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Superblock Urbanism in Dhaka as a Sustainable Redevelopment Strategy for Tejgaon Industrial Area

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ABSTRACT

Dhaka's rapid urbanisation has intensified challenges of fragmented land use, congestion, and environmental decline, particularly in the Tejgaon Industrial Area (TIA), once designated for light industry but now marked by unregulated mixed-use growth. This study examines the superblock model as a sustainable redevelopment framework for TIA, aiming to integrate density management, mobility, and environmental resilience. A mixed-methods approach combined GIS-based spatial analysis, traffic observations, policy review of the Detailed Area Plan (2022–2035) and Building Construction Rules (2008), and participatory design workshops. Insights from 151 residents, workers, and students informed scenario testing across three models: plot-based, block-based, and superblock development. Findings show that superblocks reduce congestion by diverting traffic to peripheral roads, enhance permeability with 44% more permeable surfaces compared to block-based schemes, and allocate nearly 50% of land for open and public spaces. These outcomes highlight the potential of superblock urbanism to support Sustainable Development Goals (SDGs 3, 11, 13, and 15), improving walkability, public health, and climate resilience. The study concludes that superblocks provide a scalable planning strategy for Dhaka's transformation and for other fast-growing urban contexts.

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Highlights:

- Superblock design cut traffic congestion by 82%, confirming mobility gains in Dhaka's sustainable redevelopment.
- Permeable surfaces in superblocks increased by 44%, boosting climate-resilient urban planning.
- Mixed-use zoning improved safety and vibrancy, reducing 47% of night-time insecurity in Tejgaon.
- MRT-linked superblocks raised transit use, with 60% preferring walkable, transit-oriented development.

Contribution to the field statement:

This study extends existing literature by integrating equity-focused frameworks with empirical findings, offering both theoretical insight and practical strategies for inclusive urban design and planning. The work bridges disciplinary gaps and introduces actionable knowledge.

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1.Introduction

Dhaka, the capital of Bangladesh, ranks among the world's most densely populated megacities and continues to experience rapid urban sprawl. Its urban morphology has evolved over more than four centuries, shaped by intersecting drivers such as economic transformations, demographic expansion, spatial dynamics, and political shifts. Collectively, these factors have influenced policies governing

Dhaka's development and underscore the city's complex planning history (Roy et al., 2018). The current pressures are visible in fragmented land use, speculative development, and the widening mismatch between population density and infrastructure provision, challenges that are particularly acute in areas like the Tejgaon Industrial Area (TIA).

Historically, Dhaka's planning trajectory reflects successive periods of intervention and neglect. During its colonial foundations (1608–1947), Dhaka was established as the capital of Bengal (1608–1707) and gained municipal status in 1864. British colonial authorities invested in administrative infrastructure, while systematic planning began with Sir Patrick Geddes' *Dacca Town Planning Report* of 1917. Although this report laid important conceptual foundations, it was never fully implemented, leaving Dhaka to grow organically until independence in 1947 (Roy et al., 2018; Jahan, 1990).

After the partition of India in 1947, Dhaka became the provincial capital of East Pakistan, prompting new institutional frameworks and statutory plans. The Dhaka Improvement Trust (DIT) was established in 1956—later renamed Rajdhani Unnayan Kartripakkha (RAJUK) in 1987—modelled after the Calcutta Improvement Trust (Roy et al., 2018). The British-prepared 1959 Master Plan, for example, sought to organise arterial roads, railway networks, and zoning systems to guide growth over two decades (Ahmed, 2018). Specific areas such as Tejgaon Industrial Area (industrial), Segunbagica (residential), and New Paltan (commercial) were demarcated under the Ministry of Public Works. However, weak enforcement led to unregulated growth, haphazard mixed-use development, and long-term infrastructure deficits.

Today, Dhaka is undergoing a paradigm shift in its urban development trajectory. Expansion is increasingly characterised by new road networks, planned neighbourhoods, and transit-oriented development (TOD), marking a departure from rigid and outdated zoning models. The transformation of TIA epitomises this shift: once envisioned as a hub for light industries, the area has degenerated into an unplanned and congested commercial zone after the relocation of industries to the city's periphery (Hossain, 2020). Although its reclassification in 2015 as a mixed industrial-commercial-residential zone was intended to stimulate regeneration, TIA now suffers from spatial inefficiency, environmental degradation, and a lack of cohesive planning. Figure 1 illustrates the historical spatial growth of Tejgaon, highlighting the pressures of unregulated urbanisation.

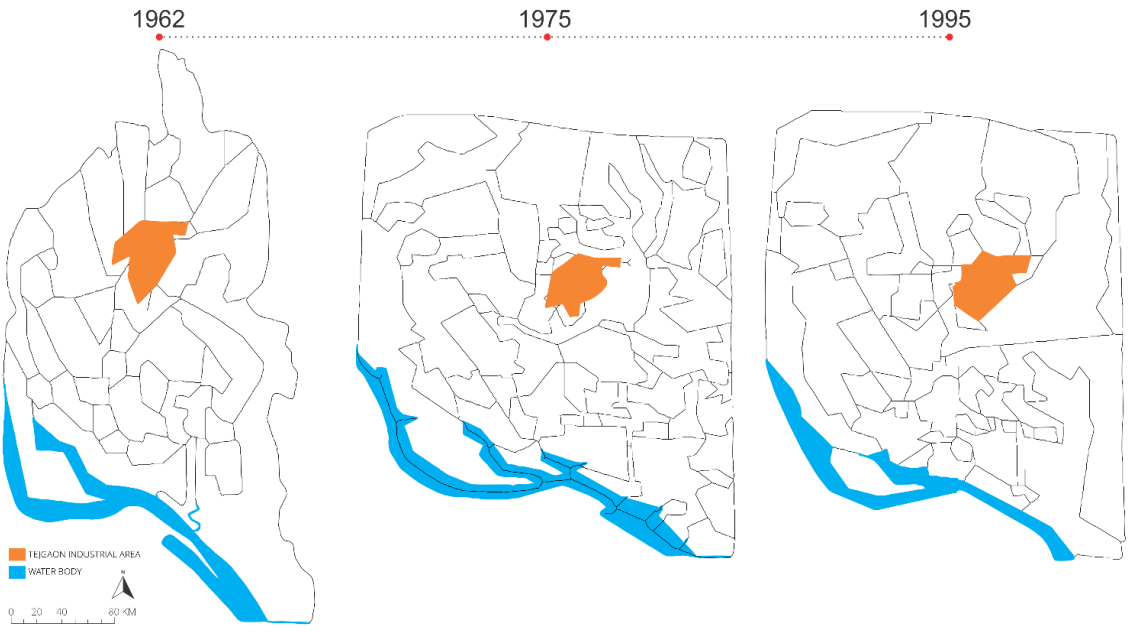

Figure 1. Tejgaon development Process.

Against this backdrop, Dhaka's planning discourse has increasingly turned to innovative frameworks that might reconcile density with liveability. Policy initiatives such as the Dhaka Structure Plan (2016–2035) and the Detailed Area Plan (DAP 2022–2035) highlight the need for block-based development

as an alternative to plot-based growth. These planning efforts are aligned with global discourses that emphasise density optimisation, sustainable land use, and integrated infrastructure systems. Within this framework, the concept of the *superblock*—derived from Barcelona's urban restructuring and adapted across other global contexts—has emerged as a promising model for Dhaka. The superblock approach restructures conventional street grids into larger blocks that reduce through-traffic, create pedestrian-friendly environments, and integrate green and public spaces. Empirical evidence from European cities demonstrates that reorganising streets into superblocks can reclaim between 15% and 25% of urban land for public use, with significant benefits for environmental quality and community well-being (Laurence, 2006).

The theoretical underpinnings of this study are rooted in multiple strands of urban thought. Henri Lefebvre's notion of the "Right to the City" frames urban space as a collective resource that must be democratised to support social equity (King, 2019). Manuel Castells' theory of the network society provides further insights into how globalisation and information flows reconfigure urban space (Castells, 2023). Meanwhile, modernist paradigms represented by Le Corbusier and the human-scale urbanism of Jane Jacobs reveal the tensions between technocratic planning and community-driven design (Laurence, 2006). These frameworks collectively inform the application of superblocks as both a spatial and socio-political instrument for urban transformation in Dhaka.

The Tejgaon Industrial Area is central to this analysis. Originally designated in the 1950s as an industrial hub by the Department of Public Works and later formalised as a light industrial zone in 1968 by the Dhaka Improvement Trust, TIA has gradually transformed into a fragmented mixed-use landscape (Hossain, 2020). This reflects not only the rapid urbanisation of surrounding districts but also the strategic centrality of TIA between Dhaka's historic core and newer residential extensions. The government's ambition to redevelop TIA is consistent with global trends in repurposing former industrial districts to create more liveable, economically vibrant, and socially integrated urban environments (Bredikhina et al., 2023; Pichkalova, 2022). Figure 2 illustrates the proposed land-use reconfiguration for Tejgaon under the DAP (2022–2035), highlighting its intended transformation into a mixed-use commercial and residential area.

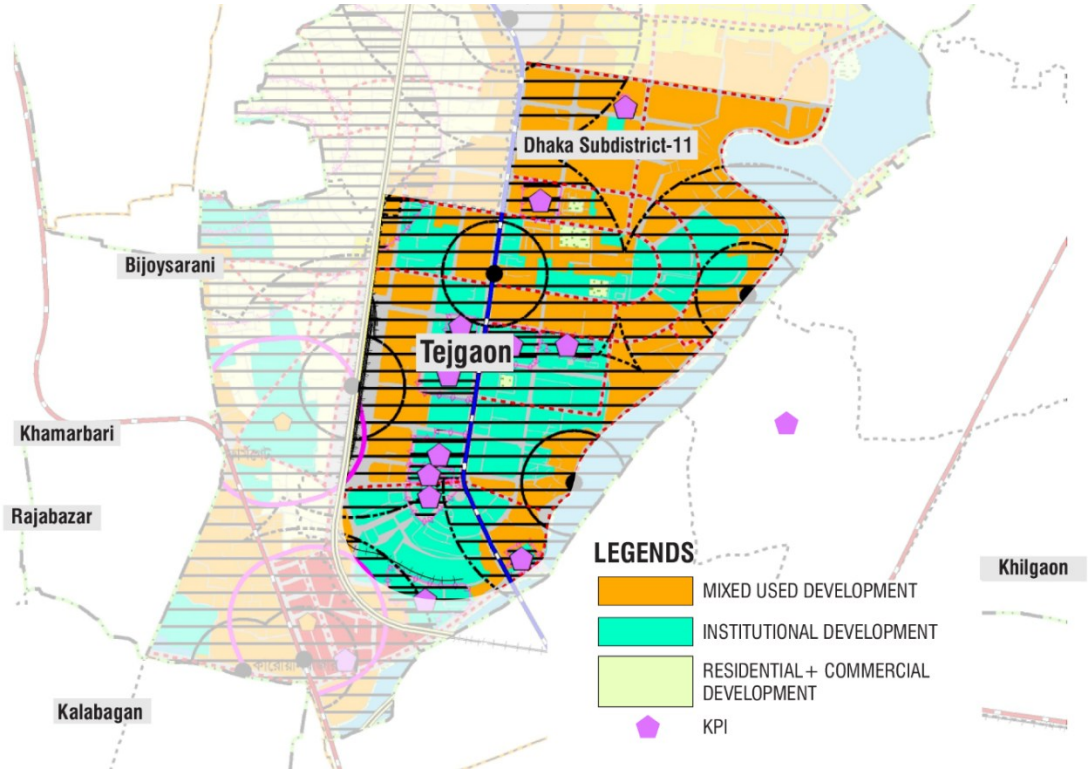

Figure 2. Detail Area Plan proposed Tejgaon Land Use Plan.
Note: GIS Map from DAP-2022-35 (RAJUK, 2022)

A critical gap persists in understanding how such transitions affect commercial activity, land value, spatial connectivity, and socio-economic conditions in TIA. Current approaches often adopt piecemeal land-use changes that fail to address the systemic challenges of fragmented ownership patterns, congestion, and social disparities. Scholars note that land inheritance and subdivision through succession in Dhaka complicate the consolidation of sufficiently large parcels for cohesive block-based redevelopment (Tanvir, 2025). Consequently, without integrated frameworks, redevelopment risks deepening inequalities and failing to achieve sustainable outcomes.

The present study addresses this research gap by examining the feasibility of the superblock model in TIA through a mixed-methods approach, combining GIS-based spatial analysis, traffic simulations, participatory design, and policy review. By evaluating three scenarios—plot-based, block-based, and superblock development—this research proposes an alternative framework for sustainable redevelopment in Dhaka. The methodology is outlined in Figure 3, which demonstrates the integration of spatial diagnostics, policy analysis, and participatory methods into a multi-phase evaluation process.

