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Re-Imagining High-Density Mixed-Use Streets

*[1] Ph.D.Candidate **Somi Sareen**, [2] Assistant Prof. Dr. **Mazharul Haque**
*[1 & 2] *Department of Architecture and Planning, National Institute of Technology Patna, India*
E-mail [1]: somis.ph21.ar@nitp.ac.in E-mail [2]: mazharul@nitp.ac.in

Abstract
This paper analyses the essential role of mixed-use streets in contemporary cities and addresses their inherent issues. The study highlights the national policy focus on mixed-use streets, which can improve sustainability, economic development, social integration, and quality of life. Due to divided responsibilities, traffic prioritization, and changes in the commercial sector, mixed-use streets are sometimes neglected. The study reviews mixed-use street patterns in Okhla, an unplanned, high-density area; examining how population density and urban activities affect streets, focusing on its imprecise definition and seeming popularity. An extensive case study reveals the lack of specific zoning standards, poor planning provisions, and low network density along with traffic congestion, space encroachment, and a lack of public spaces. The author proposes merging multivariable densities and using network density to portray urban structure. The findings contribute to sustainable urban development discussions and help policymakers and planners improve mixed-use spaces' livability and functionality.
Keywords: Mixed-use streets; Urban sustainability; Density; Zoning Regulation; Public Spaces.

1. Introduction

Mixed land use has been a crucial component of urban settlements throughout history, influencing the structure of cities (Amen, 2021; Amen et al., 2023). However, the understanding of mixed-use development differs widely among urban planners and authorities. Some consider it as a technique to boost density inside metropolitan areas, while others emphasize its blending of commercial and residential spaces. Mixed-use is a feature that depicts the texture of the settlement which offers insight into its importance in creating the character and quality of urban landscapes (Sharifi, 2019). Despite the wide investigation of mixed-use development, particularly its benefits and challenges, there remains a major gap in research regarding the application of planning principles, such as form-based regulations, to mixed-use streets (Wen et al., 2020). While several studies have delved into the complexity of mixed-use design, few have specifically addressed the specific issues and opportunities given by mixed-use streets (Wen et al., 2020).

One of the key sources of ambiguity surrounds the notion of mixed land use. While it is commonly acknowledged to comprise a diverse variety of development types, from large-scale mixed-use complexes to finer-grained streetscapes, a specific and universally agreed definition remains problematic (Maleki et al., 2012). Furthermore, the particular factors that affect the success or usefulness of mixed-use streets, like grain, density, and permeability, are not fully defined (Xia et al., 2020). Additionally, while density is typically emphasized as an important aspect in urban planning, its relationship with constructed form, particularly in the context of mixed-use streets, is not well understood (Yue et al., 2017). There are insufficient studies examining how different forms of density, such as population per unit area or number of houses per unit area, impact the design and performance of mixed-use streets. The impetus behind this research arises from the recognition of the dynamic and developing character of urban surroundings. With cities experiencing tremendous expansion and transformation, understanding the dynamics of mixed-use streets is vital for efficient design and urban planning. By exploring the importance of grain, density, and permeability in defining the functionality of mixed-use streets, the study intends to provide significant insights for legislators, planners, and designers. Furthermore, the application of form-based rules to mixed-use streets is a fresh method for resolving the challenges connected with urban growth (Sharifi, 2019). By studying the possible benefits and constraints of form-based codes in the context of mixed-use streets, this research hopes to add to the current dialogue surrounding urban planning principles and practices.

The research uses a deductive reasoning approach as mentioned in Figure 1, beginning with a detailed examination of existing planning concepts and theories relevant to mixed land use. From this theoretical base, the research proceeds to analyze specific case studies as illustrated in drawing upon interviews, surveys, and mapping tools to acquire a greater understanding of the challenges and opportunities given by mixed-use streets. By merging theoretical ideas with empirical data acquired from the field, the paper intends to evaluate the functionality of mixed-use streets and inform the identification of significant challenges and the formulation of policy and design responses aimed at improving the quality and liveability of mixed-use streetscape.

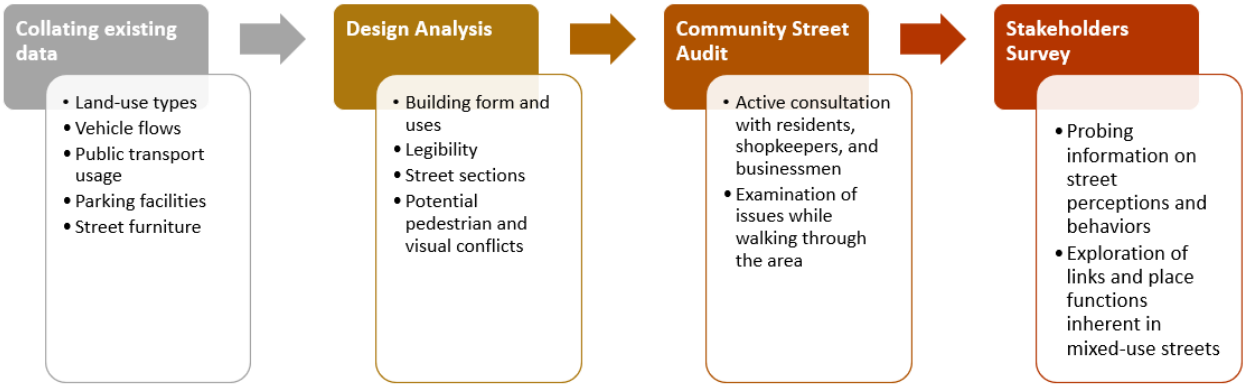

Figure 1:Structure of the Study (Developed by Author).

