

A Governance Framework for Mixed Land Use in the Era of Stock Renewal

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Abstract: As urban development shifts from incremental expansion to stock renewal, mixed land use has become a core instrument for easing spatial resource constraints and advancing refined governance. Its governance focus has consequently shifted from whether mixed use should be adopted to the systemic question of how mixed use can be made effective, adaptive, and smoothly convertible. This paper traces the conceptual evolution of mixed land use from physical superimposition and functional integration to systematic governance, then analyzes the practical dilemmas of stock renewal around the central issue of flexible conversion and dynamic adjustment. It develops a tripartite space-rights-governance framework: the spatial dimension follows the logic of land-category allocation, cadastral management, and land-value assessment; the rights dimension follows the logic of property-rights clarification, interest balancing, and value-increment sharing; and the governance dimension follows the logic of multi-stakeholder co-governance, cross-departmental coordination, and sustained oversight. Four implementation pathways are proposed: use regulation and flexible control, rights coordination and property-rights innovation, benefit balancing and value sharing, and organizational optimization with long-term supervision. The study offers a theoretical framework and practical reference for refined mixed-land-use governance in the stock-renewal era.

Keywords: mixed land use; conceptual evolution; practical dilemmas; space-rights-governance framework; implementation pathways

As the urban development model moves from incremental expansion toward stock renewal, an increasing number of cities will rely on existing construction land to provide spatial resources [1]. The spatial governance model dominated by functional zoning has exposed sustainability risks, including insufficient spatial support for industrial upgrading, jobs-housing imbalance, encroachment on cultivated land, and ecological pollution [2]. In this context, mixed land use has become an important tool for intensive land use and refined governance. By creating compound functional spaces suited to the innovation economy, building living circles that improve residential quality, and developing TOD and other multifunctional hub spaces, it has become a key strategy for sustainable development [3-5]. Yet in the stock-renewal stage, the core issue has shifted from a supply orientation in which government presets functional combinations to a demand orientation centered on flexible conversion and dynamic adjustment. A new governance framework suited to this demand is therefore needed [6].

The idea of mixed land use originated in Western planning practice [7-9]. Since its introduction into China in the 1990s, understanding of the concept has shifted from passive acceptance of Western theories to active exploration of localized paths [10-11]. Existing research has addressed the concept, measurement, driving mechanisms, effects, and governance strategies of mixed land use [12-13]. Mixed land use, translated from mix use or mixed land use, has expanded from the external form of mixed functional development to a land-function process determined by the coordination between land-quality attributes and socioeconomic demand, and it differs from the strict functional zoning of conventional land-use practice [14-15]. Measurement usually covers quantitative scale, spatial structure, functional relations, and comprehensive dimensions, using cross-sectional data to represent diversity, compatibility, dispersion, and other features [16-18]. The degree and pattern of mixed land use are shaped by physical, socioeconomic, and institutional factors and show clear spatial heterogeneity [19-20]. Studies on its effects remain fragmented, covering spatial vitality, urban innovation, public health, and social equity [21-24]. Overall, assessments of different externalities are inconsistent, making it necessary to build a more complete and scientific system for value sharing and value capture [25-26].

Research on governance has proposed policy designs from land-use classification and planning control, explored strategies for industrial land and technology-innovation industries [27-29], proposed refined governance through integration of planning, construction, and management [30], and emphasized multi-actor, multidimensional, whole-process supervision [31]. Recent studies have also examined property rights, transaction costs, and benefit allocation, exploring how to reduce transaction costs in use conversion and address mismatches in spatial factors [32]. These studies provide a solid foundation, but they focus mainly on functional outcomes and pay insufficient attention to flexible conversion and dynamic adjustment in the stock-renewal era. In the incremental stage, government-led supply could preset functional combinations through planning. In stock renewal, however, urban demand for space is diverse and dynamic, and use conversion and adjustment become the key links and substantive content of mixed land use. The central concern has therefore shifted from whether mixed use exists to elastic adaptation and dynamic optimization.

