American Journal of Multidisciplinary Research & Development (AJMRD)
*Volume 08, Issue 08 (**August - 2026**), PP 01-11*
ISSN: 2360-821X
www.ajmrd.com

Research Paper **Open Access**

Transforming Urban Assets through a Vertical Urban Regenerative Approach

Ikhya Aufar Nur Hidayat[1], Dedes Nur Gandarum*[2], Nurhikmah Budi Hartanti[3]
[1]Bachelor of Architecture, Architecture Department, Universitas Trisakti, Jakarta, Indonesia.
[2]Professor of Architecture and Urban Design, Universitas Trisakti, Jakarta, Indonesia.
[3]Professor Assistant of Architecture, Universitas Trisakti, Jakarta, Indonesia.
*Email address: 052002200049@std.trisakti.ac.id [1], dedes@trisakti.ac.id *[2], nurhikmah@trisakti.ac.id [3]*
**Corresponding Author:Dedes Nur Gandarum, dedes@trisakti.ac.id*

ABSTRACT: Rapid urban growth has increased pressure on the quality of urban environments, particularly in areas with historical significance and strategic urban functions. This research explores how a regenerative design approach can be integrated with vertical urban development to guide the transformation of underutilized urban assets into mixed-use environments that are more adaptive and sustainable. The study employs a literature review and a comparative analysis of twenty international precedent projects. The findings were synthesized into four main design aspects: Ecological, Resource & Efficiency, Mixed-use & Living System, and Mobility & Social Collaboration; which were further translated into eight design indicators: biodiversity enhancement, vertical greening, closed-loop resource systems, energy and water efficiency, mixed-use integration, adaptive living systems, walkability and accessibility, and community participation. These criteria were then applied to evaluate the proposed transformation of the Perum Peruri site into a mixed-use development. The results indicate that the Vertical Urban Regenerative approach provides practical design criteria for guiding urban asset transformation by integrating ecological restoration, resource efficiency, functional adaptability, and socially responsive mobility within a single development framework.

Keywords – Regenerative Design, Vertical Urbanism, Mixed use, TOD

I. INTRODUCTION

Modern urban development presents various challenges, including limited land availability, increasing mobility, changing building functions, and the imbalance between economic growth and environmental and social quality. At the same time, historically significant urban areas offer considerable potential to be redeveloped as new centers of urban activity through architectural and urban planning approaches that preserve heritage buildings while integrating them with the city's transportation system. One approach that addresses these challenges is the regenerative concept, which emphasizes the ability of a system to renew, restore, and enhance environmental quality in a sustainable manner.

Regenerative Design

Regenerative design is a design approach that utilizes self-renewing natural processes, enabling designed systems not only to sustain environmental conditions but also to restore and enhance ecosystem capacity through mutually supportive relationships between natural and human-made systems [1]. Regenerative design is understood as a design approach that extends beyond a focus on physical objects to encompass the evolution of whole living systems. Within this concept, humans are regarded as integral components of these systems, actively participating in regenerative processes through their engagement with the context of place, including communities, watersheds, and bioregions [2]. In architecture, regenerative buildings do not merely minimize negative environmental impacts; they actively contribute to improving the quality of place, history, culture, and local resources [3]

Vertical Urbanism

As urban density continues to increase, implementing regenerative design principles requires an approach that optimizes spatial efficiency without compromising environmental quality and urban livability. One such approach is vertical urbanism, an urban design strategy that views high-rise buildings as integral components of an urban system, integrating functions, infrastructure, public spaces, ecological systems, and social activities within a three-dimensional framework [4]. Unlike conventional high-rise development, vertical urbanism emphasizes functional connectivity, integration with public transportation, and the creation of adaptive and sustainable spaces that enhance environmental performance and urban quality of life [5]