2. Mixed Use Planning

A mixed land use pattern occurs when a parcel of land is simultaneously used for multiple separate activities. Indian towns exhibit a robust legacy of incorporating diverse land use practices. The proximity of the workplace in the adjacent room, the shop in the neighboring building, and the community square around the corner have consistently been an integral aspect of life, clearly shown in the physical structure of conventional towns (Kotharkar et al., 2014)the past forty years, urban planning in India has incorporated a zoning system for both small and major towns, following the traditional practice of mixed land use. The reasons for implementing mixed land use can be summarised as follows(Kotharkar et al., 2014; Seyed Ali Azimi Rashti & Mehrdad Javaherian, 2016): 1. Insufficient provision of commercial areas in terms of quantity; 2. Insufficient provision of commercial zones in terms of convenient location; 3. The occurrence of non-permissible use in residential areas due to inadequate enforcement of regulations.

Recently, the idea of mixed-use has become an important planning strategy for urban designers who are creating new urban areas or revitalizing existing ones. This has become evident due to the heightened visibility and the abundance of publications discussing the idea of mixed-use and its practical application. The primary proponents of mixed-use development appear to have strong affiliations with movements such as Compact City, Smart Growth, and New Urbanism (Grant, 2002). These three movements, although similar, have gained significant influence among architects and planners. They prioritize contemporary issues like ecological sustainability while also incorporating traditional planning principles such as the art of placemaking. Additionally, they have revitalized mixed-use developments (Hoppenbrouwer & Louw, 2005). Therefore, mixed-use development is highly valued as a crucial means of enhancing liveliness in otherwise monotonous urban surroundings. The concept of mixed-use was initially given substantial consideration in the work of Jacobs (Schubert, 2016) who presents a compelling argument for the significance of diversity in urban areas. The concepts of mixed-use and land-use integration, which are central to contemporary planning movements, have been firmly established in the theories of Jacobs. Proponents of mixed-use development argue that traditional zoning focused on single-use areas is incorrect since it promotes urban sprawl and leads to unsatisfactory environmental results (Berghauser Pont, 2020). As a response to traffic congestion and low quality of life, the idea of mixed-use developments has resurfaced.

Historically, town centers have primarily housed the majority of commercial areas, resulting in a diverse range of land uses such as shops, civic centers, entertainment venues, educational facilities, and health institutions. Multiple studies have indicated that to accommodate big populations in a city in a sustainable manner, it is necessary to follow principles such as the integration of different land uses, transit-oriented development (TOD), and increased population densities (Crawford et al., 2015). The recent inflation associated with mixed-use development has incurred expenses. There are clear disparities between planning professionals and academicians. The precise meaning of mixed-use development has become ambiguous, as evidenced by research that has had significant difficulty in establishing a globally accepted definition of this concept (Boeing, 2019). Presently, the definitions of mixed use are diverse and regrettably, they are prone to being misunderstood.

Multiple reports and research indicate the advantages that integrated land uses provide in terms of the economy, citizens' quality of life, and the environment. Many authors support mixed-use development as a means to enhance urban density. Consequently, density has become an integral part of the definition of mixed-use, so contributing to the complexity of the concept (Yue et al., 2017). An important concern regarding mixed-use development and its growing popularity is that it is often seen as a quick fix for creating well-designed urban spaces. The potential expenses associated with this are significant, as the term "mixed-use" carries the danger of being used as a marketing

slogan for developments that are inferior substitutes for traditional mixed-use areas. Rowley cautions that the mere inclusion of a variety of uses in development does not ensure long-term quality, success, or acceptance (Salami et al., 2021).

2.1.Mixed Use Street concerning urbanism and densities.

The meticulous categorization of various land uses has been criticized for contributing to several negative consequences in metropolitan settings, such as urban sprawl, inefficient utilization of land, and excessive dependence on automobiles. According to recent studies, the rise in mixed-use development is a direct result of applying new theories to zoning and land use management(Badawi & Farag, 2018; Softaoğlu, 2019).

2.1.1 New Urbanism

In recent times, the idea of "new urbanism" has been included in the ongoing development of traditional zoning notions. New urbanism is occasionally referred to as "traditional neighborhood development" and "smart growth." New urbanism prioritizes neighborhood-level development and emphasizes creating pedestrian-friendly streets, in contrast to traditional zoning which typically involves specific designations for use, density, and height (Mouratidis & Poortinga, 2020).

