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Sustainable Neighborhood in the Kemayoran Sunter Area

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ABSTRACT

The Kemayoran-Sunter area exemplifies Jakarta's urban transformation from airport land and industrial sites to a modern mixed-use center with offices, residences, and commercial spaces—yet this evolution poses complex challenges to achieving sustainable neighborhood in the Kemayoran Sunter Area status. A sustainable neighborhood integrates environmental sustainability, social equity, and economic viability via balanced ecosystems, efficient resource management, inclusive design, and community resilience. This study reviews eight dominant bottleneck dimensions: water and climate biodiversity, carbon footprints, spatial design, renewable energy, landscape resilience, social justice, and environmental risks. Using a systematic literature review of scientific journals and documents, it identifies inhibiting factors like post-industrial degradation and socioeconomic imbalances, analyzed through this eight-dimensional framework. Urgency stems from rapid development, climate impacts, and gentrification risks. Novelty lies in tailoring the framework for post-airport areas in tropical megacities, incorporating regenerative urban design. The goal: a comprehensive evaluation framework to measure performance against global standards, plus contextual recommendations for stakeholders—local governments, developers, and communities—to foster holistic, healthy, inclusive, resilient transformation, positioning Kemayoran-Sunter as Indonesia's adaptive urban model.

Keywords: *Sustainable neighborhood, Kemayoran Sunter Area, mixeduse*

INTRODUCTION

As cities develop, the opportunities they offer are as great as the challenges they present. Today, more than half of the world's population lives in cities, a figure expected to increase substantially in the coming decades. According to the United Nations (2018), urban populations are projected to reach 68% of the global total by 2050, intensifying pressures on urban ecosystems, infrastructure, and social systems. This underscores the urgent need to adopt a sustainable neighborhood approach in urban development. City growth must balance expansion, inclusivity, and environmental preservation to ensure long-term sustainability. Therefore, planning with a sustainable neighborhood approach is crucial for creating and maintaining adaptive, resilient, and livable urban systems (Anguelovski et al., 2019; Dempsey et al., 2011; Smith, 2015).

A sustainable neighborhood is operationally defined as a geographically bounded urban settlement that achieves integration across three core pillars: (1) environmental sustainability through functional ecosystems, efficient water and energy systems, low carbon emissions, and climate-resilient infrastructure; (2) social equity through inclusive public spaces, affordable housing, community cohesion, and accessible services; and (3) economic viability through diverse livelihood opportunities, fair resource distribution, and long-term financial sustainability (Sharifi, 2016; Dempsey et al., 2011). This definition serves as the dependent variable in this study, representing the desired outcome that the Kemayoran-Sunter area aspires to achieve.

Sustainable neighborhoods are inseparable from urban living standards, such as the provision of clean air and water, green spaces, public transportation, and decent housing.

However, over the years, these essentials have faced increasing pressure from urban challenges, including environmental degradation and infrastructure damage, which threaten sustainability. Cities often overuse resources, disrupting ecological balance and biodiversity (Hyra, 2017; Sharifi, 2016; Khatibi et al., 2023). Urban heat island effects, water scarcity, air pollution, and biodiversity loss have emerged as critical challenges requiring integrated solutions at the neighborhood scale (Rosenzweig et al., 2018). Addressing these interrelated issues demands appropriate urban planning and development measures to maintain sustainability and enhance residents' welfare in urban areas.

KemayoranSunter is a strategic area in North and Central Jakarta that evolved from agricultural land and swamps into an airport center in 1935, then a modern business hub after the closure of Kemayoran Airport in 1986, and now a sustainable neighborhood model through the PPK (Kemayoran Area Management Center) initiative. This mixed-use area is dominated by mid-rise apartments, industrial warehouses, and JIExpo. The PPK has revitalized urban forests through tree planting and green paths for recreation, education, conservation, degradation reduction, and ecosystem restoration.