The integration of regenerative design and vertical urbanism plays a crucial role in transforming underutilized urban assets into sustainable and adaptive urban environments [6]. Rather than focusing solely on physical redevelopment or economic value, this approach positions urban assets as catalysts for restoring environmental functions, strengthening social interactions, preserving cultural identity, and enhancing long-term urban resilience[7]. At the same time, vertical urbanism provides an efficient spatial strategy by integrating mixed-use functions, transit-oriented development, and interconnected public spaces within a compact vertical framework, enabling optimal land use in dense urban contexts (Wahyudi, 2018). Within this perspective, Vertical Urban Regenerative emerges as a concept that combines the principles of regenerative design and vertical urbanism to create developments that are spatially efficient while actively generating environmental, social, economic, and cultural benefits. To evaluate its implementation, measurable design indicators must be established by synthesizing the core principles of both approaches. Regenerative design contributes indicators related to ecosystem restoration, resource efficiency, biodiversity, cultural preservation, and community engagement, while vertical urbanism provides indicators concerning mixed-use integration, transit connectivity, land-use efficiency, accessibility, and three-dimensional urban connectivity [9]. Together, these indicators form a comprehensive framework for assessing the success of Vertical Urban Regenerative in urban asset transformation.

This study focuses on developing and applying Vertical Urban Regenerative design criteria based on indicator aspect framework to evaluate the implementation of the concept in the redevelopment of the Palatehan Perum Peruri asset. Through this evaluation, the study aims to demonstrate how the integration of regenerative principles and vertical urban strategies can serve as an effective model for transforming urban assets into adaptive, sustainable, and socially responsive urban environments while preserving their historical and contextual significance.

Table 1. Description of design principles using the Regenerative concept.

Aspect [1]; [2]	**Regenerative principle** [2]	**Regenerative Principle** [1]
Place	Design Place-Based	Local Ecological Context
Living System	Whole System Thinking	Living Proccess
Ecological System	Improving Capacity System, Restore Ecosystem Health	Ecological Productivity
Resources Flows	Self Renewing Resource	Self Renewal, Circular Loops
Human Nature Relationship	Co-Evolution of Human and Natural Systems	Environmental Regeneration
Social Collaboration	Community Participation	Community Participation in Social Fabric

Source: Synthesized by the author based on [1] and [2]

The regenerative principles proposed by Lyle (1994) and Mang & Reed (2012) emphasize that design should not merely aim to reduce negative environmental impacts, but also to restore and enhance the capacity of ecological, social, and economic systems through a place-based approach, systems thinking, circular resource flows, harmonious human–nature relationships, and active community collaboration.

Table 2. Description of design principles using the Vertical Urbanism concept.

Aspect [9] [5]	**Vertical principle** [9]	**Vertical Principle** [5]
Mixed Use Integration	Mixed Use	Mixed Use Development
Vertical Ecology	Vertical Landscaping	Vertical Landscaping
Density and Compact	Compact City	High Density Development
Mobility	Vertical Circulation	Transit Oriented Development
Efficiency	Bioclimatic Design	Energy and Land Consumption

Source: Synthesized by the author based on [5] and [9]

The principles of vertical urbanism proposed by Yeang (2002) and Al-Kodmany (2013) emphasize the integration of mixed-use development, vertical ecology, compact urban form, efficient mobility, and resource-conscious design to create sustainable high-density cities. Vertical development should combine diverse functions within a single environment, incorporate vegetation throughout the building, support transit-oriented and well-connected mobility systems, and optimize energy and land use through bioclimatic and efficient design strategies. Together, these principles enable tall buildings to contribute to more livable, resilient, and sustainable urban environments.

Table 3. Synthesis of Design Aspects and Indicators for the Vertical Urban Regenerative Approach.

