Creativity and Innovation
2025, VOL. 9, NO. 4, 84-87
DOI: 10.47297/wspciWSP2516-252718.20250904

Analysis on Spatial Adaptability of Historical Block Renewal under the 15-Minute City Concept

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ABSTRACT
With the widespread application of the "15-minute city" concept in global urban governance, how to realize this people-oriented, compact and multifunctional model in historical blocks has become an important topic that needs to be explored. This paper focuses on the spatial adaptability of the "15-minute city" concept in the renewal of historical blocks. By systematically sorting out relevant theories and domestic and foreign practical experiences, combined with typical cases of Shanghai Caoyang New Village and Nanjing Xiaoxihu District, this paper analyzes the opportunities and limitations of historical blocks in terms of functional complexity, service accessibility and spatial flexibility. The study found that although historical blocks face multiple challenges such as building protection, infrastructure aging and space constraints at the physical level, their compact texture, and community network are highly consistent with the value orientation of the "15-minute city" concept. Based on this, this paper proposes a "flexible adaptive" living circle construction strategy, advocating the organic integration of life convenience and cultural continuity through micro-renewal, embedded functional substitution, cross-community sharing mechanism and digital support. The study enriches the theoretical system and practical path of the "15-minute city" concept in the stock space scenario, and has a certain reference value for the renewal of historical blocks and urban governance.

KEYWORDS
15-minutes city; Historic district renewal; Spatial adaptability; Micro-renewal

1 Introduction

As an important carrier of urban cultural memory, historical blocks are facing unprecedented challenges in the process of urban renewal. On the one hand, the spatial structure of historical blocks is usually compact, the streets and lanes are small, and the functions are relatively simple, which makes it difficult to meet the needs of modern life for diverse services and efficient accessibility; on the other hand, excessive development and standardized renewal models may also destroy their unique spatial texture and cultural value.

In recent years, the concept of "15-minute city" has attracted widespread attention around the world as a compact, multifunctional and people-oriented urban development model. The concept was proposed by French scholar Carlos Moreno in 2016. Its core idea is that urban design - or redesign - should enable residents of all ages, backgrounds and abilities in all corners of the city to obtain daily necessities (housing, work, food, medical care, education, culture and leisure) within a 15-minute walk or bike ride (Award and Moreno, 2021). This model can reduce dependence on cars, rebuild neighborhood relationships and improve urban sustainability. In China, Shanghai has adopted the "15-minute living circle" as one of the important strategies for urban planning and governance.

In this context, the 15-minute city concept is introduced into the renewal of historical blocks. While integrating the new planning concept with the traditional spatial structure, the spatial adaptability of both parties is raised: Can historical blocks achieve mixed functions and convenient living while retaining their original characteristics? What spatial factors promote or hinder the implementation of this concept? How to improve its responsiveness to the "15-minute city" through micro-renewal, functional embedding, and traffic transformation? These issues need to be explored in depth.

This study aims to explore the spatial adaptability of the "15-minute city" concept in the renewal of historical blocks, analyze the theoretical coupling relationship between the "15-minute city" concept and the renewal of historical blocks, and clarify the compatibility and conflict points between the two in terms of value goals, spatial logic and implementation strategies.

This study takes "spatial adaptability" as the starting point, focusing on the feasibility of the 15-minute city concept in historical blocks. By introducing an adaptability analysis framework, it enriches the research perspective of the 15-minute city concept in complex spatial contexts at the theoretical level, and makes up for the lack of attention in existing literature on the applicability of historical areas.