Urban renewal studies suggest that mixed land-use structures within defined areas should be controlled to connect with overall development orientation and land-use planning [33]. Current governance of mixed land use, however, still focuses on single objects and material dimensions, lacking systematic discussion that links rule adaptability, complex rights, difficulties in value assessment, and low organizational efficiency with the core demand of flexible conversion from the perspective of use control. Negative lists are often considered the main management tool, but they are essentially regulatory strategies around compatibility and negative externalities. In the stage of stock improvement, governance logic that takes value increment and its distribution into account is required for sustainable development, and this logic still lacks a systematic institutional framework. This paper follows the analytical line of conceptual evolution, practical problems, theoretical framework, and implementation pathways, constructs a governance framework for mixed land use in the stock-renewal stage, and proposes corresponding paths.

1 Conceptual Evolution of Mixed Land Use

The connotation of mixed land use has evolved with changes in the governance logic of urban development. It has gone through three progressive stages: physical superimposition, functional integration, and systematic governance (Fig. 1). The driving mechanisms, spatial characteristics, and governance priorities differ across these stages, while the internal force behind the shift is adaptive adjustment between land-use efficiency and governance complexity.

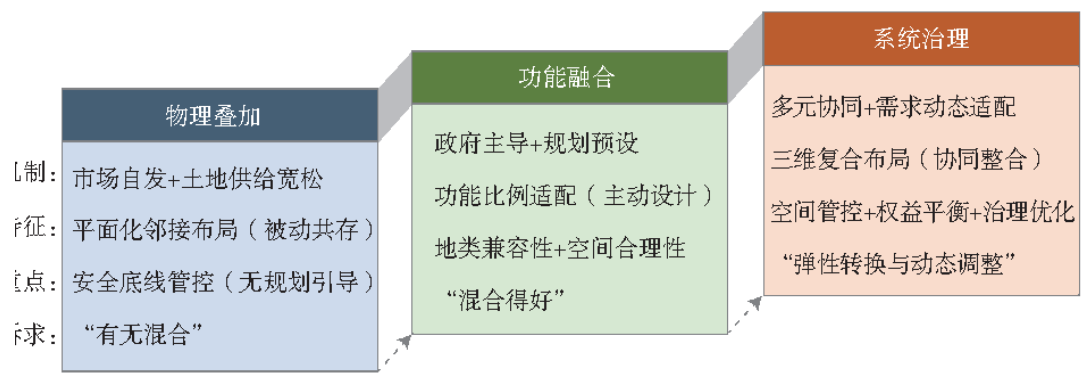


Fig. 1 Conceptual evolution of mixed land use.

1.1 Physical Superimposition: Spontaneous Spatial Coexistence in Early Incremental Expansion

In the early phase of incremental expansion, mixed land use was driven by both spontaneous market demand and loose land supply. As urban space expanded rapidly, planning control focused on securing basic functions,

and land use tended to emphasize quantity and quality in a narrow sense. Mixed use appeared as the passive coexistence of different functions. Typical examples include informal mixed use in old urban quarters, simple service facilities in industrial zones, and early TOD development. The spatial logic was mainly planar adjacency, with limited functional interaction. Governance focused on safety bottom lines, lacked adaptive design for spatial efficiency and benefit coordination, and often failed to establish corresponding rules for rights registration and benefit distribution. In essence, mixed land use in this stage was largely a spontaneous behavior without strong planning guidance. It partly alleviated shortages of urban functions at the early stage, but also created hidden risks such as spatial disorder and unclear rights.

1.2 Functional Integration: Goal-Oriented Combination Design in the Middle and Late Stages of Incremental Expansion

As urban development entered the middle and late stages of incremental expansion, government-led planning began to replace spontaneous market behavior. Mixed land use moved from passive coexistence toward active design. At this stage, industrial land, residential communities, public services, and transportation hubs were increasingly organized through planned functional combinations. The objective was to improve land-use efficiency and coordinate functional relations. Yet this governance logic still relied heavily on preset combinations and relatively stable functional assumptions. It could respond to planned development goals but lacked sufficient flexibility when market demand, industrial organization, and population behavior changed. Therefore, although functional integration improved the quality of mixed land use, it still remained within the logic of incremental supply and did not fully address the dynamic adjustment required by stock renewal.