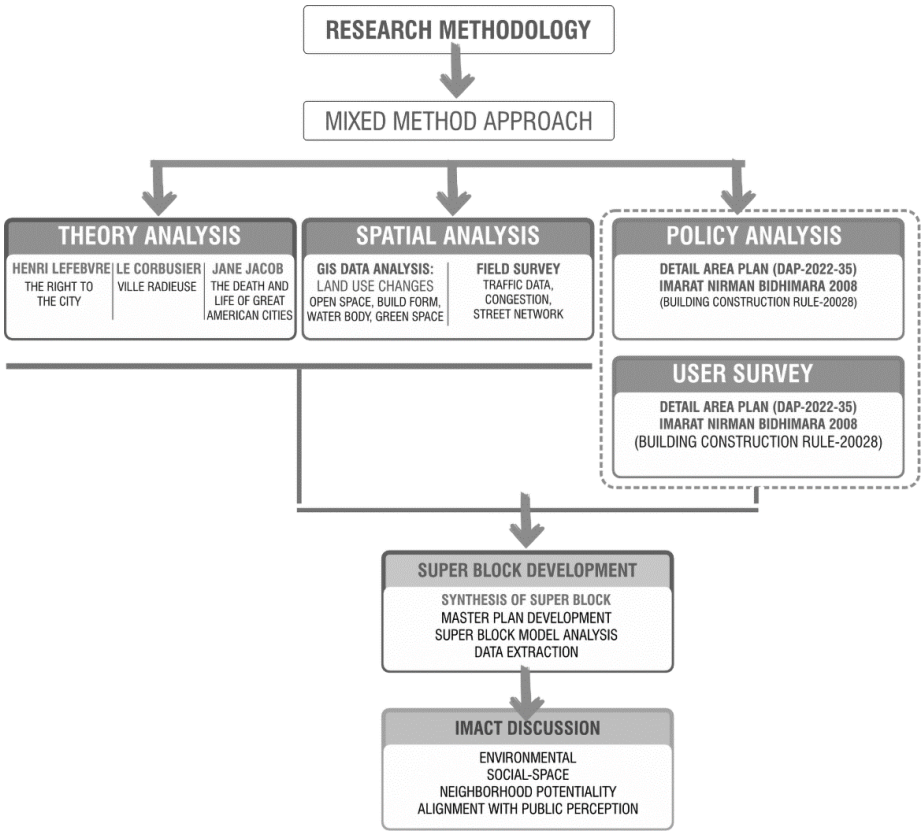

Figure 3. Research methodology-Conceptual Diagram.

This study contributes both empirically and theoretically: empirically, by generating evidence on traffic management, land use efficiency, and pedestrian accessibility in TIA; and theoretically, by situating the superblock concept within global debates on urban sustainability and equity. In doing so, it aligns with international commitments such as the Sustainable Development Goals (SDGs) 11 (sustainable cities and communities), 3 (good health and well-being), 13 (climate action), and 15 (life on land). It advances urban design strategies that address air pollution, mitigate heat island effects, and foster biodiversity through climate-resilient infrastructure. Importantly, it also highlights areas for future research, particularly regarding socio-economic dynamics, community adaptation, and the role of TOD in reshaping Dhaka's growth trajectory. By contextualising Dhaka's transformation within its cultural, geographical, and socio-economic realities, this study provides a scalable and adaptable model that may inform both policy and practice in other rapidly urbanising contexts.

2. Literature Review

2.1. The Concepts of Urban Blocks

In planned urban development, the city block functions as the fundamental unit of the built environment. It refers to a land parcel enclosed by both formally planned and spontaneously evolved street networks (Siksna, 1996). The morphology of the block is often defined by distinct zones: the *edge*, which interfaces with streets and represents the public realm, and the *interior*, which remains primarily private (Krier & Rowe, 1991). Moudon (1997) identifies four widely recognised scales of urban form analysis: *building/lot*, *street/block*, *city*, and *region*. Similarly, Canzen's work, as discussed by Whitehand (2001), situates the block within a tripartite composition of the townscape that integrates street systems, plot subdivisions, and block configurations into the broader urban fabric.

The Dhaka Structure Plan (2016–2035) has embraced block-based residential development as a strategic shift from traditional parcel-based zoning. This approach aims to foster Planned Unit Development (PUD), integrating mixed land uses and diverse housing types to create more vibrant and resilient communities (Apatenko & Bezliubchenko, 2024). Such a transition is intended to address Dhaka's pressing challenges of rapid urbanisation and population growth through a more compact, integrated, and sustainable urban form. By structuring neighbourhoods around walkable blocks, this strategy facilitates access to essential services and infrastructure within cycling or walking distance, thereby enhancing social cohesion (Apatenko & Bezliubchenko, 2024).

Research indicates that block-based planning also offers significant transportation benefits. It can improve accessibility and reduce the crippling traffic congestion that remains one of Dhaka's most persistent urban challenges (Rana, 2021). The Dhaka Structure Plan directly addresses this by proposing the decentralisation of activities from the city centre toward peripheral zones such as Savar, thus relieving core congestion and promoting more sustainable metropolitan growth (Rahman, 2024).

Urban blocks are thus dynamic morphological units that evolve in response to design ideologies, planning trends, and societal needs. They may consist of a single building, a cluster of varied structures, standalone developments embedded within green areas, or interconnected complexes forming integrated systems. Regardless of typology, blocks constitute the primary interface between private property and the public realm and are indispensable to shaping the liveability and identity of urban environments (Ghisleni, 2023).

Drawing from the literature, five planning principles are consistently emphasised as the foundations of block-based city design:

- Integration of urban morphology and design
- Multifunctionality and compactness
- Sustainable urban development
- Public participation and design-based planning
- Use of practical tools and frameworks

2.2. Block-Based Development in the Context of Dhaka

The Detailed Area Plan (DAP) 2022–2035 provides Dhaka with a formal framework for implementing block-based development, positioning it as a corrective to the shortcomings of plot-based urbanisation. Under this framework, block development is encouraged across the city when certain planning thresholds are met. Table 1 presents the DAP's proposed block-based development framework, outlining the minimum land requirements, design conditions, infrastructure provisions, and associated incentives.

Table 1: DAP proposed block-based development framework.

Serial No.	Location	Area of the Block	Conditions to be Considered as Block-based Development	Minimum Road Width	Available Incentives
04	Entire City	More than 5 acres	50% of the area must be open space, such as parks or playgrounds	60 ft. existing; proposed in the running or detailed area plan	Net Population Density: +30% Area-based FAR: +30% Plot-based FAR: 1.0

Notes:

- *The width of the front road must be maintained throughout the entire plot; the minimum width condition applies in all directions where a road exists.*
- *For block development, land size must remain consistent with minimum and maximum standards after the dedication of land for proposed roads.*
- *In block-based development, the area-based Floor Area Ratio (FAR) is redefined according to net population density incentives provided in the framework.*

This regulatory framework represents a significant institutional shift in Dhaka's planning practices. By mandating that at least half of the land area in large blocks (over 5 acres) be reserved for open spaces such as parks or playgrounds, the DAP integrates ecological resilience and liveability into its core principles. Furthermore, by linking development rights to incentives such as increased FAR and density allowances, it aligns private sector interests with public policy objectives. This not only ensures compliance but also strengthens the capacity of block-based development to achieve broader goals of sustainability, accessibility, and social inclusivity across the metropolitan region.

2.3 The concepts of Superblocks:

The concept of superblocks involves urban design strategies that accommodate urban growth by creating larger blocks with reduced vehicle access, promoting pedestrian-friendly environments, and improving public spaces for social and environmental benefits (Alawadi et al., 2024). Superblocks have been implemented in various forms across different contexts, each with unique objectives and outcomes.

2.3.1 The concept of the Chinese Superblock:

The superblock urban planning model has been widely adopted in Asian megacities to manage rapid urbanization and infrastructure demands. Originating from the Radburn city design and influenced by Clarence Perry's neighbourhood unit concept, superblocks are expansive urban blocks with smaller clusters inside, surrounded by a super grid of arterial roads (Chen, 2022). In Asian contexts, particularly in China and Japan, superblocks have been adapted to fit cultural and urban development needs, though they face challenges related to connectivity and urban fragmentation.

The morphology and functionality of the Chinese Superblock are very different, and it is found to be a fragmented urban area. Eventually, the improvement of street connectivity had to be rethought (Kan et al., 2017). These blocks are a distinctive urban planning model characterized by large, enclosed areas defined by arterial roads, which have evolved from historical and cultural influences, including Soviet micro districts and modern car-oriented planning (Ge & Han, 2020).

Figure 4. Nanjing, China Super Block Model
Note. *Shanghai Roads by Denys Nevozhai* (Nevozhai, 2019).

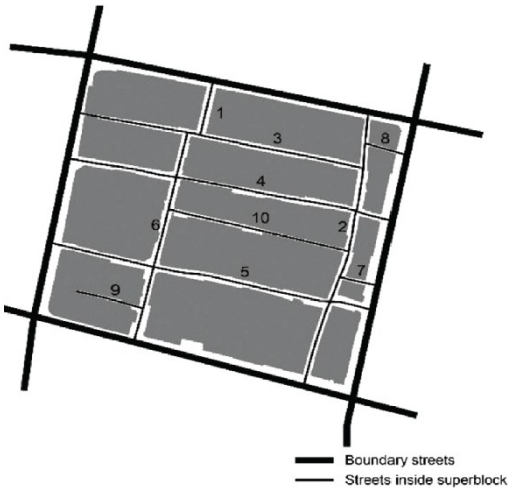

Figure 5. Streets within Hongmiao Nanjing (Ge & Han, 2020).

The Chinese superblocks are the product of a dualistic planning idea, where duality refers to government investment and hard control of boundary trunk roads only, resulting in considerable differences in hierarchy, form, and function between the boundary and the interior. Figures 4 and 5 show the street network of Shanghai and Nanjing. The Superblock's internal street network structure immensely affects people's daily travel and activity patterns. It involves land use distribution, development intensity, and places' diversity and local character. The connections between the internal and boundary streets determine whether global and local movement, the public, and daily space can coexist and interact effectively and collaboratively (Ge & Han, 2020). The Chinese Superblock's primary roads are purposefully designed and connected to an existing network. As an example, the micro network allows small-scale, complex, and dynamic interactions to stay inside the boundaries of the rigid macro urban framework since it often has an unlimited shape, complicated structure, and high spontaneity. When the interior and boundary are intricately linked, as in most historic districts, one can experience local and urban activities within walking distance (Ge & Han, 2020). The ideal interwoven street network of China's superblocks is closely linked to the macro-scale street network and contributes to promoting the sustainable Development of transportation, economy, and society.

2.3.2 The Barcelona Superblock model

In Barcelona, the original Cerdà plan of 1855 laid out a grid of large blocks with intended open spaces, which were later filled with buildings, leading to a lack of open space in Barcelona (Amati et al., 2024). The concept of Superblocks in Barcelona emerged as a transformative urban planning strategy aimed at addressing the challenges posed by the city's historical grid layout. In the previous approach, roadways occupied 15–25% of the land in most European cities, and by changing them into superblocks, the streets can be used for various purposes, making cities more livable. Figure 6 shows how the Superblock model reimagines urban spaces by reducing car traffic, increasing green spaces, and enhancing the quality of life for residents; this concept also contributes to combating climate change and improving urban liveability.

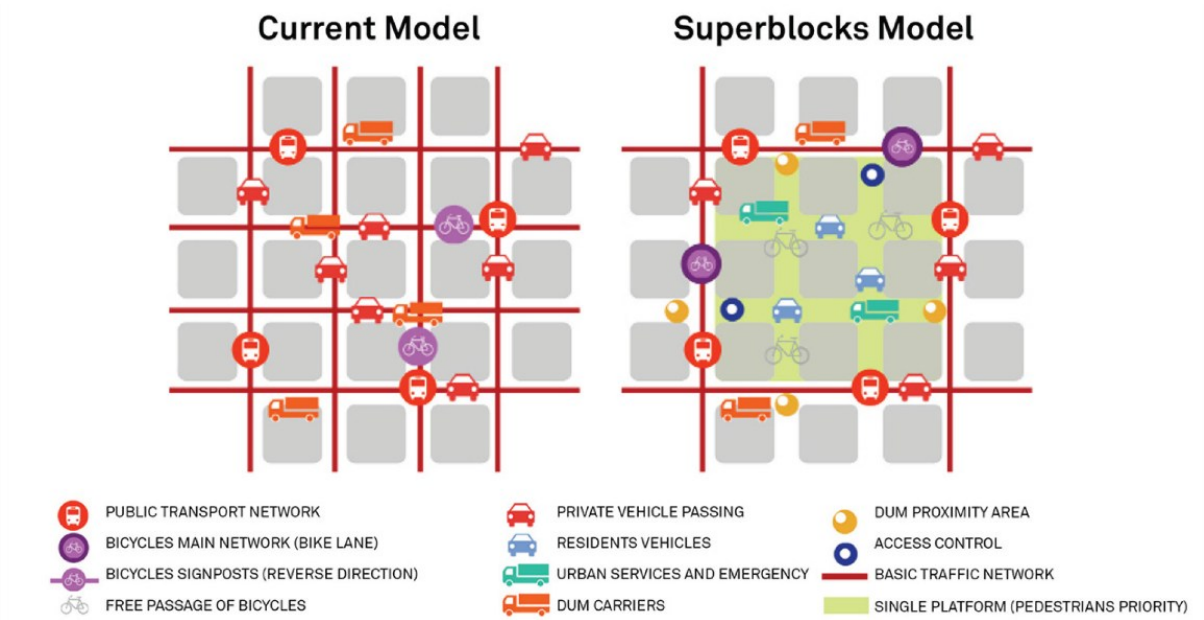

Figure 6. Barcelona Superblock Street network.