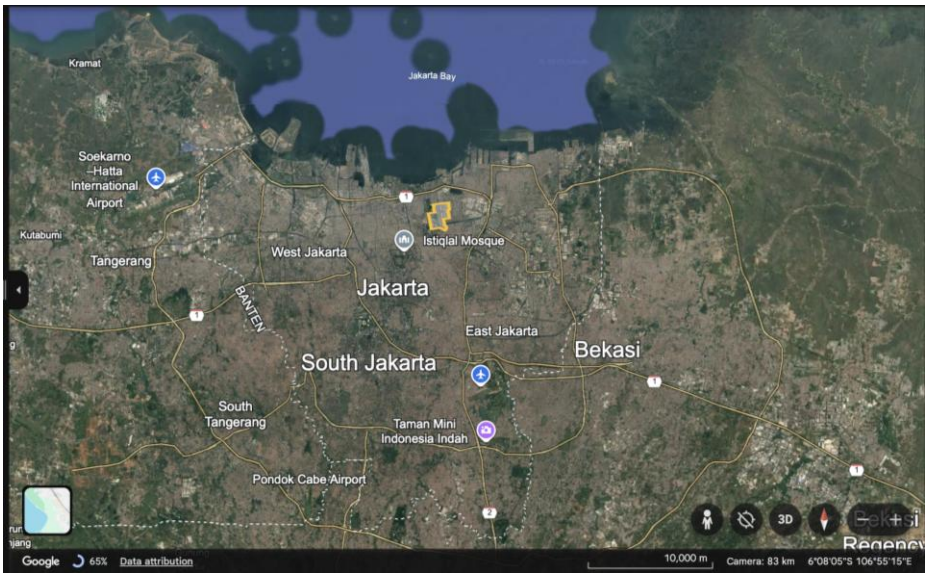

Figure 1. Position of research locations in the Kemayoran area to the city of Jakarta
Source : Google Earth 2025