2.1.2 Advantages of New Urbanism in mixed-use

- Connected communities enhance the well-being of individuals, the quality of the environment, and the economic conditions. Mixed-use development aims to foster the creation of inclusive and interconnected communities. Mixed-use communities encompass a variety of amenities such as homes, restaurants, services, schools, cultural facilities, parks, and more. This interconnectedness diminishes the necessity for individual automobiles, hence enhancing the viability of public transport, walking, and cycling (Xia et al., 2020).
- Mixed-use development not only reduces the necessity for automobile travel but also fosters the creation of shared communal space. Plazas, parks, and walkways facilitate social engagement among individuals within a community (Yue et al., 2017).
- • Ultimately, communities that combine different types of land use and are easily accessible by public transportation have a positive impact on the local economy. They help individuals save money on transportation by minimizing the duration and frequency of daily travel and obviating the necessity of owning a car. Additionally, mixed-use development promotes local businesses by augmenting pedestrian activity (Berghauser Pont, 2020).
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2.1.3 Disadvantage of New Urbanism in mixed-use

However, zoning rules that incorporate the principles of modern urbanism primarily emphasize the attainment of design goals through visual illustrations. This outcome is to be anticipated from a regulatory system that is intended to create a specific visual impression on the streets, which is simpler to portray visually rather than describe orally (Zumelzu & Barrientos-Trinanes, 2019).

Conceptually, mixed-use developments have the potential to enhance the urban environment. However, it is crucial to address the primary concerns highlighted in the research (Gleeson, 2006; Mavoa et al., 2018; Sharifi, 2019) when designing such developments.

a) Land use conflicts are considered a significant obstacle to mixed-use developments since the proposed land uses may not be compatible with one another.
b) The intricacy of planning and developing prosperous mixed-use developments may dissuade developers from embarking on such projects.
c) It is commonly misunderstood that raising density through mixed-use developments is an effective strategy to counteract the negative consequences of urban sprawl, without taking market factors into account.

Mixed-use developments are highly dependent on their location and surroundings, and hence should not be viewed as a solution for resolving an existing issue.

2.2 Perception of density

The researchers have a particular interest in examining the correlation between density and other spatial and non-spatial attributes. Understanding this link is crucial for effectively estimating the effects of particular design and planning approaches. Their primary objective is to investigate the relationship between visual imaging and spatial qualities, as well as numerical factors such as quantity, proportion, physical characteristics, and financial attributes.

The researchers seek to clarify the dependence on visual references and ideas such as 'urbanity' by carefully analyzing their trustworthiness and investigating the prospects of re-imagining them using the perspective of density. From their perspective, comprehending density in urbanism involves delineating the correlation between a certain region and the number of entities included inside it, such as individuals, residences, amenities, or floor area. (Zumelzu & Barrientos-Trinanes, 2019). Nevertheless, they advise against assuming that density is consistently employed accurately or to its complete capacity in design specifications, plan explanations, and communication among interested parties (Berghauser Pont, 2020). They contend that any deficiencies in explanation are more likely attributable to definitions and their practical implementations rather than fundamental weaknesses in the idea of density itself (Crawford et al., 2015). To tackle these problems, the researchers suggest determining a specific range of densities that can be utilized in different planning and land use situations. The objective is to provide alternative definitions of density to make a more efficient connection with urban form and improve the comprehension of its consequences for design and planning choices.

Currently, two ongoing urbanization developments justify the study of density. Recent advances in urban planning have increased the importance of connecting development programs with spatial characteristics. Furthermore, the upward trajectory of space consumption and its consequential environmental, economic, and social impacts necessitate a thorough investigation into the correlation between space quality and capacity (Jones et al., 2007). Before incorporating, it is necessary to examine the current physical density measures to establish a standardized set of densities for a certain type of architectural form.

2.2.1 Population and Dwelling Density

Population density refers to the concentration of individuals or houses in certain places, whereas dwelling density quantifies the number of residential units in that area. Due to the often faster pace of social transformations compared to physical transformations, the population density of a place can fluctuate over time, even if the number of houses remains constant (Mavoa et al., 2018). Dwelling density is more resilient than the other measures and is frequently employed in explanations of urban trends.

2.2.2 Land Use Intensity

Another measure of physical density that was largely developed for commercial areas is F.S.I (Floor space index). Following zoning restrictions in New York, India too adopted a similar measure of density known as Floor area ratio. Both variables represent the ratio of the built floor space to the size of the plan or lot. While FSI considers all aspects, it lacks the subtlety to accurately represent urban morphology(Jones et al., 2007). This measure utilizes the proportion of the land area to the floor area and can be compared inversely to the Floor Space Index (FSI) or Floor Area Ratio (FAR). However, land use intensity is not yet as widely utilized as F.S.I.

2.2.3 Ground Space Index (Coverage)

The purpose of coverage was to limit the utilization of land for construction purposes. While places with the same Floor Space Index (FSI) may have different constructed and coverage characteristics, the Gross Space Index (GSI) or coverage is considered a more reliable measure for distinguishing spatial disparities in Space, Density, and Urban Form(Brown, 1988; Maleki et al., 2012). Therefore, it may be inferred that coverage alone also has a rather feeble correlation with urban shape.

2.2.4 Building Height

Building height ordinances were primarily implemented to reform land use planning consistently. The method involved establishing a relationship between the height of buildings and factors such as street width and the presence of open areas or courtyards(Alalouch et al., 2019; Balarabe et al., 2019). (Brown, 1988) also considered the correlation between the width of the street and the courtyard sizes along with the height of the building in his investigations. He contended that by implementing a strategy of constructing taller structures, it would be possible to create additional open areas without compromising the quantity of housing units and population density. When examining regions with identical average building heights, such as two stories, we observe a variety of instances, ranging from expansive villa layouts to small, older settlements (Crawford et al., 2015). Therefore, it may be inferred that the height of a building does not necessarily add to the comprehension of urban form and density, nor does it affect the relationship between the two.