2 Literature review

At present, the research on 15-minute cities mainly focuses on five directions:

First, focus on the origin, core concepts and framework evolution of the 15-minute city concept, emphasizing the relationship between concepts, theoretical frameworks and models. (such as Moreno et al., 2021; Pozoukidou and

Chatziyiannaki, 2021). Second, study urban policies and project cases, such as how to apply the 15-minute city concept to actual planning and governance (such as Shanghai, Barcelona, Melbourne, etc.), involving land use adjustment, transportation system optimization, facility distribution reconfiguration, etc. (such as Rueda, 2018). Third, use GIS, network analysis and other tools for measurement and evaluation, such as spatial analysis and accessibility assessment. These studies quantitatively evaluate the degree of realization of the 15-minute city by measuring the spatial accessibility and temporal distance between public facilities, service nodes and residents in the city (such as Caselli et al., 2021; Gaglione et al., 2022). Fourth, explore the social participation mechanism, community governance structure, and policy distribution justice in the 15-minute city, involving topics such as class differences and regional imbalances to explore social equity, institutional implementation, and resource allocation (such as Jiang and Ma, 2025; Xin and Guo, 2025). Fifth, conduct a critical analysis or review of the "15-minute city", pointing out its idealization risks, adaptation barriers, and differences in local conditions, such as questioning whether it is suitable for old urban areas, or revealing structural differences among different audiences (such as Guzman et al., 2024).

Although the "15-minute city" model has been widely discussed in new urban development or redevelopment areas, there is still a lack of systematic research on its practical path in historical blocks. Most existing studies assume that cities have flexible land use and modern infrastructure, which are precisely the conditions that historical blocks do not have. In response to the above research gaps, this paper intends to construct a "spatial adaptability analysis framework" for 15-minute cities applicable to historical blocks. By integrating accessibility assessment and protection sensitivity principles, this paper explores strategic paths to improve the accessibility of basic living services for residents while protecting the existing historical environment.

In summary, existing research on 15-minute cities provides a multi-dimensional theoretical basis and methodological reference for this study. Among them, the concept origin and framework construction research clearly defined the core principles of people-oriented, mixed functions, and accessibility priority; policy and case studies demonstrated the policy implementation paths in different urban practices. However, for the special urban space type of historical blocks, there is still a lack of research. This study is carried out in this context, aiming to respond to the above research gaps and focus on the spatial coupling relationship between the 15-minute city concept and the renewal of historical blocks.

This study uses the 15-minute city concept as an analytical framework. The 15-minute city was first proposed by Carlos Moreno in 2016. Its purpose is to establish a new urban model that is people-centered, time-efficient, and driven by local sentiment. Moreno criticized the over-reliance on cars in modern cities, which has caused spatial functional fragmentation, a tense pace of life, and urban heterogeneity, and believed that the urban structure should be reconstructed "with time rather than space." In the 15-minute city concept, every resident should be able to achieve six major functions within a 15-minute walk or bike ride: living, working, shopping, learning, medical care, and leisure. The concept was promoted by Anne Hidalgo, the mayor of Paris (2020), and was subsequently widely accepted by planners around the world. In 2021, Carlos Moreno defined the core concept of the 15-minute city more clearly and systematically, and responded to the challenges of the post-epidemic era, digitalization, and social inequality. Successful urban policy cases such as Paris, Melbourne, and Shanghai have proved its practical feasibility.

3 Methodology

This study adopts literature analysis and case study methods to explore the spatial adaptability of the 15-minute city concept in historical blocks. The study first systematically sorts out relevant research on the 15-minute city concept, historical block renewal strategies and spatial adaptability assessment through qualitative literature review, and clarifies the theoretical framework and practical strategies. Secondly, typical historical blocks are selected as cases to evaluate the spatial distribution and walkability of basic service facilities in the area, and identify their advantages and shortcomings in achieving the "15-minute living circle". This method aims to reveal the spatial realization path of the "living circle" concept in historical blocks under the constraints of existing textures from both theoretical and technical levels, and to provide support for the renewal and policy formulation of historical blocks.

4 Findings

The "15-minute city" is not just a planning model at the physical space level, but also an urban governance concept that emphasizes spatial compactness, functional mix and living convenience. Its core lies in realizing the humanized reconstruction of urban space through the optimization of accessibility and the balanced allocation of service resources. This concept is highly consistent with the "slow life", "compact texture" and "high sense of neighborhood" that historical blocks naturally possess. Therefore, from the perspective of value orientation and renewal goals, the 15-minute city does not exclude historical blocks, but can provide a strategic path for their renewal that focuses on the daily life of residents.