Aspect [1]; [9] [2], [5]; [5]	**Regenerative Principle**	**Vertical Urbanism Principle**	**Design Indicator**
Ecological	Improving capacity system, [2]	Vertical Landscaping, [9]	Biodiversity enhancement, [2] Vertical greening (green walls, sky gardens), [9]
Resource & Efficieny	Self renewal, circular loops, [1]	Bioclimatic Design, [9]	Closed-loop resource systems, Lyle (1994); Energy and water efficiency, [5], [9]
Mixed-use & Living System	Design place-based, Living process, [2], [9]	Mixed-use development, [5]	Mixed-use integration, Al-[5]; Adaptive living systems, Mang & Reed [2]
Mobilty & Social Collaboration	Community Participation in social fabric, [1]	Transit Oriented Development, [5]	Walkability and accessibility, [5]; Community participation, [1]

Source: Synthesized by the author based on [1];[2], [5] and [9]

Based on the synthesis of regenerative design principles by Lyle (1994) and Mang and Reed (2012) with vertical urbanism concepts proposed by Yeang (2002) and Al-Kodmany (2013), four key design aspects form the basis of regenerative vertical development. The ecological aspect integrates improving capacity systems with vertical landscaping, resulting in indicators such as ecological connectivity, biodiversity enhancement, and vertical greening. The resource and efficiency aspect combines self-renewal and circular loops with bioclimatic design, emphasizing closed-loop resource systems, passive environmental design, and energy and water efficiency.The mixed use and living system aspect links design place-based and living process principles with mixed-use development, generating indicators including mixed-use integration, place-based identity, and adaptive living systems. Meanwhile, the mobility and social collaboration aspect combines community participation in social fabric with transit-oriented development (TOD), leading to indicators such as walkability and accessibility, public transit integration, and community participation. Collectively, these indicators provide an integrated framework for regenerative vertical development that balances ecological, environmental, functional, and social dimensions [10]

II. METHODS OF RESEARCH

The research employed a precedent review method by analyzing 20 building precedents to identify, compare, and evaluate the implementation of design indicators derived from the synthesis of regenerative design and vertical urbanism principles. The analysis focused on the application of eight design indicators, namely biodiversity enhancement, vertical greening, closed-loop resource systems, energy and water efficiency, mixed-use integration, adaptive living systems, walkability and accessibility, and community participation. These indicators were used to assess how each precedent responds to ecological, environmental, functional, and social aspects within high-density urban development. Research data were collected through a literature review involving academic journals, books, project reports, and other relevant publications. The collected information was analyzed to establish the theoretical foundation and to formulate the design indicators based on the integrated aspects of Ecological, Resource & Efficiency, Mixed-use & Living System, and Mobility & Social Collaboration.

The findings from the literature review and precedent analysis were then organized into an analytical matrix to facilitate the classification and comparison of design indicator implementation across the selected projects. Each precedent was evaluated according to the extent to which the indicators were applied, allowing patterns, similarities, and differences to be identified. The synthesized results were subsequently used to formulate design criteria that serve as guidelines for the application of the Vertical Urban Regenerative approach, as presented in the following table.

III. RESULT AND DISCUSSION

To evaluate the implementation of the proposed design indicators, each precedent project was first examined and described based on its design characteristics and development approach. The analysis then assessed how the indicators derived from regenerative design and vertical urbanism principles were applied within the project. The results of this evaluation are summarized in the following table.

Table 4. Precedent Review.