2.2.5 Expansiveness

Spaciousness refers to the ratio of open space to the overall floor area, which is used as a measure to assess the quality of an urban design (Badawi & Farag, 2018). The idea of spaciousness is equivalent to the Open Space Ratio (OSR) as stated in the Zoning Resolution of New York City. OSR was employed as a mechanism to require that a

development allocate a precise amount of open space on a zoning lot in designated districts. It can be interpreted as a depiction of the trade-offs between the desired domains of unfettered entry. The research case studies on Space, Density, and Urban Form reveal that buildings with the same OSR values consist of large building blocks that are 4.5 stories high and small blocks that are 2.5 stories high (Alalouch et al., 2019). Thus, it may be deduced that OSR alone does not considerably contribute to the understanding of urban form. However, it does reveal the characteristics of the regions in terms of the pressure placed on the underdeveloped areas.
(Alalouch et al., 2019; Balarabe et al., 2019)

2.3 Assessment of Density Measures

Population and dwelling density exhibit significant limitations in establishing a correlation with urban form. When considering residential density, the floor area designated for employment is not factored in. It is additionally unfeasible to ascertain if individuals inhabit spacious or compact residences. Furthermore, the consideration of health and hygiene in urban planning, which prompted the incorporation of the notion of density, is not solely determined by the population size in a given area (Kotharkar et al., 2014). Equally important are the dimensions of the house, the vertical extent of the building, and the spacing between buildings. It has been shown that land use intensity, measured by factors like floor space index (FSI) or floor area ratio (FAR), is impactful. However, it does not provide us with the ability to distinguish between various spatial arrangements. The aforementioned density indices can also be described similarly (Zumelzu & Barrientos-Trinanes, 2019). While each of these methods provides some level of information, none of them can independently provide a comprehensive description of spatial features necessary for distinguishing urban kinds based on density.

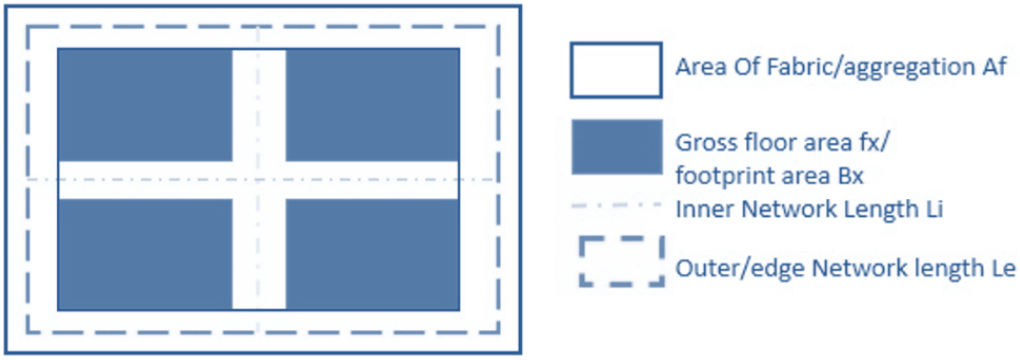

Figure 2: Depicting the Network and Edge in Urban layout

2.3.1 Network Density (N)

After realizing that the current density alone is insufficient for establishing a link with the urban built form, it becomes necessary to contemplate a new range of densities. Network density is a type of measurement that quantifies the amount of network inside a certain area. The metric commonly used to express this is the ratio of network length to ground surface area. The urban fabric, also known as the tissue, is created by a network of roadways and a group of islands surrounded by these streets. Street space serves as the essential infrastructure for all urban public areas, establishing a cohesive network that interconnects various elements. This continuum is crossed by multiple parcels of privately owned land. The development of floor space creates different movements and requires the management of flows, such as people and vehicles, through a network (Kotharkar et al., 2014)In addition, the open space in the network permits light to enter the buildings and affects seclusion, depending on the width of the profiles and the size of the islands. The key focus in redefining density should be the interconnectivity of networks, islands, and the scale of buildings (Mouratidis & Poortinga, 2020). By including network density as a fundamental measure of density, we can improve our ability to assess and explain important aspects of the urban environment and urban structure.

2.3.2 Multivariable Density

A multivariable density concept consisting of different indicators can offer a method that is specific enough to allow for the definition of urban types. These indicators may be taken as FSI, GSI, and N.

A. Density Calculation

The four variables needed to calculate the basic indicators FSI, GSI and N, as illustrated in Figure 2 are:
- Plot area (A);
- length of the Network (l);

- Gross floor area (F);
- Built-up area (B).