However, at the physical level, especially for historical blocks with complex textures such as Ming and Qing ancient cities, traditional hutongs, and neighborhood lanes, the full implementation of the 15-minute city faces significant structural constraints. On the one hand, strict historical building protection regulations make large-scale demolition and

reconstruction unfeasible, and space utilization is strictly restricted; on the other hand, historical blocks are often accompanied by problems such as aging infrastructure, scattered land ownership, and shortage of buildable space, which makes it difficult to introduce modern facilities such as drainage, power grids, and barrier-free systems, thereby affecting the realization of functional integration and service accessibility. In addition, some blocks are prone to single business formats and tourist-oriented tendencies during urban renewal, resulting in the superposition of "commercialization" and "hollowing out", further eroding the original living texture and historical and cultural values. The construction of a 15-minute city usually involves six major infrastructure dimensions: first, public service facilities, such as basic education, community medical care and cultural venues; second, daily commercial facilities, including daily consumer outlets such as vegetable markets, convenience stores, and barber shops; third, leisure space, such as small green spaces, fitness facilities, and slow-moving trail systems; fourth, diversified housing supply, including affordable housing and rental housing; fifth, a convenient transportation system, especially a network of walking, cycling, and barrier-free paths; and sixth, office space that meets employment diversity, such as shared office points or community entrepreneurship spaces. However, the objective conditions faced by historical blocks, such as high-density built-up environments, narrow streets and lanes, and old buildings, have caused serious bottlenecks in the systematic introduction of the above facilities in reality.

Therefore, the 15-minute city construction of historical blocks should not be promoted as a templated "targeted project", but should be understood as a gradual and adaptable strategy for optimizing the quality of life. The core is not to mechanically copy the concept, but to explore the integration path of convenience, fairness and livability on the basis of respecting historical texture and continuing cultural memory.

Two renewal cases represented by Shanghai Caoyang New Village and Nanjing Xiaoxihu District provide useful practical experience. As the first workers village after the founding of Peoples Republic of China, Caoyang New Village, combined with the protection of 20th century architectural heritage, completed systematic renewal around 2025, clearly taking the 15-minute living circle as the renewal orientation, coordinating the layout of residential, commercial, public services, cultural education and leisure space, and reshaping traffic lines and service nodes. The renewal mechanism of one household and one drawing tailors the renovation plan for 1,500 households, while improving the quality of life and preserving the original urban texture and collective memory. In contrast, as a typical traditional historical block, Xiaoxihu District adopts a micro-renewal path of "small scale, gradual, courtyard by courtyard", focusing on preserving the street structure and the original community network of residents, and activating the living atmosphere by introducing new formats such as bookstores, cultural and creative, and light catering, realizing the mutual integration of functional supplementation and cultural continuity. Although the "15-minute living circle" framework has not been explicitly proposed, the practice in the Xiaoxihu area has demonstrated a high degree of consistency in concepts such as improved accessibility of life, embedded services, and diversified public spaces.

On this basis, for historical blocks with complex textures and limited space, building a "flexible and adaptable" 15-minute living circle has become a feasible path. The key lies in adopting a multi-dimensional, low-intrusion strategy combination: first, through embedded functional substitution, idle courtyards or corner spaces are transformed into micro green spaces or community care points to improve service proximity; second, a shared service mechanism is built to integrate education, medical and other resources through cross-community linkage to form a regional service network to make up for the lack of service capacity of a single block; third, the model of micro-renewal combined with multi-functional mixed use is promoted to transform single functional spaces into composite ones, such as using historical buildings to integrate cafes and cultural exhibition spaces to improve spatial complexity; finally, with the help of digital technologies, such as intelligent guide systems and mini-program platforms, information and service penetration at the non-physical level is achieved, and the service radius and experience dimension in limited space are expanded.

In summary, the applicability of the 15-minute city concept in historical blocks does not lie in the comprehensive replication of the modern city circle construction model, but in exploring a set of progressive renewal paths with life convenience as the core, cultural protection as the bottom line, and spatial flexibility as the support. In this way, historical blocks can retain their authenticity while achieving modern transformation of structural functions and continuous optimization of residents' lives.

