualization of the research, provided invaluable guidance on methodology and analysis, and offered critical revisions to the manuscript. It was reviewed by all three authors.

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Conflict of Interest Statement

Author declares no conflict of interest.

Data Availability Statement

Online survey was conducted from the residents in several neighbourhoods and the data has been stored in corresponding author's google drive in google sheet format. Secondary data collected has also been stored in microsoft excel and google sheet. It has not been shared publicly as this research is part of the PhD.

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