1.3 Systematic Governance: Integrated Coordination of Space, Rights, and Governance in the Stock-Renewal Stage

In the stock-renewal stage, mixed land use is no longer merely a question of spatial combination or functional allocation. It involves the transformation of existing land uses, adjustment of rights, redistribution of value increments, and coordination among multiple actors. The key issue is to enable flexible conversion under clear rights and controllable risks. The governance focus shifts toward systematic coordination among spatial rules, property-rights arrangements, value assessment, organizational collaboration, and long-term supervision. Mixed land use therefore becomes a governance process that integrates space, rights, and institutions, and its success depends on whether dynamic conversion can be achieved without weakening public interests, ecological safety, and planning order.

2 Practical Dilemmas of Mixed Land Use

2.1 Use Lock-in and Conversion Barriers

Use control under current land-management systems often shows a tendency of multiple controls and guidance. Each department conducts approval according to its own regulatory field. Planning departments emphasize spatial layout, fire-safety departments focus on evacuation and fire zoning, environmental departments pay attention to pollutant discharge and ecological impact, and different standards are difficult to align. As a result, departmental review requirements may conflict or overlap. For mixed land use, the conversion of functions is closely linked with the interests of different groups, but spatial decision-making is still excessively concentrated in government and capital. Public participation is insufficient, and a society-wide consensus on supporting optimized land use is difficult to form. Participation is usually limited to post-hoc publication after a planning scheme has been largely fixed, while earlier stages such as planning research and scheme preparation lack individual channels through which interests can be fully expressed.

2.2 Ambiguous Rights and Interest Imbalance

The functional complexity of mixed land use is closely related to stakeholder interests. Under the existing spatial decision-making pattern, which is overly concentrated in government and capital, public participation and discourse power remain weak. From the perspective of participants, disadvantaged groups are constrained by information access and expression capacity, making it difficult to express their needs for employment, living services, facilities, and environmental quality. Demands of workers in new industries for workspace can also be ignored. Ambiguous rights further restrict the sustainable optimization of mixed land use. Under supervision, the boundary between new industrial and traditional industrial land is increasingly blurred, as shown by compound forms such as industry plus research and development or commerce plus cultural and creative uses. These forms are difficult to classify through traditional industrial categories and lack clear boundary standards, causing mismatch in planning approval and later supervision.

2.3 Insufficient Coordination and Weak Supervision

The current supervision mechanism for mixed land use remains incomplete. It constrains the continuous optimization of mixed-use patterns. In many places, post-supply supervision agreements focus on quantitative indicators such as investment intensity, output value, and taxation, and pay less attention to core requirements such as functional matching, environmental compatibility, public service efficiency, and long-term social value. The indicator system may therefore become one-dimensional. A tendency toward economic priority leaves insufficient evaluation of compatibility between industrial and residential functions and insufficient oversight of the use efficiency of public service facilities. Cross-departmental coordination is also weak, and the links among planning, natural resources, housing and construction, ecology and environment, emergency management, and market supervision are not yet smooth.

3 Governance Framework for Mixed Land Use

Mixed land use in the stock-renewal stage involves complex actors and interest games. This paper shifts from the previous question of what to mix toward a rights-oriented perspective on for whom the land is used, and from the governance question of who manages and how to manage toward a framework suited to stock renewal. It proposes a space-rights-governance framework for mixed land use (Fig. 2).