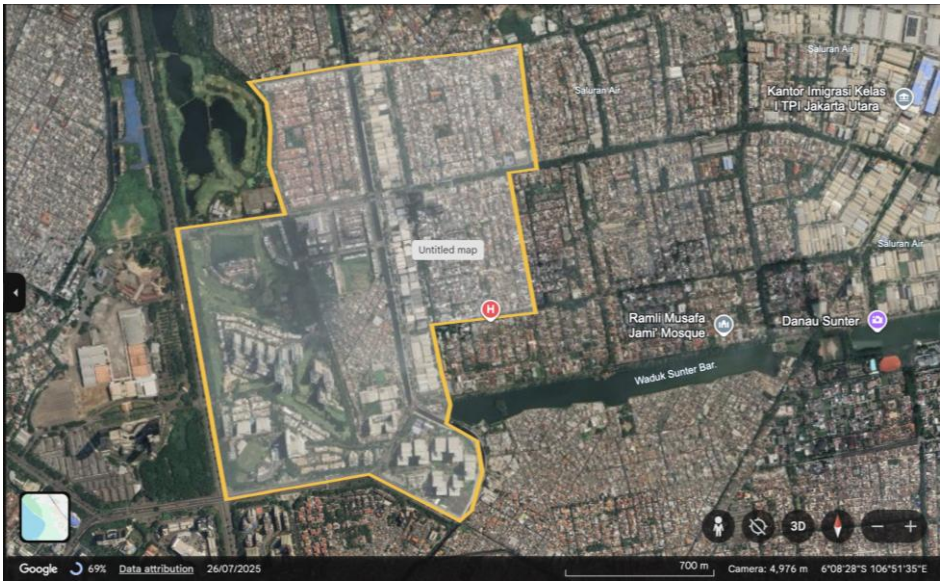

Figure 2. Research Location
Source : Google Earth 2025, Author 2025

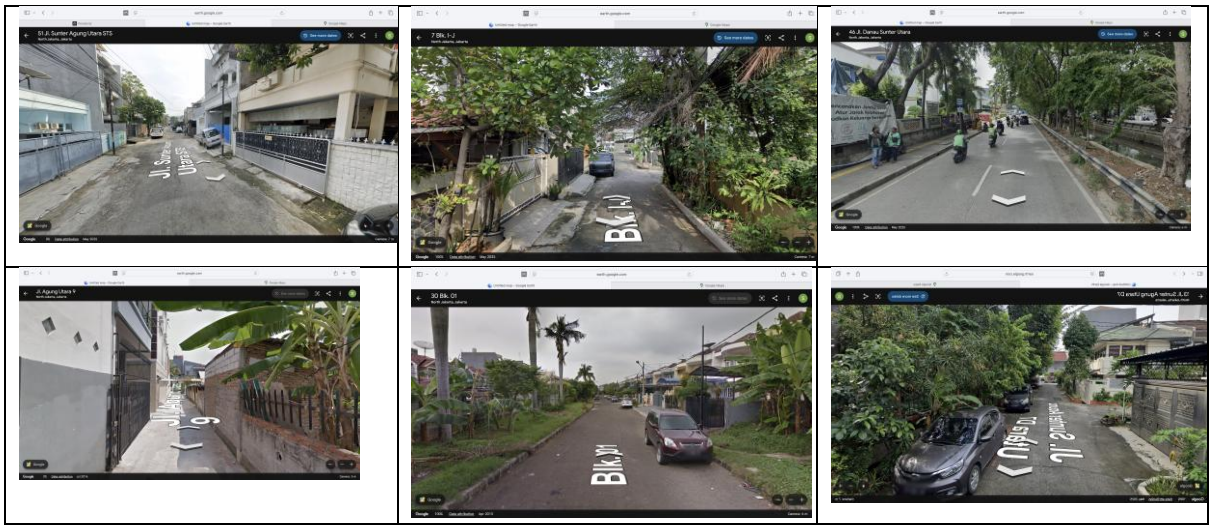

Figure 3. Research Area P1 Location
Source : Google Earth 2025

The urgency of this research is driven by multiple converging pressures on the Kemayoran-Sunter Area. First, the rapid pace of development—with annual growth rates in commercial and residential construction exceeding 15% (Jakarta Provincial Government, 2023)—threatens to overwhelm the area's ecological carrying capacity. Second, climate change impacts are intensifying, with Jakarta experiencing increased flooding frequency and urban heat island effects that particularly affect dense mixed-use areas like Kemayoran-Sunter (BMKG, 2022). Third, gentrification processes are creating social tensions as original residents are displaced by rising property values, threatening community cohesion and social justice (Kusno, 2020). Fourth, the area's post-industrial legacy—including soil contamination and fragmented ecosystems—requires urgent remediation to prevent long-term environmental and health consequences.

The novelty of this research resides in several key aspects. First, it develops an integrated eight-dimensional evaluation framework specifically designed for post-airport transformation areas in tropical megacities—a context largely absent from existing sustainable neighborhood literature that predominantly focuses on Western temperate cities (Sharifi & Murayama, 2013). Second, the research incorporates regenerative design principles beyond conventional sustainability, emphasizing ecosystem restoration and social healing rather than merely minimizing harm (Mang & Reed, 2012). Third, it addresses the unique intersection of rapid urban transformation, post-industrial remediation, and tropical climate challenges that characterize Jakarta's development trajectory. Finally, the framework integrates quantitative environmental metrics with qualitative social dimensions, providing a holistic assessment tool rarely found in studies of Indonesian urban contexts.

The purpose of this study is to identify the dominant factors affecting the achievement of a sustainable neighborhood in the Kemayoran-Sunter Area. These results can guide local governments, developers, and communities in maintaining, improving, or reversing declines in sustainable neighborhood quality based on the identified factors. This study explicitly formulates the main research question: "What are the dominant factors affecting the achievement of a sustainable neighborhood in the Kemayoran-Sunter Area?"—which forms the core of the literature review, focusing on eight main inhibiting dimensions (e.g., fragmentation of biological ecology, suboptimal water and climate management, and chronic environmental risks) analyzed through the theoretical framework and subdimensions.

This research question is descriptive, aiming to reveal dominant inhibiting factors through reviews of scientific journals and related documents to produce a comprehensive evaluation framework for measuring the area's performance according to sustainable neighborhood principles. Thus, the purpose of this research is not only conceptual but also applicative: to generate regenerative recommendations—such as ecosystem restoration, pedestrian-friendly design, and renewable energy integration—that enable holistic transformation toward a healthy, inclusive, and resilient environment as an adaptive urban model for Indonesia.