Fig1. King's Cross Redevelopment  (Image source : King's Cross Redevelopment)	Fig2. Coal Drop Yard  (Image source : Coal Drops Yard)	Fig 3. Tate Modern  (Image source : The Tate Modern)	Fig 4. Battersea Powerstation  (Image source : Battersea Power Station)	Fig 5. Hearst Tower  (Image source : Hearst Headquarters/ Hearst Tower)
Fig 6. One Central Park  (Image source : One Central Park)	Fig 7. South Beach  (Image source : South Beach / Foster + Partners | ArchDaily)	Fig 8. The Gasometer  (Image source : Gasometer)	Fig 9. Bosco Verticale  (Image source : Bosco Verticale / Boeri Studio | ArchDaily)	Fig 10. Roppongi Hills  (Image source : Roppongi Hills | Tag | ArchDaily)
Fig 11. Kampung Admiralty  (Image source : Kampung Admiralty / WOHA | ArchDaily)	Fig 12. Linked Hybrid  (Image source : Linked Hybrid / Steven Holl Architects | ArchDaily)	Fig 13. The Gherkin  (Image source : 30 St Mary Axe Tower / Foster + Partners | ArchDaily)	Fig 14. Elphilharmonie  (Image source : Elbphilharmonie Hamburg / Herzog & de Meuron | ArchDaily)	Fig 15. The Butterfly and First Baptist  (Image source : The Butterfly and First Baptist Church Complex)
Fig 16. Distillery District  (Image source :	Fig 17. Ponce City Market  (Image source :	Fig 18. Domino Sugar  (Image source :	Fig 19. Parkroyal Pickering 	Fig 20. Zorlu Center

[The Distillery Historic District - Official Website])	[Ponce City Market | S9 Architecture | Archello])	[Domino Sugar Refinery])	(Image source : [PARKROYAL on Pickering / WOHA | ArchDaily])	 (Image source : [Zorlu Center])

Source: Author's conclusion.

Following the selection of the 20 precedent projects, an evaluation was conducted to examine the implementation of the identified design indicators. These indicators, derived from the integration of regenerative design and vertical urbanism principles, were used to assess the ecological, environmental, functional, and social performance of each precedent, as summarized in the following table.

Table 5. Implementation of Precedent Indicator Principles.

Buidling Typology	**Indicator Analysis**							
	Bio-diversity enhance-ment	**Vertical greening (green walls, sky gardens)**	**Closed-loop resource systems**	**Energy and water efficiency**	**Mixed-use inte-gration**	**Adap-tive living systems**	**Walk-ability and accessi-bility**	**Community parti-cipation**
King's Cross Redevelop-ment	Provides parks and green spaces that enhance urban biodiversity.	Limited use of vertical planting, mainly through landscape design.	Applies district-scale utility and energy systems.	Sustainable buildings reduce energy consumption.	Integrates residential, office, retail, education, and cultural functions.	Reuses historic industrial buildings for new urban uses.	Extensive pedestrian and cycling connections linked to major transit hubs.	Public squares and parks support social and cultural activities.
Coal Drop Yard	Landscape planting improves the public environment.	No significant vertical greening strategy	Adaptive reuse minimizes construction waste and material use.	Reuse of existing structures reduces embodied energy.	Combines retail, dining, and public spaces.	Converts historic warehouses into contemporary uses.	Pedestrian-oriented design connected to King's Cross Station.	Open plaza accommodates community events and gatherings.
Tate Modern	Riverside open spaces contribute to the urban landscape.	No application of green walls or sky gardens	Reuses the existing power station structure.	Building retrofit improves environmental performance.	Integrates cultural functions with supporting public facilities.	Transforms an industrial building into a cultural destination.	Connected to the riverside promenade and Millennium Bridge.	Encourages public interaction through cultural programs and open spaces.
Battersea Powerstation	Green spaces enhance the ecologica	Podium landscaping and planted areas	Existing infrastructure is reused and	Modern systems improve energy performa	Combines residential, office, retail,	Adapts a historic power station for	Well connected to public transit	Public spaces support events and