B. Basic Indicators N, FSI, and GSI

i. Network density (N)

The network density, denoted as N, represents the level of network concentration within a given area. The network density is a measure of the amount of network infrastructure per unit of land area. It is determined by adding the total length of the internal network and half of the length of the network that defines the boundaries of the land area (Kotharkar et al., 2014) as shown in Figure 3.

$$N_f = \frac{\left(\sum l_i + \frac{\sum l_e}{2}\right)}{A_f}$$

Where
l_i = length of interior network (m)
l_e = length of edge network (m)
A_f = area of fabric (m^2)

Figure 3: Depicting the sample of the division of land to explain the entities

ii. Building Intensity (FSI)

FSI, or Floor Space Index, is a measure of building intensity that is not influenced by the programmatic composition. It is derived using the formula provided by (Maleki et al., 2012). Please see Figure 4 for details.

$$FSI_x = \frac{F_x}{A_x}$$

where
F_x = floor area_gross (m2)
A_x = area_aggregate x (m2)
x = aggregation
This index uses the unit square meters per square meter (m2/m2).

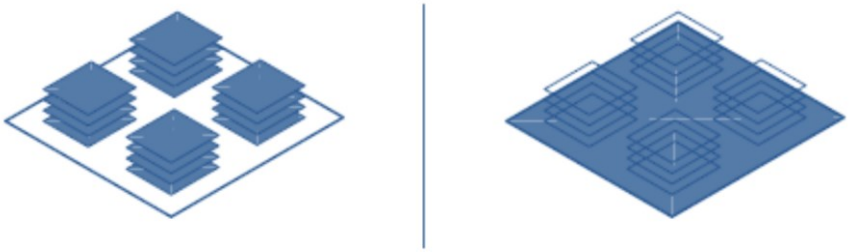

Figure 4:Depicting the sample of the division of land to explain the entities

C. Coverage (GSI)

GSI, or coverage, demonstrates the relationship between built and non-built space and is calculated as follows for all levels of scale as described earlier (Maleki et al., 2012):

$$GSI_x = \frac{B_x}{A_x}$$

where
B_x = footprint of (m^2)
A_x = area_aggregate x (m^2)
x = aggregation (lot (l), island (i), fabric (f), or district (d))

This index uses the unit square meters per square meter (m^2/ m^2).
Using these variables many other indicators could be derived that will help in identifying urban built form.
The limitations of the current methods for measuring density in effectively communicating information about urban design and performance are undeniably significant. Nevertheless, these deficiencies have caused several individuals to conclude that the concept itself is fundamentally defective and perhaps hazardous. The research emphasizes that the issue with the generally employed density measuring methods is in their representation and resolution, rather than the notion itself. By selecting appropriate indicators and constructing derived indicators effectively, density might provide additional information about spatial features. Moreover, network density is employed to incorporate non-built space more deeply, resulting in abstract measurements. When applied and quantified accurately, these indicators can be utilized for any type of land use and contribute to the formation of a comprehensive understanding of the area.

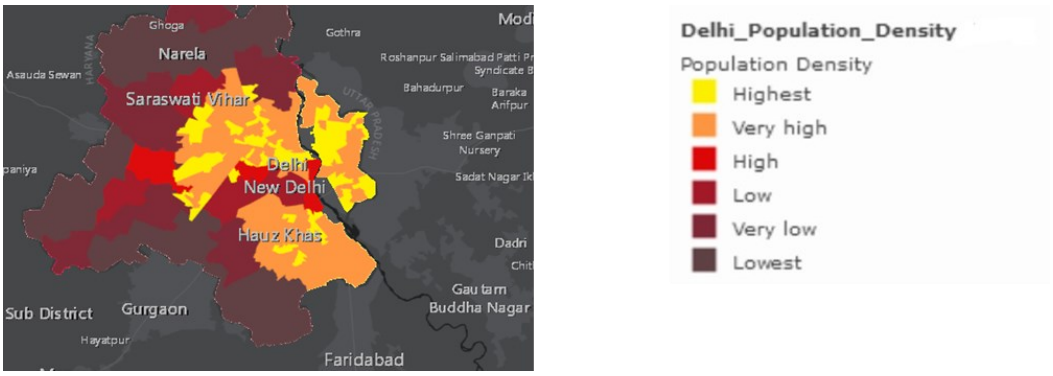

Figure 5: Delhi Population Density

3. Case Study: Batla House

The case taken is in South West Delhi. The area comes under Okhla, ward numbered 7 of South Delhi Municipal Corporation. The area is known for its shopping culture and food junction. The area is designated as an Unauthorized Colony in the Master Plan Delhi. The area comes in a very high population density category in Delhi according to Census 2011 as shown in Figure 5.
The selected case study is Zakir Nagar Main Road, located in Okhla, which serves as a mixed-use street. The length of the stretch is around 800 meters. The roadway serves as a prominent central axis that runs through the two primary regions. Zakir Nagar and Batla House. The route serves as an excellent conduit, connecting New Friends Colony to Kalindi Kunj Road. The chosen location is specifically designated for studying the influence of density on mixed-use development due to the street's strong connectivity and functional spatial qualities.
Upon hearing the term Batla House, two distinct images typically come to mind: one of disorder, a large gathering, and loud sounds, and the other of a vibrant market with street foods and clothing stores. Some individuals may perceive the location as disorganized, while others may view it as a central hub where all amenities are conveniently located in one area. This street with a combination of different functions maintains the region vibrant and active. Upon a cursory examination, it becomes evident that this region is in dire need of proper management. As an unregulated colony, there is no oversight on the excessive activities taking place on the road, the size and height of the structures being built, and, most critically, the lack of attention or provision for public spaces and amenities. Using multivariable densities, as previously described, we will examine the area to identify any potential deficiencies and provide recommendations for their resolution. The street consists of buildings that are 3-5 stories tall, with some having a basement, lower ground, and mezzanine floor. The first two floors of the buildings are designated for commercial purposes, while the levels above are intended for residential use. However, in several buildings, the upper floors are being utilized as offices by organizations or by professionals such as physicians and lawyers.