Note. Barcelona's 2013-2018 Urban Mobility Plan (PMU) was a strategic planning tool to foster a more sustainable, efficient, safe, and equitable mobility model to support the block development of the city from Barcelona City Council (Barcelona City Council, 2016).

Figure 7. Areial View of Barcelona superblock.

Note. Superblock (Superilla) Barcelona—a city redefined by Ronika Postaria (Postaria, 2021).

Based on the Cerdà grid (400x400 meters), Barcelona's Superblocks reduce private vehicle trips by 15% and free up 70% of public space for public use, making inner streets pedestrian-friendly (Palenzuela, 2021). Streets become neighbourhood hubs with playgrounds, seating for seniors, social spaces, and running tracks—encouraging physical activity and enhancing residents' well-being, local businesses, and the environment (Babic, 2021). Inner "green streets" are closed to through traffic, allowing only limited vehicle access—for residents, public transport, emergency services, disabled users, and recreational cyclists. Speed is restricted to 10 km/h, with one-way motorized movement. These streets become safe public pedestrian spaces (Amati et al., 2024). Revitalization includes curbless paving for accessibility, tactile paving for the visually impaired, and barrier marking pedestrian zones. Boom barriers and spike strips restrict vehicle access. Street design mandates 20% permeable surfaces and 80% tree coverage for shade. Other key measures include removing sidewalk parking, monitoring bike lanes, and providing accessible lifts and escalators (Amati et al., 2024).

2.3.3 Le Corbusier's Ville Rasieuse:

Le Corbusier's belief in social advancement through technology led him to support emerging industrial practices, such as mass production techniques and a car-based transportation culture. Le Corbusier's Ville Rasieuse (figure 8) was designed to increase urban capacity while improving the urban environment and city efficiency. The plan included high-density skyscrapers surrounded by large open spaces intended to enhance daylight and solar performance, as evaluated through computer simulations (Montavon et al., 2006). The ambitious proposal suggested the demolition of central Paris to make way for this new urban form, which was met with significant opposition. However, because of strong resistance, it never materialized. Later, its principles influenced post-war architects and urban planners, contributing to the worldwide Development of modernist urban environments. Examples include the city of Chandigarh in India (Corbusier, 2020). The concept of the "tapis-vert," or green carpet, was central to Le Corbusier's vision, integrating natural surroundings with urban spaces, aimed to create a harmonious alliance between the city and nature, a theme that was prevalent in his urban planning philosophy (Rabaça, 2016).

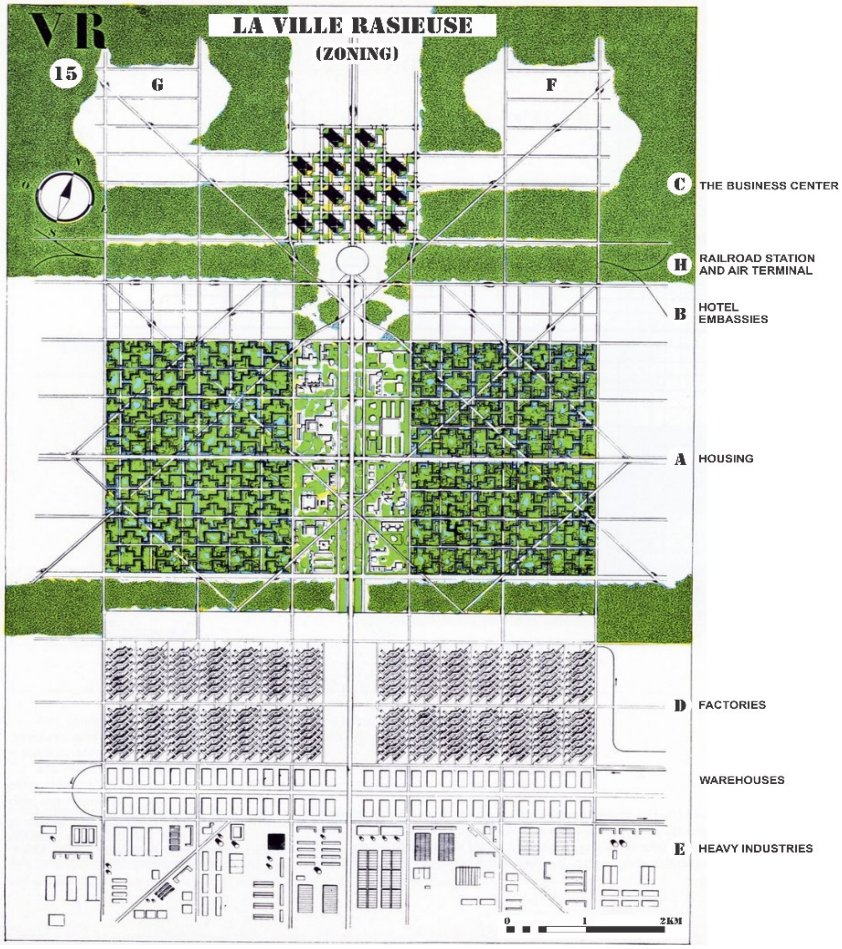

Figure 8. Le Corbusier's "Radiant Cities" (1935) were built around large towers set far apart to provide residents with equal access to light, air and open space.
Note. *From Le Corbusier's "The Radiant City" (1933)* (The Urbanist, 2012).

While Le Corbusier's Ville Rasieuse was a bold and visionary proposal, it also faced criticism for its utopian nature and the potential social implications of its rigid zoning and high-density living. Critics argue that such plans can lead to a loss of cultural and historical context and a lack of consideration for the social dynamics of urban life (Rodríguez-Lora et al., 2021).

2.4. Jane Jacobs and the Critique of Superblocks

In her seminal work *The Death and Life of Great American Cities*, Jane Jacobs developed a strong critique of modernist planning paradigms that prioritised efficiency over vibrancy. Jacobs' theory emphasises the significance of urban diversity and vibrancy, which she argued are sustained by specific urban form conditions. These include the integration of residential, commercial, and cultural functions within close proximity, thereby generating vitality and resilience in neighbourhoods (Fuller & Moore, 2017). By contrast, superblocks often compartmentalise or segregate land uses, resulting in less dynamic and less socially interactive environments.

Jacobs identified four essential conditions for urban vitality: mixed land uses, short blocks, aged buildings of varied conditions, and sufficient density. These conditions collectively foster opportunities for encounter, innovation, and street-level vibrancy. Superblocks, by their very nature, challenge these principles, since they are characterised by larger parcels and reduced street intersections, which may limit pedestrian permeability and diminish spontaneous interactions between different user groups (Fuller & Moore, 2017). This spatial structure risks undermining the fine-grained urban fabric Jacobs celebrated as the cornerstone of successful cities.

Empirical evidence supports these concerns. Studies indicate that superblocks can reduce pedestrian access and connectivity by consolidating multiple smaller blocks into larger, vehicle-restricted zones. While this has advantages for traffic management and open-space provision, it may conflict with Jacobs' advocacy for intimate, mixed-use environments where short blocks facilitate accessibility and enhance street-level vibrancy (Sung et al., 2015). For Jacobs, smaller blocks were not simply a matter of form, but of socio-spatial function—enabling interaction, inclusivity, and resilience within the public realm.

2.5. Henri Lefebvre and the Right to the City

Complementing Jacobs' critique, Henri Lefebvre's concept of the *Right to the City* provides a theoretical framework for the democratization of urban space. Lefebvre argues that the production of urban space is inherently political and should be shaped by its inhabitants rather than by centralised authorities or market-driven actors (Carlos, 2020; Chérrez-Rodas, 2020). This concept situates urban space as a collective right, wherein citizens are entitled not only to inhabit but also to transform their environments.

Lefebvre's vision aligns with Jacobs' bottom-up advocacy, reinforcing the principle that residents' voices must take precedence over technocratic master-planning. As Lefebvre notes, "citizens should have the power to shape the cities they live in," underscoring the emancipatory potential of participatory urbanism (Henri, 2000; LeGates & Stout, 2020). Deeply rooted in Marxist theory, Lefebvre's arguments reveal how the production of space both reflects and reproduces socio-political inequalities, while also providing opportunities for emancipation through collective agency.

In the context of superblock development, Lefebvre's framework raises critical questions about inclusivity and justice. While superblocks may provide environmental and infrastructural benefits, they risk marginalising community participation if conceived solely as top-down interventions. Thus, Lefebvre's work challenges planners to rethink block- and superblock-based development not just in spatial terms, but as arenas for democratic negotiation and socio-political transformation.

2.6. New Urbanism and Block Development

Emerging in the mid-1980s, the New Urbanism movement provides another relevant lens for understanding contemporary block-based development. New Urbanism responds to the failures of post-war suburban sprawl and automobile dependency by advocating for the creation of walkable, human-scale communities that integrate diverse functions and foster social interaction (Talen, 2024). The principles of New Urbanism centre on:

- **Walkability and human scale** – designing neighbourhoods where daily needs are accessible within a five- to ten-minute walk.

- **Mixed-use development** – integrating housing, retail, employment, and cultural amenities within a single urban fabric.
- **Diversity and density** – promoting socio-economic diversity and sufficient urban intensity to support public transit and local economies.

These principles significantly influence block development by encouraging infill projects and compact communities that resist car-oriented sprawl. By promoting coherence in block organisation, New Urbanism complements Jacobs' vision of vibrant city life while operationalising Lefebvre's call for socially inclusive urban spaces. In contexts like Dhaka, where unregulated growth has led to spatial inefficiency, the application of New Urbanism principles in block-based development may provide a path toward more livable, socially equitable, and environmentally resilient urban environments.

3. Analysis of the Study Area

3.1. Location and Spatial Context

The selected study site is located within the Tejgaon Industrial Area (TIA), Dhaka, encompassing approximately 46.5 acres (Figure 9). The site is strategically situated and exhibits high levels of connectivity, bordered by a primary road to the west, secondary roads to the north and south, and a tertiary road to the east. This robust accessibility positions the site favourably for redevelopment into a mixed-use urban block structure, consistent with the DAP's strategic objectives.

Figure 9. Satellite view of the study area *(image adopted by authors using Google Earth map).*

The historical development of TIA (Figures 9 and 10) illustrates a clear trajectory from industrial concentration to gradual diversification. Initially developed as Dhaka's prime industrial hub, the area has, over the past two decades, experienced a rapid transition towards commercial and mixed-use functions. Commercial activity has significantly expanded, with numerous industrial plots repurposed for retail, office, and institutional functions. This transformation accelerated after the establishment of RAJUK (formerly the Dhaka Improvement Trust, DIT) in 1987, whose planning regulations facilitated rezoning initiatives. Tejgaon's proximity to Dhaka's central business district further catalysed this shift, making it an attractive location for commercial and institutional investment (Das, 2018).