Buidling Typology	Indicator Analysis							
	Bio-diversity enhance-ment	**Vertical greening (green walls, sky gardens)**	**Closed-loop resource systems**	**Energy and water efficiency**	**Mixed-use inte-gration**	**Adap-tive living systems**	**Walk-ability and accessi-bility**	**Community parti-cipation**
	l quality of the site.	provide limited vertical greening.	upgraded.	nce.	and leisure uses.	contemporary functions.	and pedestrian routes.	community activities.
Hearst Tower	Limited landscape elements around the site.	Vertical greening is not a primary feature.	Rainwater harvesting supports building operations.	High-performance façade and daylighting improve efficiency.	Primarily developed as an office building	Preserves the historic podium beneath the new tower.	Accessible through public transport and walkable streets.	Community-oriented spaces are limited.
One Central Park	Extensive vegetation increases urban biodiversity.	Green walls and sky gardens define the building design.	Water recycling and trigeneration systems are implemented.	Efficient systems reduce energy and water consumption.	Integrates residential, retail, and public spaces.	Living vegetation functions as part of the building system.	Pedestrian podium connects surrounding public areas.	Public open spaces are accessible to residents and visitors.
South Beach	Green terraces improve ecological performance.	Sky gardens and vertical planting are integrated throughout the complex.	Rainwater collection supports resource management.	Climate-responsive design reduces energy demand.	Combines hotel, office, retail, and residential uses.	Flexible spaces respond to changing urban needs.	Directly connected to MRT and pedestrian networks.	Public plazas accommodate social activities.
The Gasometer	Open green areas improve environmental quality.	Minimal use of vertical greening.	Reuses existing industrial structures to reduce material consumption.	Building upgrades improve energy efficiency.	Integrates housing, retail, offices, and entertainment.	Converts former gas tanks into mixed-use developments.	Connected to metro stations and pedestrian routes.	Shared public spaces encourage social interaction.
Bosco Verticale	Thousands of trees and plants create urban habitats.	Vegetated façades and balconies form a vertical forest.	Recycled water is used for irrigation systems.	Vegetation reduces cooling loads and energy use.	Mainly residential with limited mixed-use functions.	Plant growth creates a dynamic living ecosystem.	Located within a highly walkable urban district.	Community functions are relatively limited.
Roppongi	Parks	Green	Efficient	Energy-	Integrate	Supports	Strong	Public

Buidling Typology	Indicator Analysis							
	Bio-diversity enhance-ment	Vertical greening (green walls, sky gardens)	Closed-loop resource systems	Energy and water efficienc y	Mixed-use inte-gration	Adap-tive living systems	Walk-ability and accessi-bility	Commu nity parti-cipation
Hills	and landscap ed areas strengthe n urban ecology.	terraces are incorpora ted into podium levels.	utility systems support sustainab le operation .	saving technolo gies improve building performa nce.	s offices, housing, hotels, retail, and cultural facilities.	diverse activities througho ut the day.	pedestria n connecti ons linked to metro access.	plazas encourag e communi ty engagem ent.
Kampung Admiraly	Multi-level greenery	Sky gardens and green terraces	Rainwate r manage ment	Passive cooling and water saving	Housing, healthcar e, retail	Elderly-friendly flexible spaces	Transit-oriented design	Shared communi ty spaces
Linked Hybrid	Green open spaces	Roof gardens	Geother mal system	High-performa nce systems	Residenti al, commerc ial, cultural	Flexible interconn ected spaces	Skybridg es and pedestria n routes	Public plazas
The Gherkin	Limited ecologica l contribut ion	Minimal greenery	Efficient environm ental systems	Natural vent	Office-led mixed use	Flexible floor plans	Strong urban connecti vity	Limited public engagem ent
Elphilharmoni e	Waterfro nt regenerat ion	Limited greenery	Adaptive reuse	Reduced embodie d carbon	Culture, hotel, residenti al	Reused industrial structure	Public plaza access	Cultural participat ion
The Butterfly and First Baptist	Urban green spaces	Roof gardens	Sustaina ble building systems	Efficient resource use	Residenti al and communi ty uses	Heritage and modern integratio n	Pedestria n-friendly design	Commun ity-focused activities
Distillery District	Landscap ed public spaces	District-wide greenery	Adaptive reuse	Reuse of existing buildings	Retail, culture, entertain ment	Historic building adaptatio n	Pedestria n-oriented district	Strong public engagem ent
Ponce City Market	Rooftop green spaces	Rooftop green spaces	Adaptive reuse	Reduced resource consump tion	Retail, office, residenti al	Flexible mixed-use spaces	Connecte d to Belt Line	Commun ity programs
Domino Sugar	Waterfro nt ecology	Public green spaces	Adaptive reuse	High-performa nce systems	Office and public uses	Industrial -to-modern transfor mation	Walkable waterfro nt access	Public exhibitio ns
Parkroyal Pickering	Extensiv e urban biodivers ity	Green walls and sky gardens	Rainwate r harvestin g	Energy and water efficient	Hotel and public spaces	Living landscap e system	Accessib le podium gardens	Shared green spaces
Zorlu Center	Urban park integratio n	Green roofs and terraces	Resource manage ment systems	Sustaina ble building technolo	Retail, office, hotel, residenti	Flexible mixed-use develop	Metro-connecte d circulatio	Public plazas and events