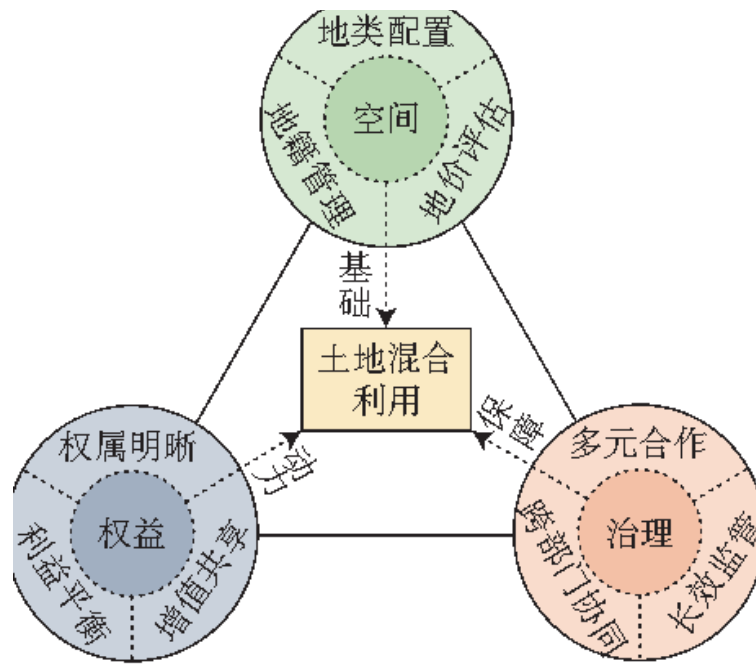


图2 土地混合利用“空间—权益—治理”

Fig. 2 Space-rights-governance framework for mixed land use.

3.1 Spatial Dimension: Land-Category Allocation, Cadastral Management, and Land-Value Assessment

Clear spatial control rules form the basis for defining rights and assessing value. To enable flexible conversion of land uses, spatial governance should coordinate land-category allocation, cadastral management, and land-value assessment. Land-category allocation is the basic premise of mixed use. It requires a more flexible and adaptive land-use classification system that moves beyond single dominant-function control and permits moderate compatible mixing. The core task of land management is to shift from project-guided management to positive-list guidance. On the basis of prohibiting incompatible combinations, such as highly polluting industry and residence, more innovative space should be given to markets and society. Refined cadastral management is crucial for ensuring flexible conversion. It requires moving from two-dimensional to three-dimensional cadastral management, clarifying the rights over compound space, underground and above-ground space, and providing legal and technical support for lease, transfer, and mortgage. Land-value assessment is an important regulatory lever for stock-renewal projects. A valuation system suited to mixed use should reasonably evaluate the value and external effects of different functional combinations, explore policy tools such as multi-dimensional evaluation, tolerance-based pricing, and elastic annual-period pricing, guide mixed-use directions, capture value increments, and provide an interest-adjustment mechanism for dynamic adaptation.

3.2 Rights Dimension: Rights Clarification, Interest Balance, and Value-Increment Sharing

Fair allocation of rights and interests is the key to stimulating participation by the market and society and reducing transformation resistance. In stock renewal, the property-rights structure is often complex. The rights dimension must clarify spatial ownership and the boundaries of rights and obligations across multiple links, including subject change, scheme confirmation, and interest balancing (Fig. 3). Interest balance is the core goal of rights allocation. It is necessary to consider efficiency within a broader spatial scope and the capitalization of future rights, establish inclusive interest coordination platforms and benefit-sharing rules, and ensure that the

benefits generated by mixed land use are distributed in a scientific and reasonable way. Use conversion and spatial compounding often generate land-value increments. A scientific mechanism of value recovery and sharing should be established. Incremental gains should not be exclusively held by governments or developers. Under the premise of respecting original right holders, investors, governments, and public interests, recovered value should be used first to improve regional public services and then fed back to society, thereby realizing fair distribution of public value.