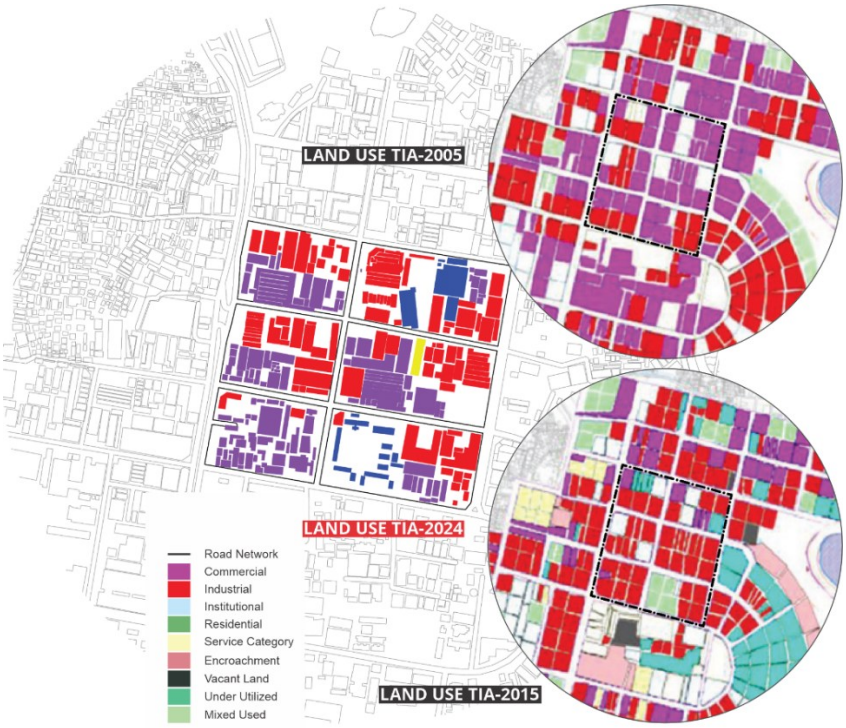

Figure 10. GIS MAP study showing land use change 2005, 2015 and 2025 in Tejgaon Industrial Area (TIA) (image adopted by authors).

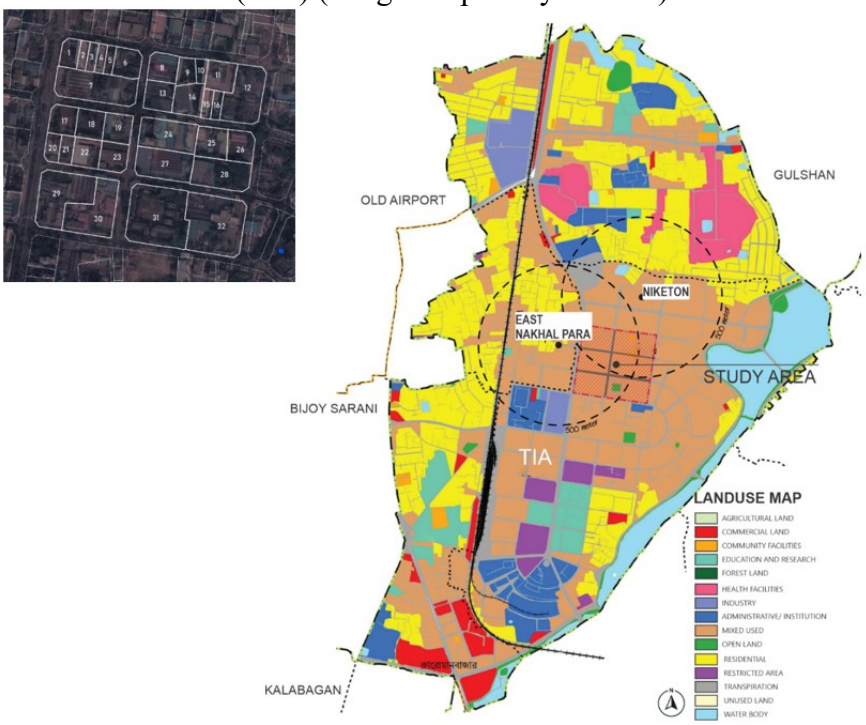

Figure 11. 32-Super imposed segmented plots boundary on Google Earth map & land use map of Tejgaon.

3.2. Adjacent Residential Neighbourhoods

Within a 500-metre radius (approximately a 15-minute walking distance) of the study area, two established residential neighbourhoods, Niketon and East Nakhalpara, are located. These neighbourhoods, being well-planned and developed, represent valuable urban assets that enhance the viability of future mixed-use redevelopment within TIA. The integration of residential and commercial

uses in such proximity offers opportunities for vibrant local economies, reduced commuting distances, and enhanced walkability.

The government's transformative master plan, prepared by the Public Works Department and declared in September 2015, envisions the conversion of the entire TIA into a mixed-use industrial, commercial, and residential zone. This master plan anticipates not only the intensification of commercial and institutional uses but also the emergence of new residential typologies within TIA, thereby reinforcing its mixed-use potential (Das, 2018).

3.3. Land Parcels and Mouza Map

According to the mouza map, the study area comprises 32 plots connected through an internal road network, covering a total area of 46.8 acres. This granular dataset is essential for determining Floor Area Ratio (FAR), Maximum Ground Coverage (MGC), and setback requirements, which form the basis of the three development scenarios analysed in this research. By calibrating these planning parameters, the study can project feasible density levels, land-use allocations, and infrastructural provisions under different urban models.

3.4. Building Typology

The study area currently accommodates 251 structures, representing a variety of typologies including steel-frame buildings, reinforced cement concrete (RCC) structures, and semi-pucca constructions. A significant proportion of these buildings have already surpassed 50 years of continuous use, and many are approaching the end of their functional and structural life cycle. Average building heights range between 15 and 25 feet, reflecting their original industrial functions as factories, warehouses, and workshops. This ageing building stock highlights the urgency of regeneration, as deteriorating structures provide both a challenge and an opportunity: a challenge in terms of safety and functionality, and an opportunity for adaptive reuse, densification, and integration of new mixed-use programmes.

3.5. Traffic and Transport Connectivity

The site is defined by perimeter roads that serve as arterial connections in the broader superblock context (Figure 12). These roads are differentiated by capacity and intensity of traffic flow:

- The primary perimeter road on the western edge carries heavy daily traffic volumes and consists of three lanes in each direction, with a total width of 90 feet.
- The secondary and tertiary perimeter roads on the northern, southern, and eastern edges experience mild to moderate traffic flows. Each of these has two lanes in each direction, with a total width of 40 feet.

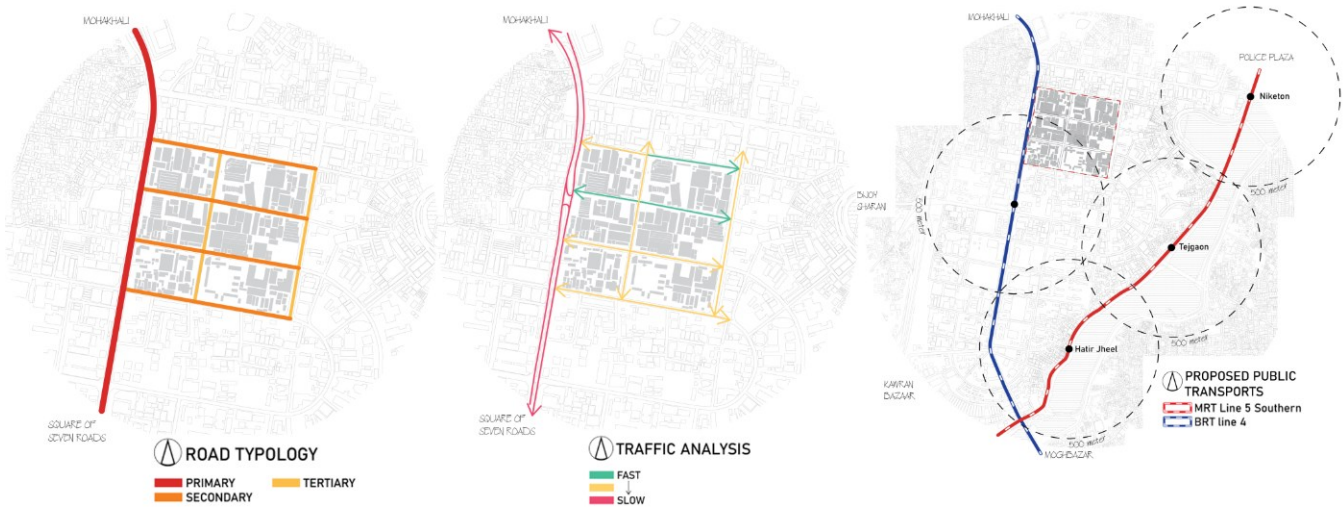

Figure 12. Traffic routes analysis of the study area.

Future public transport integration is expected to enhance connectivity further. According to the DAP (2022–2035), MRT Line 5 (Southern Route) and BRT Line 4 will operate along the eastern and western peripheries of TIA. The inclusion of mass transit infrastructure will transform Tejgaon into a transit-oriented district, supporting higher densities, reduced car dependency, and improved accessibility. This road hierarchy and the planned transit corridors are integral to calculating FAR values for redevelopment scenarios. They also align with the principles of block-based and superblock development, where perimeter roads absorb heavy vehicular flows, freeing internal blocks to prioritise pedestrian-friendly and mixed-use development.

3.6. T-Test Analysis of Green Space Use and Value

The provision and preservation of public green spaces represent one of the most significant contributions of block-based development. In the dense metropolitan environment of Dhaka, where annual urbanisation trends continue to erode open spaces, green infrastructure becomes a critical determinant of environmental sustainability, social well-being, and overall livability. Within this context, gender-based perceptions and use of green spaces provide valuable insights into how inclusive planning models should be structured to respond to diverse user needs.

3.6.1. Methodological Approach

To assess gender-based differences, independent-samples t-tests were conducted. The tests evaluated two key variables: (i) frequency of use (walking activity within green spaces), and (ii) perceived value (importance assigned to proximity and availability of parks/open spaces). The comparison between male and female respondents allows the identification of not only behavioural differences but also attitudinal patterns that can inform equitable planning interventions.

- **Sample Size**: 174 valid responses (Males: 101; Females: 73). Non-binary genders and incomplete responses were excluded to ensure data validity.
- **Variables**:
    - *Use of green space*: coded on a 4-point scale (Daily = 4; Never = 1).
    - *Value of green space*: rated on a 5-point Likert scale regarding importance of "[Parks/Open Spaces] near home."
- **Group Comparison**: Male vs. female respondents.

This methodological approach aligns with previous urban studies that utilise gender-disaggregated analyses to highlight differences in mobility patterns and perceptions of urban amenities (Rafieian & Tabaeian, 2022).

3.6.2. T-Test Results and Interpretation

- **Use (walking frequency)**: Male respondents reported a higher frequency of walking activity in and around the study area than females (mean ≈ 3.14 vs. 2.75 on the 1–4 scale). The difference was statistically significant ($t \approx 2.20$, $p \approx 0.03$).
    - *Interpretation*: The results suggest that men engage in daily or frequent walking activities more than women in the study area. This may be influenced by cultural norms, occupational mobility, or perceived levels of safety. It aligns with prior research indicating that women often face restrictions in mobility due to concerns about harassment or inadequate pedestrian infrastructure (Sung et al., 2015).
- **Value (perceived importance of green space)**: Female respondents placed a higher importance on having accessible parks/open spaces near their homes compared to males (mean ≈ 4.25 vs. 3.42 on the 1–5 scale). The difference was highly significant ($t \approx -3.74$, $p \approx 0.0003$).
    - *Interpretation*: This finding highlights a critical gendered dimension of urban planning. While men demonstrate higher actual use, women assign greater value to the *availability* and *proximity* of green spaces. This suggests that female residents may view green areas as essential extensions of residential life, linked not only to recreation but also to safety, child-rearing, and opportunities for social interaction.

These findings reinforce Jacobs' (1961) principle of "eyes on the street," which underscores the need for safe, accessible, and inclusive spaces to ensure equitable use of public realms. In the absence of such considerations, women's participation in public life risks being structurally constrained.

3.6.3. Analysis of Green Space Importance by Gender

To complement the earlier analysis on walking frequency and perceived value of proximity, an independent-samples t-test was conducted to determine whether statistically significant differences exist between male and female respondents regarding the *overall importance* of green spaces. The results are presented in Table 2.

Table 2: Gender preference regarding green space.

Gender	Sample Size	Mean Importance (M)	Standard Deviation (SD)
Male	101	3.82	1.36
Female	73	3.88	1.26

T-statistic: -0.303, P-value: 0.762

As shown in Table 2, male respondents reported a mean importance score of 3.82 (SD = 1.36), while female respondents reported a nearly identical mean score of 3.88 (SD = 1.26). The difference was not statistically significant ($t = -0.303$, $p = 0.762$), confirming that both genders value green spaces equally. These results provide three important insights:

1. **No Statistically Significant Difference**: The p-value well exceeds the $\alpha = 0.05$ threshold, demonstrating that both male and female respondents attach similar levels of importance to parks and open spaces.
2. **Consistently High Priority**: Both groups rated green spaces highly ($M > 3.8/5$), indicating strong and consistent demand for parks and open areas. This consensus reinforces the critical role of green infrastructure in shaping inclusive urban design strategies, irrespective of gender differences.
3. **Practical Implications for Planning**: While men tend to use green spaces more frequently (as shown in Section 3.6.2), and women place higher importance on proximity and safety features, the overall importance ratings remain comparable. This suggests that universal provision of green spaces—incorporating features such as shaded walkways, seating, recreational facilities, and natural aesthetics—should be prioritised in planning block-based and superblock developments. Furthermore, gender-sensitive considerations, particularly women's emphasis on safety (e.g., lighting, visibility, secure pathways), should complement these universal provisions to enhance inclusivity.