RESEARCH METHOD

This research employed a systematic literature review method following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The literature study involved reviewing journals and other references related to sustainable neighborhoods until researchers identified the dominant factors affecting the quality of sustainable neighborhoods in the Kemayoran-Sunter Area.

The systematic review process consisted of four stages:

1. Literature Search Strategy: Academic databases searched included Scopus, Web of Science, Google Scholar, and Indonesian scientific repositories (SINTA, Garuda). Keywords used were "sustainable neighborhood," "urban transformation," "post-industrial regeneration," "mixed-use development," "Jakarta urban planning," "tropical megacity sustainability," and "ecosystem restoration." The search covered publications from 2010 to 2025 to capture recent developments in sustainable neighborhood theory and practice.

2. Inclusion and Exclusion Criteria: Inclusion criteria: (a) peer-reviewed journal articles, conference proceedings, government reports, and policy documents; (b) studies focusing on sustainable neighborhoods, urban transformation, or related environmental, social, and economic dimensions; (c) empirical studies, theoretical frameworks, or case studies relevant to tropical megacities or post-industrial areas; (d) publications in English or Indonesian. Exclusion criteria: (a) studies with insufficient methodological rigor; (b) publications without clear relevance to the eight-dimensional framework; (c) duplicate publications.
3. Data Extraction and Synthesis: Data extracted from selected literature included: (a) theoretical frameworks for sustainable neighborhoods; (b) indicators and metrics for each of the eight dimensions; (c) case studies of urban transformation in similar contexts; (d) best practices in regenerative design; (e) barriers and enablers of sustainable neighborhood development. Data synthesis employed thematic analysis to identify patterns, causal relationships, and gaps in existing knowledge.
4. Quality Assessment: Literature quality was assessed based on: (a) methodological rigor (clear research design, appropriate methods, transparent data analysis); (b) relevance to research objectives; (c) credibility of sources (peer-reviewed publications, government agencies, reputable international organizations). High-quality sources were prioritized in the synthesis, while lower-quality sources provided supplementary context.

Data and measuring tools related to the region were drawn from journals or other secondary sources discussing the same area and then interpreted qualitatively. This secondary data served as key material in the research process. The qualitative interpretation employed content analysis to identify dominant themes, compare findings across sources, and construct the eight-dimensional evaluation framework tailored to the Kemayoran-Sunter context.

RESULTS AND DISCUSSION

Sustainable Neighborhood Theory and Analysis

Kemayoran Sunter faces eight main dimensions towards a sustainable neighborhood, first, biological ecology with fragmented ecosystems and former airport hardlands. Second, water management and a damaged microclimate turn rain into puddles, while the city's heat is trapped among new high-rise buildings. The three high carbon footprints of the dominant concrete of cement trucks and the glass walls reflect heat forcing the use of refrigeration (AC). Fourth, the design of a uniform or box-like space without an authentic park, damaged sidewalks that prioritize cars instead of pedestrians (Chen et al., 2015; Siewert, 2020; Yuan et al., 2021). Fifth, renewable energy is limited. Sixth, the resilience of the landscape is weak. Seventh, social conditions are no longer close due to gentrification that marginalizes residents and eliminates traditional mutual cooperation. Eighth, chronic environmental risks from annual floods and extreme heat pollution around toll roads, so that sustainable neighborhood transformation requires socio-economic ecological integration at the regional scale so that settlements get a healthy and sustainable environment (Mehdipanah et al., 2015; Rosenzweig et al., 2018; Yang et al., 2015).

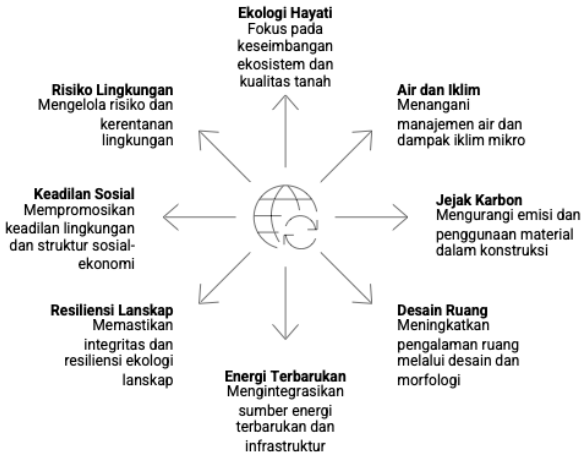

Figure 4. Dimensi Sustainable Neighborhood
Source : Author 2025

Ecosystem Balance and Soil Quality

Kemayoran-Sunter features a fragmented urban ecosystem. The area reflects the paradox of a big city: former airport land and industrial landfill are trying to be transformed into a modern neighborhood, but the sustainability of natural functions is under pressure in a network of concrete buildings and asphalt roads.