3.1 Site Observations

Based on the 2011 district-wise population census statistics, South Delhi has a population of around 2,731,921 individuals, with a population density of 11,060 individuals per square kilometer. This data is sufficient to indicate that the district has a high density. However, the issue lies in the fact that the distribution of these densities is quite uneven. The South district features meticulously designed neighborhoods such as Greater Kailash and Friends Colony, which may not be subject to the same level of population density. According to the ward-wise figures provided by the South Delhi Municipal Corporation for the 2001 census, Okhla has a population of 125,935. The

distribution of these densities is ambiguous based on this average. To accurately depict the area, it is necessary to have a greater number of variables and a combination of various densities. The observation also discovered a noteworthy characteristic of the mixture employed, known as the 'Everything is Everywhere' phenomenon (Institute of Transportation and Development Policy, March 2013). There is no optimal combination of uses. A dining establishment can be located adjacent to a beauty salon, a bookstore, a medical laboratory, or an educational tutoring center. The arrangement of these uses is so haphazard that they rarely have any logical coherence. There must be a specific sequence or proper arrangement of these uses that should be combined with the residential use.

3.2 Composition of Uses and Population

The author conducted the survey and it was found that the area employs many populations as shown in Figure 6. This working class generally does not live in the same building. The owner has rented or sold the shops to other people who have further employed other people to work in their shops. And there are typologies of the shop that makes these areas complex as illustrated in Table 1. It is rightly said that it boosts the economy of the area and thus it is necessary to keep a check on its development.

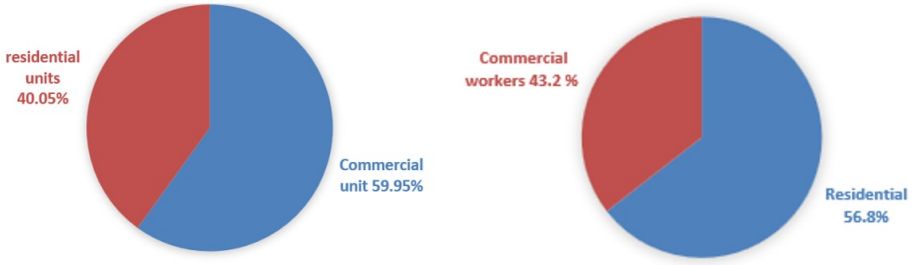

Figure 6: Population Composition

Table 1:. Type of Uses

Type of Use	No. of Units	No. of Employee
Eatery	80	360
Cloth	94	423
Pharmacy	14	25
Book Store	7	12
Departmental Store	58	232
Fruits & Vegetables	23	34
Salon	9	36
Accessories	43	108
Gymnasium	4	12
Professional Activity	31	82
ATMs	3	3
Dairy Store	11	38
Others	11	35
Total	392	1454

3.3 Street's function as Link: Activity mapping of Pedestrians

The function of this street is quite conflicted with the sense of place. Since these mixed-use are most of the time placed major connecting routes, the problem of traffic congestion always remains one of the problems. The street vendors be mobile or static also find such routes important places as opportunities. The problem is not with the vendors; it's their undesignated place that has to be resolved.

Table 2: Activity Mapping

Activity level	**Activity type**	**Frequency**								
		12 P.M.-3 P.M.			**3 P.M.-6 P.M.**			**6 P.M.-8 P.M**		
		Single	Double	Group	Single	Double	Group	Single	Double	Group
Active	Walk-Children	15	12	4	11	18	2	17	12	19
	Walk	60	22	3	43	16	5	43	16	5
Passive	Sit	15	20	2	9	8	1	16	8	4
	Stand and Talk	18	4	1	24	4	4	13	20	8
	eat	23	18	9	39	21	12	44	37	26

The above activity mapping (

Table 2) for the pedestrians in the area clearly shows that the pedestrian children often move alone or in groups during the daytime as soon as it is the evening their number decreases. And the number of other age groups number increases. This would be because the vehicle movement increases during evening time and school time closes too. At the time of Adhan, the movement suddenly increases to a great extent. At any peak time, a section of 9m Wide Street contains more than 13 pedestrians. The street is without any sidewalk or pedestrian provision. Hence conflict in traffic is a frequent problem

3.6 Street's function as Link: Activity mapping of Vehicles

In the early morning and late night i.e. before 9 a.m. and after 11 p.m. the movement of vehicles is comparatively low on the road. In the peak hours of the evening, the road is mostly occupied by moving vehicles and pedestrians. In the given section, from 112 vehicles per hour to 314 vehicles per hour. The transition of such high and low has no controlling check over it. Resulting in regular traffic conflicts.

3.4 Interviews

There are around 27 interviews conducted by the author to help support the case as shown in Figure 7. These questions and their answers help in concluding the issues confronting the street.