In summary, Table 2 highlights the convergence of male and female perspectives on the value of green spaces, suggesting that the provision of high-quality, accessible, and safe parks will benefit all demographic groups in the Tejgaon Industrial Area.

3.7. Development Scenarios

The spatial and behavioural analyses described above provided a basis for the development of three distinct scenarios for the Tejgaon Industrial Area. These scenarios are evaluated against the principles of sustainability, inclusivity, and resilience, and align with regulatory guidelines in the Building Construction Rules 2008 and the Detailed Area Plan (DAP) 2022–2035.

Scenario One: Plot-Based Development

This conventional model relies on the existing fragmented plot system, where individual land parcels are developed separately according to current regulatory standards. While offering flexibility to individual landowners, this model perpetuates inefficiency, poor integration of infrastructure, and limited opportunities for large-scale public amenities. *Figure 14* illustrates the master plan and three-dimensional spatial relations for the plot-based scenario, highlighting its fragmented spatial organisation.

Scenario Two: Block-Based Development

In this scenario, the 32 existing plots are consolidated through land readjustment policies into a single, larger development parcel. This approach draws from the DAP's 2022–2025 block development incentives, enabling greater integration of infrastructure, public green spaces, and compact mixed-use typologies. By pooling resources and reorganising land, block-based development offers opportunities for efficient space utilisation, improved pedestrian accessibility, and cohesive urban design. This scenario reflects principles of *Planned Unit Development (PUD)*, which encourage diversity, multifunctionality, and compact growth (Apatenko & Bezliubchenko, 2024).

Scenario Three: Superblock Development

The superblock model adapts global precedents, such as Barcelona's superblocks, to the Dhaka context. It incorporates DAP (2022–2035) regulations, Imarat Nirman Bidhimala (2008), and the design philosophy of *omniplatz*. The latter advocates multifunctionality in built form, ensuring that buildings remain flexible and adaptable to shifting uses over time. Superblocks prioritise pedestrian and cycling movement, restrict through-traffic to perimeter roads, and reserve internal spaces for green infrastructure, communal facilities, and mixed-use clusters. *Figure 13* provides a comparative illustration of the three development scenarios, while the superblock scenario demonstrates potential to deliver climate resilience, reduced congestion, and enhanced livability.

By contrasting these scenarios, the study identifies the relative strengths and limitations of each model. While plot-based development maintains continuity with existing practices, it perpetuates fragmentation. Block-based development introduces efficiency and integration but requires extensive coordination among landowners. Superblock development, though ambitious, offers transformative potential to reshape TIA into a model of sustainable and inclusive urbanism for Dhaka.

Figure 13. Different development scenarios.

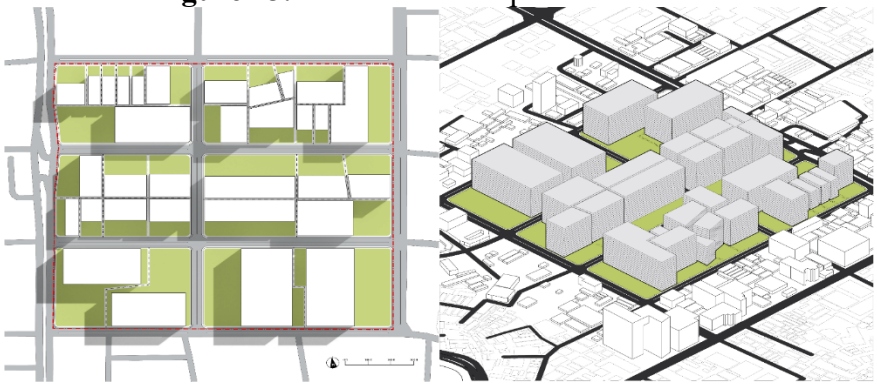

Figure 14. Plot based development- master plan and three-dimensional spatial relation.

3.7.1. Scenario 1 — Plot-Based Development

The first scenario, illustrated in Figure 15, demonstrates the conventional development model based on the *Imarat Nirman Bidhimala (2008)*. In this case, each of the 32 plots within the study area is developed individually and independently, applying regulations related to Floor Area Ratio (FAR), Maximum Ground Coverage (MGC), setbacks, and paved-surface percentages. The orientation of massing is derived from the frontage of each plot facing the existing road network.

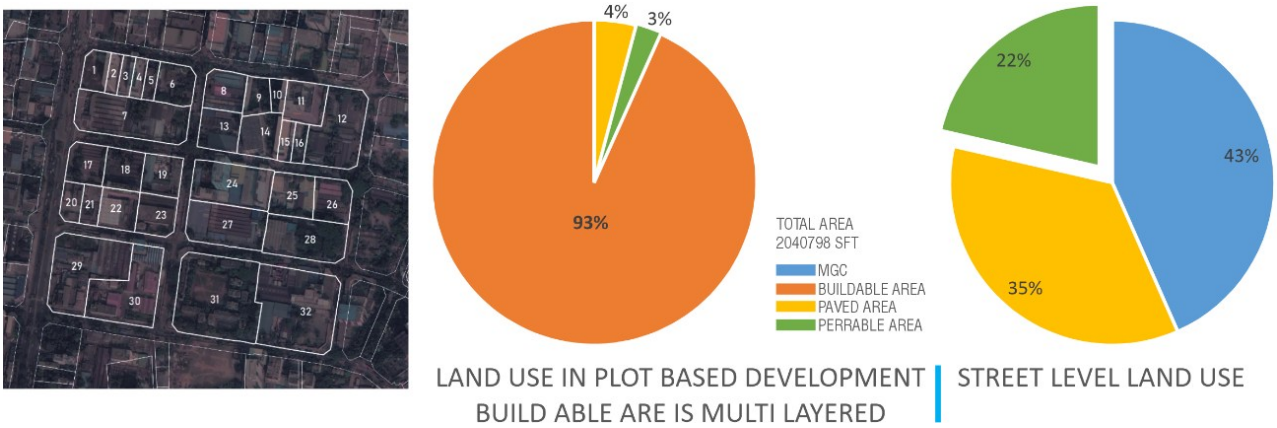

Figure 15. Plot based development-imposed plot divisions on Satellite map and land use pie-chat showing percentage of land use.

Although this scenario accurately reflects Dhaka's prevailing urban development context, several limitations become apparent. First, green spaces are fragmented, existing only in small residual pockets determined by plot boundaries. This discontinuity prevents the creation of meaningful, connected ecological or recreational systems. Second, narrow setbacks between buildings form poorly ventilated and under-lit voids, sometimes referred to as "urban canyons" or "light wells," which contribute little to environmental quality. Third, the pattern of isolated plots reproduces socio-spatial fragmentation, with limited opportunities for integrated amenities or shared public spaces.

Overall, while the plot-based scenario maintains continuity with Dhaka's historic development patterns, it fails to address the quality-of-life deficits identified in earlier analyses (see Section 3.6, Table 2). The fragmented urban form underscores the need for more consolidated, cohesive strategies.

3.7.2. Scenario 2 — Block-Based Development

Block-based development, illustrated in Figure 16 and further detailed in Figure 17, introduces an alternative planning approach proposed in the *Detailed Area Plan (DAP) 2022–2035*. While this concept has not yet been widely implemented in Bangladesh, it seeks to merge multiple plots into larger urban blocks governed by uniform planning rules. The regulatory framework combines provisions from the *DAP (2022–2035)* and the *Imarat Nirman Bidhimala (2008)*, ensuring consistent application of FAR, MGC, and setback requirements.

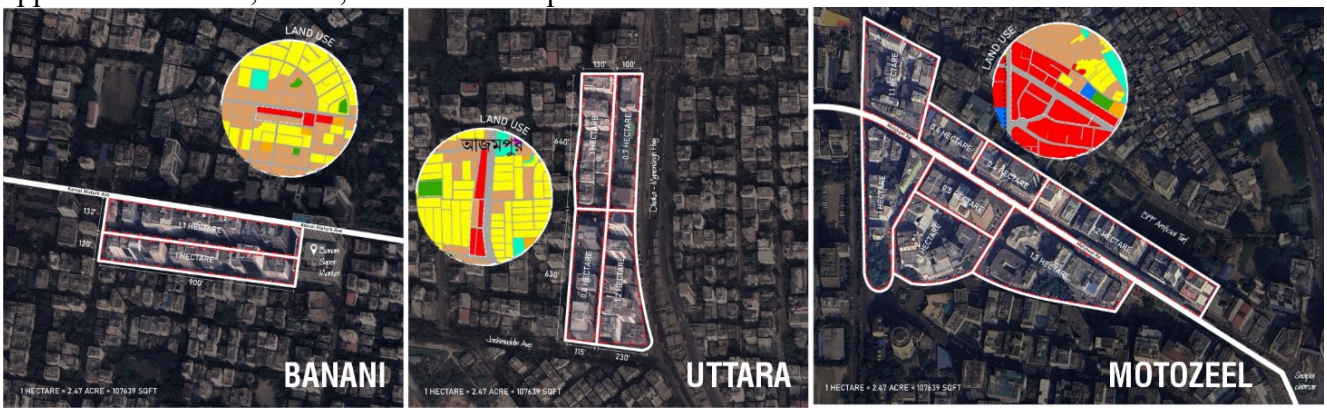

Figure 16. Three scenarios to determine the block size in different context were studied.

Note. Image based on Google Earth map adopted by authors.

Figure 17. Block development master plan and three-dimensional spatial relation.

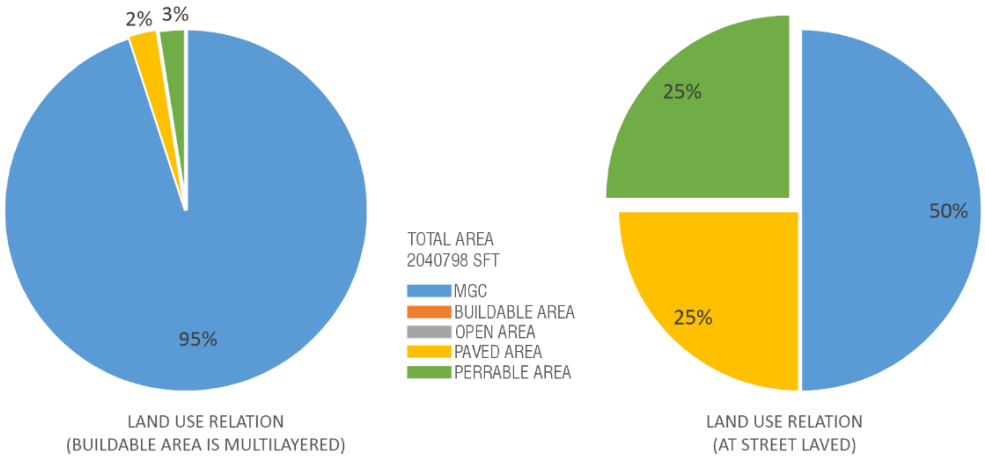

Figure 18. Land use ration in block development.

To determine appropriate block sizes for commercial development, this study reviewed three reference areas in Dhaka: Banani, Uttara, and Motijheel (Figure 16). Across these contexts, commercial and mixed-use blocks typically measured around 1 hectare (2.47 acres). Along major arterial roads, commercial functions dominated, while interior blocks were characterised by mixed uses. These findings support the adoption of 1-hectare block sizes for Scenario 2, balancing accessibility, zoning efficiency, and land-use diversity (Tavassoli, 2020).

Applying this standard to the study site, the 32 plots are reorganised into 16 consolidated blocks, integrated by a central green belt. The master plan (Figure 17) demonstrates the spatial relationship of blocks, while Figure 18 presents the block development land-use ratios.
The scenario offers several advantages over the plot-based model:

- Green spaces are more continuous, enabling the creation of a centralised ecological and social corridor.
- Land consolidation improves efficiency, reducing fragmented ownership challenges.
- Mixed-use and vertical zoning within blocks allow for flexibility—residential blocks can host limited commercial or social functions, and commercial blocks can incorporate social services.

Nevertheless, limitations remain. Internal zoning conflicts persist, as vertical integration often privileges one use over others (e.g., commercial dominance over social functions). Moreover, without additional sustainability measures, permeability and environmental performance remain limited compared to more innovative frameworks.

3.7.3. Scenario 3 — Superblock-Based Development

The third scenario, illustrated in Figure 19, represents the central focus of this study: the Superblock Development model. Building upon the regulatory framework of block-based development, this model integrates additional sustainability and mobility indicators inspired by international precedents, notably the Barcelona superblock model.