The Kemayoran City Forest functions as a strategic green oasis but is isolated by infrastructure walls. The green area is the last breath of the city, with tall trees creating a shady canopy under the scorching Jakarta. Pedestrian paths are built along the vegetation path. However, the fence of apartment complexes, and parking lots separate the urban forest from the ecosystem, creating isolated areas that are incapable of functioning as ecological corridors. Rivers and lakes are still the breakers of the symbiotic relationship between land and water (Fletcher et al., 2013; Yin et al., 2015).

The soil undergoes chronic compaction from gradual construction resulting in the loss of pore structure and natural water retention ability. The legacy of industrial landfills leaves heavy metal contamination absorbed by vegetation, each new apartment project adds a layer of concrete that presses down the soil, destroys pore spaces and breaks the roots with the still healthy layers above (Qin, 2015; Santamouris et al., 2012; Senevirathne et al., 2021).

Water conditions and microclimate in the Kemayoran-Sunter area show a decrease in the function of the hydrological cycle, where rainfall is no longer optimally absorbed by the soil due to the dominance of concrete and asphalt surfaces, so that rainwater tends to stagnate and overflow into highways, yards, and residential alleys. At the same time, the region's carbon footprint is increasing due to the continuous use of air conditioning and the dominance of heat-absorbing construction materials, which not only increases urban energy consumption but also accelerates the degradation of ecosystems and reduces the existence of natural life. From the aspect of spatial design, the arrangement of the mass of multi-storey buildings that are segregated from the surrounding landed house neighborhood creates an isolated area that is less integrated spatially and socially (Abdul & Hameed, 2021; Ilmu et al., 2015; Enab et al., 2024). Efforts to utilize renewable energy are still in the early stages, characterized by the use

of experimental-scale solar panels whose effectiveness is hampered by the shadow of high-rise buildings and limited integration with the public power grid (Ogedengbe et al., 2018). In addition, the resilience of the region's landscape is relatively weak because vegetation is scattered separately and the green spaces that should form ecological corridors are cut off by wide highways, complex walls, and parking areas, so that each park functions individually without supporting each other and cutting off the natural life flows that are supposed to connect throughout the region (Ayu & Putri, 2023; Buntaran et al., 2023; Dias, 2015).

The change in socio-economic structure in the Kemayoran-Sunter area is clearly visible due to the entry of new residents with higher economic status. The presence of the "new rich" group influences social interaction, separating local workers from professional immigrants in terms of both residence and social relationships. Traditional public spaces that were previously a meeting point for residents are now increasingly rarely used, so that the air-conditioned mall lobby is the only place for interaction, even though the interaction that occurs is transactional between shoppers and shopkeepers. On the other hand, this region faces quite significant environmental risks. The problem of flooding remains a major problem because the natural water flow system does not function optimally, plus coordination between government agencies is less intense, so that handling efforts are often incomplete. Rainwater that should have seeped into the ground or flowed orderly into the river now ends up as puddles that interfere with residents' activities.

The factors that affect the environmental sustainability of this region are closely related to its ecology and natural conditions. The transformation of land from the airport into a mixed-use development area has led to ecosystem degradation, but the Kemayoran City Forest remains an important asset to restore biodiversity through the revitalization of local vegetation and green corridors. The region's water cycle depends on the presence of biopores and infiltration areas, but urban climates suffer from the effects of extreme urban heat due to the dominance of concrete and asphalt surfaces from former airport infrastructure, which absorb and emit excess heat and reduce the effects of natural cooling through evaporation.