5 Discussion

Through the literature and case analysis of the 15-minute city concept and the practice of historical block renewal, this paper summarizes the following key findings: First, although historical blocks face challenges such as limited space, strict protection regulations and lagging infrastructure at the physical level, their "compact texture", "slow-moving scale" and "high sense of neighborhood" are highly consistent with the 15-minute city in terms of value logic. This shows that the 15-minute living circle concept not only does not exclude historical blocks, but can provide conceptual support and strategic framework for their humanistic renewal. Secondly, the service system required for the construction of a 15-minute city (including public services, daily commerce, leisure green space, traffic accessibility, etc.) is difficult to be embedded in the historical block as a whole, but can be "flexibly adapted" through gradual, small-scale, functional complex and sharing mechanisms. Such strategies help to improve living convenience and service balance without destroying the historical

texture.

Cases as Shanghai Caoyang New Village and Nanjing Xiaoxihu demonstrate adaptation models under different paths: the former promotes the construction of living circles through institutionalized planning and transformation, while the latter emphasizes gradual micro-renewal and cultural ecological activation, both of which have achieved the goal integration of accessibility optimization, functional integration, and texture continuation to varying degrees.

Finally, the study proposed a strategy for building a "flexible and adaptive" living circle, emphasizing the introduction of embedded facilities, cross-border sharing mechanisms, functional composite utilization, and digital support. These strategies not only respond to the actual limitations of historical blocks, but also provide a realistic path to break through spatial difficulties and improve living experience.

Compared with existing research on the 15-minute city concept, this paper provides a supplement and extension in the analysis perspective of selecting historical blocks as research objects and emphasizing "spatial adaptability". On the one hand, this paper draws lessons from some cases and proposes strategies such as "flexible adaptation", "micro-renewal" and "functional embedding", which responds to the feasibility of the concept in a specific context from a micro level. On the other hand, some studies have begun to notice the connection between the regeneration of historical blocks and the 15-minute living circle, but most of them remain at the level of concept advocacy or facility layout, lacking a systematic analysis of institutional logic, spatial texture and renewal path. Through case comparison and strategy induction, this paper summarizes the renewal mechanism applicable to historical blocks and expands the application boundary of the 15-minute city concept.

The findings of this study have the following implications for urban planning practice, policy formulation and theoretical deepening: although historical blocks do not have the spatial flexibility and facility layout freedom of new urban areas, their compact texture and slow-moving scale themselves contain the soil for the concept of living circles. Therefore, the 15-minute city should not be regarded as a "future model" that excludes historical areas, but should be used as a strategic tool to reconstruct the daily living space and social relations of residents. At the academic level, this paper verifies the feasibility of transforming the 15-minute city concept from an abstract concept to a specific spatial operation, and also proposes an adaptability analysis framework and spatial renewal strategy model suitable for complex blocks, providing theoretical support and case basis for subsequent related research applicable to stock space scenarios.

Although this study has systematically explored the spatial adaptability of the 15-minute city concept in the renewal of historical blocks through literature review and case analysis, it still has certain limitations and needs to be supplemented and improved in subsequent research.

First, this paper adopts a qualitative analysis method, which mainly relies on literature and policy documents, and does not combine quantitative methods such as GIS accessibility analysis and built environment data. Therefore, the judgments on the spatial distribution of facilities, accessibility assessment, and residents' behavioral responses are more based on theoretical logic and case induction, lacking refined data support. Secondly, the case selection is mainly concentrated in Chinese cities, and fails to cover the diverse practices of other countries in adapting historical blocks to the 15-minute living circle. This limits the cross-cultural applicability and universal promotion of the research to a certain extent, and the breadth of analysis can be expanded through comparative studies in the future. Thirdly, this article has not yet explored in depth the differences in spatial needs among different groups within the historical district. For example, the real feelings and specific demands of the elderly, the disabled, and foreign tenants in the construction of their living circles still need to be further explored through field research or participatory methods.

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