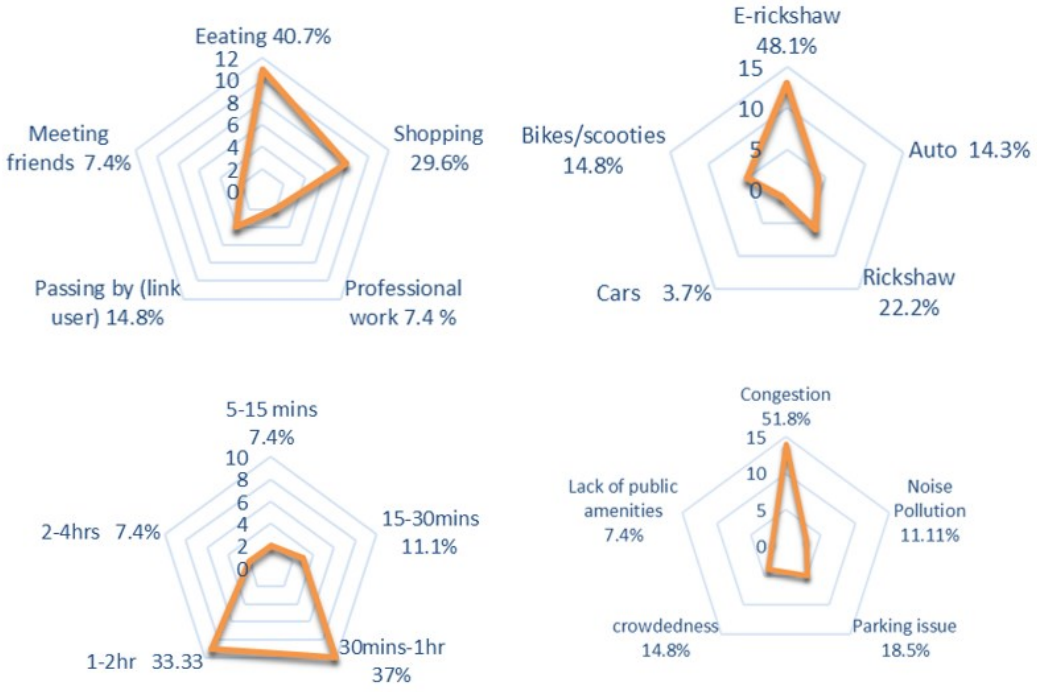

Figure 7: Interview Response

This response of people has a clear indication that people visit the place more often for shopping, eating, and using the link corridor. Since the street offers the service of E-rickshaw, it is the most common means of travel. And the most striking factor is people do not expect this street to offer public amenities like toilets and street benches. They have adapted themselves to such unavailability. And one more result is people who visit the street as a place do not come here by car as they understand there is no provision for parking. So, the ones who use the link corridor are the ones with the cars most of the time

3.5 Issues

After the case study, the author found out that there is a list of issues that have to be addressed to solve the problems on the streets. There are many problems which are related to street design, some of the problems are related to the built-by-laws not being followed but the major part of the problem resides in the fact that the mixed-use is not related to a fixed density of occupation attached to the building. No one talks about the structures that are being over-utilized or the street being used as a link rather than a place. Given below is the detailed list of issues found during the case study:

- There is no explicit zoning rule that allows for mixed-use development. Consequently, there is no oversight regarding the number of individuals or the type of work connected to a single structure. Consequently, the

presence of these diverse customers puts additional strain on the infrastructure, such as water and sewage systems.

- The planning principle does not include suitable terms to describe the percentage distribution of different types of land uses within each zone. Therefore, the land and property owners over-exploit their assets to maximize their earnings. Planning is conducted at the state level, rather than the city level, which leads to the prioritization of the development of major arterial highways, while other streets are neglected. Therefore, the persistent issues at the local level will continue to exist until they are recognized by the state authority, namely due to the inadequate network coverage. Land use zoning promotes the idea of having all necessary amenities within walking distance, however, there is often a lack of the necessary infrastructure, such as a well-connected roadway grid, to support this concept.
- Traffic congestion and accident-prone locations are caused by the absence of spatial separation.
- The congestion is caused by a lack of enclosed lots and a scarcity of custom-designed buildings that may function as parking garages.
- The overflow of activities on highways is caused by the absence of a designated vendor zone. Mobile sellers typically utilize whatever available location they come across.
- Frequently, private retail and business establishments extend into nearby public areas, enhancing their visibility and increasing their revenue.
- Mixed-use areas lack a sense of space due to the absence of open public spaces, pedestrian-friendly features such as street furniture, and unobstructed pedestrian movement caused by electric poles and encroached shop frontages. These issues arise due to the lack of designated locations for poles, street furniture, and other objects.

4. Results

4.1 Depicting Urban Form with the Help of Network Density

The issues that have been identified in the paper so far could be dealt with by the given below measures. But before going into all the measures, the author is going to discuss how the discovered Network density could be applied in the site of the case illustrated in Figure 8. With the help of this network density, determine the other entities that provide a complete image of the built form. This would help in reviving the essence of these mixed-use streets as a 'place' as well as a 'link'. However, the dissertation is completed in a short period of span. Hence various equations related to the whole area could not be formed. A small chunk has been taken and the sample equations are formed using the form.