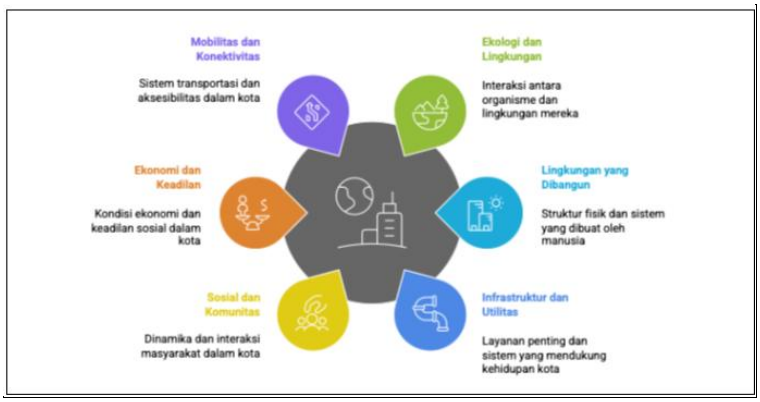

Figure 5. Factors that affect Sustainable Neighborhood
Source: Author 2025

Built Environment

Construction materials rely on conventional concrete with a high carbon footprint in apartments The energy system still relies on fossil electricity with limited solar panel pilots on the rooftop mall, the Kemayoran-Sunter area relies on conventional concrete to build

apartments creating a high carbon footprint during the construction process and making integration with the surrounding nature difficult. The morphology of homogeneous rectilinear architecture dating back to the old airport era resulted in building forms that were less adaptive to climate.

Infrastructure and Utilities

The quality of the environment in the Kemayoran-Sunter area is starting to show improvement through monitoring waterways. However, areas of the water body remain vulnerable to fine dust pollution coming from the traffic of the nearby JORR toll road, where heavy vehicles and exhaust emissions continue to settle on the surface of the water and waterfront vegetation. This approach reflects the challenge of sustainable neighborhoods where advances in monitoring technology must be balanced with stronger green buffers to protect water ecosystems from urban transportation threats.

Social and Community

Social cohesion is divided by the gentrification of old residents versus new residents, the Kemayoran-Sunter area has experienced a marked decline in social inequality due to gentrification, where old workers living in modest settlements feel marginalized by the arrival of new apartment residents with different modern lifestyles.

Economics and Justice

The economic structure is dominated by retail and general offices. Exhibition centres and modern office complexes attract significant investment, but tend to marginalise local small and medium-sized businesses such as traditional traders and home artisans, thereby reducing the diversification of the livelihoods of local residents.

Social justice in the region appears to be weak due to the glaring disparity in access to green open space between poor suburban settlements and elite areas equipped with facilities, exacerbating social fragmentation and reducing inter-community cohesion.

Mobility and Connectivity

The Kemayoran-Sunter area is equipped with a strong transportation network that integrates the main TransJakarta corridor with JORR toll access and the Elevated Toll Road that facilitates fast regional mobility for office workers and visitors to the area, but the travel pattern is dominated by private vehicles such as cars and motorcycles that exceed the capacity of public infrastructure even though the BRT system is available, creating chronic congestion during peak hours that burdens the economic efficiency of the mixed-use area.

CONCLUSION

This literature review revealed that the Kemayoran-Sunter Area, despite evolving into a modern mixed-use center, faces eight critical barriers to sustainable neighborhood status: fragmented biological ecology, impaired water and climate management, chronic environmental risks from pollution, and poor coordination. The resulting eight-dimensional evaluation framework equips stakeholders with a comprehensive tool to prioritize actions like ecosystem restoration, pedestrian-inclusive design, renewable energy integration, and socio-

environmental resilience building. Recommendations advocate holistic transformation blending global sustainability principles with Jakarta's local context, enhancing inter-agency coordination to create a healthy, inclusive, resilient environment that upholds cultural values, boosts resident quality of life, and models post-industrial urban regeneration across Indonesia amid climate change and urban dynamics. For future research, empirical validation through field surveys, stakeholder interviews, and longitudinal monitoring of framework implementation in Kemayoran-Sunter could quantify impacts and refine indicators for broader tropical megacity applications.

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