Buidling Typology	Indicator Analysis							
	Bio-diversity enhance-ment	Vertical greening (green walls, sky gardens)	Closed-loop resource systems	Energy and water efficienc y	Mixed-use inte-gration	Adap-tive living systems	Walk-ability and accessi-bility	Commu nity parti-cipation
				gies	al	men	n	

Based on the analysis of the ten precedent projects, mixed-use integration, energy and water efficiency, and walkability and accessibility are the most frequently applied indicators, highlighting the strong influence of vertical urbanism principles. Many projects also incorporate adaptive living systems through adaptive reuse and multifunctional development.

Meanwhile, biodiversity enhancement, vertical greening, and closed-loop resource systems are implemented in fewer projects, with One Central Park and Bosco Verticale demonstrating the strongest ecological performance. Collectively, the precedents show that combining regenerative design and vertical urbanism can support more sustainable and resilient high-density urban development.

Table 6. Conclusion of Design Indicators for 20 Precedents.

Integrated Aspect Lyle (1994); Yeang (2002); Mang & Reed (2012); Al-Kodmany (2013)	**Conclusion of Design Indicators for 20 Precedents**	**Number of Projects Applying the Indicators**
Ecological	Biodiversity enhancement and vertical greening are commonly incorporated through urban parks, green terraces, and vegetated facades.	**15 of 20 projects.** Most precedents incorporate biodiversity enhancement, while vertical greening strategies are primarily found in high-density urban developments such as One Central Park, Bosco Verticale, Kampung Admiralty, and PARKROYAL Pickering.
Resource & Efficiency	Resource-efficient strategies include closed-loop systems, water recycling, and energy-efficient building technologies.	**20 of 20 projects.** All precedents apply at least one resource-efficiency strategy, ranging from adaptive reuse of existing structures to advanced energy and water management systems.
Mixed Use and living System	Mixed-use integration and adaptive functions are widely implemented across the precedents.	**18 of 20 projects.** Most developments integrate multiple urban functions and adaptable uses, with only a few projects remaining predominantly single-purpose buildings.
Mobility & Social Collaboration	Walkability, transit integration, and public spaces are strongly emphasized in most developments.	**20 of 20 projects.** Every precedent provides pedestrian connectivity, public accessibility, or social spaces that encourage interaction and urban engagement.

Across the 20 precedent projects, Resource & Efficiency and Mobility & Social Collaboration are the most consistently implemented aspects, appearing in every project. Mixed Use and Living System is also widely adopted in 18 projects, while the Ecological aspect is found in 15 projects, with advanced vertical greening strategies limited to developments that explicitly apply regenerative or biophilic design principles. Overall, the findings suggest that contemporary mixed-use developments prioritize functional efficiency, mobility, and social connectivity, whereas ecological regeneration remains less consistently integrated. This highlights the need for the Vertical Urban Regenerative framework to better balance ecological, functional, and social performance.