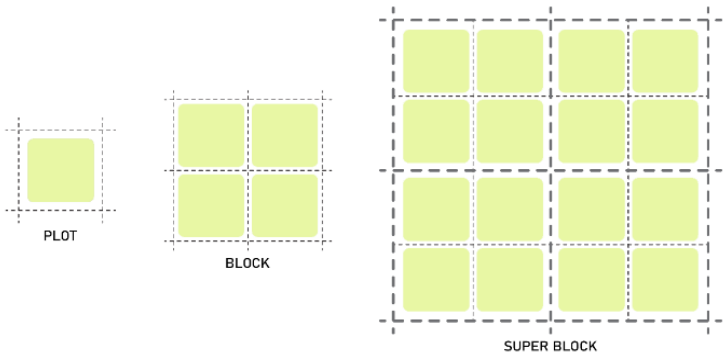

Figure 19. Plot to super block- conceptual framework.

In the proposed layout, the 32 original plots are amalgamated into 16 blocks and further merged into **four superblocks**, linked by a central green belt serving as an ecological corridor and communal public space. The model introduces two additional key indicators:

1. **Increased Permeable Surface Area**: Superblocks incorporate at least 20% more permeable surfaces compared to conventional blocks, replacing paved areas with landscaped green zones. This improves stormwater absorption, reduces flooding risks, and mitigates urban heat island effects (Damnjanović et al., 2024; Nieuwenhuijsen et al., 2024).
2. **Vehicular Traffic Restriction and Internal Circulation**: Traffic is confined to peripheral arterial roads, while internal streets are pedestrian- and micro-mobility-prioritised. Emergency access is retained, but general vehicular intrusion is minimised. This reallocation of road space reduces private car trips by an estimated 15% and liberates up to 70% of internal road area for pedestrian and community use (Palenzuela, 2021).

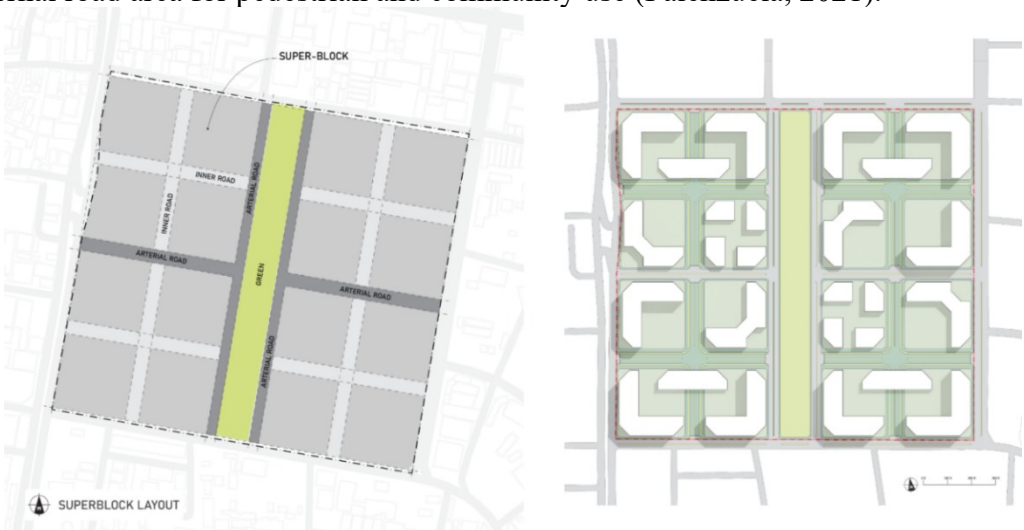

Figure 20. Superblock master plan of showing four large super blocks (left) and master plan with conceptual block spaces (right).

The land-use distribution for the superblock scenario is presented in Table 3.

Table 3: Land use calculation for the Superblock.

Parameter	Value
SITE AREA	2,040,798 sq. ft.
MGC	50%
FAR	9.5
OPEN AREA	50%
PAVED	30%
PERMEABLE	70%
TOTAL MGC	1,020,399 sq. ft.
TOTAL BUILDABLE AREA	19,387,581 sq. ft.
TOTAL OPEN AREA	1,020,399 sq. ft.
TOTAL PAVED	306,120 sq. ft.
TOTAL PERMEABLE	714,279 sq. ft.

Note: *Imarat Nirman Bidhimala 2008, DAP (2022–2035), Superblock Indicator Policies*

The results highlight the superior spatial and ecological efficiency of the superblock model. A FAR of 9.5 facilitates high-density vertical development, generating nearly 19.4 million sq. ft. of buildable floor area while maintaining a balance between constructed and open space. With 50% of the total site area allocated as open space, including 70% permeable surfaces, the model surpasses both plot-based and block-based approaches in terms of environmental resilience. The integration of permeability, open space, and walkability reflects New Urbanism's principles of compact, human-scale communities, while the redistribution of mobility networks aligns with Jacobs' advocacy for vibrant, safe public spaces and Lefebvre's notion of the *Right to the City*. By prioritising collective benefits over individual plot-based interests, the superblock model demonstrates the potential for an inclusive and sustainable urban transformation of Tejgaon.

4. Entropy analysis and comparison with the other two scenarios:

4.1 Change in maximum ground coverage:

This research examined three scenarios, comparing data from each case to observe changes in Maximum Ground Coverage (MGC). Significant variations in MGC were identified, with the graph indicating a 15% increase in MGC from the Plot Base to the Block and Superblock Base scenarios. This increase can be attributed to the Plot Base's 32 individual plots, each with its own MGC. In contrast, in the Block and Superblock Base scenarios, the area is consolidated into a single plot with one MGC value after land use adjustments.

4.2 Buildable area comparison:

The buildable area refers to the total volume that can be constructed on the site. This figure is obtained by multiplying the Floor Area Ratio (FAR) by the site area. Building height can be estimated by dividing the buildable area by the MGC. The analysis reveals a 20% increase in the buildable area when transitioning from the Plot Base to the Block and Superblock Base. This is because individual plots, being smaller, contribute less to the total area, whereas consolidated block or superblock developments allow for higher densities. Higher density facilitates shared services among a larger population, contributing to more sustainable systems and better resource optimization.

4.3 Paved areas analysis:

A key issue associated with paved areas is impermeability, preventing groundwater recharge. In Dhaka, groundwater abstraction has risen by over 700% in the past three decades, resulting in a severe decline in water tables—up to 75 meters in some regions (Parvin, 2019).

In this study, the paved surface area decreased by 29% when moving from Plot Base to Block Base and 57% from Plot to Superblock Base. This is because each of the 32 plots in the Plot Base scenario has its paved area, whereas only one shared paved area is needed in the Block Base. The Superblock Base scenario further reduces this by incorporating soft-paved, permeable inner roads.

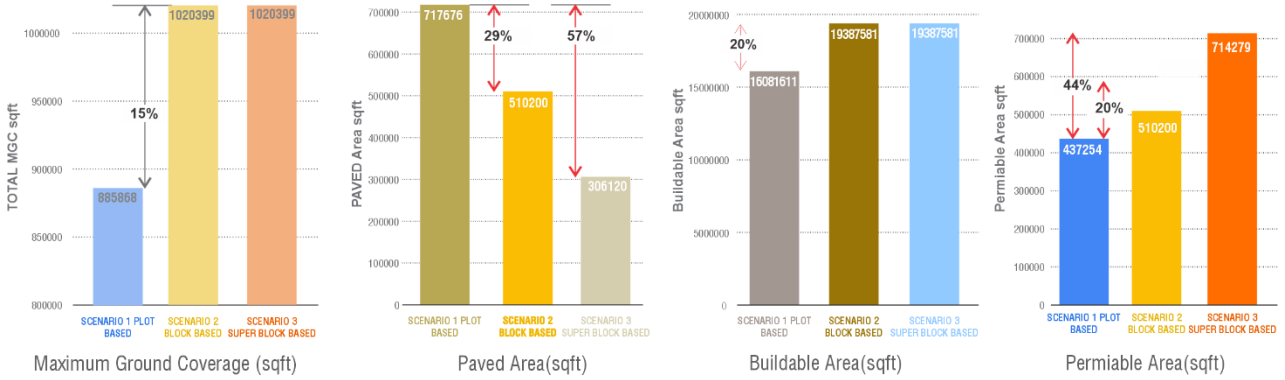

Figure 21. Entropy Analysis comparison chart with three scenarios.

Permeability analysis shows a 16% increase in permeable surface from the Plot Base to the Block Base. This is due to the transition from multiple small, isolated permeable areas to a more open and integrated block structure layout, allowing for a higher proportion of permeable space. From Block to Superblock Base, permeability increases by an additional 44%, primarily because the Superblock model requires at least 20% more permeable area, thus significantly enhancing ground infiltration capacity.

5. Superblock spatial zoning analysis

5.1 Superblock-horizontal spatial zoning analysis:

This research aims to develop a Super Block analysis that fits the Tejgaon Industrial Area well. Data from the entropy analysis of Scenario 3 is the basis for further details of the zoning proposal. The first factor to consider is what the zones on the site will be and how the blocks will sit based on the zone type. After evaluating field data and tracing the building typologies change pattern in TIA, three building typologies are identified.

- COMMERCIAL
- SOCIAL
- RESIDENTIAL

The transformation of land use patterns in Tejgaon towards commercialization is observed in various urban areas, driven by economic growth, urbanization, and strategic location advantages. Proximity to educational institutions, demand for commercial services, and urban planning policies often influence this shift. The incremental commercial uses in Tejgaon can be understood through similar transformations in many parts of Dhaka, where residential areas evolve into commercial hubs due to various socio-economic factors.

The concept of mixed-use zones, as proposed for the social and residential blocks in Superblock at Tejgaon, follows New Urbanism principles from the 1980s and modern urban planning concepts. This type of Mixed-use development aims to integrate functions like residential and recreational spaces within a single area, promoting an interdependent, vibrant, sustainable, and accessible urban environment. The proposed type of mixed-use development is theorized to enhance social integration, improve housing and service distribution, and stimulate local economic Development. It also addresses environmental concerns by reducing transportation needs and promoting sustainable urban growth (Geyer, 2024).

5.2 Commercial blocks:

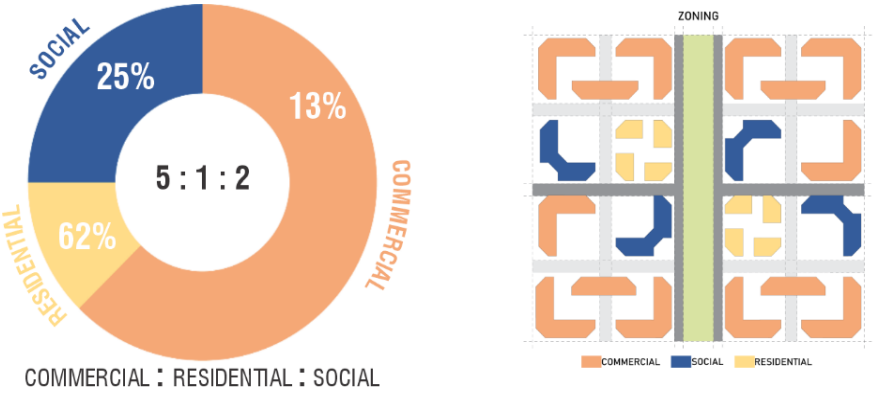

Figure 22. Schematic horizontal spatial distribution of commercial, residential and social spaces.

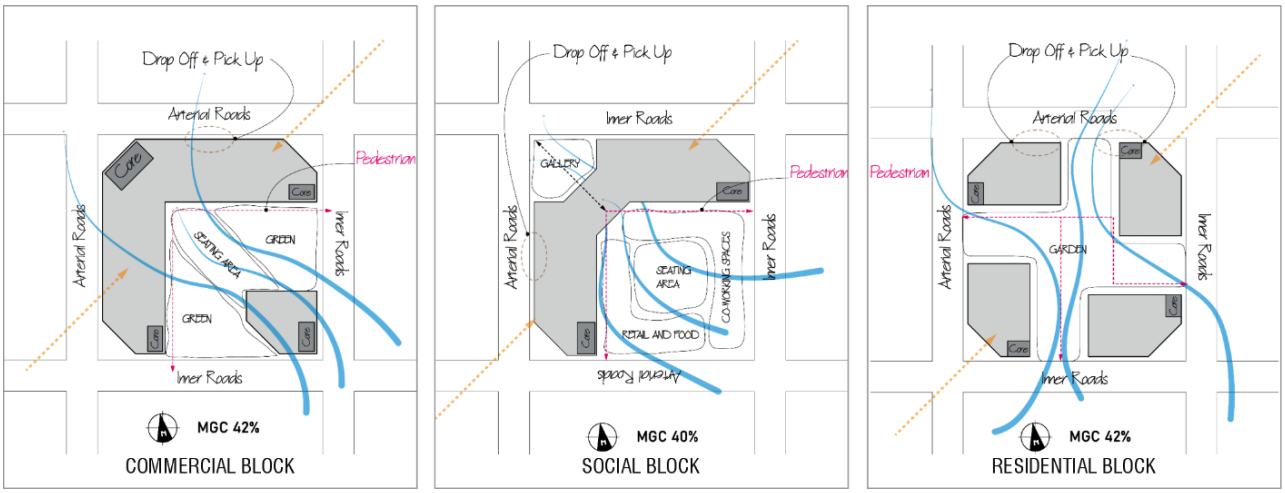

Figure 23. Super block functional distribution.