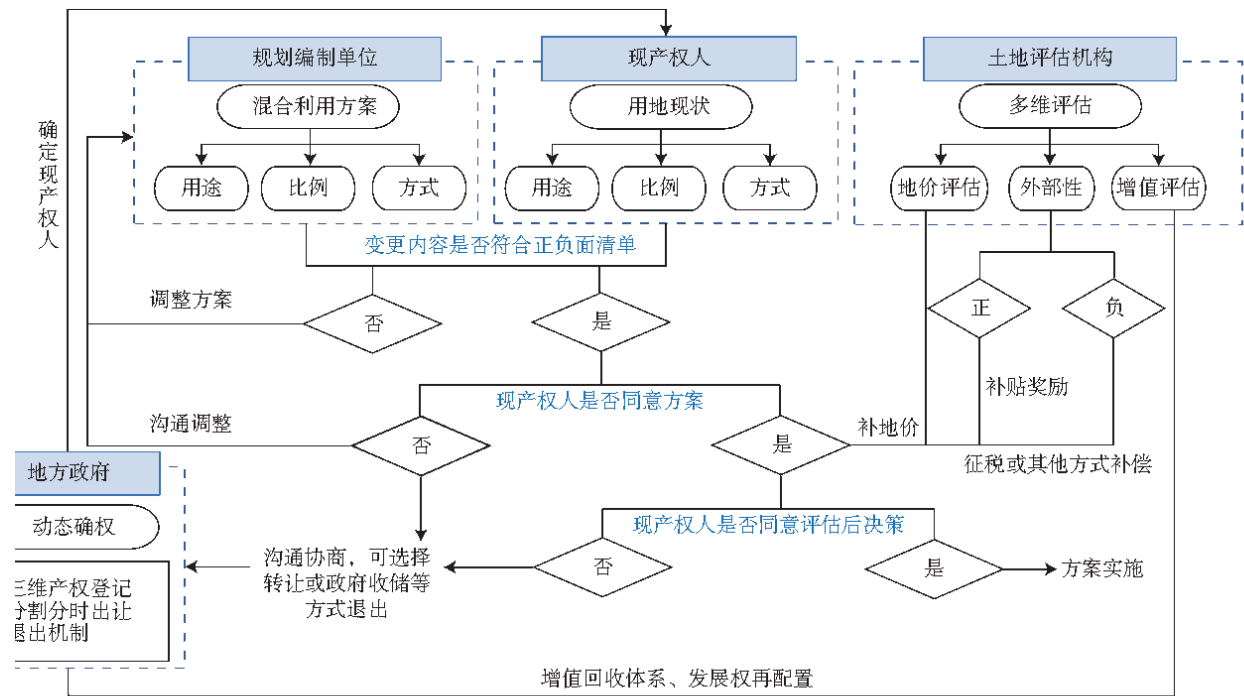


Fig. 3 Mixed land use conversion process in the stock renewal stage.

3.3 Governance Dimension: Multi-Actor Cooperation, Cross-Departmental Coordination, and Long-Term Supervision

An efficient coordination and supervision mechanism is the organizational guarantee that spatial planning and rights arrangements can be implemented. Its core objective is to achieve dynamic controllability and continuous optimization throughout the life cycle of mixed land use, ensuring efficient progress in flexible conversion and dynamic adjustment. Government should shift from planner and controller toward service provider, focus on cross-departmental coordination, develop clear rules and bottom-line standards, and strengthen pre-event, in-process, and post-event supervision. Market actors are the direct implementers of mixed land use and conversion. Because transaction costs are relatively low only when rules are predictable, governments should create a fair, transparent, and predictable business environment and use policy incentives such as reasonable floor-area ratio rewards and tax reduction to stimulate innovation by market actors. Society is also an important participant and direct beneficiary. Mechanisms involving community planners, participatory budgeting, public knowledge rights, participation, expression rights, and supervision rights should be improved, so that social consensus and dynamic monitoring can support the maximization of public value.

4 Governance Pathways for Mixed Land Use

4.1 Use Regulation and Flexible Control: Refining Rules for Spatial Adaptation and Conversion

The core logic of use regulation in stock renewal should move from strict prohibition toward encouraging positive items while maintaining safety bottom lines. Market vitality can be released through encouragement items and permission items. For example, Chengdu's Positive List for Multiple Mixed Land Use establishes a control rule of priority for dominant uses plus area-weighted ranking. It clarifies the primary and secondary relationship between dominant uses such as industry, commerce, and residence and their corresponding encouraged or permitted combinations, while also prohibiting combinations such as highly polluting industry with residence. This approach both guarantees the stability of dominant functions and accommodates flexible functional combinations. At the project-process level, mature conversion procedures should be simplified and institutional transaction costs reduced. Based on the governance logic of legality unless prohibited, mixed-use scenarios that have been verified by practice and whose risks are controllable can draw on the British permitted development-right system for localization and innovation [46-47].