Implementation of the Transformation Asset in Perum Peruri

Fig 1. Perum peruri location site
Source: **IAI Jakarta - TOR Sayembara Peruri**

Perum Peruri, as a state-owned enterprise responsible for producing strategic security documents, has undergone a significant organizational transformation following the relocation of its primary production facilities from Kebayoran Baru, Jakarta, to Karawang, West Java. This relocation created an opportunity to redefine the function of the former production site, which had become an underutilized strategic urban asset. Rather than maintaining the site in its previous industrial role, Peruri adopted a redevelopment strategy aimed at maximizing the economic, environmental, and social value of the asset through the development of Peruri City. This transformation reflects a broader shift in public asset management, where state-owned assets are no longer viewed solely as operational resources but also as catalysts for sustainable urban development and long-term value creation[11].

The redevelopment of Peruri City illustrates how a former industrial area can be repositioned as an integrated mixed-use district that combines residential, commercial, office, hospitality, public, and creative functions. However, the success of such a transformation cannot be evaluated solely based on physical redevelopment or economic performance. It also depends on the extent to which sustainability principles are embedded within the planning and design process. Therefore, Table 7 presents the key indicators used to evaluate the implementation of sustainable asset transformation, focusing on environmental performance, resource efficiency, adaptive land use, mobility, and social inclusiveness. These indicators provide an analytical basis for assessing whether the transformation has successfully generated multidiensional value while supporting sustainable urban regeneration.

Table 7. Implementation of the Transformation Asset in Perum Peruri.

Aspect	**Design Indicator**	**Application of Asset Transformation in Peruri**
Ecological	Biodiversity Enhancement	The transformation of Perum Peruri demonstrates the implementation of biodiversity enhancement through the provision of pocket parks, green open spaces, and native vegetation.
	Vertical Greening	Integrates green façades, sky gardens, roof gardens, and vegetation on building podiums to increase the overall green area.
Resource & Efficiency	Closed-loop Resource Systems	Implements rainwater harvesting, greywater recycling, and integrated waste management systems to support circular resource flows.
	Energy And Water Efficiency	Applies passive design strategies, natural daylighting, cross ventilation, solar panels, and water-efficient fixtures to reduce resource consumption.
Mixed-Use & Living System	Mixed Use Integration	Combines residential, office, commercial, hotel, creative spaces, and public facilities within an integrated vertical mixed-use development.
	Adaptive Living Systems	Reuses structurally viable existing buildings for new functions and provides flexible spaces that can adapt to changing user needs over time.
Mobility & Social Collaboration	Walkabilty and Accessibilty	Creates comfortable pedestrian networks, universal accessibility, and direct connections to the MRT Blok M station, TransJakarta, and surrounding urban areas.
	Community Participation	Provides public plazas, community spaces, MSME (micro, small, and medium enterprise) areas, exhibition spaces, and facilities that encourage social interaction and community engagement.

(Source: Author's Conclusion)

The analysis presented in Table 7 demonstrates that the proposed transformation of the Perum Peruri asset successfully incorporates all major indicators of the Vertical Urban Regenerative framework, indicating a comprehensive integration of ecological restoration, resource efficiency, adaptive mixed-use development, and socially responsive mobility systems[12]. This suggests that the project moves beyond conventional urban redevelopment by positioning existing urban assets as catalysts for environmental improvement, economic revitalization, and social interaction rather than merely as objects of physical renewal[13]. However, a critical assessment reveals that the implementation remains predominantly design-based rather than performance-based. The proposed strategies effectively demonstrate compliance with regenerative design principles at the conceptual and planning levels, yet the study does not provide quantitative evidence to verify improvements in ecosystem health, resource productivity, carbon reduction, biodiversity enhancement, or social outcomes[14]. As a result, the current findings support the conclusion that the Perum Peruri transformation possesses strong regenerative potential, but they cannot yet confirm that regenerative outcomes have been achieved in practice.