Nf= (Σli+ (Σle)/2)/Af where

Li = length of interior network (m)

le = length of edge network (m)

Af = area of fabric (m2)

Length of the interior network ,Li =197m

Length of the edge network, Le =387m

Area of the fabric ,Af = 6670 sq. m.

Figure 8: Selected blocks for calculation

$$N_f = \frac{197 + \frac{387}{2}}{6670}$$

This N_f = 0.058 m of network per square meter of fabric area

Similarly, the other part of the street's network density could be calculated using the same formulae. The above calculation clearly shows that such a small length of the network is available for 1 sq.m of built area. Hence we can depict how dense an area is with the help of this entity.

4.2 Depicting urban form with the help of Coverage

Using the formulae,

$$GSI_x = \frac{B_x}{A_x}$$

where Bx = footprint of (m^2), A_x = area of aggregation x (m^2), x = aggregation (lot (l), island (i), fabric (f), or district (d))

Therefore, GSI= 6770/8199 = 0.82 This implies, that the coverage is 82 % which is quite high. One needs to have some open space amidst all this chaos.

5. Discussion

In the busy setting of streets that are used for several purposes, it is crucial to prioritize the creation of a unified and well-structured environment to promote sustainable development and peaceful cohabitation among different activities. An essential factor to consider is the restriction of construction density and coverage. Establishing a predetermined network density and building density, along with specific ratios for open space and waste, is essential for organized growth. In the absence of restrictions, the organic development of these streets often led to disorderly arrangements, characterized by haphazardly soaring buildings that disregarded the need for crucial open spaces. By implementing and upholding these standards, authorities can guide the direction of progress toward a more structured and environmentally responsible course. In addition, establishing a specific number of shops or divisions for non-residential use within these mixed-use buildings serves as a precautionary measure against excessive utilization. This allocation not only maintains the structural soundness of the building and its related infrastructure but also promotes an equitable distribution of commercial activity along the street. In addition, the regulation of shop sizes in proportion to plot size or dwelling units helps maintain a unified street character and prevents excessive use of resources. The standardization of shop sizes promotes an aesthetically acceptable arrangement of buildings and maximizes the efficient use of resources.

Other than focusing on the individual buildings, it is important to consider the connectedness and functionality of the wider roadway network. Enhancing traffic flow and safety can be achieved by improving the design of street intersections and establishing appropriate turning radii for vehicles. Inner connectedness is enhanced by establishing distinct access points for households and minimizing needless through movements. This discourages the dependence on main thoroughfares for local transit. The example of Zakir Nagar Main Road highlights the need to optimize roadway networks to promote efficient and secure transportation practices among people.

To preserve the integrity of mixed-use zoning, it is imperative to implement strict safeguards to prevent the unauthorized conversion of residential areas into commercial or other non-residential activity. Enforcing the requirement for separate entrances for residents and buyers, together with frequent inspections and sanctions for any breaches, contributes to maintaining the unique identity of mixed-use streets. Distinct categorization of residential and non-residential activity not only eliminates confusion but also maintains the lively yet harmonious atmosphere of these streets.

Furthermore, the inclusion of specific areas for mobile vendors and points of connection for different transportation methods boosts the practicality and attractiveness of mixed-use streets. By creating specific zones for vendors and enabling smooth transitions between various forms of public transportation, encroachment is reduced and accessibility is optimized. In addition, the inclusion of noise-absorbent panels, building facades, and graded pavements helps to reduce noise pollution and improve the comfort of pedestrians, creating a more enjoyable and welcoming cityscape. Finally, by installing traffic signals at crossroads that are prone to accidents, we demonstrate a strong dedication to prioritizing the safety of people using the streets. These interventions collectively contribute to the establishment of lively, secure, and environmentally friendly streets that accommodate the varied requirements of both residents and visitors.

6. Conclusions

The objective of this study was to examine the daily operations on mixed-use streets, including their regular utilization, and the viewpoints of those involved in their management or visitation. Although previously overlooked by specialists, these streets present viable solutions to the issues faced by planners, engineers, and designers in constructing urban forms that are both sustainable and inclusive for the future. They establish a distinct local identity and function as central points for social and economic engagement, while also encouraging ecologically conscious travel. To fully exploit the potential of high streets, it is necessary to acknowledge and address the need to accommodate and balance different connections and place functions in innovative ways. This requires making adjustments to the planning, design, and management of high streets. These modifications are necessary in terms

of both the conceptualization and the implementation of high street management. A difficulty that emerges with mixed-use in Indian towns is that it has traditionally maintained the character of a local market. This pattern has a long history. In contrast, the government never employed a tangible identity to enforce regulations regarding the structure and functions of the built environment. The issue of high density has been regarded as an unmanageable problem that cannot be effectively mitigated. An entity with a physical form that possesses the ability to identify the precise nature of the issue inside the given area. The dissertation has achieved two objectives: firstly, it has examined the role of mixed-use streets in the new urbanism. Secondly, we should consider the approach to the construction of the form that surrounds this type of street design. Which physical entities must be used to accurately depict its image and serve as parameters for the design of such areas? Therefore, it can be inferred that network density is a suitable criterion that should be used to determine the type of urban built form.

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Conflict of Interests
The authors declare no conflict of interest.

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