4.2 Rights Coordination and Property-Rights Innovation: Establishing a Clear and Efficient Property-Rights Framework

Clear property rights are the primary condition for mixed land-use projects. The key is to upgrade cadastral management from two-dimensional plane management to three-dimensional spatial management. Traditional cadastral systems define surface ownership, but cannot respond adequately to rights division and registration demands for underground commerce, above-ground corridors, and other composite spaces. Guangzhou's Interim Measures for Mixed Industrial Land, implemented in 2025, innovatively proposes a classification and rights-confirmation approach combining mixed tenure with layered establishment. For above-ground, surface, and underground spaces whose land-right subjects are consistent, a unified mixed-tenure registration can be established. Where right holders or spatial scopes differ, separate establishment should be implemented to clarify the rights boundary and scope of each layer. This approach addresses the difficulty of confirming complex spatial rights. On this basis, architectural internal property-right division rules should be refined, allowing different functional units within the same building to establish independent property rights. For stock land with complex rights or historical legacy problems, a temporary property-right allocation model can be explored, in which conditional regional priority transfer is granted and development is resumed after conflicts are resolved.

4.3 Interest Balance and Value-Increment Sharing: Building an Externality Compensation and Value-Capture Mechanism

Mixed land use produces both positive and negative externalities. Governance should establish a value-capture and compensation mechanism that responds to these externalities. For positive externalities such as improved public space, increased walkability, higher innovation vitality, and enhanced public-service efficiency, part of the value increment can be recovered through land-price adjustment, development-right reallocation, or negotiated contribution. For negative externalities such as traffic pressure, environmental impact, noise, and congestion, compensatory measures should be required through planning conditions and regulatory agreements. The recovered funds should be used for regional public services, facility upgrading, and environmental improvement. This mechanism can transform mixed land use from a private development strategy into a public-value creation process.

4.4 Organizational Optimization and Long-Term Supervision: Strengthening Coordinated Implementation and Dynamic Governance

Mixed land use involves multiple departments and actors, so organizational optimization is necessary. A cross-departmental coordination mechanism should be established among planning, natural resources, housing and construction, ecological environment, emergency management, market regulation, finance, and taxation

departments. The review process should be streamlined by clarifying the responsibilities of each department and reducing repeated approvals. At the same time, long-term supervision should be strengthened. Project access, construction management, use change, operation, and later evaluation should be connected through a full-cycle management mechanism. Digital platforms and cadastral data can be used to monitor function changes, rights transactions, and externality impacts. Through the closed loop of monitoring, evaluation, and adjustment, mixed land use can maintain flexibility while keeping risks controllable.

5 Conclusions and Future Prospects

5.1 Main Conclusions

First, the connotation of mixed land use has evolved from physical superimposition to functional integration and then to systematic governance. In the stock-renewal stage, its core issue is flexible conversion and dynamic adjustment. Second, current practice faces dilemmas of use lock-in, ambiguous rights, interest imbalance, insufficient coordination, and weak supervision. Third, the space-rights-governance framework provides a systematic explanation of mixed land-use governance. The spatial dimension clarifies what to control, the rights dimension clarifies for whom and with what rights, and the governance dimension clarifies who coordinates and how to supervise. Fourth, implementation should proceed through use regulation and flexible control, rights coordination and property-rights innovation, benefit balancing and value sharing, and organizational optimization with long-term supervision.

5.2 Future Prospects

Future research should strengthen empirical assessment of the externalities of mixed land use, refine quantitative methods for evaluating mixed-use value, and explore institutional designs for three-dimensional property rights, value capture, and dynamic supervision. It is also necessary to compare local experiments in different cities and identify policy tools that can be scaled up. In the longer term, mixed land-use governance should become an important component of urban stock-renewal governance and support the transformation from land expansion to refined use of existing spatial resources.

Notes

(1) Shenzhen's increasingly diversified land-supply methods accurately meet the needs of high-quality industrial development: <https://mp.weixin.qq.com/s/D5m6qjWx2LOdOdO8vdYBig>.

(2) Guangzhou local standard DB 4401/T 318-2025, Technical Regulations for Three-Dimensional Cadastral Survey.

(3) Xiaonan: one of Hubei's first state-owned plus collective construction-land combined supply projects was successfully signed: https://news.hubeidaily.net/mobile/c_2797683.html.

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