The commercial blocks' core functional attributes are banks, showrooms, and offices. There is also provision for future expansion, and a schematic plan has been proposed that supports the concept of *Omniplatz*—meaning a building should not have a single, fixed functional identity. Instead, it should be capable of accommodating a broader range of uses. The floor plan is designed to be flexible, allowing adaptation to various user needs and functions. The blocks are vertically expandable, with a static core for vertical and shared circulation. The proposed functional space for commercial blocks is banks, Showrooms, and offices.

5.3 Social blocks:

The Social Block forms a key component of the site's superblock development strategy, acting as a vibrant public space that draws users from the site and surrounding neighbourhoods. The modular open space in front of the block supports a wide range of social and cultural activities, significantly contributing to the urban vitality and quality of life. This configuration aligns with superblock principles by prioritizing walkability, accessibility, and flexible public use. Proposed functions for the Social Block include:

- Art Gallery, Retail Shops, Market, Expo Center, Restaurants

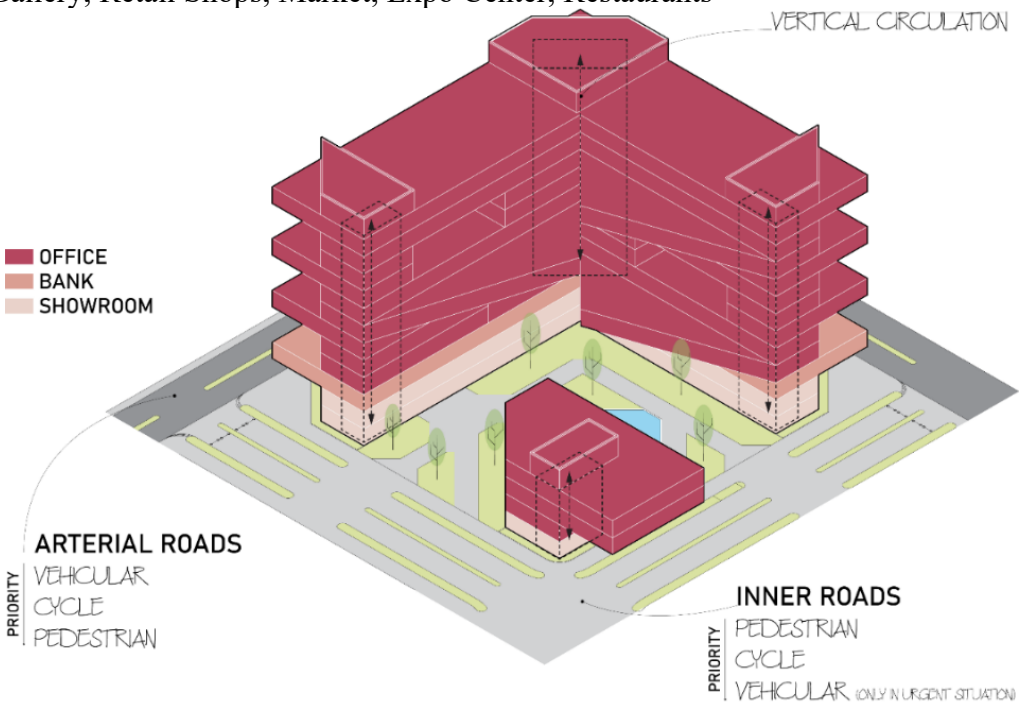

Figure 24. Three-dimensional spatial relation of proposed Commercial blocks.

5.4 Residential block

The residential blocks are primarily for office personnel working in or near the area, so the program list focused on those users. The ground level of the block will retain shops with mixed-use advantages and act as a vertical buffer.

6. How Superblock Development Will Address Acute Urban Issues in TIA: Survey Data Analysis

To understand how superblock development could respond to the acute urban challenges of the Tejgaon Industrial Area (TIA), a structured survey was conducted with 151 respondents. Participants included residents, employees, and regular visitors to the area, many of whom had longstanding ties to TIA, transitioning from its industrial past to current service-sector dynamics.

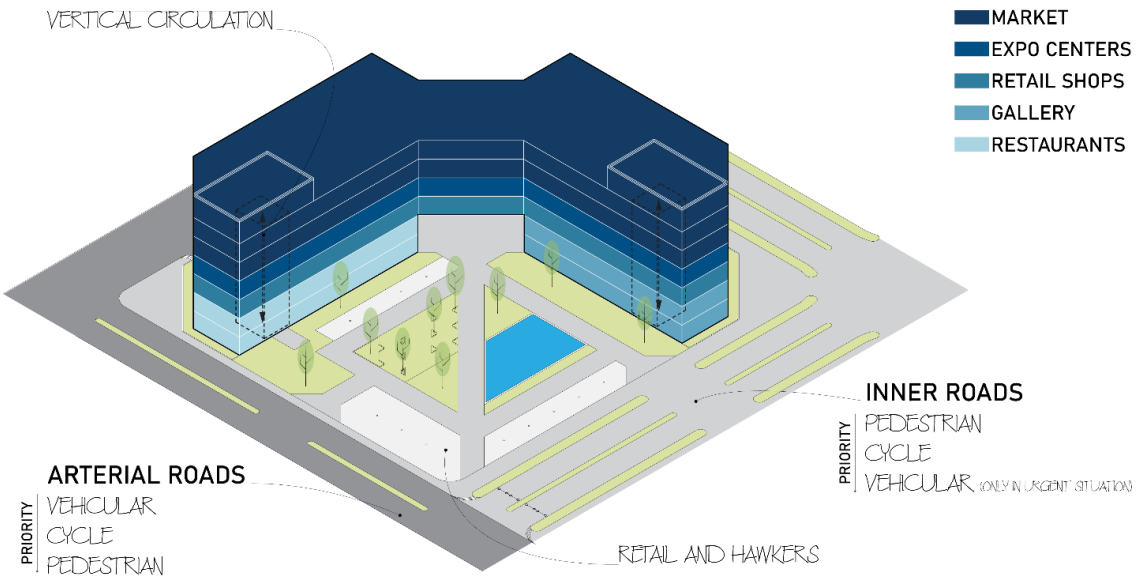

Figure 25. Three-dimensional spatial relation of proposed social block showing public green plaza.

The survey data highlight persistent gaps in mobility, environmental quality, public safety, and economic vibrancy. In parallel, the superblock framework—characterised by integrated open spaces, pedestrian-prioritised mobility, and mixed-use activation—provides targeted strategies to address these challenges. The spatial potential of the superblock model is illustrated in Figure 26, which shows the proposed residential blocks organised around a central green courtyard, ensuring permeability, natural surveillance, and community interaction.

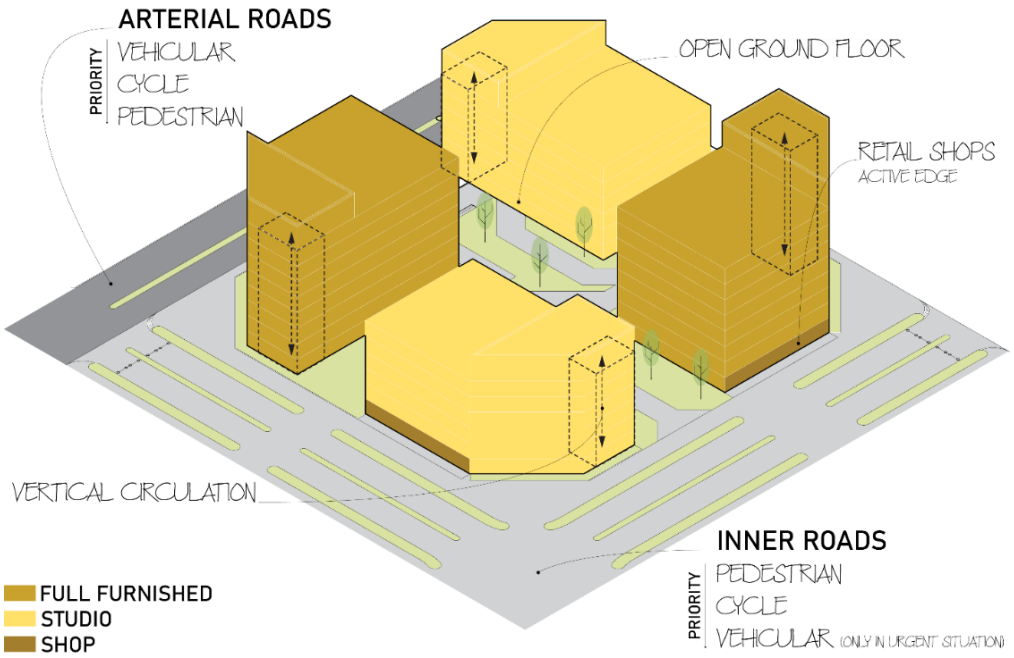

Figure 26. Three-dimensional spatial relation of proposed Residential blocks showing central green courtyard surrounded by residential blocks.

6.1. Mobility and Congestion

Approximately 82% of respondents reported that traffic congestion and inadequate parking are among the most critical issues faced on workdays. The coexistence of diverse vehicle types—manual rickshaws, motorcycles, freight trucks, and private cars—combined with weak enforcement mechanisms intensifies congestion, prolongs travel times, and exacerbates air pollution.

Superblock Solution. By redirecting through-traffic to peripheral arterial roads and converting interior streets into pedestrian and micro-mobility corridors, the superblock strategy reduces congestion and encourages active transport. This design not only enhances mobility efficiency but also contributes to improved air quality and reduced noise levels. Over time, the restructuring of mobility patterns creates safer, healthier, and more inclusive neighbourhoods.

6.2. Public Space and Environment

Over 52% of respondents expressed dissatisfaction with the lack of accessible public spaces such as parks, benches, and community gathering areas. The absence of greenery and recreational amenities has reduced opportunities for relaxation, social interaction, and cultural engagement.

Superblock Solution. Within the superblock model, inner streets are reimagined as green corridors, micro-parks, and public plazas, reinforcing ecological connectivity and providing safe, multifunctional spaces. These public realms foster community identity, encourage cultural exchange, and strengthen social cohesion. Importantly, creating a sense of collective ownership over these spaces also discourages illegal encroachment and antisocial behaviour, enhancing both environmental and social security.

6.3. Safety and Night-Time Experience

Nearly 47% of respondents indicated that they feel unsafe in TIA during evening and night-time hours. After office hours, the area becomes largely inactive, with few open businesses, insufficient lighting, and minimal pedestrian presence. Superblock Solution. To improve night-time safety, the superblock approach integrates human-scaled lighting, visible public amenities, and "active edges" such as cafés, restaurants, bookshops, IT gadget shops, and bakeries. Encouraging late-evening operations of street food vendors and small businesses sustains activity after office hours, increases passive surveillance, and builds social capital. This aligns with Jacobs' (1961) "eyes on the street" principle, where constant visibility and activity in the public realm reinforce safety.

6.4. Economic and Mixed-Use Activation

Respondents also emphasised the lack of cafés, retail shops, and seating areas in TIA, particularly at ground-floor levels accessible to pedestrians. The absence of such amenities limits vibrancy and discourages lingering in the area. Superblock Solution. By reallocating road space from cars to pedestrians, superblocks enhance foot traffic in commercial areas, directly benefiting ground-floor businesses. Flexible zoning encourages live-work-play ecosystems, integrating housing, services, and leisure. Empirical evidence from Barcelona demonstrates that superblock policies not only improve environmental health but also indirectly stimulate local economies by creating more attractive, walkable public environments (Damnjanović et al., 2024; Palenzuela, 2021). Ground-level shops and cafés thrive in such conditions, reinforcing urban vibrancy and economic resilience.

6.5. Superblock Integration with MRT Development

According to the Strategic Transport Plan, MRT Line 5 (Southern Route) will establish a station within a 200-metre radius of the study area, significantly influencing mobility patterns within a 500-metre catchment zone. Survey results reveal that 60% of respondents would prefer to live near the MRT station if walkability is ensured, citing improvements in work-life balance and economic savings.
Superblock Solution. By prioritising walkability and cycling infrastructure, superblocks naturally complement mass rapid transit systems. The integration of superblock principles with MRT access supports Transit-Oriented Development (TOD), reducing first- and last-mile friction. This integration fosters mixed-use, compact urban growth around transit stations, enhancing accessibility to housing, services, and employment opportunities while reducing dependency on private motorised vehicles.