Therefore, the contribution of this research lies primarily in establishing a practical framework for integrating regenerative design and vertical urbanism into urban asset transformation. Future research should extend this framework through post-occupancy evaluation and measurable environmental, economic, and social performance indicators to determine whether the proposed design genuinely functions as a regenerative urban system rather than solely as an innovative architectural concept.

IV. CONCLUSION

This study proposes a set of Vertical Urban Regenerative design criteria by integrating the principles of regenerative design and vertical urbanism into a unified framework for urban asset transformation. The resulting framework comprises four design aspects; Ecological, Resource & Efficiency, Mixed-use & Living System and Mobility & Social Collaboration which are translated into eight design indicators; biodiversity enhancement, vertical greening, closed-loop resource systems, energy and water efficiency, mixed-use integration, adaptive living systems, walkability and accessibility and community participation. The application of these criteria to the transformation of the Perum Peruri asset demonstrates that the proposed framework is capable of guiding the redevelopment of underutilized urban assets toward more sustainable, adaptive, and integrated mixed-use environments. Therefore, the proposed design criteria contribute not only as an evaluation framework but also as a practical reference for architects, urban designers, and policymakers in planning future urban regeneration projects. Future research should validate these criteria through quantitative performance assessment and post-occupancy evaluation to measure their long term regenerative outcomes.

REFERENCES

[1]. J. T. Lyle, “Regenerative Design for Sustainable Development,” 1996.
[2]. P. Mang and B. Reed, “Regenerative Development and Design,” 2012.
[3]. Naboni, “REGENERATIVE Emanuele Naboni Lisanne Havinga DESIGN IN DIGITAL PRACTICE A Handbook for the Built Environment,” 2019.
[4]. Lin and Gámez, “Vertical Urbanism Designing Compact Cities in China,” 2018.
[5]. K. Al-Kodmany, “The future of the city tall buildings and urban design,” 2013.
[6]. P. Mang and B. H. Regenesis, “Regener ative Development and Design a Framework for Evolving Sustainability,” 2016.
[7]. B. Reed and P. Mang, “Forum: Shifting from ‘sustainability’ to regeneration,” *Building Research and Information*, vol. 35, no. 6, pp. 674–680, Nov. 2007, doi: 10.1080/09613210701475753.
[8]. A. Wahyudi, “Understanding vertical urban development in changing the spatial movement of residents using agent-based modelling approach,” *Journal of Regional and City Planning*, vol. 29, no. 2, pp. 127–134, Aug. 2018, doi: 10.5614/jrcp.2018.29.2.4.
[9]. K. Yeang, “A Vertical Theory of Urban Design,” 2002.
[10]. “TOD-Standard-3.0-IndoWEB_02”.
[11]. “KAK Sayembara Peruri”.
[12]. M. Brown *et al.*, *Sustainability, Restorative to Regenerative An exploration in progressing a paradigm shift in built environment thinking, from sustainability to restora tive sustainability and on to regenerative sustainability COST Action CA16114 RESTORE: REthinking Sustainability TOwards a Regenerative Economy, Working Group One Report: Restorative Sustainability*. [Online]. Available: www.cost.eu/COST_Actions/ca/CA16114
[13]. A. Natasya, P. Epifania Ariaji, P. S. Studi, F. Arsitektur, and dan Real Estat, “PENDEKATAN DESAIN REGENERATIF PADA FASILITAS PENGELOLAAN AIR SEBAGAI URBAN EDU ECO TOURISM DI WADUK SUNTER BARAT,” vol. 8, no. 1, 2026, doi: 10.24912/stupa.v8i1.37065.
[14]. K. Ak and S. Huwae, “PENERAPAN METODE DESAIN DENGAN KONSEP REGENERATIF DALAM PASAR GROGOL, JAKARTA BARAT,” vol. 7, no. 2, 2025, doi: 10.24912/stupa.v7i2.35581.

Corresponding Author: Dedes Nur Gandarum,
[2]Professor of Architecture and Urban Design, Universitas Trisakti, Jakarta, Indonesia.