6.6. Frequency Analysis Summary

Table 4 summarises the key survey findings.

General Information

Indicator	Category	Frequency	Percentage (%)
Age Group	Under 18	13	8.6
	18–30	84	55.6
	31–50	39	25.8
	51–70	12	7.9
	70+	3	2.0
Gender	Male	81	53.6
	Female	58	38.4
	Not Willing to Mention	12	7.9
Most Recent Occupation	Student	62	41.1
	Employee at PO	35	23.2
	Government Employee	23	15.2
	Self-employed	20	13.2
	Unemployed	11	7.3
Living Distance (500–1km)	Yes	84	55.6
	No	67	44.4
Duration of Stay/Work	Less than a year	35	23.2
	1–3 years	44	29.1
	3+–5 years	36	23.8
	5+–8 years	12	7.9
	8+ years	24	15.9
Experience & Satisfaction			
Frequency of Visiting on Foot	Daily	57	37.7
	A few times a week	42	27.8
	Rarely	34	22.5
	Never	18	11.9
Perception of Safety	Extremely Unsafe	21	13.9
	Unsafe	27	17.9
	Neutral	41	27.2
	Safe	35	23.2
	Extremely Safe	27	17.9
Green Space Accessibility	Restricted	39	25.8
	Not Accessible	31	20.5
	Neutral	54	35.8
	Accessible	12	7.9
	Very Accessible	15	9.9
Feel Safe at Night	Yes	48	31.8
	No	71	47.0
	Unsure	32	21.2
Enough Green/Public Spaces	Yes	47	31.1
	No	78	51.7
	Not Sure	26	17.2
Visiting Purposes & Preferences			
Purpose of Visit	Work	77	51.0
	Shopping	20	13.2
	Dining	10	6.6
	Visiting Friends/Family	31	20.5
	Leisure	13	8.6
Desired Public Facilities	Toilets	19	12.6
	Open Seating	48	31.8
	Cafés	39	25.8
	ATM	19	12.6
	Information Booth	12	7.9
	Wi-Fi	14	9.3
Mode of Transport	Walking	31	20.5
	Rickshaw	53	35.1
	Car	25	16.6
	Bus	38	25.2
	Train	4	2.6
Traffic/Parking Affected	Yes	124	82.1
	No	27	17.9

MRT-Related Indicators

Indicator	Category	Frequency	Percentage (%)
Housing Choice Due to MRT	Very Likely	24	15.9
	Likely	60	39.7
	Neutral	37	24.5
	Unlikely	21	13.9
	Very Unlikely	9	6.0
Maximum Walking Willingness to MRT	Do not like to walk	24	15.9
	<5 minutes	65	43.0
	5–10 minutes	34	22.5
	10 minutes	23	15.2
	Nearly 30 minutes	2	1.4
	30 minutes	1	0.7
	Not Sure	1	0.7
MRT Use After Completion	Never	18	11.9
	Rarely	44	29.1
	Often	51	33.8
	Regularly	31	20.5
	Primary Transport	7	4.6
MRT Complementary Facilities	Safety/Lighting	55	36.4
	Covered Walkways	30	19.9
	Ride-Sharing Zones	25	16.6
	Bicycle Parking	19	12.6
	Retail Kiosks	22	14.6
MRT Convenience	Yes	72	47.7
	No	33	21.9
	Not Sure	46	30.5
Likelihood to Visit via MRT (Future Dev)	Very Likely	24	15.9
	Likely	60	39.7
	Occasionally	37	24.5
	Rarely	21	13.9
	Never	9	6.0

Summary of Key Findings from Frequency Analysis

Indicator	Insight
Age Group	56% are aged 18–30, indicating a young, mobile base and a powerhouse as a working group
Occupation	41% are students, 23% are local employees.
Transport Mode	35% use rickshaw, 25% use buses, 21% walk
Traffic Congestion	82% feel affected—signalling a major urban flaw
Safety Concerns (at night)	47% feel unsafe at night; 21% are unsure
Public Space Availability	52% say there are not enough parks or open spaces
MRT Usage Willingness	60% are likely to use it if well-integrated
Business Preferences	Favour mixed-use, walkable environments (cafés, retail)

Note. Survey conducted in Tejgaon Industrial Area (n = 151), 2024–2025.

6.7 Synthesis

The survey analysis confirms that TIA faces acute deficits in mobility, public space provision, safety, and economic vitality. The superblock development model addresses these deficits through a holistic reorganisation of space, as demonstrated in Figure 26. By integrating residential, commercial, and recreational functions around a centralised green courtyard, superblocks foster inclusive, vibrant, and climate-resilient communities. Taken together, the solutions identified through both survey data (Table 4) and land-use calculations (Table 3) demonstrate the transformative potential of superblocks for TIA. The integration of public space, ecological corridors, and transit-oriented growth aligns with global best practices while responding to the unique socio-economic realities of Dhaka.

Although this is a conceptual proposal based on facts and presents a hypothetical scenario, it is considered a pilot project that can address the urban issues of a megacity like Dhaka. The impact areas are as follows:

Table 5: Superblocks' impacts on Dhaka's urban Development.

SUPER BLOCK IMPACT - IN THE CONTEXT OF DHAKA	
Urban Mobility	Lower emissions, safer streets, improved last-mile access.
Environmental Quality	More green cover, reduced noise, and air pollution
Public Health	Encourages walking, reduces respiratory risk, improves health quality
Economic Vitality	Boosts small businesses and mixed-use investment
Resilience & Equity	More inclusive access to infrastructure and open space

Table 5 presents the projected impacts of superblock development on Dhaka's urban transformation, with particular emphasis on the Tejgaon Industrial Area (TIA). The analysis highlights how superblocks directly address five critical dimensions of urban sustainability: mobility, environmental quality, public health, economic vitality, and social equity. By restructuring street hierarchies, reducing vehicular dependence, and reallocating space to pedestrians and green infrastructure, superblocks offer systemic benefits that extend beyond traffic management to include environmental resilience and inclusive growth. These impacts align with both local planning goals and global best practices in sustainable urban development.

SDG goals supported by the proposed superblock development for TIA

Table 6 identifies the **Sustainable Development Goals (SDGs)** that are supported through the proposed superblock framework in TIA. The analysis demonstrates that the superblock model contributes to multiple SDGs, ranging from health and well-being (SDG 3) to sustainable cities and communities (SDG 11), climate action (SDG 13), and life on land (SDG 15). Each design intervention—such as pedestrian-prioritised streets, cycling networks, mixed-use zoning, and permeable pavements—is linked to specific SDG targets. This mapping illustrates the integrative potential of superblocks, showing how a single urban design framework can address interconnected challenges in public health, environmental sustainability, and urban equity.

Table 6: SDGs' goals addressed.

SUPER BLOCK SUPPORTED SDG GOALS	SDG 3.6	SDG 3.9	SDG 3.d	SDG 11.1	SDG 11.2	SDG 11.3	SDG 11.5	SDG 11.6	SDG 11.7	SDG 11.a	SDG 13.1	SDG 13.2	SDG 13.3	SDG 15.1	SDG 15.5	SDG 15.9
Pedestrian-prioritized streets																
Cycling networks and MRT connectivity																
Mixed-use zoning (Commercial + Residential + Social)																
Vehicle-free cores																
Green corridors and waste-to-energy systems																
Pocket parks and rooftop gardens																
Permeable pavements and rainwater harvesting																
Solar-powered and energy-efficient buildings																
Urban farming and rooftop gardening																

7. Discussion

The findings of this study demonstrate that the superblock model offers a significant departure from Dhaka's prevailing plot- and block-based urbanism, providing measurable gains in mobility, environmental resilience, and public life within the Tejgaon Industrial Area (TIA). Compared to conventional plot-based development, superblocks reduce paved areas by 57%, increase permeability by 44%, and allocate nearly half of the site (50%) to open and public spaces. These outcomes are particularly important in a megacity where impermeable surface growth has been directly linked to a 700% increase in groundwater extraction over the past three decades, leading to severe aquifer depletion (Parvin, 2019). The capacity of superblocks to enhance infiltration and restore ecological balance positions them as a climate-resilient strategy within the broader framework of sustainable urbanism.

Survey evidence further validates these quantitative improvements by linking them to lived experience. Over 82% of respondents identified traffic congestion and inadequate parking as critical challenges, reflecting Dhaka's dependence on fragmented vehicular networks. By diverting through-traffic to perimeter roads and reorganising inner streets as pedestrian-prioritised corridors, the superblock scenario aligns with global best practices such as Barcelona's Superilla, where private car trips fell by 15% and public space accessibility rose by 70% (Palenzuela, 2021). Importantly, 60% of respondents expressed willingness to relocate near a proposed MRT station if walkability was assured, highlighting the synergy between superblocks and emerging Transit-Oriented Development (TOD) frameworks in Dhaka.

Social and safety dimensions are equally significant. Approximately 47% of survey participants reported feeling unsafe at night within TIA, citing poor lighting and lack of activity after business hours. Superblock zoning that encourages mixed-use activation and "eyes on the street" through cafés, shops, and extended operating hours directly addresses this deficit, echoing Jacobs' (1961) advocacy for continuous, community-driven street life. Similarly, the gendered analysis of green space use revealed that while men reported higher daily walking frequency ($M = 3.14$ vs. 2.75; $p = 0.03$), women placed significantly greater value on accessible green areas ($M = 4.25$ vs. 3.42; $p < 0.001$). These findings emphasise that inclusive public realms must balance ecological design with cultural sensitivity and gender-responsive planning.

From a theoretical perspective, the study situates the superblock model within a synthesis of Le Corbusier's rationalist emphasis on efficiency, Jacobs' insistence on human scale and social diversity, and Lefebvre's "Right to the City." The Tejgaon case demonstrates that while modernist strategies can provide structural clarity and environmental efficiency, they must be tempered by participatory and democratic frameworks that prioritise equity. This echoes global critiques of superblocks in China, where excessive enclosure has led to social fragmentation (Kan et al., 2017), and underscores the need for adaptive, context-sensitive application in Dhaka.

Finally, the alignment of the superblock model with the Sustainable Development Goals (SDGs) reinforces its international relevance. By addressing SDG 3 (health), SDG 11 (sustainable cities), SDG 13 (climate action), and SDG 15 (life on land), superblocks extend beyond urban design to support broader ecological and social agendas. These integrative contributions position the superblock not merely as a planning tool but as a systemic framework capable of addressing Dhaka's intertwined challenges of congestion, environmental degradation, and inequitable growth.

8. Conclusion

This study has shown that superblock urbanism provides a scalable, climate-resilient redevelopment strategy for the Tejgaon Industrial Area, surpassing traditional plot- and block-based models in efficiency, equity, and sustainability. Quantitative analysis demonstrated significant improvements in permeability (+44%), reduced paved surfaces (–57%), and expanded open space allocation (50%), while qualitative findings revealed strong community demand for safer, greener, and more walkable environments. By integrating transport planning, ecological corridors, and mixed-use zoning, the superblock framework directly addresses Dhaka's acute mobility, safety, and environmental deficits.

The research confirms that superblocks are not only feasible within the regulatory context of the DAP (2022–2035) but also synergise with Dhaka's forthcoming MRT and BRT systems, providing a foundation for Transit-Oriented Development. However, successful implementation requires overcoming entrenched barriers, including fragmented land ownership, speculative land markets, and institutional inertia. Without deliberate policy instruments such as land pooling, financial incentives, and inclusive governance mechanisms, the transformative potential of superblocks risks being undermined by piecemeal development.

Future research should focus on piloting superblock prototypes within TIA and other strategic zones of Dhaka to test real-world challenges of financing, governance, and community acceptance. Longitudinal studies are also necessary to evaluate the socio-economic impacts of superblocks, particularly their effects on housing affordability, business vitality, and gender-equitable access to public spaces. By bridging theory and practice, this study argues that superblock urbanism represents more than a physical design solution: it is a pathway towards a more resilient, inclusive, and sustainable Dhaka—one that prioritises collective rights to urban space and sets a precedent for other rapidly urbanising global contexts.

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Conflicts of Interest

The authors declare that there are no conflicts of interest.

Data availability statement

Data are available upon request due to privacy and ethical restrictions. Raw data were produced at North South University, while processed data can be obtained from the corresponding author, Shahriar Iqbal Raj, upon request.

Institutional Review Board Statement

This study was conducted in accordance with ethical research practices, ensuring voluntary participation, informed consent, and participant confidentiality. Approval was obtained from the NSU Institutional Review Board/Ethics Review Committee (IRB/ERC): https://www.northsouth.edu/research-office/research-committee

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